

The Effects of a Mindfulness Based Intervention on Impulsivity, Symptoms of
Depression, Anxiety, Experiences and Quality of Life of Persons Suffering from
Substance Use Disorders and Traumatic Brain Injury

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Dedication

For my mom, the quintessential nurse; takk fyrir allt...

Abstract

Background: Studies have shown that of the 1.4 million Americans who experience a traumatic brain injury (TBI) each year, many have significant cognitive disabilities as a result of their injuries and up to half suffer from substance use disorders (SUDs). This often leads to significant issues such as increased rates of mental health problems and delay or lack of return to full employment.

Aims: The purpose of this pilot study was to examine the effectiveness and impact of an adapted MBSR program on different psychosocial dimensions of persons suffering from a dual diagnosis of SUDs and TBI.

Method: Anxiety, depression, quality of life, impulsivity and participants' and staff persons' experiences were explored using a mixed methods design to gain a comprehensive picture of the impact of the adapted eight week mindfulness intervention on the participants of the study. The qualitative evaluation focused on the impact that mindfulness meditation practice had on clients' and staff persons experiences using an adapted grounded theory approach. Descriptive and analytical statistics were used to examine outcomes of quantitative measures

Results: The general health perceptions scale of the SF-36 declined over the course of the study in a statistically significant manner. Changes in other measures were mostly in the predicted direction but were not statistically

significant. The qualitative interviews revealed numerous perceived benefits reported by participants gleaned from their involvement in the intervention. These included subjective reports of positive effects of the intervention on mood, impulsivity, anxiety and personal relationships.

Conclusions: The adapted mindfulness based intervention applied in this study is an inexpensive and safe method that appeared to fit the needs of the participants in this study well according to qualitative interviews. However, the exploratory nature of this study and the paucity of statistically significant results, indicates that future studies with a larger sample size are needed in this field.

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Chapter 1: Introduction

Significance

Studies have shown that persons living with both substance use disorders (SUDs) and traumatic brain injury (TBI) face greater obstacles in returning to normal functioning and maintaining their sobriety compared to persons suffering only from TBI (Parry-Jones, Vaughan, & Cox, 2006; Taylor, Kreutzer, Demm, & Meade, 2003). Many are never able to achieve the level of general functioning experienced prior to the TBI, due to their dual condition. Currently there is little evidence on the efficacy of any one optimal treatment approach for people with SUDs/TBI, let alone in the quality and quantity needed to impact policies and clinical decision making. There is however extensive evidence that this population does have a very specific set of needs compared to other patient populations (Carney & Schoenbrodt, 1994; Hux et al., 2010).

Persons that have suffered a TBI may have a decreased seizure threshold as a result of their injury (Asikainen, 1999). This threshold is further lowered with many of today's most widely used psychotropics, as well as many pain medications. This lowered seizure threshold is significant as seizures can have many serious long term and short term psychological and physiological effects, including death (Asikainen, 1999). Any non-pharmaceutical approach to reduce

the psychiatric symptoms of the SUDs/TBI population thus decreases the risks of this life threatening event.

The innovation component of using mindfulness as a part of the treatment plan of for people with SUDs/TBI is strong, as the application of a mind-body intervention like mindfulness has not been studied before and the gains that are possible from such an intervention could be extensive and have far reaching implications. In addition, the effect of a mindfulness based intervention (MBI) on impulsivity has never been studied directly. There is some indication in recent research literature that there is a negative correlation between impulsivity and mindfulness, supporting the assumption that with increased mindfulness, that MBSR has been shown to achieve, impulsivity is decreased (Brown, 2003; Lattimore, Fisher, & Malinowski, 2011a). Decreased impulsivity has significant and wide implications for those suffering from it. This includes less general psychiatric morbidity, improved substance use outcomes, and general improvement in decision making skills, affecting every area of a person's life in meaningful ways (Evenden, 1999; Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001).

Conceptual Framework

Proposed underlying mechanisms of MBI.

In this study, the intervention implemented was a mindfulness based stress reduction program (MBSR) adapted to the needs of people with TBI/SUDs. MBSR has been widely used; its main goal has been defined as “the progressive acquisition of mindful awareness, or mindfulness” (Grossman, Niemann, Schmidt, & Walach, 2004, p. 36). It has been suggested that humans have a capacity to increase moment to moment awareness of their everyday activities, thoughts, emotions and sensations greatly, compared to the relative unawareness of these that most humans have (Grossman et al., 2004). With practice and time such an ability can be developed, and through this, a more vital and full sense of life can be obtained as unmindful reactivity is replaced by mindful actions and reactions. This leads to a more accurate perception of reality that then leads to more appropriate reactions to stressors and events; it can increase the practitioner’s sense of control over his/her reactions to external and internal stimuli (Grossman et al., 2004). People who practice mindfulness are thus able to be released from the vicious cycle of action/reaction, and are able to place increased deliberation between stimuli and reaction increasing the likelihood of more thoughtful reactions and enjoy the beneficial consequences of those better thought out responses (Adele & Feldman, 2004; Grossman et al., 2004).

Mindfulness based interventions may affect prefrontal brain activity as measured by EEG. Meditators in this study were found to have a shift in left

sided anterior alpha activation which has been associated with positive emotions (Chiesa, 2010a). A thicker and more activated prefrontal cortex has been associated with MBI, which is associated with increased ability to regulate attentional processes (Chiesa, 2010a; Deshmukh, 2006). MBI have also been associated with increased activity and function in other areas of the brain controlling attention and awareness. Further studies indicate other structural and functional changes in meditators, using methods similar to those used in many mindfulness based interventions (Deshmukh, 2006). Positive effects on the ventro-medial and dorso-lateral pre-frontal cortex have also been documented with meditators practicing mindfulness based meditation (Lutz, Slagter, Dunne, & Davidson, 2008). Mindfulness has been related to various measures of well being and self regulation, including emotional well being and increased autonomous behavior regulation (Brown, 2003). Mindfulness has further been associated with the de-automization of cognitive processes, and thus an increase in self regulation (Lattimore, Fisher, & Malinowski, 2011b).

The relationship between MBSR and impulsivity.

There is clear indication in the literature about the efficacy of MBI on increasing quality of life, and reducing symptoms of anxiety and depression in diverse populations (Baer, 2003; Bishop, 2002; Grossman et al., 2004; Hofmann, 2010). However the same cannot be said about the efficacy of MBI in reducing symptoms of impulsivity, which warrants further discussion about the proposed

relationship between these two constructs. The exact effects of MBI on impulsivity are unknown. But it stands to reason, that if impulsivity is defined as acting without awareness, that an intervention designed to increase awareness, may reduce impulsivity. And that decreased activity and function in those regions of the brain dealing with awareness have been correlated with increased impulsivity. That increased awareness and methods that help to increase activity and function in those same areas of the brain, like MBI, should decrease impulsivity. There are indirect indications that suggest that MBI including MBSR could be useful in the treatment of impulsivity (Dixon et al., 2005; Lattimore, Fisher, & Malinowski, 2011a). Meditation has been shown to positively affect similar areas in the brain as have been adversely affected by those with increased impulsivity such as in the ventro-medial and dorso-lateral pre-frontal cortex of the brain. Further cognitively, the proposed mechanisms of mindfulness should affect impulsivity directly as mindfulness is meant to help the practitioner “park” his or her thoughts in the “parking space” between stimuli and reaction, and one of the main components of impulsivity is the inability to contemplate choices and carefully weigh and measure each option present in each situation.

The specific aims of this study are:

- Aim 1: Explore the effects of an adapted eight week mindfulness course on impulsivity levels of persons suffering from substance use disorders

and traumatic brain injury. The working hypothesis is that mindfulness training will lower the participants' levels of impulsivity.

- Aim 2: Explore the effects of mindfulness training on the quality of life of persons suffering from substance use disorders and traumatic brain injury. The working hypothesis is that the mindfulness training will increase the participants' quality of life.
- Aim 3: Explore the effects of mindfulness training on the anxiety, and depression symptoms of persons suffering from substance use disorders and traumatic brain injury. The working hypothesis is that the mindfulness training will decrease the participants' anxiety and depression symptoms.
- Aim 4: Explore the effects of the mindfulness training on the subjectively reported experiences of persons suffering from substance use disorders and traumatic brain injury. No working hypothesis is present for this aim due to the nature of the research method used to explore this aim.

Mindfulness is a low cost, safe and efficacious intervention for numerous disorders and appears an appropriate intervention for this population given their sensitivity to medications, their high incidence of depression and anxiety and the impulsivity that often accompanies TBI, which studies have shown can likely be reduced by mindfulness practice (Brown, 2003; Chiesa, 2010a; Hofmann, 2010; Lattimore, Fisher, & Malinowski, 2011a; McCown, Reibel, & Micozzi, 2010).

Chapter 2: Background and Significance

In this chapter, the feasibility of implementing an adapted MBSR program for persons suffering from TBI and SUDs are examined by reviewing the relevant published research. For the purposes of this paper, the term SUDs includes any substance use disorder including dependency to or abuse of various addictive substances. The most widespread of these are alcohol and various recreational drugs, such as cannabis, cocaine, assorted forms of stimulants and opiates. TBI is most commonly referred to as a brain injury resulting from accidents, assaults or abuse while injuries to the brain derived from infections, tumors, anoxic injuries and metabolic disorders resulting in altered brain function are often referred to as non traumatic brain injury (Savage, 1994). The nature of these injuries are often similar and the difference between the two is only related to how the injury was incurred, not its functional consequences.

TBI remains a devastating problem in our society. Studies have shown that of the 1.4 million Americans who experience TBI each year, many have significant cognitive disabilities as a result of their injuries and up to half suffer from SUDs (Bjork & Grant, 2009; Corrigan, Rust, & LambHart, 1995; Graham & Cardon, 2008). This often leads to various problems such as increased rates of mental health problems and delay or lack of return to full employment with all the cost and suffering this incurs for the individual, his or her family and the

community at large (Lovasik, Kerr, & Alexander, 2001).

It is extremely important to address substance abuse with the TBI population as the risks for the many adverse effects of SUDs are even greater than in the non-TBI population. In addition to the well known problems SUDs causes, examples of additional problems this may cause in the TBI population include the possible interactions with medications. This population often requires seizure and pain medications. SUDs increase seizure risk and cause impaired rehabilitation and diminished cognitive abilities (Cox et al., 2003). Numerous studies have indicated that alcohol is involved in about half of all head injuries and a substantive part of those brought into emergency departments with head injuries are legally intoxicated (Parry-Jones et al., 2006; Sparadeo, 1990). It has also been shown that individuals who are intoxicated at time of head injury are more agitated and have less functional ability at time of discharge from hospital compared to those with no blood alcohol at time of injury and that they have poorer recovery in relation to their verbal learning skills and memory (Sparadeo, 1990). Some studies have also indicated that substance use often increases with time after injury (Bogner, Corrigan, Spafford, & LambHart, 1997). The cognitive, behavioral physical and emotional deficits involved in TBI make recovery difficult from SUDs (Hensold, Guercio, Grubbs, Upton, & Faw, 2006). SUDs after a TBI have been clearly linked with lower life satisfaction, poorer neuro-behavioral outcomes and increased medical and vocational difficulties (Taylor et al., 2003).

Lower employment status and independent living status has also been demonstrated 10 years after TBI for patients with pre-TBI substance abuse histories (Parry-Jones et al., 2006). Persons with TBI are more sensitive to side effects from various medications, especially due to their lowered seizure threshold.

Interventions for Persons with SUDs-TBI

Blackerby and Baumgarten examined the impact of a 12 step based intervention specifically designed for persons with SUDs-TBI in a quasi experimental design (1990). The overall goal of the intervention was total abstinence from illicit drugs and alcohol, but it was based on the 12 step philosophy of Alcoholics Anonymous. Data were gathered on seven subjects; six males and one female. They collected dichotomous outcome data on family involvement, treatment recommendations and adherence to these, substance use and staff prognosis. Staff prognosis proved unreliable. Three patients were sober at follow up, three were not and one could not be tracked down. Attempts were made to draw conclusions on this very limited sample regarding correlations between the different dichotomous outcomes, which appeared quite bold given the extremely small sample size and lack of any description of the statistical methods the authors used to do this (Blackerby & Baumgarten, 1990). This is however one of the earliest attempts to assess the benefits of an

intervention specifically designed to improve psychosocial outcomes for this population.

Bogner et al. (1997) explored the effectiveness of the TBI Network model for treating substance abuse in a SUD/TBI population. The TBI Network is a case management program emphasizing facilitation of resources and service coordination specifically designed to meet the needs of the SUDs/TBI population. This was a retrospective study, using a convenience sample of consecutive patients treated by the TBI network for the first 2.5 years of service. Comprehensive assessments were conducted before treatment planning and 1 year after its initiation focusing on substance use and employability. About 75% of the subjects reduced, maintained or attained notable lengths of sobriety over the course of the intervention. The researchers also found that the sooner after the injury the patients participated in the program the more likely they appeared to be to stay sober. Increased productivity was also noticeable for the patients involved in the study post test compared to pre test (Bogner et al., 1997). Some salient flaws were that no comparison group was used by the researchers and the study was retrospective in nature making any causal inferences difficult. The researchers also used self report measures of substance use, with no collateral family feedback or drug testing.

Corrigan et al. looked into the effects of the TBI Network on the substance use (illicit drugs and alcohol) of the first 37 patients to go fully through the first 6

months of their program (1995). This was an evaluation of the same program as described above but it was unclear if all of the same patients were involved so it is included in this review. The research subjects consisted of the first 37 clients screened and assessed and followed for six months in the program.

Comprehensive assessments were conducted before treatment planning but substance use was the only variable included in the findings. For the first 37 patients participating fully in the intervention for six months the average frequency of alcohol use declined by 77% and quantity when using declined by 33% per occasion compared to pre-test data. Frequency of other drugs used decreased by 89% (Corrigan, 1995). Those remaining abstinent increased by nearly three-fold compared to pretesting. The main weaknesses of the study included the lack of control subjects and randomization. Post assessment, subjects and attrition from the program were poorly accounted for which will make replication and comparison to other studies challenging.

The fourth intervention to address the needs of persons with SUDs/TBI is the research of Cox et al. (2003) on the effects of Systematic Motivational Counseling (SMC) on post treatment functioning following traumatic brain injury. SMC is based on the principles of motivational interviewing and is focused on eliciting behavioral change by helping clients to explore and resolve ambivalence about harmful behaviors (Rubak, 2005). SMC was added on to treatment as usual (TAU). Baseline measurements were conducted with subjects in both SMC

and TAU groups. SMC group members received 12 individual counseling sessions over a few months followed by another assessment. About a year after baseline data were collected, both the groups were assessed again. Results were reported for 40 subjects in the SMC group and 54 in the TAU group (completers of all phases of study). The SMC group participants showed improvements compared to the participants in the TAU group on five of the twelve spheres of the Motivational Structure Questionnaire (MSQ). Negative affect of SMC participants was lowered compared to those in the TAU group between pre and post test, decreased number of substances used was also evident in the SMC group compared to the TAU group. SMC group members also had increased frequency of total abstinence (from illicit drugs and alcohol) during treatment compared to the TAU group members (Cox et al., 2003). This research appeared the most robust and best executed of those reviewed here. More recruitment information was needed though. The treatment groups were not at the same facility and this was not controlled for in the study design. Additionally, random assignment was not used, which could undermine the generalizability of the study.

The fifth and final study in this category was the work of Henshold et al. (2006) who studied the treatment outcomes of a sample of TBI patients in a personal intervention program substance abuse treatment approach. The researchers evaluated outcomes of 30 individuals treated over the first two years

of a substance abuse program who had concluded the program and been formally discharged. The results indicated that the level of supervision and support needed was decreased for the participants after the intervention. They were better able to participate in community programs and their awareness of risk of relapse also increased. Vocational status did not improve though (Hensold et al., 2006). Of all the studies under review in this category this was perhaps the one most riddled with methodological flaws. It was unclear how some of the dependent variables were measured and the study was very much lacking in description of measurement tools. No confidence intervals were given and no statistical methods were described. Furthermore no control or comparison group was used and there was no mention of substance abuse outcomes in the research report.

These five studies described here all used a quasi experimental design or program evaluation methods to determine the effectiveness of a specific program model. Only one study used some sort of comparison group but that was with patients in separate facilities. None of the studies were randomized and all lacked much in methodological rigor, including small sample sizes, and lack of description of vital issues such as of subjects and measurement tools. After reviewing the state of evidence of interventions specifically designed for the TBI/SUDs population it can only be said that there is not enough evidence to recommend any one approach over another for this population.

Overview of Mindfulness Literature

Mindfulness as it is currently known in the clinical research literature is a term popularized by Jon Kabat-Zinn in the nineteen-eighties, but its origins, are probably over 2500 years old (Micozzi, 2006). Reducing stress is merely intended as a by-product of this practice but nurturing the balance of the mind is its true aim, which allows practitioners to face life's calamities with clarity, stability, insight and serenity (Micozzi, 2006). Its main objective is the development of conscious attention on the present moment through various activities and exercises: mindfulness stresses a general attitude of acceptance, openness and curiosity (Hofmann, 2010; Shapiro, 2009). Mindfulness based interventions (MBI) can be seen as a subgroup of meditative practices that although indirectly related to certain Eastern religious traditions such as Buddhism, do not adhere to any one religious or philosophical tradition. MBI have been shown, in a recent review of the literature, to be helpful with various psychiatric and physical disorders, and in addition could provide an important preventative element to healthy populations (Chiesa, 2010a). This includes high blood pressure, alcoholism and depression (Chiesa, 2010a). A recent meta-analytic review examined the effects of mindfulness based therapy on anxiety and depression in 39 different studies (Hofmann, 2010). But both of these disorders are known co-morbidities of SUDs and TBI (Colby, 2009; Corrigan & Cole, 2008; Lovasik et al., 2001). The authors reveal substantial support for the

efficacy of mindfulness based therapies for the treatment of these conditions including pre-post effect size estimates in the moderate range for anxiety reduction (Hedges's $g=0.63$) and depression (Hedges's $g=0.59$). The application of MBI in these patients was statistically significantly associated with large effect sizes for improving depression and anxiety (Hofmann, 2010). In another review of mindfulness training as a clinical intervention, MBI were found to alleviate various mental health symptoms and that despite the often considerable homework requirements, patients proved fairly likely to stick with the intervention throughout the considerable follow up periods (Baer, 2003). The populations included in the review include people suffering from eating disorders, chronic pain, psoriasis, depression, fibromyalgia, anxiety, and cancer, as well as various healthy populations (Baer, 2003).

Clinically oriented groups have been developed based on the concept of mindfulness, to facilitate research and consistency of practice and implementation with different clinical populations (Chiesa, 2010a). Mindfulness based stress reduction (MBSR) is a good example of a clinically oriented mindfulness group and currently boasts the most impressive body of empirical evidence of any such groups (Chiesa, 2010a; Chiesa, 2010b; McCown et al., 2010). MBSR has shown considerable benefits for people dealing with, chronic pain, a well known co-morbidity of TBIs, as well as various other physical and psychological problems (Bowen et al., 2006; Miller, Fletcher, & Kabat-Zinn, 1995;

Perkins, 1999). It also has proved successful in treating various forms of mental illness, many of which are known and common co-morbidities of chemical dependency including depression, anxiety and insomnia (Baer, 2003; Follette & Vijay, 2009; Grossman et al., 2004; Hofmann, 2010; Winbush, Gross, & Kreitzer, 2007).

MBSR has minimal risks to participants; no adverse effects of MBSR have been reported so far in the literature (Chiesa, 2010a; Hofmann, 2010). Research shows surprising long term follow through of practice and positive effects, indicating participants might utilize the methods taught for a significant time to come with considerable ongoing benefits from their practice (Baer, 2003; Grossman et al., 2004).

Other well known and researched interventions such as Mindfulness Based Cognitive Therapy (MBCT), Dialectical Behavioral Therapy (DBT) and Acceptance and Commitment Therapy (ACT) have integrated mindfulness practice into their approach and the efficacy of these interventions serve as some indication into the efficacy and appropriateness of mindfulness based interventions for psychiatric populations (Shapiro, 2009). There is no suggestion in the literature that mindfulness based interventions are inappropriate for the SUDs/TBI population, on the contrary due to their efficacy in addressing various known co- morbidities of SUDs/TBI such as chronic pain, anxiety and depression, they appear a promising approach for this population.

Overview of the TBI-Mindfulness Literature

No published study exists on the efficacy of using mindfulness-based methods with the SUDs/TBI population and only one study exists where a mindfulness based intervention was used with the TBI population. This was Bedard et al.'s pilot evaluation of a mindfulness-based intervention to improve quality of life among individuals who sustained TBIs (2003). The researchers executed a pre-post design study with drop out as controls. Ten participants that completed the program were compared to three that dropped out, on various dimensions. Of the 39 patients referred to the study, 21 were interviewed, 19 included and 10 completed all pre and post measures. The exclusion criteria was quite strict as the authors excluded from the study all those who did not have sufficient insight in to their own conditions measured by the Patient Competency Rating Scale (PCSR), they also excluded all those with substance abuse histories, major mental illness or suicidal ideation, which effectively excludes a vast majority of the TBI population (Graham & Cardon, 2008; Jorge et al., 2005; Parry-Jones et al., 2006).

Of all the dependent variables explored in the study the researchers found the mental health summary score of the Short Form-36 scale (SF-36) improved from 37 to 52, which were the only statistically significant findings of the study. The Becks Depression Inventory-II (BDI-II) revealed improvements although not statistically significant. No changes in the physical health summary

of the SF-36 were found. The changes outlined above in the SF-36 mental health summary score were maintained in one year follow up and in addition, the energy levels of the participants continued to improve (Bedard et al., 2005). Regrettably, the sample size was low and dropout rates were high. The retention was better with the female participants. Of note, was that the data on intervention protocol were lacking, especially how it exactly differed from MBSR and was adapted to the need of these patients. No documentation of practice outside of group or at follow up was reported, either which would have been helpful to ascertain the impact of the intervention. The research design was quite rigorous and the effort the authors put into this never before studied field is also laudable.

Overview of SUDs-Mindfulness Literature

The literature on SUDs and MBI has been growing fast in the last decade. Zigerska and colleagues reviewed the literature in this field in 2009. They conducted a comprehensive review which included 25 eligible manuscripts extrapolated from 500 abstracts initially reviewed by the research team (Zgierska et al., 2009). Of the 25 eligible manuscripts seven were randomized controlled trials (RCT's), six were controlled non randomized trials, six were prospective case series, two were qualitative studies, one was a case report, two were unpublished manuscripts and one was a PhD dissertation. Various subpopulations of people suffering from SUDs were included in the studies

reviewed by the authors, but none of them included subjects suffering from SUDs/TBI. The authors' inclusion criteria were very broad and did include studies regardless of methodological quality, design or intervention protocol due to the limited work that has been done in this field (Zgierska et al., 2009). All the studies included were clearly mindfulness based, the results and designs presented in the English language and with more than just interim results to present. The authors divided the interventions used in the studies into five different categories of MBI: Vipassana meditation (three publications), MBSR (ten publications), Spiritual Self Schema Therapy (four publications), ACT (three publications), and DBT (two publications). All of these approaches share common traits of MBI such as intentional attention of emotions, nonjudgmental stance towards practice and focusing on sensations in the present moment (Zgierska et al., 2009).

The studies included were rated on numerous scales based on their clinical benefit, methodological quality, population severity, and cumulative evidence. Most of the studies, regardless of design or methodological rigor, sub population or MBI approach, did demonstrate positive outcomes of the respective MBI program on persons suffering from SUDs (Zgierska et al., 2009). Most often the interventions in question were compared to standard of care. The case studies showed positive results of MBI of persons suffering from SUDs related disorders in real life clinical settings, which renders an important insight into their efficacy. The review also revealed consistent patient satisfaction with the

MBI, something that cannot be underestimated, especially in the SUDs population, due to the often coerced (directly or indirectly) circumstances under which they attend the treatment for their disorder (Zgierska et al., 2009). Common methodological issues identified by the authors in the publications they reviewed were low sample sizes, inappropriate or flawed comparison- or control groups and lack of a specific treatment intervention protocol to assess impact of intervention (Zgierska et al., 2009). In this review various interventions that only include mindfulness as a part of their program, such as DBT and ACT, were included. The individual effects of mindfulness in those interventions are impossible to discern, somewhat undermining the impact of the review.

Zigerski et al.'s review included studies published up to March of 2008 so this author conducted a brief updated search in the field. The search revealed five studies published since March 2008 that might have some impact on this review and were not included in the review outlined above, as described in the methods section. Only quantitative studies into the efficacy of mindfulness based interventions were included in the updated review.

The first paper identified was Marcus et al.'s publication on the impact of MBSR in a therapeutic community (Marcus et al., 2009). The researchers compared MBSR adapted to the needs of the therapeutic community, and mindfulness based therapeutic community (MBTC) with treatment as usual in a residential facility for substance use disorders. The study included 259 patients in

the treatment group and 164 in a historical control group (Marcus et al., 2009). The researchers compared scores for the two groups on the Symptoms of Stress Inventory (SOSI), cortisol levels measured through saliva, and treatment retention. Both the treatment group and the control group demonstrated a reduction in stress over the time of the study. However the MBTC group showed significant improvements over the TAU group on two subscales of the SOSI: "muscle tension" and "emotional irritability" in the third month of treatment (Marcus et al., 2009). Salivary cortisol levels corresponded with these results. Greater baseline stress was associated with reduced retention in both research groups.

The quasi-experimental design of the study does limit the causal inference to be drawn from the study significantly, as randomization was absent. The lack of description of the intervention was also a salient flaw of the study (Marcus et al., 2009). The findings are encouraging though and indicate that a mindfulness-based intervention might be a feasible option in the long term treatment of persons suffering from SUDs. As a part of this same study, but described in a separate publication, the same core group of authors used linguistic analysis through written stories of stress to assess the effects of the intervention on self change (Liehr et al., 2010). Using linguistic analysis, no significant change was found over time between the two groups, which would either indicate lack of

difference in efficacy between the two interventions or lack of sensitivity of the outcome measurement to the effects of MBCT (Liehr et al., 2010).

A second relevant study published after Zigerskis' review is Garland et al.'s research on the impact of mindfulness on cognitive, affective and physiological mechanisms implicated in alcohol dependence (2010). The authors recruited 53 alcohol dependent individuals from a therapeutic community. The participants were randomized to a support group and a group using manualized mindfulness training intervention based on the principles of MBCT, referred to by the research team as mindfulness oriented recovery enhancement (MORE) (Garland et al., 2010). Various measurement tools to assess treatment credibility were included in the study, but treatment credibility refers to the extent the participants feel that the intervention they are participating in will be of use to them. The measures also included the Five Facet Mindfulness Questionnaire (FFMQ) to measure mindfulness, The Brief Symptom Inventory (BSI) to assess psychological factors related to alcohol dependence, the Penn Alcohol Craving Scale (PACS) to assess subjective alcohol craving frequency, and the Impaired Alcohol Response Inhibition Scale (IRISA) to measure the ability to "inhibit the urge to use alcohol" (Garland et al., 2010, p. 182). The Perceived Stress Scale was also used to assess stress and the White Bear Suppression Inventory was used to assess repression of thoughts and emotions and recovery from stress primed alcohol cues were measured through an electrocardiogram (ECG) and

structured rating scales. But this refers to the participants' reactions to various alcohol related cues provided by the researchers while measuring the participants' brain response to these stimuli in an ECG. Finally, alcohol attention bias was measured through a modified dot probe task but this measures attention given to certain alcohol related cues provided by the researchers. The Mindfulness intervention appeared to reduce stress and alcohol thought suppression significantly more than the intervention received by the control group (Garland et al., 2010). Treatment credibility and adherence were quite high with the research group and attrition rates were similar to the comparison group (Hoppes, 2006). However the mindfulness training did not increase significantly self reported mindfulness or reduce cravings. Both groups showed significant reductions in psychiatric symptoms, with no significant difference between the two groups. The mindfulness group showed augmented psycho-physiological recovery from alcohol cues compared to the control group (Garland et al., 2010). Limitations of the study include a small sample size, absence of random sampling, and the dependence on self report measures in many of the measurements of the study. The impact the intervention had on the stress reactivity of the patients is especially interesting as the study was conducted on chronic alcoholics which we can assume face many of the issues that make the SUDs treatment of persons suffering from SUDs/TBI so challenging.

Witkiewitz and Bowen implemented a mindfulness based relapse prevention program (MBRP) targeted to address cravings, depression and substance use in a chemically dependent population (2010). The researchers measured substance use with the Timeline Follow-Back, alcohol, and drug craving with the Penn alcohol craving scale (PACS) and depression with the Beck Depression Inventory-II (BDI-II). Of the 187 patients that met the inclusion criteria, 168 patients participated in the study. Patients were randomly assigned to two groups: TAU and MBRP. The TAU group participated in their standard outpatient care program, which integrated process-oriented groups, psycho education and work based on the 12 step model.

Subjects in the treatment group showed no association between depression and cravings while the TAU group had strong association, indicating that the treatment group was better able to differentiate their emotional state from their alcohol use. This indicates an increased ability to cope with negative emotions without reverting to drinking/using for the MBRP group (Witkiewitz & Bowen, 2010). Furthermore, those with increased depressive symptoms in the MBRP group were more resilient to substance use compared to their counterparts in the TAU group. Continued practice of mindfulness appeared to lower risk for relapse in the four month follow up. The study appeared well designed and executed; the intervention description was adequate as was the description of statistical analysis. Retention rates and drop outs were well

accounted for. The follow up period could have been longer than four months though, and handling of missing data was also a concern (Witkiewitz & Bowen, 2010).

Brewer et al. studied the impact of mindfulness training on stress reactivity in substance abuse (2009). This was a stage I pilot study where 36 patients in an outpatient facility were randomized to either cognitive behavioral therapy (CBT) or mindfulness training (MT). Nine patients of 21 concluded the MT and five out of 15 concluded the CBT. Patients were given the Structural Clinical Interview for DSM-IV to clarify psychiatric diagnostic picture (Brewer et al., 2009). The Substance Use Calendar was used to assess alcohol and drug use, the Five Facet Mindfulness Questionnaire (FFMQ) to assess mindfulness, the Treatment Credibility Score (TCS) to assess credibility of the intervention and the Differential Emotion Scale to assess "patterns of emotions after stress provocation" (Brewer et al., 2009, p. 309). The investigators found no significant difference between CBT and MT members regarding substance use, treatment satisfaction, or retention. Subjects in the MT group did however differ from those in the CBT group by demonstrating reduced psychological and physiological responses to stress provocation. These results are similar to those described by Witkiewitz and Bowen above (2010). It is notable that the outcomes of the MT intervention positively compare to those of the CBT intervention on all measurements, CBT being the standard of care in many SUDs treatment

facilities, especially in the UK (Dakwar & Levin, 2009). But the extreme small sample size (N=14) and high drop-out rates in the study are salient flaws that cannot be overlooked, as was the relatively short follow up period. The researchers' effort to randomize must be positively noted. Again the results hold special relevance to the SUD/TBI population indicating that mindfulness can be helpful to people with SUDs to reduce their reactivity to stress and thus perhaps stem their impulsivity (Allen, Goldstein, Caponigro, & Donohue, 2009; Corrigan & Cole, 2008).

Finally, a review of the benefits of meditation on SUDs was published in 2009 by Dakwar and Levin. While it did not focus solely on mindfulness based meditation, the results do include a review of this topic. The authors concluded that meditation is a promising intervention for those suffering from SUDs and related disorders. They further state that MBI is the group of meditation interventions with the most compelling evidence base in the treatment of SUDs, but lack of RCT's is a salient limitation to the field, although movements in positive direction have been noted in recent years (Dakwar & Levin, 2009).

Studies using mindfulness for sufferers of SUDs have revealed some positive effects of mindfulness meditation on substance use outcomes such as length of abstinence and alcohol related cue reactivity. But many of the studies examining the effects of mindfulness on substance use suffer from considerable

methodological shortcomings and much work remains to be done in this area of research still.

Special Needs of the TBI Population

The special educational needs of persons with TBI are of utmost importance in the context of this research study. Much work went into adapting the MBSR program to fit the needs of the TBI population and it is important to give the reader insight into the evidence base of the adaptation process by reviewing the major considerations when designing educational material for the SUDs/TBI population. It is very hard to be specific when reviewing the learning needs of those who have suffered from TBIs because of the extreme variability in nature and type of injury and impairment involved. In designing a mindfulness program for this population a broad review of the special considerations they require is needed, especially when it comes to didactic content and time, and nature of instructions. People with TBI commonly experience increased impulsivity, memory impairments, attention deficits, behavioral problems and decreased tracing ability, all requiring special accommodations to optimize the learning experience of those afflicted. (Maclennan & Maclennan, 2008; Parry-Jones et al., 2006).

The majority of the literature that focuses on the special educational needs of persons with TBI does so with a focus on the special educational needs of

children and/or young adults. Numerous deficits that often come as a result of a TBI strongly effects a person's ability to participate in educational experiences designed with the needs of persons without TBI in mind. Note taking and listening at the same time becomes harder for many people with TBI, and their limited concentration span affects their ability to utilize traditional educational resources (Briel, McManus, & Getzel, 2007).

It was not until in the nineteen nineties that any real attention was given to the special educational needs of children and adolescent suffering from a TBI (D'Amato & Rothlisberg, 1996). And as previously stated various factors determine the impact of the TBI on a person's educational needs, including nature and location of injury. Younger age, and longer duration of coma and post traumatic amnesia are factors that have been associated with negative long term cognitive outcomes (Hynd and Willis as cited in D'Amato & Rothlisberg, 1996). The variability of the consequences of TBIs suggests that an individualized educational approach is especially important for this population, no matter their age, because the injuries can range from severe, where the impact of functioning is both traumatic and irreversible, to mild where there is no discernible change in function (Kennedy et al., 2008). But despite this variability in nature and consequences of TBIs, some common traits can be identified, including but not limited to, difficulty in group functioning, attention difficulties, depth perception difficulties, decreased organizational qualities, reduced frustration tolerance,

verbal expression problems, personal inconsistencies and reduced stamina and endurance (D'Amato & Rothlisberg, 1996). It is obvious that all of these effects could impact a person's ability to attend and perform the traditional MBSR intervention. Functional assessments of this population are especially challenging and it is important that they are holistic, comprehensive and sensitive to the dynamic and temporal factors involved in the development of persons suffering from TBI's (D'Amato & Rothlisberg, 1996). Among the areas that should be included in a functional assessment according to one study are: perception, motor functions, IQ and cognitive abilities, academic achievement, styles of processing, personality and behavior, and educational and classroom environment (D'Amato & Rothlisberg, 1996).

Different teaching methods have been used to enhance the learning process of children with TBI most of which should also be applicable in many ways to the adult TBI population. Some increased tolerance should be for outbursts, behavioral problems and inappropriate behavior. Homework will be very challenging for this population so it should be kept organized and to a minimum. Stability in the classroom environment is also important, i.e. not moving tables and chairs from one week to the next, and using the same classroom throughout the course (Maclennan & Maclennan, 2008).

Environmental distractions should be kept at a minimum and it is also important that the instructor is well versed in and familiar with the special needs of this

population. Clear expectations for behavior might be especially important as many persons with TBI have problems picking up environmental cues. Reduced stamina is a key factor also for this population so reduced assignment load and a simple class structure is very important (D'Amato & Rothlisberg, 1996). Tasks should be broken into smaller units to facilitate understanding. Providing educational content through various methods can help the person with TBI go around some of their deficits depending on location of injury, i.e. emphasizing visual cues or graphics for a person who has an injury that affects the brain structure that processes verbal instructions. (D'Amato & Rothlisberg, 1996).

Sohleberg, Ehlhardt and Kennedy performed an extensive review of the literature on instructional techniques in cognitive rehabilitation (2005). They describe a method from the field of special education that might be relevant when reviewing the special education needs of persons with TBI and that their review revealed as effective for this group. This is direct instruction (DI), which is based on systematic and explicit directions and has been shown effective to teach various subjects, from mathematics to social skills, to various special educational populations, including those with TBI (Sohlberg et al., 2005). This technique involves different approaches, but can be individually adapted to the needs of each student. This approach is sometimes divided into four phases: a) introduction and review, drawing attention to the subject matter based on students previous learning b), developing understanding, i.e. by using concrete

examples, questions and demonstration of skill, c) guided practice, helping the students attempt and perform the desired task under the teacher care and supervision and d) independent practice, where the student performs the task himself, first under the watchful eye of the teacher and then alone, i.e. as homework (Eggen & Kauchak, 2007).

Another evidence based educational approach that has proved beneficial for persons with cognitive deficits, including those suffering from TBI, is Errorless Learning (EL). But EL is achieved by breaking tasks into small attainable steps, modeling the task before the student executes it, stressing to student to avoid guessing in performing the task, correcting any errors right away and slowly phasing out necessary prompts (D'Amato & Rothlisberg, 1996; Eggen & Kauchak, 2007; Sohlberg et al., 2005). This method has been shown to be helpful in individuals with memory problems, although not initially designed for populations with such deficits. This method along with direct instruction have been shown to complement each other well and can be used apart or together; their basic principles are alike and their efficacy with the TBI population gives excellent insight in to how the adapted MBSR curriculum should be designed and what teaching style best fits this population (Hux et al., 2010; Sohlberg et al., 2005).

Some work has been done in evaluating the special needs of college students following a TBI. A survey conducted by Kennedy, Krause and Turkstra

among college students with TBI showed that a majority of respondents had received severe TBI as opposed to mild or moderate. They did report several deficits affecting their school performance including memory problems and academic difficulty including but not limited to, organizational problems, anger, fatigue and headaches (Kenndy, Krause, & Turkstra, 2008). They also had a feeling that others did not understand their problems, which indicates how important verbalizing understanding of the learning difficulties might be and that the attempts to accommodate this are discussed openly.

There are indications that despite clear adversities, including serious impairment in memory, and verbal skills, persons suffering from TBI, even severe TBI, can pursue higher education (Kenndy et al., 2008; MacLennan & MacLennan, 2008). This should give hope that the MBSR curriculum is not out of range for this population. There is also unambiguous confirmation in the literature that this population has special learning needs, which have been reviewed in some detailed in these previous pages.

These findings support the need for adapting the MBSR curriculum for the persons with SUDs/TBI, namely the shortening and clarification of homework, shortening of educational sessions and simplification and further structuring of didactic material. The teaching methods and approach of the instructor are also important and should include modeling and in class exercises. This fits well with the MBSR model which already integrates many of the principles needed to

address the special needs of the SUDs/TBI population, including opportunities to practice expected homework in class, (Grossman et al., 2004; Kabat-Zinn, 1990; Kabat-Zinn, 1994; Winbush et al., 2007).

Other Relevant Literature Related to the SUDs/TBI Population

Singh et al. studied the effects of a mindfulness based intervention on levels of aggression on six adult offenders with mild cognitive deficits (2008). Baseline measures over 3-7 months depending on participant were taken and compared to the same measures over 27 months of mindfulness practice and levels of aggression measured. The measures included number of aggressive behaviors, medication use, physical restraints used and staff and peer injuries. A cost benefit analysis on the intervention was also executed. The participants were able to perform the intervention without difficulties, but it consisted of focusing their attention on the soles of their feet for a few minutes a few times a day during the time of the study. Despite their disabilities the results showed a dramatic decrease on all measured variable of aggression, and further more no physical aggression was reported for any of the subjects for the entire last six months of the study. The authors estimated the financial benefits of the mindfulness intervention to be just under \$50,000 due to reduced injuries and less sick days taken by staff due to patient aggressive behavior and less need for direct care. The long-term follow-up in this study was quite impressive, but a lack

of a control group and the very small number of subjects make it hard to establish a plausible causal relationship between the intervention and decreased levels of aggression (Singh et al., 2008). Also, a detailed description of the intervention was missing (i.e. how long the homework exercises lasted).

Another study was performed by McHugh, Simpson and Reed who explored *Mindfulness as a potential intervention for stimulus over selectivity in older adults* (McHugh, Simpson, & Reed, 2010). This study is pertinent to the topic of this paper due to its focus on *over selectivity*, but it “describes a situation when only a limited set of available stimuli come to control behavior” (McHugh et al., 2010, p. 178). Over selectivity has been correlated with poor decision making, and has been demonstrated to be problematic in numerous populations including those suffering from TBI’s (McHugh et al., 2010; Wayland & Taplin, 1985). The researchers randomly assigned 24 adults from ages 70-90 years old to two groups; a focused task group (mindfulness intervention) and an unfocused task group (control group). They used numerous tools to measure patient outcomes. The focused task intervention consisted of a 10 minute mindfulness breathing exercise. The intervention reduced levels of stimulus over-selectivity for the treatment group compared to the control group. Study limitations included lack of reporting on all outcome measures and lack of intervention description. The randomized design was a salient strength though.

The final piece of pertinent literature reviewed here is about the use of mindfulness based interventions in attention deficit and hyperactivity disorder (ADHD). Persons with ADHD share some of the cognitive deficits as persons suffering from TBI's, including in language processing, inhibition, working memory, and attention (Zylowska, Smalley, & Schwartz, 2009). A recent study found that adults with ADHD have significantly lower mindfulness scores as measured by the Kentucky Inventory of Mindfulness Skills (KIMS) compared to a compatible non ADHD population (Smalley et al., 2009). These results indicate that perhaps there is need to cultivate mindfulness skills for persons with ADHD. Little work has been done with mindfulness based interventions in the ADHD population, but the limited results existing so far are promising, albeit in dire need of repetition and improved research designs (Singh et al., 2010; Smalley et al., 2009; Zylowska et al., 2008; Zylowska et al., 2009).

A recent feasibility study demonstrated high patient satisfaction with an eight week mindfulness training program and high training adherence rates, along with no reports of adverse effects, which all are positive indicators for the application of a mindfulness based intervention for the SUDs/TBI population (Zylowska et al., 2008). Eight of the subjects were teenagers and 24 were adults. All of the subjects reported decreased ADHD symptoms and the adults reported reduced anxiety and depressive symptoms. Regrettably, the sample size was small, and the sample heterogeneous, also five out of the 32 subjects were

diagnosed as *possibly* ADHD. Despite these limitations, the results indicate that MBI might be an appropriate intervention for the ADHD population (Hux et al., 2010; Kenndy et al., 2008).

These studies, demonstrate the feasibility of mindfulness based interventions for the TBI population, reviewing the evidence on these populations which have many similarities to the TBI population, including known co morbidities and cognitive deficits. But as before there is paucity of studies in the fields reviewed and methodological flaws plague the few that have been conducted.

Discussion of Background and Significance

The literature review provided some clear indications as to the next logical steps needed for the application of mindfulness based interventions with the SUDs/TBI population. The SUDs/TBI category proved inconclusive, there was a lack of literature in the field and the studies reported were often of poor methodological quality with low sample sizes and designs that gave little clues regarding causal relationships between interventions and outcomes. One study was quite rigorous though, indicating that a well known intervention in the substance abuse treatment field could also prove efficacious with the SUDs/TBI population, Systematic Motivational Counseling. Still there is little that can be said about which methods work best for the SUDs/TBI population at this point.

The mindfulness literature is much more compelling and the success that mindfulness based interventions have had with various co-morbidities of both SUDs and TBI, such as insomnia, anxiety, depression and chronic pain is promising, although lack of randomized trials is problematic. There was only one study which examined the effects of a mindfulness based intervention on people with TBI, but few research subjects and the exclusion of persons with diminished insight and SUDs also limited its usefulness as regards to the purpose of this paper. The lack of adverse effects of the intervention on the subjects and positive outcomes indicate that more research is warranted in this field though.

A recent review of the SUD/mindfulness literature showed that mindfulness based interventions demonstrate promise in the field. Even more recent research has indicated positive outcomes, although somewhat questionable due to methodological problems. There is indication that mindfulness can help with cravings and impulsivity, which could prove a great asset for the SUDs/TBI population, as well as decrease emotional reactivity.

It remains clear that the TBI population has special educational needs and an adaption of the MBSR program would be in order. But given adaptations to time spent in group and shortening of homework, the content should not have to be changed much especially if the instructor is mindful of certain pedagogical principles while instructing this population, such as those of DI and Errorless Learning. Finally there is some limited evidence that mindfulness based training

might be an effective intervention to decrease aggression in cognitively impaired offenders, improve decision making process for elderly populations and aid persons with ADHD with attention and emotional regulation. All of these populations share important traits with the SUDs/TBI populations, including known co morbidities, high levels of vulnerability and nature of cognitive deficits.

The literature appears especially lacking when it comes to studies on specialized SUDs/TBI interventions and mindfulness for persons with cognitive disabilities. More rigorous research is needed, especially using designs that would include randomization in to control and treatment groups and a sufficient number of participants. Currently there is little direct evidence to construct an optimal treatment approach for the SUDs/TBI population, let alone in the quality and quantity needed to greatly impact policies and clinical decision making. Nor is there evidence on the efficacy of mindfulness for persons with SUDs/TBI. There is however a fast growing literature accumulating evidence on the efficacy of mindfulness for persons with SUDs, and the special educational needs of those suffering from TBI. The assumption of feasibility for an adapted MBSR program for persons suffering from SUDs/TBI is thus mainly based on data from other populations, such as the SUDs/ mindfulness literature and related populations.

Presently, there is reason to believe that mindfulness based interventions could be beneficial for the SUDs/TBI population but given the lack of rigorous outcome studies thus far, a well designed pilot study is a fundamental next step.

Summary of Background

Using mindfulness based interventions to improve functional and emotional outcomes in the SUDs/TBI population might prove to be a cost-effective, low risk method of addressing the devastating symptoms these persons face daily. The potential for a relatively low intensity, cost efficient, non pharmaceutical method to address this very significant issue in a highly innovative approach represents an opportunity that should not be overlooked. The literature suggests that mindfulness might be helpful for those suffering from SUDs. There is also a study that suggests that a mindfulness based program might be appropriate for persons suffering from TBI. It seems a rational goal to adapt the MBSR program to the needs of this population without dramatic changes to content, if the instructor is aware of the most appropriate teaching style for individuals with cognitive disabilities and the curriculum is adapted to the needs of this population when it comes to class length and levels of complexity.

In summary, there is evidence to suggest that implementing a mindfulness based intervention for persons suffering from SUDs/TBI warrants further investigation. There is, however, insufficient evidence at this time to suggest a

large scale application of mindfulness for this population. Implementing a pilot study with this population to ascertain the safety and applicability of mindfulness adapted to the special needs of the SUDs/TBI appears a rational next step. The dependent variables employed should be measured using measurement tools that have been validated for use in both the SUDs and TBI populations and have been used frequently in related research for ease of comparison. These would include commonly used scales measuring popular dependent variables such as quality of life, anxiety and depression. As can be seen from the review of the literature it is high time to include an impulsivity measure in a clinical mindfulness study as the use of a mindfulness intervention to stem impulsivity symptoms appears to have strong theoretical and face value. In addition it stands to reason to use qualitative methods as well in any pilot study such as this one, due to the lack of previous studies of the effects of mindfulness.

Chapter 3: Research Design and Methods

Research Strategy

Design.

This proposal describes a quasi-experimental feasibility study with a mixed methods time series design and descriptive qualitative interviews that examines the effectiveness and impact of an adapted MBSR program on different psychosocial dimensions of persons suffering from a dual illness of SUDs and TBI.

Participants and setting.

A total subject pool of 22 persons was available for recruitment to the study. The recruiting of the participants was based on convenience. The participants were recruited through Vinland National Centers' (Vinland's) two residential facilities through direct staff contact. Vinland is a nonprofit organization based in Loretto, MN that specializes in the treatment of persons suffering from SUDs/TBI and is thus a uniquely situated setting to examine the distinctive needs of the SUDs/TBI population. Vinland Center includes an inpatient treatment center that can treat up to 45 clients of both genders at a time, and two supportive residential housing facilities with a combined number of 22 residents at a different location, offering long term support for persons with

SUDs/TBI. It is at these residential facilities where this study was conducted. The treatment center itself proved an inappropriate research setting for the purposes of this study since clients stay there only four-five weeks, which is too short of a time in which to implement the mindfulness intervention. Additionally the confounding variables present in this setting are legion. An introduction meeting was held prior to the start of the study where the primary investigator, Vinland staff and an experienced MBSR instructor introduced the intervention and the study.

Inclusion criteria.

Eligible for this study were residents in Vinland's two residential supportive facilities with a diagnosis of both SUDs and TBI verified through Vinland staff. The residents needed to be willing to participate in the study, be at least 18 years old, English speaking, reachable by phone and willing to complete the necessary forms, interviews and consents. Participants were legally competent as verified through Vinland staff report. One requirement to stay at the residential facilities is sobriety from drugs and alcohol, so this automatically became part of the inclusion criteria of this study.

Exclusion criteria.

Participants who were acutely psychotic, suicidal or actively practicing mindfulness meditation were excluded from the study.

Measures.

The measures included in this study were chosen due to their prior use in literature related to the topic of this study as well as having been validated with the SUDs and/or TBI populations. It was deemed imperative not to have the questionnaire overly lengthy as this might create adherence problems with this population due to the nature of their disabilities that include high levels of impulsivity, and a lowered frustration threshold (Taylor et al., 2003).

Unfortunately a copy of the questionnaire used in this study could not be included in this paper due to copyright issues.

Anxiety and depression remain the two most widely used psychosocial research outcomes in the mental health research literature and as mental health issues remain the focus of this researcher it stands to reason to include these measures in the study questionnaire. Accessibility also played a part in selection of measurement tools as the measurement tools chosen could be accessed for a minimal or no fee, and the budget for this study was limited.

The impulsivity measure was chosen due to its high level of innovation and the extent to which impulsivity adversely affects the well being of the SUDs/TBI population. In Table 1 the measurement tools used and the point of times when they were used are illustrated.

Quality of life measures are widely used in both the TBI and Suds literature and offer a broad way of viewing health and well being that fit well with the exploratory nature of this study.

General demographic information.

These included, age, gender, marital status, employment status (full time equal to or greater than 40 paid hours a week; part time equal to or greater than 40 paid hours a week; no employment equal to 0 hours a week of paid employment), years of education, and self reported length of sobriety.

Impulsivity.

Impulsivity was assessed through the Barratt Impulsivity Scale (BIS) which is a 30-item self report measure that tests impulsivity in three dimensions; motor, which is acting without thought, cognitive, which is making decisions quickly, and non planning which refers to present orientation (Patton, 1995). The BIS total scores are averages of each item of the entire questionnaire which means the score for each question ranges from 1-4 and the score for each subscale and the total score also range from 1-4 with 4 representing the most severe impulsivity and 1 representing the least amount of impulsivity.

There are different ways to assess impulsivity, some of which require a laboratory setting. The BIS remains one of the most simple and inexpensive ways to measure impulsivity levels available to researchers, and fits the limited financial resources of this study well. The BIS has been used repeatedly with the

TBI population and has been shown to have good internal consistency and test-re-test reliability in related populations (Cronbach's $\alpha = 0.79 - 0.83$) (Greve et al., 2002; McHugh, 2008).

Quality of life.

The Medical Outcomes Survey 36-item Short Form Health Questionnaire (SF-36) was used to measure functional health measures in this study. It measures health related quality of life in eight domains, including physical function, role physical, bodily pain, general health, vitality, social function, role-emotional, and mental health (Guilfoyle et al., 2010). Two summary measures can be further assessed describing mental and physical health that give important insight given the high validity of its domain scores (Cronbach's $\alpha > 0.82$ for all domains) (Guilfoyle et al., 2010).

The SF-36 has been used repeatedly in TBI research as well in numerous MBI studies (Berger, 1999; Dijkers, 2004; Jacobsson, Westerberg, & Lexell, 2010). Documentation of its reliability and validity in measuring the quality of life of various populations including the TBI population is prolific in the research literature (Berger, 1999; Dijkers, 2004; Guilfoyle et al., 2010). It is an appropriate tool to use in this study due to its wide spread use and familiarity. The implications of mindfulness practice can be quite broad and affect both physical and psychosocial outcomes of practitioners, as discussed previously. This makes the use of a broad measurement tool such as the SF-36 especially attractive, and

allows for the possibility to capture a full picture of the impact of the mindfulness intervention with relatively few items.

Anxiety.

Anxiety was measured using the State Trait Anxiety Inventory (STAI). The STAI is a two section self-report questionnaire with two four point Likert-type scale items, each containing 20 questions. The first one measures state anxiety, and the second trait anxiety; the higher the score, the greater the anxiety. It is specifically designed to differentiate symptoms of depression from symptoms of anxiety (Spielberger, 1983). State anxiety focuses on capturing more transient feelings of anxiety over times, while trait anxiety refers to more stable and consistent levels of anxiety. Minimum score on each subscale of the STAI is 20 and maximum score is 80.

The STAI has been used repeatedly in the TBI population, and has been demonstrated to have excellent correlation with other measures of anxiety, or .73 with the anxiety scale questionnaire and .83 with the manifest anxiety scale, as well as having good internal consistency in various populations (Cronbach's alpha 0.83- 0.92) (Curran, 2000; Peterson Robert, 1987; Russell, 1980). The STAI is a short but effective tool, and its distinction between two forms of anxiety can be enlightening, especially when examining an intervention which has an impressive track record positively affecting levels of anxiety, like mindfulness does (Hofmann, 2010).

Depression.

The Center for Epidemiological Studies Depression Scale (CES-D) was used to assess depressive symptoms. The CES-D is a 20-item self report questionnaire which rates symptoms of on a 4-point Likert-type scale with total scores ranging from 0-60; larger scores indicate greater depressive symptoms (McCauley, 2006). A score over 16 represents a positive screen for clinical depression. The CES-D can be retrieved and used for no fee and is short and fairly simple to fill out. It has been used repeatedly in TBI and SUDs research (Bombardier et al., 2010; Fann, Hart, & Schomer, 2009; Thombs, 2010). The CES-D factor structure has been examined specifically in the TBI population and proved compatible to factor solutions in general population samples, and internal consistence was high (Cronbachs alpha = 0.93) (McCauley, 2006).

Participants' experiences.

The experiences of the participants of attending the mindfulness intervention were explored through qualitative interviews. This fit well with the main purpose of the study and complements the quantitative measures of the study nicely (Ray, 1994; Wojnar, 2007). A naturalistic approach guides the qualitative inquiry. This approach appeared to be a good fit for the present study, where participants were interviewed in their current place of residence, which they were likely to perceive as a safe and comfortable place, with open ended questions (Patton, 2002). Naturalistic inquiry focuses on a "...dynamic process

orientation that documents actual operations and impacts of a process, program or intervention over a period of time” (Patton, 2002, p. 42).

One hour long interviews were conducted with each subject focusing on his/her experience of the mindfulness intervention and the impact mindfulness had on his/her experiences. The guiding questions for the follow up interviews for the participants were: “How did you like the mindfulness intervention?” “What changes if any have you experienced as a result of participating in the mindfulness intervention?” (negative/positive changes, sleep, mood); and “what can you tell me about how participating in the mindfulness program has affected your life so far, if at all?” Only probes were used in addition to these three main questions.

A semi-structured interview guide was used to interview the one staff person that oversaw both facilities: The guiding questions in this interview were: “what impact do you think the mindfulness intervention has had on the participants of the study?” and “what changes, if any, have you noticed in the participants since the start of the program?” (e.g., on mood, sleep, levels of irritability, in-house conflict), along with numerous probing questions that can be found in Appendix A. The interviews were audio taped and later transcribed; notes were also taken by the researcher during and immediately after the interviews that further broadened the data gathered.

Practice Logs.

A time tracking form was completed daily by the participants, and turned in at the end to the study to the researcher. The form can be found in Appendix B. This was limited to a recording of time spent on mindfulness homework and the nature of the homework. Other information was not asked for so as not to create undue burden for the participants. This was to track mindfulness activity of the participants and to better understand the level of practice that could be expected from this population.

Weekly phone calls.

A weekly telephone interview was included in the intervention for the duration of the intervention. These were intended for adherence purposes and for qualitative data gathering purposes, as the researcher attempted to take notes during each interview. They were meant to be 5-10 minutes in duration. The participants were contacted weekly and asked the following questions: “How do you feel the mindfulness program is going for you?” “Do you have any questions regarding the program?” “Do you have any questions regarding the research part of the program.” “I want to remind you that you can drop out of the research part of the program (homework expectation, questionnaires and interviews) at any time but still continue participating in the program”...“Do you have any final questions or concerns?”

Procedures

Changes within the participants of the group were assessed at three points in time; at the beginning of the intervention (T1), post-intervention (T2) and 16 weeks from start of intervention (eight weeks post intervention) (T3). Phone calls were placed to the participants each week during the intervention as described above. These were seen as part of the intervention, but the researcher also took notes during these conversations which provided qualitative data on adherence issues, and the appropriateness of the intervention for this population. Depression, anxiety, impulsivity and quality of life were measured at each time point. Intervention started at 0 weeks and ended at eight weeks. Qualitative interviews were conducted at week 16 after the final quantitative measurements had been taken.

Table 1

Measures Used in Study

Measurement tool	Phenomenon under investigation	Measurement points
BIS	Impulsivity	T1, T2, T3
SF-36	Quality of life	T1, T2, T3
STAI	State and trait anxiety	T1, T2, T3
CES-D	Depression	T1, T2, T3
Qualitative interviews	Participants experiences	T3
Phone calls	Adherence and participants experiences	Weekly during time of intervention
Practice logs	Frequency and nature of homework practice	Continuous during intervention. Due at T2.

Data Analysis

Quantitative measures.

Results of quantitative data were analyzed using descriptive measures, including examining means and standard deviations of the scores of the dependent variables. These were performed in SAS v.19.2., while graphs were created using Office Excel 2007. The change over time was assessed using mixed models with an autoregressive covariance structure, using SAS v.19.2. Covariance structure analysis (CSA) is also known as structural equation modeling (Singer, 2003). CSA was originally developed to examine cross sectional data but in time it has been adjusted to measure change over time as well. By using autoregressive covariance structure there is the assumption that the correlation between the dependent variables (i.e. depression/anxiety /impulsivity/quality of life) and independent variable (mindfulness intervention) weakens over time (Singer, 2003).

In a mixed models approach, also known as multi level model or random effects modeling, the observations are not independent, a random variable may also be introduced---suspecting that there is an effect due to person. The small sample size did not allow adding another parameter for random effect. The p-value estimates how likely it is the predicted change in means over time is achieved by chance. In this study the probability of this happening was to be less than 5% (or $p < 0.05$.)

A linear model was used assuming a unidirectional trend in the dependent variable over time. That is, the model assumed that the changes in symptoms (scores on the dependent variables) would be in one direction over all three measurement points; either increase or decrease over time. One of the strengths of this method is that with so many measuring points the amount of missing data would have to be quite extensive to have noteworthy effects and that parameter estimates utilize all available data, even if some time points are missing (Singer, 2003). But in reviewing the literature it was predictable that missing data might be an issue with this population (Bedard, 2003).

Regrettably due to the small number of participants in the study and regardless of the statistical analysis approach used the effects are going to have to be quite strong for the intervention to effect the population in a statistically significant way (Agresti, 2009). However, the estimates from the mixed models are useful to identify any possible trends and plan sample sizes for a full-scale study.

This model is preferable to using paired t-tests, as with the paired t test two or three separate tests would have to be performed (T2 vs. T1, T3 vs. T2, T3 vs. T1) to answer the question of whether dependent variables were affected by the intervention over time. This would again require larger treatment effects for them to be statistically significant accounting for the multiple testing. The mixed model regression approach allows assessment of the statistical significance of

the time trend using a single test/model with less impact on the effects needed to make a statistically significant impact.

Qualitative measures.

The qualitative data for this research was gathered and processed focusing on a naturalistic qualitative approach. According to Patton (2002), a specific philosophy of qualitative inquiry is not needed under certain circumstances, such as when gaining answers to fairly specific and pragmatic questions: The questions explored in this study would certainly qualify as such. However, using a specific qualitative method can add to the quality of the theoretical background and further ensure the quality of the data gathered and analysis performed, even when exploring specific research questions (Creswell, 2007). Grounded theory was originally developed by Glaser and Strauss in the 1960's as a systematic way to gather, analyze and constantly compare data, from which to develop theory (Willig, 2008). This approach almost reverses the traditional scientific method by using the data that are gathered to generate theory, instead of starting out with the theory and then having the theory guide in the generation of the data.

There has been movement in recent years to develop and adapt grounded theory to the needs of more specific research questions. The application of grounded theory in mixed methods studies is becoming more common and appears to add the best of both worlds when it comes to theoretical fit and the

depth of data analysis performed (Willig, 2008). The focus in grounded theory is to systematically *ground* the analysis in the data, and allow the data to develop the theory. The focus remains on identifying categories of data, and developing an explanatory framework to better understand the focus of the research question, in this case how mindfulness has affected the experiences of persons suffering from SUDs/TBI (Willig, 2008). Numerous strategies specific to grounded theory are used to achieve this understanding, including coding, constant cooperative analysis and theoretical saturation, which represent the gathering of data until no new pertinent data is surfacing, at which point theoretical saturation has been reached (Willig, 2008).

In this study a social constructivist version of grounded theory was employed, where it is acknowledged that the researcher, in interacting with the data, actually constructs the interpretation and view of the data. This underlines the post modernistic view that the researchers' interpretation of the data is simply one way to look at it and does not represent *the truth* about the data; rather *a truth* about the data. In this case it seemed appropriate to use the social constructivist and abbreviated version of grounded theory where "...the interview transcripts or other documents are analyzed following the principles of grounded theory (i.e. the process of *coding* and *constant comparative analysis*); however, *theoretical sensitivity*, *theoretical saturation* and *negative case analysis* can only be implemented *within* the texts that are being analyzed." (Willig, 2008, p.39).

The abbreviated social constructivist approach to grounded theory was used due to the mixed methods nature of this study, as the researcher already had data and ideas that might have influenced the analysis, and as such, the researcher's role in constructing this analysis could be best acknowledged by this approach. Additionally the qualitative component of this study was limited by the constraints on how much time could be asked of the participants of the study, and how broadly the interviews could explore participant experience due to the relatively narrow focus of the research questions. Although more traditional schools of thought of grounded theory might be more realist in orientation the social constructivist view might be more relativist in nature. Thus in the qualitative part of this study, the research process becomes more context dependent. Due to the explorative nature of this study, the traditional development of theory in grounded theory will only be indirectly explored. This is mainly due to the fact that it had been anticipated that there would be insufficient data for conclusive theory development at the end of this study.

Line-by-line coding was performed by using the software NVivo. The data were analyzed using a social constructivist view of grounded theory and discussion was coded into specific themes, which were then organized into groups of main themes and sub themes, showing how different concepts that emerged from the data related to each other. The categories identified through the careful line-by-line coding process were then used to explain and discuss

how the practice of mindfulness affected the subjects' experiences. All of the participants in the study who completed all of the quantitative questionnaires were interviewed for the purpose of this study. Following the development of the themes and sub-themes, the researcher met with and discussed the coding and emerging analysis with an experienced qualitative researcher. This is a method used to ensure rigor and increase the quality of the analysis of the qualitative data.

Rationale for Design

The design that appeared most appropriate for the feasibility study was a mixed methods within group time series design. This seemed a good choice due to the small pool of participants available and the exploratory nature of the research question. There are numerous reasons why this design seemed a better choice than a randomized design under the circumstances. First of all, with so few participants, (22 available for recruitment to the study) the potential power of the statistical analysis was recognized to be quite low and the benefits of the randomized design were unlikely to outweigh the liabilities (Robson, Shannon, Goldenhar, & Hale, 2001, ch. 4). A broad research approach would be appropriate to begin with, seeing as this is an exploratory study and a thorough review of the literature revealed that little is known on the affects of mindfulness on this, and related populations. Logistical factors also played a part, but due to

the limited resources at the researcher's disposal it was more feasible to conduct only one group, one time; this eliminated concerns over attrition in the control group that are often an issue in a study like this.

The addition of qualitative measurements for this study appeared especially appropriate under these circumstances. As the intervention has not been implemented with this population in the past, it was very important to ensure maximum richness of data, which could only be attained through qualitative interviews. Furthermore, due to the low number of participants, no definitive results were expected from the quantitative part of the study, although certainly important clues can be derived from this part. The qualitative interviews, however, were likely to provide vital information about the applicability and appropriateness of the intervention to this population. Such an approach is more likely to capture the full extent of the effects of the intervention on this population, and reveal effects not foreseen by the author and thus not captured by the quantitative measures chosen to assess its impact (Ray, 1994). Thus, just like the quantitative measures, the qualitative interviews told a story, but unlike the quantitative measures, the stories they told were in the participants' own words, using their own voice, which adds a profound dimension to this method of inquiry and allows readers and researchers to see real world and pragmatic examples of the applicability and feasibility of adapting a MBI to the needs of the SUDs/TBI population.

Intervention

The intervention implemented in this research study is an eight-week mindfulness course adapted from the MBSR program to fit the needs of the SUDs/TBI population. It was delivered by an experienced MBSR instructor who received initial and advanced training at the University of Massachusetts, where the MBSR intervention was originally developed. The present study's curriculum consisted of eight weekly classes, each about one hour in duration, with a four-hour meditation retreat towards the end of the course. The content taught and practiced was fairly manualized and based on the MBSR curriculum developed by Jon Kabat-Zinn and colleagues and then adapted for duration and content to the needs of the target population (McCown et al., 2010; Shapiro, 2009). The concept of a "sober breathing space" was also integrated in to the intervention from the book *Mindfulness-Based Relapse Prevention for Addictive Behaviors: A Clinician's Guide*, but it is essentially a modified version of mindful breathing designed specifically to meet the needs of persons in recovery from SUDs (Bowen, 2011). Aside from the "sober breathing space" activity the rest of the exercises in the intervention were all adapted from the original MBSR curriculum.

The process of adapting the intervention to fit the needs of the SUDs/TBI population was thorough. In the fall of 2010 this researcher along with the MBSR instructor that delivered the intervention in the present study, and Vinland staff that had been through the MBSR program at the University of Minnesota, started

working on designing the intervention that is currently used at Vinland's main campus. This is a four week mindfulness course adapted from the MBSR program delivered by two Vinland counselors, both of whom have gone through the eight-week MBSR course at the University of Minnesota. On the main campus there are four weekly classes, one hour in duration. The groups are gender divided.

The group had been ongoing for almost six months when a program evaluation was implemented. During those six months the researcher, the MBSR instructor and Vinland staff worked to adapt the intervention to the needs of this population. This author and the MBSR instructor observed three to four sessions of the groups and then gave specific feedback to the instructors on what would need refining or adapting. Vinland staff also shared significant insight in to what approaches might be successful in teaching mindfulness to persons with SUDs/TBI. Over time it became somewhat evident what mindfulness approaches and exercises worked best, and the curriculum had taken final shape at the time of the program evaluation in the spring of 2011.

Based on the results of the program evaluation and a review of the literature on the special education needs of the TBI population the didactic for the 8 week intervention implemented in the present study included a body scan meditation exercise, mindfulness in everyday activities such as eating and walking, on site Yoga and meditative exercises and homework that participants

were encouraged to continue after course was concluded. Exercises and homework were shortened somewhat to better fit the needs of this population from the original MBSR curriculum. The adapted mindfulness curriculum used in the course can be found in Appendix C and was created by the MBSR instructor but was in part based on feedback from this researcher and Vinland's staff experience with delivering the mindfulness content to the SUDs/TBI population. In addition a weekly telephone interview was included in the intervention for the duration of the intervention. These were intended for adherence purposes and for qualitative data gathering purposes, as the researcher did take notes during each interview. The phone calls were 5-10 minutes in duration and focused on how the participant was doing generally in the course and with the homework, and whether any questions or concerns remain unanswered. This added part of the intervention appeared to fit well with the special educational needs of the TBI population (Sohlberg et al., 2005; Ylvisaker et al., 2001).

Research findings support the need for adapting the MBSR curriculum to the needs of the SUDs/TBI population, namely the shortening and clarification of homework, shortening of educational sessions and simplification and further structuring of didactic material (Ehlhardt et al., 2008; Glang et al., 2008; Ylvisaker et al., 2001). The teaching methods and approach of the instructor are also important and included modeling and in class exercises. This fits well with the MBSR model, which already integrates many of the principles needed to address

the special needs of the SUDs/TBI population while others were clarified, adapted or emphasized (Grossman et al., 2004; Kabat-Zinn, 1990; Kabat-Zinn, 1994; Winbush et al., 2007).

The intervention used in the current study was based on the work described above. The intervention was 8 weeks long, compared to 4 weeks with the intervention developed for Vinland's main campus, which contained no retreat, as this was not possible to implement on Vinland's main campus. The lessons learned during the program evaluation and adaptation progress did benefit the development of the present 8 week mindfulness curriculum to a great extent. This included stressing shorter duration exercises like beginning each session with a mindful breathing exercise, and constantly reframing and clarifying the purpose of the exercises, as well as keeping the more physical aspects of the program as simple as possible. In the 8-week program all the mindfulness exercises could be done in a chair or standing up, due to the numerous physical disabilities of the group participants.

Human Subjects Review

The research proposal was submitted to and approved by the Internal Review Board of the University of Minnesota.

Special populations.

Of the 22 persons invited to participate in the study (all residents in Vinland's residential facilities) five were female, and two were Native American; all other possible recruits were non Hispanic-white. No children participated in the study, as no children reside in the Vinland residential facilities.

Safety.

The participants did reside in a residential treatment facility and had 24 hours support if difficult feelings had surfaced related to their participation in the study. The numerous measures that were a part of the study did pose somewhat of a burden on the participants, although these were hopefully offset by the compensation the participants received and the benefits the intervention might have entailed for them. The risks in this study were thus deemed as minimal, while the benefits included that an intervention that is safe and low cost might be implemented at the facility long term for this population, and the intervention might be of significant benefit for the participants themselves. This intervention had never been researched in any way for this particular sub population so this evaluation was an important first step in preparing the ground for future studies. This work could also help to improve and make future mindfulness groups more pleasant and efficacious for its participants.

Audio recordings and notes were taken and secured at a location at the University of Minnesota in a password protected document in a hard drive in a

locked drawer. They will be kept for one year after the conclusion of the study. The participants were informed that this is a study on how the mindfulness group is working out at Vinland residential facilities. That they were in no way obligated to participate, and that it had no effect on their care or standing with the researcher, the University of Minnesota, or Vinland if they decided to not to participate in the study, or to stop their participation, which they were free to do at any time. It was also reviewed with them that their participation might possibly trigger some bad memories or thoughts, and if that happens, and also for any other reasons, they could talk to the researcher or Vinland staff and withdraw from the study immediately and receive appropriate support to process their concerns. In addition it was stressed that all their responses were confidential and could not be traced back to them individually.

Consent.

Two Vinland staff members that helped with the recruitment for the study were coached carefully so that undue coercion did not take place in the recruitment process. Participants were presented with the consent form along with the initial introduction to the study, at least a week prior to the implementation of first data gathering session, in person, by this author at Vinland (see Appendix D for copy of consent form used in the study). Clarifying questions were asked to ensure that participants understood risks and benefits involved with the study.

Compensation.

There was compensation available to the participants for the time and effort spent in the study. After each data gathering point the participants were compensated with \$20 giftcard for WalMart. They further received a \$20 incentive if they conclude all measurment points. The maximum amount a participant did receive in compensation and incentives was \$100, in gift cards.

Chapter 4: Results

Overview

This study focused on examining the impact of mindfulness on impulsivity, anxiety, depression, quality of life and experiences of 16 persons suffering from co-existing substance use disorders and traumatic brain injury. Of the 22 persons that were offered to participate in the study, 16 participants started the study, and 12 completed all measurements. The six persons that did not want to participate in the study initially cited lack of interest or time as the main reasons for not wanting to participate. Three participants dropped out in the first week of the intervention and one participant dropped out of the study after the completion of the intervention and the pre and post-intervention questionnaires (T1 and T2). The reasons for dropping out of the study were either relapse followed by subsequent discharge from the residential facilities (two participants) or failure to participate in the intervention beyond the introductory session (two participants). The data from the three participants who only completed the first questionnaire were not used. The data from the participant who completed the pre and post questionnaire was used in the analysis of the significance of the change over time, as the mixed models method used to analyze the data adequately addresses the issue of missing data points. One participant did not completely complete part of the Barratt Impulsivity Scale in the second questionnaire due to

high frustration levels but this only marginally affected the data analysis, due to the way the BIS is scored and how few data points were missing.

Basic Demographics of Participants

The participants' (N=13) ages ranged from 33 to 67 years with a mean of 52 years. The length of sobriety ranged from 6 months to 9 years with a mean just under 4 years. All of the participants were Caucasian with four females and 8 males completing all phases of the study. All study drop outs were males. Two of the participants completed more than basic high school education. None of the participants worked full time, one was retired and three had part time employment. None of the participants were married.

The participants all suffered from alcohol dependence, and some participants had histories of abusing other substances as well to various degrees as indicated in the qualitative interviews. Furthermore the participants had varying severity of TBI, but all had demonstrated significant impairment as a result of their TBI as verified by Vinland staff. Time since brain injury varied greatly for the participants, from 4 years to over 40 years for those who disclosed this information, or 62 % of the participants (8/13 that completed first questionnaire). The nature of injury also varied greatly from a car accident during childhood to anoxic injury related to substance use sustained "a few years" prior to initiation of this study. Due to the limited number of participants, there were no

comparisons of data based on demographic factors.

Quantitative Results

Impact of mindfulness intervention on impulsivity.

When looking at change over time in the mean scores of the three subscales of the BIS, little change was observed during the time of the study. None of the subscales or the total scores changed significantly as can be seen in Figure 4.1. and Table 2. The three subscales of the BIS did not change significantly over time; attentional ($p=.12$), motor ($p=.73$), non planning ($p=.52$) nor did the BIS total scores change significantly over time ($p=.54$). In Figure 4.1 the only noticeable reduction in symptoms was in the non-planning subscale of the BIS from T2 to T3, although this change did not reach statistical significance. For the other subscales and the total score there was a slight increase in scores over the time of the intervention with a small trend for reduced scores from T2 to T3, except for the attention subscale of the BIS where a slight increase in scores was noted from T2 to T3.

The total impulsivity scores (total mean scores times 30) for T1 were 68.45 with a standard deviation of 7.06 (SD) and for T3, 69.55 (9.69).

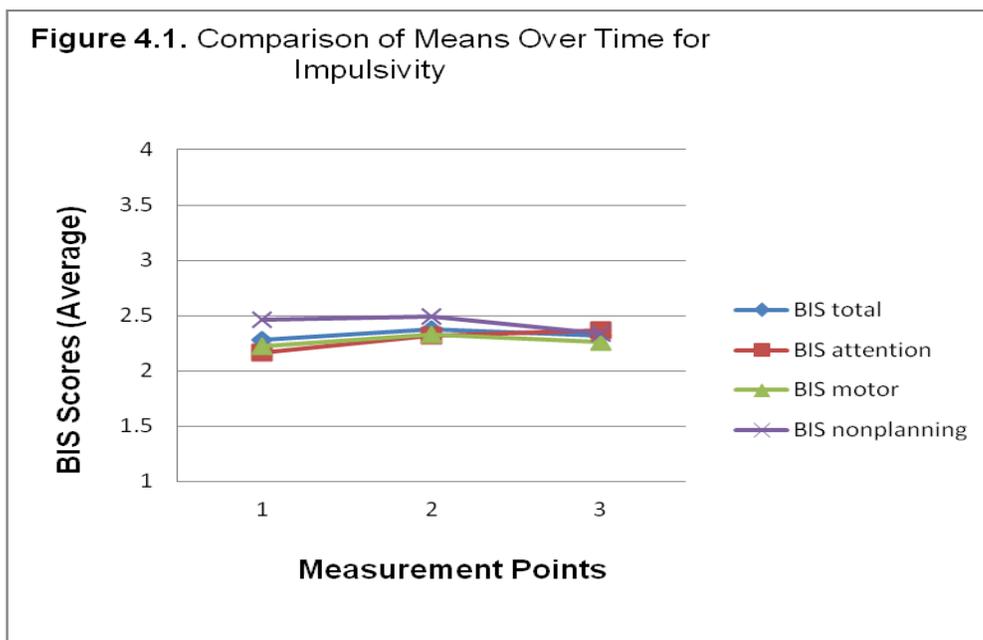


Table 2

Summary Statistics of Changes in Mean over Time for Levels of Impulsivity

TIME		BIS attention	BIS motor	BIS nonplanning	BIS total
1	Mean	2.2	2.2	2.5	2.3
	Median	2.25	2.18	2.55	2.45
	Std. Deviation	.42	.42	.48	.32
	Minimum	1.50	1.45	1.45	1.47
	Maximum	2.88	3.00	3.18	2.68
2	Mean	2.3	2.3	2.5	2.4
	Median	2.38	2.36	2.45	2.47
	Std. Deviation	.36	.37	.29	.27
	Minimum	1.50	1.55	2.00	1.68
	Maximum	2.75	2.73	2.91	2.75
3	Mean	2.4	2.3	2.3	2.3
	Median	2.44	2.18	2.36	2.35
	Std. Deviation	.44	.29	.20	.24
	Minimum	1.63	1.82	1.91	1.97
	Maximum	3.00	2.73	2.55	2.63
P value for change over time		.12	.73	.52	.54

Impact of mindfulness intervention on quality of life.

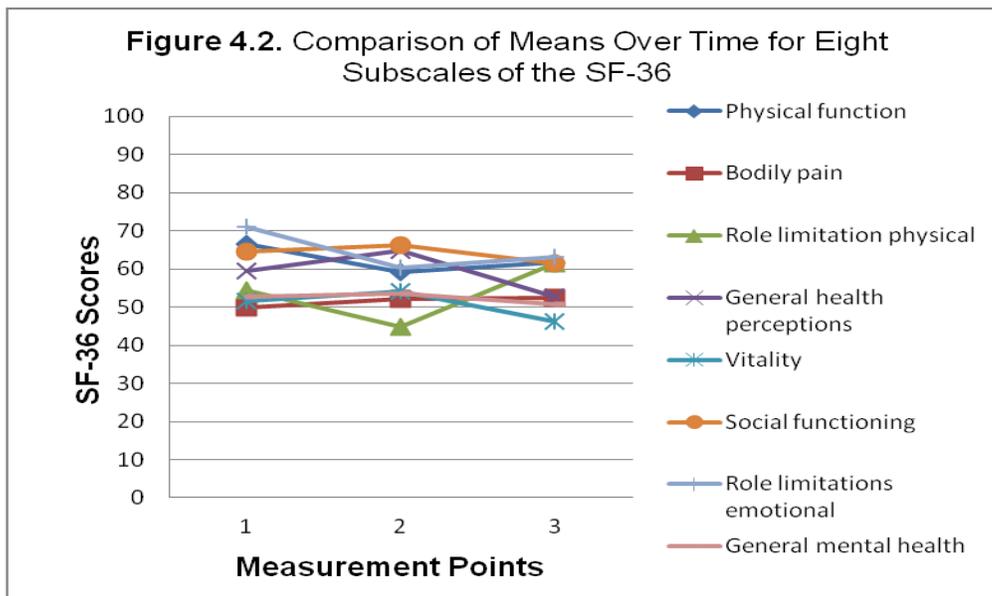
The greatest variability between measurement points was found in the various subscales of the SF-36, which could be expected as the impact of the mindfulness intervention is broad and the SF-36 measures overall quality of life. The only statistically significant difference between measurement points in this study was found in the *role limitations because of general health perceptions* subscale of the SF-36 ($p=0.005$) in an unexpected direction. The scores increased slightly from T1 to T2 indicating that participants perceived their general health in a more positive way post vs. pre intervention. The scores then decreased distinctly from T2 to T3 indicating that the participants perceptions of their general health was becoming more negative in the weeks after the mindfulness intervention was completed.

There also seemed to be a considerable change in scores over time in the *role limitation because of physical health problems* subscale of the SF-36 but this effect did not reach statistical significance ($p= 0.07$). This change was also in an unexpected direction with a decrease in scores from T1 to T2 indicating lower physical functioning, and a considerable improvement in scores from T2 to T3 indicating improved physical functioning. Changes in scores between measurement points did not reach statistical significance in the other subscales of the SF-36 which include: *physical functioning* ($p= 0.20$), *bodily pain* ($p= 0.90$),

social functioning ($p= 0.88$), *general mental health (psychological distress and psychological wellbeing)* ($p= 0.89$), *role limitations because of emotional problems* ($p= 0.28$) and *vitality (energy/fatigue)* ($p= 0.17$).

Figure 4.2 displays the change over time in the mean scores of the various subscales of the SF-36. Three of the subscales do trend to show scores that worsen from T1 to T2 and then improve again at T3 (*role limitation physical, physical function and role limitations emotional*), while the remaining five subscales trend to improve slightly from T1 to T2 but worsen again slightly at T3.

In figure 4.3 the change over time in the two summary scales of the SF-36 can be seen; the mental summary scale (MCS) and the physical summary scale (PCS). The scores remained fairly stable on both scales throughout all three measurement points.



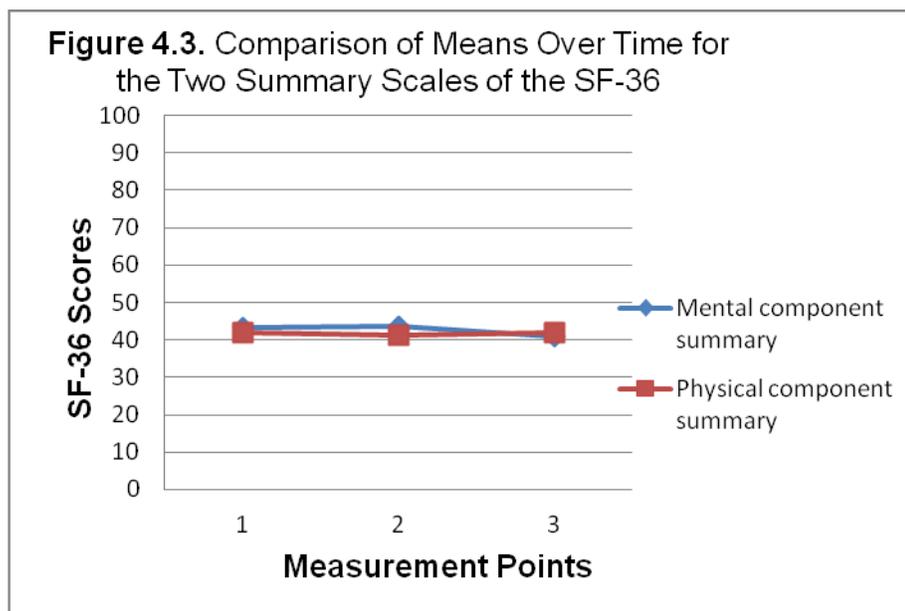


Table 3

Summary Statistics of Changes in Mean over Time for Quality of Life

TIME		PhysFun	Pain	RolePhys	Genhth	Vitality
1	Mean	66.5	49.8	54.3	51.5	59.5
	Median	70.00	51.00	50.00	50.00	62.00
	Std. Deviation	24.44	28.87	24.39	12.31	21.90
	Minimum	20.00	.00	.00	35.00	20.00
	Maximum	100.00	100.00	87.50	70.00	95.00
2	Mean	59.23	52.08	44.71	54.23	64.85
	Median	55.00	41.00	43.75	55.00	62.00
	Std. Deviation	30.33	30.20	32.36	9.97	16.32
	Minimum	.00	.00	.00	35.00	45.00
	Maximum	100.00	100.00	100.00	70.00	100.00
3	Mean	61.7	52.4	61.5	46.3	52.6
	Median	57.50	51.00	65.63	40.00	48.50
	Std. Deviation	22.60	25.08	20.44	12.27	21.14
	Minimum	30.00	22.00	31.25	25.00	25.00
	Maximum	100.00	100.00	87.50	65.00	100.00
P-value for change over time		.20	.90	.07	.005*	.17

Note. * Significant at the 0.05 level

Table 4

Summary Statistics of Changes in Mean over Time for Quality of Life (continued)

TIME		SocFunc	RoleEmot	MentHlth	PCS	MCS
1	Mean	64.4	71.2	52.6	42.1	43.2
	Median	75.00	75.00	52.00	42.06	42.76
	Std. Deviation	26.44	21.14	16.15	11.30	9.77
	Minimum	25.00	41.67	24.00	16.16	25.81
	Maximum	100.00	100.00	72.00	57.89	61.17
	2	Mean	66.3	60.3	53.5	41.3
Median		62.50	50.00	60.00	39.58	44.58
Std. Deviation		25.20	31.58	16.54	12.42	8.46
Minimum		25.00	.00	20.00	20.26	26.54
Maximum		100.00	100.00	80.00	62.36	55.91
3		Mean	61.46	63.19	50.67	42.1
	Median	50.00	58.33	54.00	39.98	40.93
	Std. Deviation	24.69	27.86	12.10	10.10	6.56
	Minimum	37.50	.00	32.00	29.67	33.43
	Maximum	100.00	100.00	68.00	62.45	56.99
		p-value for change over time	.88	.28	.89	.78

Impact of mindfulness intervention on anxiety.

When looking at change over time in the mean scores of state and trait anxiety there is a positive change from T1 to T2 for the participants on both subscales with participants reporting decreased symptoms of anxiety, that then increase very slightly again at T3 for state anxiety but continue to decrease for

trait anxiety. The trend that can be seen for lowering of trait anxiety among participants is certainly encouraging, although neither changes in state ($p=.42$) or trait ($p=.91$) anxiety over time reached statistical significance.

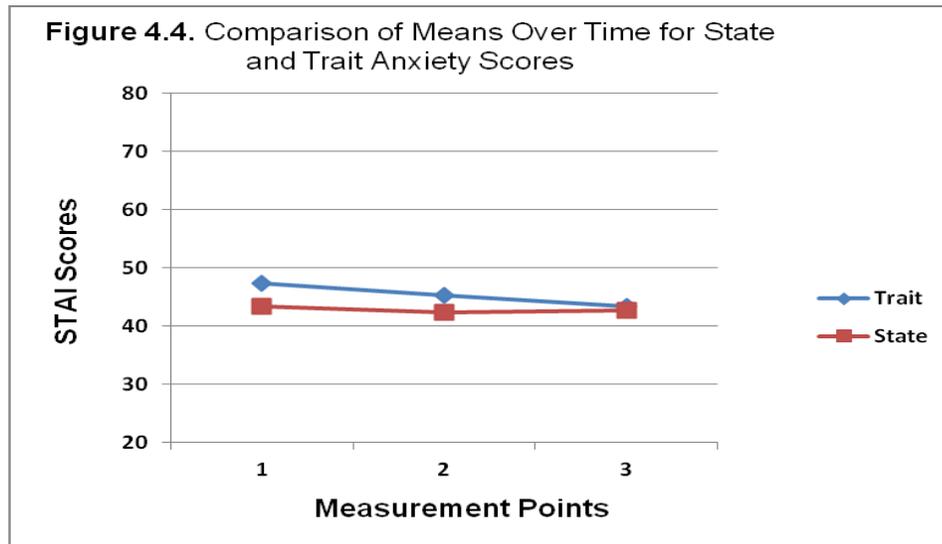


Table 5

Summary Statistics of Changes in Mean over Time for Levels of Anxiety

TIME	Statistic	STAI trait	STAI state
1.	Mean	47.3	43.4
	Median	52.00	47.00
	Std. Deviation	10.44	8.19
	Minimum	30.00	31.00
	Maximum	60.00	57.00
2	Mean	45.2	42.3
	Median	47.00	44.00
	Std. Deviation	10.90	11.38
	Minimum	26.00	20.00
	Maximum	59.00	54.00
3	Mean	43.4	42.7
	Median	42.00	40.50
	Std. Deviation	10.87	10.43
	Minimum	25.00	27.00
	Maximum	60.00	58.00
P value for change over time		.42	.91

Impact of mindfulness intervention on depression.

Looking at the CES-D scores of special note is that all but one of the participants had consistent scores of over 16 throughout all three measurement points indicating that they suffered from clinically significant symptoms of depression throughout the time of the intervention. As can be seen in Figure 4.5 the difference between means was not notable between points in time in regards to levels of depression. Table 6 illustrates the difference between the means over points of time, none of which proved statistically significant ($p=.79$).

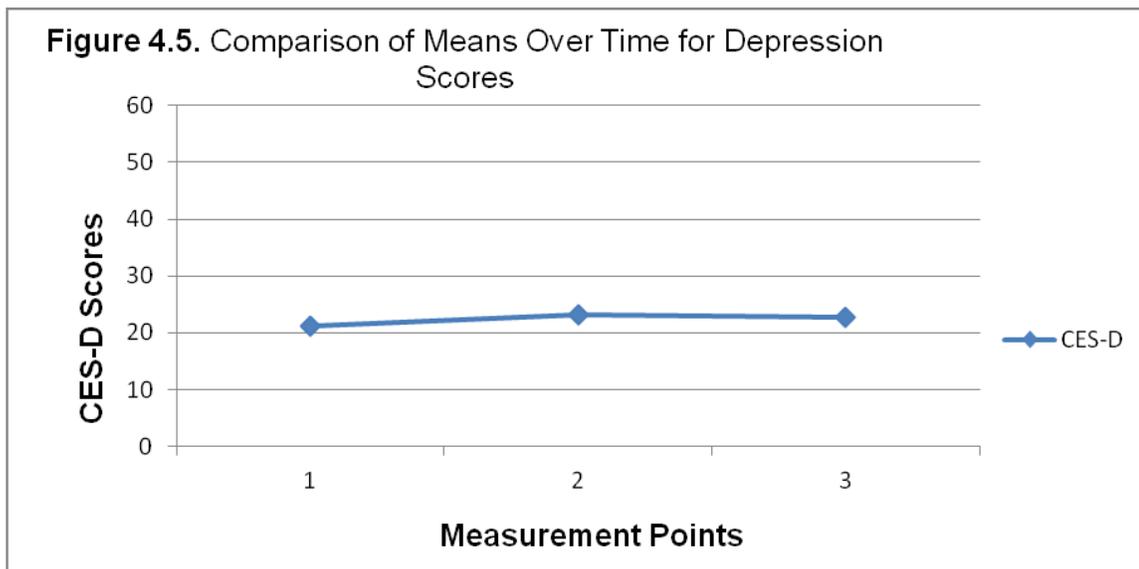


Table 6

Summary Statistics of Changes in Mean over Time for Levels of Depression

TIME	Statistic	CES-D
1.	Mean	21.2
	Median	23.00
	Std. Deviation	8.25
	Minimum	9.00
	Maximum	33.00
2	Mean	23.1
	Median	25.00
	Std. Deviation	10.24
	Minimum	3.00
	Maximum	37.00
3	Mean	22.7
	Median	19.50
	Std. Deviation	10.97
	Minimum	10.00
	Maximum	42.00
P value for change over time		.79

Phone calls.

It was quite challenging to reach participants on a weekly basis even with multiple attempts. The intention with the phone calls was to gain additional insight into the practice and adherence issues through the phone calls but calls were often quite short in duration. Insufficient data were gathered from the weekly phone calls for it to be reportable in the context of this study.

Practice logs.

The adherence to the practice logs was poor in this study. Few practice logs were turned in at the end of the study and the few that were turned in were inadequately filled out so no relevant data can be presented from the participants' practice logs in this paper. No participant used the logs consistently enough such that clear trends or patterns could be discerned from analyzing them.

Summary of quantitative results.

Impulsivity did not change significantly for the participants between measurement points during the time of the study. While there was a positive trend seen in the scores of the BIS on the non-planning subscale on the BIS from T2 to T3, this did not reach statistical significance. The quality of life scores did not change significantly over time except on the *general health perception* scale of the SF-36, in a negative direction from T2 to T3. Five of the eight subscales of the SF-36 trended to slight improvement from T1 to T2 worsening again slightly

at T3 but none of these changes reached statistical significance. In looking at the scores for anxiety, a positive trend was found between all three time points in one subscale of the STAI, but this trend did not reach statistical significance. No clear trends were seen for the depression scores of the participants over time, but the mean scores of the group on the CES-D were consistently over the cut off score for clinically significant symptoms of depression.

In essence after analyzing the quantitative data, the only significant difference in scores between measurements points on all the independent variables used in the study was in the *general health perceptions* subscale of the SF-36 where the significant change was in a negative and unexpected direction. Other changes in scores over the time of the study were not significantly changed which means that we cannot say with any certainty whether those changes happened by chance or not.

Qualitative Results

In an effort to explore how the mindfulness intervention affected the participants, face-to-face individual qualitative interviews were conducted eight weeks post- intervention, after the participants had submitted the final quantitative questionnaire. Each of the interviews was coded for themes, as outlined in detail in Chapter 3. Of the 16 participants who filled out the first questionnaire, 12 participated in a qualitative interview, along with the one

interview done with the staff person responsible for both residential facilities where the intervention was offered. Of the 12 participants, 8 were men, and 4 were women. All had been diagnosed with a brain injury and a chemical dependency issue of some kind. As can be seen in Table 5, multiple themes emerged from the analysis of the content of the interviews. The themes were separated into four broad categories, each with their own sub categories. The four main themes were personal reflection, the mindfulness practice, community and impact of the intervention. Due to the uniqueness of the research setting and the small sample size, the source of individual quotes in the text is not revealed. This is to protect the participants' anonymity and assure that individual patterns cannot be discerned. The letters "I" and "P" were used when researchers' comments needed to be included in the text for clarification purposes, "I" standing for questions asked by the *interviewer* and "P" standing for answers given by the study *participants*. When the participants used revealing wording that might have threatened their or their fellow participants' anonymity, "X" was used to replace the word or statement in question.

Appendix E is included to give an example from each main theme category on how the raw data was processed and analyzed into themes and subthemes. Initial categories were revised and refined during the interview and coding process.

Table 7

Themes and Sub Themes of Qualitative Analysis

Main Themes	Sub-themes
1. Personal Reflection	<ol style="list-style-type: none"> 1. Facing Disability 2. Acceptance 3. A Combination of Solutions 4. Pharmacological Considerations 5. Sobriety
2. The Mindfulness Practice	<ol style="list-style-type: none"> 1. Adherence 2. Likes and Dislikes
3. Community	<ol style="list-style-type: none"> 1. Relationships Formed 2. Empathy 3. A Sense of Unity 4. Ease of Communication
4. Impact of the Intervention	<ol style="list-style-type: none"> 1. Anxiety 2. Impulsivity 3. Quality of Life 4. Mood

Personal reflection.

Although the focus of the interviews was on the effects of the mindfulness intervention, the participants did discuss how past experiences impacted their perception of the intervention. They also reflected on core issues that they had struggled with in the past. This provided an interesting context to explore as it addressed the complex background of the participants and shed further light on how mindfulness practice can affect different people of different backgrounds in different ways. It also demonstrated why the participants may have found the group useful and perhaps can predict to a certain extent how well the intervention fits them.

Facing disability.

Participants described the frustration of having the kind of injury that no one can see, which further adds to the stigma of feeling unable to function like the rest of the “normal” population. The nature of TBI is that it is often hidden. No one can see the brain injury, and most of the participants described not having easily visible scars to remind other people in their environment of their disability. Participants described a palpable frustration with the hidden nature of the illness which emphasized the importance of acceptance even further:

“But then things went downhill for me because of my memory. And people look at me and think, you know, there’s nothing wrong and yet up here everything wasn’t working right.”

Most of the participants had gone through many challenges in their journey that brought them to their current situation, and expressed relief at finally being in a sanctuary of sorts. They described experiences of homelessness, struggles with severe mental illness and numerous hospitalizations related to their mental illness and addictions. In addition to their brain injury, many of the participants also had physical problems of other kinds, especially chronic pain of different etiologies. This makes recovery even more challenging, as the participants described not only dealing with the TBI and the SUDs issues, which

on their own are certainly taxing enough, but having to deal with severe physical problems as well, making achieving and maintaining recovery quite difficult.

The many underlying health problems the participants were struggling with and how the intervention did or did not impact these was also often discussed. They also discussed how their health problems affected their participation in the group. For example, one participant described how some of the exercises fit well with his chronic back pain:

That's because I have a real bad back, to help on that and yoga does help in that category and when I go and workout at the (inaudible) . . fitness, I'll know not to overdo or I'll do some stretches that I can remember what we've done and that helps for me not to strain my back or my legs or something.

Acceptance.

Seeking and finding acceptance of the disability appeared common for the participants, where they described a struggle to accept their limitations, and then continuing their work within the confines of their disability. This acceptance appeared a long journey for many of the participants and often caused frustration, although they described great strides being made in their recovery related to their participation in the mindfulness program. Acceptance is one of the

main themes of mindfulness practice and makes this intervention an especially good fit for this population. They discussed the vulnerabilities they had, not being able to function fully anymore in society, and how profoundly that affected their self image and their self esteem. Things like not being able to work full time and coming to terms with this fact was an especially difficult pill to swallow for many. This often caused participants anger and frustration, especially when they experienced people in their environment judging them on a standard they could never measure up on, i.e. having feelings of being set up for failure. Despite this, many worked hard finding alternative aspects of their lives to build up their self image, as accumulating great material wealth or climbing the corporate ladder is not a realistic option for many of the participants:

“But, you know, for the most part I’ve accepted things a lot better now. So that I’m not all that concerned with image and I know I’m still a decent person despite my shortcomings.”

Another participant commented in a similar vein:

“...we all came here with problems. It was hard for me to even acknowledge that I was considered disabled at first because it made me feel like I was a failure, you know.”

Participants had numerous health struggles but remained aware that the physical health problems are there to stay and worked to adapt and adjust to these anyway. The following quote demonstrates how one participant with severe physical problems has used the principles of mindfulness to adapt and come to accept his chronic pain issues:

“But my physical health now, I just kind of, like I say, I have to think about what it is, is it worth getting, cause it has to work with everything. Is it worth getting excited over?”

And the same participant continues:

“Like for body aches and pains, they’re not gonna go away. I’ll have them forever. You know, but I know how to work with them now, you know.”

A combination of solutions.

Participants struggled with various health issues, including chronic back pain and headaches. A recurrent theme seen with the participants is that they were doing many different things that are helpful for their physical and mental

health including working on their sobriety. Mindfulness is an important piece of this puzzle, but certainly not the only one:

“So, yeah, it’s a number of things that help me keep sober, you know. And usually put it all together and I got a pretty damn good thing going here.”

Yet another participant echoed the same opinion, where he felt the mindfulness intervention worked well with the other things he was doing to help both with his sobriety and his health problems. This underlines that although for many of the participants the mindfulness intervention was not the cure all for all their problems, it played an important role in their overall wellbeing. But as can be expected for persons struggling with so many and complex health problems, a combination of solutions is probably going to be needed to address these sufficiently:

“So a lot of this is, where do you put that, one works with the other. You know?”

Pharmacological considerations.

A common concern for the participants was the number of “pills” they

were taking. They expressed concerns about becoming dependent on their medication, whether it was sleep or pain medications. Some participants perceived the mindfulness intervention as especially exciting for them as they saw it as a way to perhaps decrease their dependence on their medication, or at least take less of them. Taking fewer medications was described as a priority, as many of the participants had experienced adverse effects of taking “too much” medication at some point in their lives, including in their recovery. The desire for persons in recovery from drug or alcohol addiction not to be dependent on medications is understandable as they are going to be concerned about any behavioral patterns in themselves towards medications that remind them of their behavior before going into recovery. The participants expressed that even though they realized that many of their medications were indeed necessary, maybe others were not, and perhaps even doses of the necessary ones could be reduced in time. Having ways to cope with their symptoms that made it possible to decrease the amount of medications they were taking seemed very important to them.

“A lot of people say, ‘Hey, I’ve never been addicted to pills, so they shouldn’t hurt me.’ Six month later they’re going through treatment again for that.”

Participants also discussed that they did notice their own tendencies in wanting to take a pill and have that “fix everything”. But the resistance to this train of thought was palpable for some with one participant ironically stating:

“Just send me something and it’ll take it all away and it’ll all be fine.”

The thought of adapting to non pharmacological methods to address their issues with sleep and pain was described as very attractive, as it fit well with their ideas about recovery and desire to minimize the role of pharmaceutical in their lives.

Sobriety.

Another theme that emerged was the background and the struggles the participants had experienced in the past. Many of the participants discussed how they had wrestled with sobriety in the past but acknowledge that often sobriety is “a work in progress” and the importance of not giving up in the effort of staying sober.

...you know, this time I’m ready finally. And it’s come more easily to me. I’m not trying to prove something to somebody, see. In the past, of course, that’s what I’ve done. I didn’t go to AA, which is not the most

important thing in the world but you're around people that are like you. So you can relate to them. And that made a big difference in my life was actually accepting them and them accepting me. You know. And also not only AA, but the group sessions, the balance groups, the Mindfulness Group, the [X] program, the anger management, the therapy, therapist, the counselors. If you put that all into one, I'm getting more help than ever before. See, I never sought that help before. I didn't think I needed it. I thought people that had seen a therapist were nuts. But here I was the crazy one on the outside, you know.

Participants were quite aware of the impact of their addictions on their lives and verbalized quite a few regrets concerning how their lives had turned out. But there was often a strong sense of purpose and the desire to find meaning in suffering through positive reframing of past events and struggles:

"But of course, that old saying, you have to go backwards to go forwards".

The practice of mindfulness.

The second main theme identified in the analysis of the qualitative data centered on the intervention itself. In this category the focus is on how the

participants felt the intervention itself went, what they liked and what they disliked about it and what influenced their rate of practice.

Adherence.

Some participants struggled with the practice piece of the mindfulness. They had determined the practice was helpful to them, yet struggled to continue their practice. More than one verbalized surprise at why they did not practice it more since it was so helpful:

“Um, yes, I think so. And I, you know, I’m actually glad you’re here to remind us to do it, you know, because it, it did help me, you know. And so why I’m not doing it every day is beyond me. You know?”

Peer support really did appear to make a difference for many of the participants. The interviews were conducted two months after the end of the intervention itself and many participants struggled to continue the practice on their own.

Yeah, Mindfulness does help. I just wish that maybe my wife would get involved in out. Maybe we’ll have to try that out and see what happens. ‘Cause having somebody else with me would really make a difference, you know.

The same participant even suggested an ongoing group of some sorts:

I think it should go on more. I don't think that those few weeks or couple months, they're, I think that we all need it more than we think. Maybe every could weeks just to remind us where we've been, you know, and what we've learned would make a big difference.

Many participants felt the access to the MBSR CDs, especially the body scan was helpful with the adherence and made the content of the course more accessible to them. They listen to it in their car, in their room or with other family members or group members that then even got interested in mindfulness themselves as a result.

A participant discussed how his disability made the mindfulness practice challenging, but also how the CDs were helpful with his effort to continue the practice after the group was over:

"I can't really remember anything. But I just know that there's, that I can retain, what I retain that Mindfulness CD a little."

But it did appear a source of frustration not having the group anymore to help prompt the practice and perpetuate a culture of mindfulness in the houses.

Participants also felt the structure of the group helped them maintain the mindfulness practice.

This was verbalized by other participants also:

“It’s harder for me to relax.”

And.

“I think it was a lot easier for me to go to my room and listen to the tape and now it’s getting to be harder and harder for me.”

This is significant, since the group setting seemed to benefit this population greatly and made the practice easier. As soon as the group was not there anymore keeping the practice up became more challenging. Likes and dislikes.

There were numerous things that surfaced in the interviews that are of note to researchers in this field. It is important to note what works best in developing and adapting mindfulness interventions for different populations, especially those with unique needs like the SUDs/TBI population. Gathering information like this helps us to determine and in time hone the intervention to be of maximum use to specific populations. Of course the variability between the

individuals in any population will usually be more pronounced than the difference between the members of different groups so the perfect mindfulness group for everybody does probably not exist. But we can certainly make an effort to adapt mindfulness programs to the needs of the populations we are serving each time.

The participants appeared to generally like the group and rarely verbalized concrete complaints about it. Although the researcher did not administer the intervention, we cannot rule out a sort of researcher bias as the researcher had been in touch regularly with all the participants and had amicable relationships with them. This will be discussed further in Chapter 5. Some participants described parts they did not like or practice as much as other parts of the program. One participant felt participation increased her eating due to the mindful eating exercise she participated in as a part of the program:

P. *“I love food. Yeah. I can really taste food more and more.”*

I. *‘Well, that’s good.’*

P. *‘Ugh, no, not really. I gained too much weight.’ ...”*

Other participants either seemed very positive towards the group or neutral at worst. This indicates that there was minimal harm from participating in the group with perhaps a part of the participants neutral or mildly positive about their experience and another group very excited and dedicated to the practice.

Most of the participants felt they got some relief or help from participating in the program and enjoyed the group activities as well as all of or part of the exercises.

The didactic part of the course was challenging for some participants even though in the design of the course the special educational needs of this population was kept in mind. Furthermore, adherence to the weekly phone calls and practice logs was very poor.

P. "But because, um, it has made me aware of what I do wrong, where I'm doing good. But, um, the paperwork and bookwork that I was supposed to be doing –... "

I. 'That was fine.'

P. 'I really didn't, I can read and can understand personally what I read, but I wasn't too good about that.'

It was common for one part of the mindfulness course to make a strong impression on the participants and to have enduring effects even two months after the course had ended. Participants verbalized pleasant surprise at how physically challenging some of the exercises were and provided positive feedback about this part of the mindfulness program. A few participants also described how impressed they were with the mindful breathing and how impactful that was on their wellbeing. That such a simple exercise was so powerful, made

a lasting impression on many. One participant describes this sort of experience with a particular mindfulness exercise he learned to do in the group:

I just lay down, you know, and just imagine that tree up there and how it goes and in the wind and everything on that mountain and that's the only thing there. You know, every once and a while I get a bird in, but not too often, you know. Then the wind comes up and the bird kind of flip flops away. But that one really helps, you know. I don't do all the other stuff.

Another example is a specific Yoga movement that one participant found particularly helpful. The participant described making graduate but steady progress with the movements learned in class:

Um, where I lay on the floor and, uh, like it's a mat, but I lay on the floor and lift my legs up and all that stuff, or arms, or I bend down. It hurts still but it's feeling a lot better. It does it a lot better. Makes it feel a lot better.

Participants did have numerous positive things to say about the group. They discussed how participation in the group helped them become more engaged in their exercise program, that their thinking process was more engaged as a result. They liked the newness of it; that it was something they had not

done before and that the group participation was something they missed. Quite a few participants described how they enjoyed the use of the Tibetan prayer bell that was used as a part of the mindfulness program. Participants also commented on how the community and communication aspect of the program also mattered a great deal for them:

So, and I agree, I totally think it's a good program because it got my thought processes going. 'Cause, you know, being alone and living kind of pathetically, I mean, you know, I never dreamed I'd live most of my life in one room that you can barely walk through. You start getting a little annoyed and a little set in your ways but the program made me think a lot more while we were, you know, just in the meetings down stairs and stuff.

Community.

The community aspect of the program made a big impression on many of the participants and almost all of the participants appeared to enjoy that aspect of the program. They verbalized that the program helped them form new relationships amongst themselves and strengthen pre-existing ones. Many participants also felt they saw an improvement in the communication among the participants and that they were able to deal with difficult scenarios better now than before the course.

Relationships formed.

A large part of the program for many of the participants was the effects of both being in the group itself, and also the effects of the mindfulness practice on the group dynamics in the residential facilities. They discussed the importance of the decrease in impulsivity on the dynamics of the group, and the ability to think things through before speaking up or reacting angrily to a situation making a considerable difference in how they reacted to others. This appeared to decrease friction markedly in the residential facilities.

Um, you know, like I said, just being around other people, exposing themselves a little bit more made me, you know, relate to them better and then the fact that we were in a situation where we could all speak out, I think it was really good in the respect that all of us got something out of it and it's actually been less stressful around here. There used to be people that want to play boss and bitchy and, you know, and now people are kind of realizing just they got to make it work.

Participants verbalized how important it was to interact with their peers in a positive setting. A participant discussed how he became good friends with one other participant as a result of their joint affinity to the group activities. They did some of the group exercises together and became very engaged in the content

of the course. Some other participants described doing other things socially with other participants of the group, as a result of the bonds formed and vulnerabilities shared during the group discourse. Participants also shared that being in a group with peers that shared the same disabilities was helpful and reduced their feelings of isolation that they described as being a big part of one's experience when dealing with chronic physical and mental health issues:

I could relate more to other people and the way they are because I cannot change them. I can only change myself. You know, I guess it made a difference being around other people, which is most important in a group session. That makes a big difference is not be isolated. I think that's number one is to get out and be with people and actually know about this. That's a great thing.

Empathy.

The empathy in the residential facilities was perceived to be markedly increased for many as a result of participating in the group. This common experience seemed to have significant meaning for many of the participants:

You know, I honestly do think most of the people there were taking it seriously. Like, when the woman was here too, there were people that

don't talk much about themselves who spoke up in the meetings, which, you know, lead me to get a little more about them and stuff. And I have a little more empathy with them now.

Participants discussed how important it was for them to hear other participants share their life stressors and stories. This created a sense of understanding and reduced the tension in the houses in many ways. They began to appreciate each other's journey and history and the day-to-day struggles they had and this appeared to create a sense of cohesiveness and mutual understanding in the group. They appeared to acknowledge each other's roles as experts in their own lives and situations and how much they had in common unbeknownst to them before this point in time. For some, embarrassment about the self-revelation and the vulnerability involved was followed by a level of acceptance:

I learned a lot, you know, about myself. Accepting others like that. And yeah, it was kind of weird. I even felt at ease being around them after awhile. I kind of enjoyed it. Where at first I was embarrassed, you know. Then it was like, 'Well, this is just the way it is.' You know?

The same participant continued to describe the dynamics that took place during the group and the changes that occurred in him with the mindfulness practice in relation to other participants:

Because I'd hold a grudge and all that stuff for a long time and I don't hold a grudge anymore. I feel more at peace and all that stuff, getting closer to this person and all that, man. I mean it's like, but, yeah, it's okay. Yep.

A sense of unity.

The group also seemed to help the participants come more together as group and create a sense of unity and cohesiveness that was not there before. One participant discussed that the involvement in the group appeared to create more consideration between the residents of the home. This is especially important seeing that the group members often were coming from harsh environments and that the coping mechanisms that were effective in those environments often tended to create conflict in their current situation. Another participant described how negativity in the house had decreased over time and a more positive attitude about things and life in general was discernible. Listening to other people's comments in group and having an open mind that these could prove useful also seemed important to some of the group participants:

“And hearing other people’s responses as well, that can help the thought process. And for that I’m grateful. You know, because you can get in a rut real easily. Especially when life is kind of repetitious here, you know.”

The view that the group setting was helpful in encouraging the practice was verbalized by many participants.

“You know, that’s where I think I need to be around other people to help me with this. And it does make a big difference in my life.”

Ease of communication.

Following the intervention, the atmosphere in both residential facilities seemed to lighten considerably according to some participants. Whether this was due to the fact that many of the residents got together in a group, to the effects of the mindfulness activity, or both, is hard to say at this point.

Participants described how anger was not as quick to come after the group. The group members discussed they were now able to resolve conflict more efficiently and support each other in resolving conflict surfacing in the houses. But many participants described how conflict can happen often when you put together in a home 12 different people with different backgrounds and severe disabilities. One

participant even described how following a mindfulness group a particular conflict got resolved:

I mean I was having trouble with two people and came in and she did the class and did the bell thing and everything and we sat there for, I don't know, for fifteen, not even fifteen minutes, five, ten minutes at the beginning of class and five or ten at the end of it, and I could feel a difference just in an hour, you know. And I went up to the person that I was having trouble with and we, I said, 'Let's go have a cigarette.' You know, we went outside in the garage, you know, had a cigarette, fifteen, ten, fifteen minutes later, you know, X came back out to me and I asked if I'd give X a ride to the store. And I was very surprised 'cause, you know, that'd X even, you know, I mean we had worked everything out, and X actually came out and asked me for a ride. And I was, I said, 'Well, hell yeah. I got, you know, nothing against you.' You know?

As a result of the participation in the group, participants appeared willing to accept some blame of past communicating difficulties with other residents. They discussed how the group brought people together in a way that did not seem possible before; that participants appeared generally friendlier and less judgmental:

“Um, but it does bring you closer together whether you want to or not. I mean, but at least it’s all a common thread that, you know, those of us who did it, shared.”

Another participant shared a similar story:

So I think at first I kind of fought it. I was more curious, you know, of what it was like and it also gave me something to do with my time. But once I started there, I really enjoyed it and I noticed everybody else, people that were none motivated, were all of a sudden showing up to where usually these guys would change their mind within five minutes of going anywhere and they wouldn’t show up. But actually it was kind of cool because they actually showed up. I thought that was pretty nice, you know, too. And, you know, not only that, but some of them even missed work to show up there. So that’s, you know, that means there’s something good there. I thought it was pretty cool. It was a good group setting.

Impact of the intervention.

The participants also noted the impact on the outcomes specifically measured in the quantitative questionnaires. It was thought important to ask

specific questions about these factors as the questionnaires might have been challenging for some participants to fill out and might not reflect the true impact of the intervention on the participants. The specific issues prompted in the qualitative interviews thus revolved around the contents of the four measurement tools used discussed in Chapter 3; anxiety, impulsivity, mood and quality of life (QOL).

Anxiety.

Participants discussed some benefits derived from the intervention on their anxiety levels. One participant described how acceptance was a key concept that helped him cope with the anxiety. After the group, participants noted subtle changes in their behavior that they felt indicated lower levels of anxiety, one participant felt she was able to be more confident in communication with other people, including being able to look people in the eye directly when talking to them, something that was problematic in the past for her. Another participant discussed how he felt at ease in the group and felt that he was given more tools to cope with his anxiety during the course of the group. Participants also discussed how fear of other people decreased, and being able to slow down and “not do everything at once” reduced their levels of anxiety. The racing of the mind was described by some participants as having slowed down, along with being in the present moment reducing anxiety about the future. Another participant described well how the mindfulness practice changed his perspective,

not necessarily his situation, and acknowledged that his interaction with his peers was helpful in this endeavor:

Um-hm. Uh, you know, I still got the same problems but some of them are less important than they used to be. But, um, I guess, it taught me to relax a little bit about things in terms of, you know, I mean obvious things that I've should have known already but hearing it and dealing with it around other people, it brings it to the surface.

Impulsivity.

Participants did express that they were able to “think things through” more as a result of the mindfulness practice. It is of note how much of an impact the reduction in impulsivity had on the group dynamics as each time a participant was able to pause and bite his/her tongue instead of going into an argument with a fellow resident, that saved both of these persons and the entire house much grief and anger. There was also indication that those residents that had the most issues including with anger were getting the most benefit out of the group:

A lot of things have changed, you know, which has really helped me out. And being with the people that I was with during those sessions was a real growing experience because I got to actually see what it can do for

somebody that most people think there's not much hope for at all. You know?

One participant with self described anger problems prior to the intervention acknowledged that he appeared to gain more from it than some of the other participants. Some participants also found support in each other managing their impulsivity:

I work with his level because I know how upset he gets and then he'd work with me and I'll see it and we kind of cool each other down when something got out of place. For me, it's something that I haven't had in my life forever, I'd have to say.

Participants described being able to walk away from situation that in the past had caused great strife in the house:

...it's just better to walk away and think about why it's happening or just saying, 'I don't know what's bothering me right now, but I got to get away from it and relax.' You know? And it seems to work quite a bit. So every part of it is good.

In this way great trouble was avoided:

And I was out there because I wanted to say something about the smoke but I just, I walked back in the house, took about five minutes break and then went back out and opened the door and everything was fine with me. Stop it, nip it in the bud before it starts.

Increased body awareness also plays a part to help with stemming the tides of impulsivity. Noticing sensations in the body and when tension arises being able to ask yourself “where is the tension coming from” was described as useful for one participant, but this is one of the main desired outcomes of the mindfulness group as described in Chapter 2. Stopping oneself reacting like on autopilot to situations and sensations and pausing for a few seconds; to be able to reexamine thoughts, actions feelings and impulses plays a key part, and is certainly one of the main outcomes of mindfulness practice. Many participants described how being able to pause before making a comment or giving in to an impulse often averted great troubles:

I think, yeah, because like even now I’m, I think I’m more aware of that. When someone asks you something quick, and I’m a smartass and I know

it, and I don't mean to be, you know, sometimes, but it's just like, 'Wait. You know, think about that.' You know?

Participants apply different coping mechanisms, whether it is getting support from a group member or noting the aggravation and withdrawing for a while until the proverbial storm has passed. Withdrawing as they felt the tension rise was something many were not able to do prior to the intervention. Following the mindfulness class, it was an option that was mentioned as being a new tool in the toolbox available for a majority of the participants interviewed. Some participants also explained how the intervention cleared their thinking process:

So they can see it in me too. So, you know, as long as I can stop myself, I can do it. When something bad happens I got to go stop and think, 'Now why am I this way? What's causing this?' And, you know, it's like, 'Okay, one step back, think about it. I can't think about it that, don't get in that situation. Just kind of relax and go on whatever I was doing.' So that's how I work it and stuff, you know.

Another participant gave an example of some of the impulsive behaviors that had been curbed after the mindfulness program:

Well, I don't run around as much. I don't shop as much and I don't think, do things that I want to do. I try to just, I just try to regulate myself, just, I don't go to the store and buy a bunch of food when I want to. Though I just don't do the things I want to do though, I'm just have more boundaries. Just like if I want, like with food or pop, if I want, if I feel like. I mean just if I, sometimes if I feel like getting a pop, I don't get it though. I just try not to, I mean spending money. I guess that was what I did on impulse though. I don't buy things when I feel like it.

Mood.

Mood was also impacted by participation in the mindfulness group, and as previously reviewed in Chapter 2 there are some indications that this can be affected by mindfulness practice. Insight was developed on why a person was feeling this way or that: the "autopilot" was challenged. But one of the immediate benefits of mindfulness is an ability to stay in touch with the body instead of reacting blindly to stimuli. Participants are thus able to put a pause between stimuli and reaction:

And if something bad that day happens or I'm tired that day, what not, um, she'll say, 'What's bothering ya?' And then I have to think back why and

why it happened and why am I this way, you know, with the Mindfulness and the mediation part, or the mediation and then the yoga.

Participants described being engaged with the group and a reoccurring theme was the enjoyment that the participant derived from being a part of something that was new and engaging and interesting. How important it was being given an opportunity to try something new and seizing the opportunity to go. One participant described being at more peace with herself after engaging with the mindfulness program. Almost all of the participants described feeling more “at peace”, more “mellow”, more “cool” and more “relaxed” as a result of the mindfulness group and finding unexpected benefits on mood with the more physical aspects of the program. One of the participants that commented specifically on the benefits of the mindfulness activities on his depression levels said:

And to help fight that depression, the Mindfulness and everything else that I do helps me keep that depression away or hold it down to a minimum. Because, you know, when you start thinking and you're depressed, that's two bad things right there. So, yeah, it's amazing.

A change in perspective also appeared to accompany the practice as previously discussed. Instead of getting wrapped up in to one's own feelings and emotions participants appeared to be able to detach more and gain some distance on their thoughts and emotions that seemed to make a marked difference in their outlook and emotional processing:

And like I said, I get a lot of things, you know, drained out of me. My headaches are getting better and, um, I think I'm, I don't feel sorry for myself like I, there's more people I met, more people that are worse off than me.

Quality of Life.

Quality of life is a very broad concept but often seen themes were effects of the mindfulness intervention on sleep and pain and then physical health in general. Mindfulness has been shown to be helpful for people that struggle with various physical problems including chronic pain and insomnia, and these participants did indeed confirm these benefits in the interviews. Some participants described very concrete mindfulness methods they used to address their physical health problems:

“You know, my head would just go right up to here where now I just kind of, it kind of melts, you know, like the snow out there. It just kind of drains me of the whole thing.”

A few participants described improved sleep using methods learned in the mindfulness program. They described increased quality of sleep and that initiation of sleep was easier as the mind was not racing as much at bedtimes, which made falling asleep much easier for some of the participants. One participant started out calming himself down with the body scan and then falling asleep under the tones of his favorite heavy metal music, and this was a combination he felt that worked well for him. Another participant described how listening to one of the mindfulness exercises on a CD helped her fall asleep:

I don't even have to do that sometimes, you know. Like a, and it helps me sleep and, you know, it just kind of drains everything. I just think of that mountain and that tree. And I just, it washes everything away, you know...

Aside from the effects of the intervention on both sleep and pain levels participants described numerous other benefits of the intervention. Participants noted that they were able to do things after the intervention that they were not

able to do before. Being able to explore new things and being more open to more new things was an unexpected consequence for some of the participants:

And everything I do, like I go to the, I started school now at the Hennepin County. So I don't think I would have ever started that without probably the class because I'm thinking of myself and making myself better. So I'm doing that.

One participant pointed out the raw practicality of belonging to a group and having something to do that was constructive, almost regardless of the content:

Yeah, it helped. It helped. Again, you know, it gave me something to do with my time and I learned something different. So that was kind of neat in itself, you know. I've always been interested in all that kind, not interested, I think I was kind of interested but I didn't want to admit it. But, yeah, it helped me. I mean at least I wasn't sitting around.

Participants stressed the importance of being able to cope better with new situations as a part of doing the mindfulness course. Some pointed out that they learned a new way to examine their reality and their life situation after

participating in the group. Participants felt it increased their level of activity and engagement with life in general. A participant went so far as to state that she felt the program had a “cleansing” effect on her. Even two months after the end of the program ideas and concepts from the program keep on surfacing for some participants:

“It’s worth thinking about things like that and, you know, you’ll be doing something and then all of a sudden comes up with some idea that will come up in the program.”

Summary of results of qualitative interviews.

It is clear upon reviewing the results from the qualitative interviews above that the mindfulness intervention had a considerable impact on the participants:

Personal Reflection.

In this category participants described various factors in their background that affected their approach to and experience with the mindfulness practice. Participants described the struggles they faced coping with their disability and the level of frustration this caused them. Participants also described that it has taken a combination of solutions to help them reach recovery from both the physical and psychological issues they struggle with. They described that mindfulness fit well with the other things they were doing to aid in their recovery and appeared to

supplement these other approaches well. Participants further found that they often struggled with reaching some level of acceptance towards their disability; some had already taken significant steps towards this before the mindfulness intervention while others felt the intervention was especially helpful with this. Another issue that surfaced for some of the participants was the desire to take less medication and reach a balance between pharmacological and non pharmacological interventions. They described the need to “just want a pill” to fix “all of my problems” while knowing that this was not a permanent or rational solution. The non pharmacological nature of the intervention was therefore especially welcome for the participants. There also was discussion among the participants on the importance of their sobriety on their overall quality of healthy and how past struggles with their addictions played a significant part in their story.

The Mindfulness Practice.

Participants discussed main issues surrounding the actual practice of mindfulness. This included adherence issues that surfaced for many of the participants. They described how helpful the group setting was in practicing the mindfulness, and how challenging it was to continue the practice outside the group setting. They also described how certain exercises learned in the group were still keeping the practice alive for them, while others were gone and forgotten. It also surfaced for many participants what they liked about the group

and group practice and what they liked less. One participant had concerns that the mindful eating exercise had increased her appetite “too much”. Most of the participants only had positive feedback concerning the group, some relating slight to moderate benefits from it, while others described more dramatic results.

Community.

Community themes frequently surfaced for many of the participants. They described how the mindfulness group had affected the dynamics on the residential facilities they were living in. Participants described how new relationships were born and old ones reinforced. Participants that did not necessarily get on well together in the past now were doing better in communicating with each other, and in some instances new friendships were formed. Participants also described how the empathy between the group members was increased over time as a result of the mindfulness intervention. Sharing mutual vulnerabilities and experiences created a sense of understanding between the group members and sometimes this understanding made it possible for some participants to react from a place of empathy instead of one of resentment towards fellow group members. The group participation also appeared to increase the sense of unity among the group members, according to some group members, as well as making communication within the group and between group members smoother. Quite a few group participants described

participants being able to resolve conflict more efficiently as a result of the mindfulness practice.

Impact of the Intervention.

As the name implies, the comments belonging to this category include descriptions from the participants regarding how the intervention impacted them when it comes to the four key outcome measures employed in the quantitative section of this study. The participants described certain beneficial effects on their anxiety as a result of participating in the mindfulness group. This included less fear of the future, as they now had tools to focus more on the present, and less racing thoughts. Participants also felt the intervention helped reduced their levels of impulsivity. This was evident by an increased ability for some participants to “think things through.” Many verbalized an increased ability to withdraw from situations where they previously had engaged in escalating verbal altercations with other residents. Participants did discuss some improvement in their mood related to the mindfulness intervention. One participant described direct positive effects on his level of depression while others described having more choice in how they felt after completing the program and being able to identify factors affecting their mood and thus having more choice in how their mood was at any given time. Participants also described various benefits the group had on their overall quality of life. Some participants had a sense of overall improved well being while others noted effects on specific areas such as decreased levels of

physical pain and increased quality and duration of sleep and less trouble initiating sleep.

Staff perspective.

In an attempt to get a more comprehensive picture of the effects of the intervention, an interview was conducted with a staff person involved with both residential facilities where the intervention was delivered. The interview focused on the staff person's perspective of the impact of the intervention on individual participants as well as the group as a whole. The staff person described improved overall outlook and behaviors in both houses as a result of the intervention, especially with those participants that appeared more engaged with the intervention. Staff person echoed what other participants had stated that participants were now able to walk away from situations that had led to conflict in the past:

For the other resident, X is able to somewhat detach from the group when there are things going on that X doesn't approve of compared to previous, X would be right in the middle of it, you know, adding to the argument or the disruption. So X is able to walk away, which is huge for this person.

The staff person had also noted that the overall atmosphere in the houses appeared somewhat improved after the intervention and that residents were now

organizing events more on their own, as before staff person had to be more instrumental in this process. Staff person also described that less intervention was needed to resolve conflict after the mindfulness program:

A couple of them have taken a greater responsibility, are more comfortable and kind of stop themselves. But there was a lot of fighting before. Now they're able to actually walk away.

It was the staff person's impression that of the twelve persons that completed the group at least five gained significant positive effects from participation in the group. Staff person further expressed that the individual improvement had rippling affects in both houses so in both conflict is markedly decreased since the time of the intervention. Staff person also noticed more patience and consideration among the participants as well as a more calm and tolerant attitude towards people in general. Staff person further noted that the participants appeared to notice their feelings better that then helped them regulate them more efficiently. Describing these effects on one participant staff person said:

And X seems more mature and X very responsible now for X own actions compared to passing the blame. 'This is why I did it.' Now X is looking to why in Xself X did it.

Staff person also described effects on another participant where the participant went through a challenging event and was able to do it calmly and be present with the experience. The staff person described that the participant was able to stay calmer during a trying time for participant than was possible before the intervention. Staff person noted more cohesiveness in the group and less discord over time. Staff person also noted an increased ability to problem solve and set appropriate boundaries with each other that then prevents situations from escalating that would often get "out of control" before the group, but is less common now.

Summary of interview with staff person.

The interview with the staff person validates many of the themes derived from the interviews of the participants. Staff person touched on the increased cooperation, increased sense of empathy in the group and the ability to walk away from trouble as clear benefits derived from the group participation. Staff person further echoed the impression that the clients that were struggling the most with anger and impulsivity issues were the ones that appeared to derive the most benefit from the group participation. It is notable how similar the benefits

staff person notes are to the impressions and experiences described by the participants and further establishes the validity of the analysis of the qualitative interviews with the participants.

Chapter 5: Discussion

This was mixed methods pilot study on the impact of an adapted mindfulness intervention on various psychosocial outcomes of persons suffering from the co-morbidities of substance use disorders and traumatic brain injury. Quantitative measures included impulsivity, depression, anxiety and quality of life while the qualitative part of the study focused on the experiences and perceptions of the participants about the mindfulness intervention.

Mindfulness and the SUDs/TBI Population

Participants described various factors in their background that affected their approach to and experience with the mindfulness practice. This is especially important to review as it gives us a glimpse in to where the participants were “coming from”, physically and mentally, and how important it is we look holistically at their rehabilitation. Their descriptions about how imperative it is for them to approach their problems from many different directions are quite compelling. The participants illustrated that a combination of many different solutions is needed, social and psychological, pharmacological and non pharmacological, to adequately address their needs. The participants expressed concern that if one of these approaches was over emphasized at the cost of others it could have adverse consequences for them. This is a compelling reason to stress the integration of solutions such as mindfulness that fit quite well with

other treatment approaches, including the 12-step model, cognitive behavioral therapy and psychotropic medications in the rehabilitation of the SUDs/TBI population.

Trouble with adherence after the group was an issue raised by many of the participants after the end of the intervention. Participants discussed how much more difficult it was to continue the mindfulness practice after the support of the group itself was no longer available. The overwhelming positive feedback from the participants regarding the group activities and the other mindfulness activities indicates that this intervention is a good fit for this population, in this setting. The group itself was conducted in one of the residential facilities from which the participants were recruited. This meant phones ringing, people coming and going and cats fighting during the group, all affecting the group process.

Despite this participants appeared to appreciate the location of the group and enjoyed being a part of it. They appeared to welcome that the intervention came to them, not the other way around, as is the usual case with group interventions. The preference of participants about what specific exercises they liked varied greatly, indicating that after the initial intervention perhaps a more individual approach might be in order, where participants can focus on those aspects of the mindfulness practice they feel fit their needs the best.

It is clear upon analyzing the interviews that the impact of the mindfulness intervention on the group dynamics was profound and perhaps future studies

should include quantitative measures that capture these effects more efficiently. Participants described how as a result of the intervention relationships were improved and friction decreased in both residential facilities. Participants described that the intimate sharing that sometimes occurred in the group, helped them have more understanding and empathy with other participants. This might indicate that knowing each other's story would be helpful for residents in facilities such as the participants lived in at the time of the study and that ongoing groups would be a useful clinical tool to reduce friction among residents at such facilities.

Impulsivity

When comparing the total scores of the BIS in the present study to other related populations, one study on the impulsivity levels of former substance abusers revealed that those participants had lower BIS scores 57.6 (14.5) compared to the participants of the present study indicating a lower level of impulsivity (Bond, 2004). In another study persons with non aggressive brain injury had a total score of 60.0 (12.9) and aggressive brain injury 64.5 (12.9) which are also somewhat lower scores on average than the participants in the present study (Greve et al., 2001). The participants of the present study scores were however considerably lower on average compared to groups that are deemed on the higher end of the impulsivity spectrum including violent male offenders whose total score was 74.5 (18.9), and a population of hospitalized

Bipolar disorder patients whose total score was 75.1 (14.3) (Dougherty, 1999; Smith, 2006).

Impulsivity is a major issue with people who have been diagnosed with substance use disorders and traumatic brain injury. As reviewed in chapter 2, increased levels of impulsivity lead to increased general psychiatric morbidity, poorer substance use outcomes, and general worsening of decision making skills (Evenden, 1999; Moeller et al., 2001). Given that mindfulness practice encourages reflection and insight, it was anticipated that participating in an 8 week mindfulness course may impact the impulsivity levels of the participants in a positive way. Using the Barratt Impulsivity Scale, no significant change was found in impulsivity scores over time for this population. Despite this the qualitative interviews revealed that the impulsivity related behavior of participants appeared positively affected by the mindfulness intervention. An often named example was that participants were now able to “walk away” from confrontations that in the past had frequently caused great conflict in their place of residence. It can be theorized that the practice of mindfulness contributed to this ability to “walk away”.

There were no previous studies found that have demonstrated the benefits of mindfulness practice on impulsivity, and although there are studies that indicate a correlation between higher levels of mindfulness and decreased levels of impulsivity this has never been demonstrated in a clinical research study

(Brown, 2003; Lattimore, Fisher, & Malinowski, 2011a). The lack of clinically significant impact of the intervention on participants can be explained by there being no therapeutic effect of mindfulness on impulsivity, but it could also result from the low number of participants. The results from the qualitative interviews give an indication that it might be the latter.

Quality of Life

Compared to normal population means the scores on the SF-36 for the participants were considerably lower as can be expected due to the participants numerous health issues. For example the mean US population norms for ages 45-54 years for the *general health perceptions* subscale are 71.76 and for ages 65-74 years 62.56 while the scores for T1 to T3 for the participants were respectively 51.53, 54.23 and 46.25 on the same subscale (Funk, 1997). A similar difference can be found comparing the participants scores on the *general mental health* subscale, to US normal population scores, that range from 75.33 for ages 45-54 years to 76.87 for ages 65-74 while the research participants scores ranged respectively from T1 to T3 52.62, 53.54 and 50.67 (Funk, 1997). This trend of the participants scoring considerably lower than US population norms over the lifespan was noted in all subscales of the SF-36, clearly highlighting the significant mental and physical impairments faced by the participants of the present study.

The only change over time that reached statistical significance in the quality of life measurements for this study was a change in a negative direction on the *general perception of health* subscale of the SF-36. There was a slight improvement in the general perceived health status between T1 and T2 but considerable negative changes between T2 and T3. This can hardly be explained by the intervention itself as the most significant changes in the scores occurred after the end of the intervention. The explanation could lie in the fact that the scores on the subscale were somewhat improved after the intervention, which signals a slight tendency that the intervention might have affected the participants positively. The scores decreased significantly after the intervention, which might indicate that the slight improvement they felt after the intervention was more than fully negated after the end of the intervention. According to the qualitative interviews many of the participants dramatically decreased their practice after the end of the intervention. This might have served as “shock” enough to negate the positive impact of the intervention and even cause negative changes beyond what the participants experienced at baseline regarding their *perceived general health status*. An alternative explanation is that the intervention increased awareness and insight and led to recognition that their health was poorer than they had presumed prior to the mindfulness program.

Participants described a general improvement in well being as a result of the intervention, but sometimes felt the positive changes achieved by the

intervention were not maintained after the end of the intervention. These results are in line with five of the eight subscales of the SF-36, and indicate that perhaps ongoing support is needed for this population to continue their mindfulness practice and thus maintain the positive effects of the intervention on their quality of life. Previous studies on the impact of mindfulness practice on quality of life have noted some impact of mindfulness practice on quality of life scores using the SF-36, including the only published study on the effects of mindfulness on a TBI population, where there was a significant pre/post change in the mental health summary scores of the SF-36, while no other significant changes were noted on any other subscale of the SF-36 (Bedard et al., 2005). The scores on the two summary scales in the present study were somewhat lower compared to US population norms but compatible to what other researchers have found for other TBI populations. But lower functioning is indicated on mean group scores below 47 (Guilfoyle et al., 2010).

Anxiety

Comparing the anxiety scores to other studies done with the TBI population the mean scores for the participants of the present study are compatible to other TBI populations. In one study persons with TBI scored 41.89 (16.20) on the state anxiety scores and 44.45 (15.14) on the trait anxiety scores while the trait anxiety scores of the participants in the present study were 47.31

(10.44) for T1, 45.23 (10.90) for T2, and 43.42 (10.87) for T3 and for state anxiety 43.38 (8.19) for T1, 42.31 (11.38) for T2 and 42.67 (10.43) for T3 (Curran, 2000).

There were some encouraging trends noticeable for the anxiety levels of the participants on the quantitative measures. The decrease in trait anxiety was positive and would indicate that given adequate sample size a noticeable impact could be observed on the anxiety levels of persons suffering from SUDs/TBI after practicing mindfulness. This is in line with previous studies where mindfulness based interventions have been shown to reduce anxiety levels significantly for participants (Hofmann, 2010). The participants also described in the qualitative interviews some direct benefits of the intervention on their anxiety levels. But this is in line with the trends noted in the STAI scores over the course of the study. Participants further mentioned improvements in outlook related to anxiety such as decreased racing thoughts and less fear of the future.

Depression

Depression is a pervasive issue for people who are diagnosed with substance use disorders and traumatic brain injury. While there is some data supporting that non-pharmacologic interventions such as mindfulness may be effective to treat depression, it is often a chronic issue that, as the participants pointed out, frequently requires a multi layered approach (Chiesa, 2010a). The

depression scores of the participants in this study remained nearly unchanged over the course of the study. But in this context it is important that a formal assessment of depression did not take place as a part of this study, as the CES-D is a screening tool for depression. It does offer important insight into the symptoms of depression faced by the participants of this study. However some general effect on mood was noted by some participants in the qualitative interviews. They described both indirect and direct effects on mood and depression levels, although this was not reflected in the quantitative results. A possible explanation for this difference might be that the depression scale is more specific than the feedback given by the participants and thus captures a more narrow view of depression than the qualitative interviews did. The difference can also be explained in part by the low number of participants, so the effect size needed could not be produced. It is also possible that the mindfulness intervention did not have a strong impact on depression levels on this sub population due to its complexity of physical and mental health issues. Or perhaps a stronger and longer dose of mindfulness was needed to impact depression levels in a significant manner for this population.

Strengths and Limitations

Quantitative issues.

The main strength of this design is that with a within group design the outcome measures are being submitted to the same participants, eliminating any possible difference in the two comparison groups that one would otherwise need to control for. A more simple pre/post design, with only two points of measurements was certainly possible in this case but adding in measurement points through a times series design does strengthen the design of the study and helps to support the assumption that changes in the dependent variables are attributable to the independent variable (Polit, 2006). This addresses the threat of maturation and lessens the effects of both possible testing and Hawthorne effects (Robson et al., 2001). The intervention was not administered by the researcher, but an experienced MBSR instructor, which is also a trained and licensed therapist. The instructor worked closely with the researcher and facility staff to adapt the MBSR program to the needs of this population over a period of almost two years.

There were a number of limitations in this study. First and foremost is the low number of participants. This affects the statistical power in the statistical analysis needed for the study, but also explains why the within group series was selected, as in an experimental versus control group design the number of participants belonging to each group would be half the size of the proposed

group size in the current design.

The lack of a control group is also a concern, this means that there was no control over the various external variables that might affect the participants during the time of the intervention and explain changes in outcome measurement scores. These phenomena sometimes referred to as "maturation" and/or "history" can strongly effect the internal validity of a study and remains major issues in within group designs (Polit, 2006, chapter 9). The lack of a control group also means there was no control for attention and group support in the design, so there is no way to tell if simply belonging to the group, regardless of its content, and getting the attention that the participation in group and outcome measurements provided, caused changes in the dependent variables. There was some indication in the qualitative interviews that for a part of the participants merely belonging to the group played a significant role in their positive perception of the effects of the intervention. It is challenging to separate the effects from the mindfulness practice from the effects of the group, as the group setting is intentionally used as a therapeutic tool in the original MBSR curriculum this research intervention was based on.

The weekly follow up phone calls could have had therapeutic effects, as was their intent, but these are not a part of most MBI and thus make comparison between the effects of the intervention used and other MBI more problematic. The poor compliance to the follow up phone calls did negate those effects

considerably though.

Finally the three measurement points, the qualitative interviews, and the weekly mediation calendar all created quite a burden on the participants, and increases the risk of missing data points which have already proved an issue in past studies with a similar population but providentially occurred less than anticipated in this study (Agresti, 2009, ch. 14; Bedard et al., 2003).

Only two points of missing data could have become an issue in the study. First of all, there was one participant who was not able to finish the BIS at T2 completely. Fortunately due to the nature of how the BIS is computed and the limited number of data points that were missing for the participant this did not affect the scores of the individual nor the mean scores of the group significantly. There were three dropouts that only completed the first set of measurements so the decision to not include these in the study was fairly simple. There was however one participant who completed measurements at T1 and T2 but not at T3 and not the qualitative interview. Due to the nature of the data analysis used, these were deemed to be minimal issues and his scores were included in computing the difference between means over time in the longitudinal data analysis.

Qualitative issues.

The qualitative interviews that were conducted with the participants at the conclusion of the intervention added value to the study by allowing the

researcher to gain information otherwise not available to him. Qualitative interventions can prove an important part of a study such as this, where no previous research is present, to identify unexpected consequences of the intervention for the population. (Polit, 2004, ch. 12). The qualitative interviews helped to further explore in depth the experiences of the participants regarding the mindfulness intervention and helped shed light on the findings of the quantitative measures (Polit, 2004, ch. 12). These interviews also attempted to answer why the intervention did what it did, and compensate for any shortcomings of measurement tools that might be present for this population (Sandelowski, 1996).

There is a case to be made to use qualitative methods in mindfulness research as the effects of mindfulness intervention can often be quite broad and subtle. Furthermore the low number of participants in the study makes the effects of the intervention extremely hard to measure using traditional quantitative measures as the effect size of the intervention would need to be very high for it to become statistically significant. Thus the inclusion of the qualitative interviews proved a key factor in shedding more light on the impact of this adapted mindfulness intervention on the SUDs/TBI population.

One issue that surfaced in the write up of the qualitative results was whether to specify at each quote which participant shared each view point. It was decided not to do this. The main reason for this decision was that the study

participants expected anonymity in the sharing of their views with the researcher. Even if using aliases, patterns can be discerned in a group this small. Due to the limited number of participants and the specific issues and circumstances of each participant, it was felt by the researcher and other experts he consulted with that the anonymity of the participants would be greatly threatened if quotes were linked with specific individuals. The down side of this is that the reader has no way of knowing that the same person did not offer most of the quotes in the study. This increases the risk of the qualitative part of the study not representing the view points of all of the participant and that quotes might have been "cherry picked" from those participants that liked the intervention the best. In the final analysis, the anonymity of the participants was deemed more important than the detail that might have been provided had more detail been offered about the participants making various statements.

Another possible issue is the fact that the researcher himself conducted the qualitative interviews. It is certainly possible that the participants did not want to disappoint the researcher and thus slanted to a more positive trend of feedback in the qualitative interviews. This could also in part explain the seeming dissonance between the qualitative and quantitative results. Furthermore the issue of the incentive also might have played a part as the participants got the final part of the incentive after the qualitative interview, but this might have further prompted the participants to please the researcher by providing positive

feedback about the intervention and the mindfulness experience as a whole.

The use of a grounded theory approach in this study can be debated. Although the modified version of grounded theory used (abbreviated social constructivist approach) is quite different from the original grounded theory presented over four decades ago, many might object to its use in a study of this kind. Both qualitative and quantitative data was available to the researcher which poses challenges for more traditional versions of grounded theory as data is not solely surfacing from qualitative data, as does the preliminary nature of this pilot study which makes theory generation based on the data obtained from the study premature.

When discussing limitations of qualitative studies, one is immediately thrown into a cauldron of debate on the merits and flaws of this category of research methods. The generalizability of qualitative studies has been debated much over the years. It is clear that the experience of the participants that are represented in the qualitative analysis varies and each quote given or theme identified can certainly not tell us the absolute and objective truth about the phenomena under investigation. But it can tell us *a truth*; give us a glimpse in to recesses of the mind that standardized lists can never reach, and thus shed light on aspects of intervention effects that would never see the light of day under other circumstances.

Other issues.***Practice logs.***

The practice logs were seldom filled out by the participants, and if filled out not adequately so. In fact, none of the participants filled these out to the extent that any useful data could be gleaned from the practice logs. The logs could have been made a more integral part of the intervention; perhaps requiring the participants to bring them in each week for review would have been helpful. The participants verified in the qualitative interviews that the nature of their disability made the logs quite challenging for them to fill out and follow up with. And perhaps these should not be included in future studies with this population due to their levels of disability.

Phone calls.

Adherence with the weekly phone calls was also quite poor in this study. An explanation of this might be that the participants preferred the researcher called them in the afternoon or early evenings on weekdays and this cost the participant's "minutes" on their cell phones. This again caused them to ask the researcher to call the home phone in their respective residential facilities rather than their cell phones. This made it quite challenging to reach participants consistently as often the home phones were not answered or someone answered, and went to get the person of interest but no one came to the phone, or the person was not there on the agreed upon time. It is likely that economic

reasons are the main reason for the difficulty of weekly follow up through phone calls, and in future studies with participants of lower socio economic status it might be prudent to provide participants with cell phones or "minutes" on their cell phones to further facilitate compliance with the weekly phone calls. Lack of privacy might also have been an issue for some participants as although the home phone was wireless making it possible for them to bring it to their room during the conversation with the researcher, some clearly did not opt for this and thus were reluctant to share more intimate aspects of the mindfulness experience with the researcher over the telephone.

Theoretical and Clinical Implications

Although the research field of mindfulness is certainly a budding field of inquiry, this study offers insight into many areas that have been under very limited scrutiny by researchers so far. The impact of a mindfulness intervention has never been studied before in this particular subpopulation. There is one study published on the impact of mindfulness on the TBI population but this excluded the participation of persons suffering from SUDs (Bedard et al., 2003; Bedard et al., 2005). The dropout rates were much greater in this study than the current one, as only 10 participants of 19 included in the study completed all pre and post measures or 53%; the same ratio in this study was 12 out of 16 or 75%. A possible explanation on this difference was the careful follow up possible by

the researcher and the incentives offered at the conclusion of each measurement point in the present study.

There have been no previous attempts of measuring the effects of mindfulness practice on impulsivity levels of any population. And although positive trends in levels of impulsivity were not statically significant the qualitative interviews did indicate that the mindfulness intervention was helpful for some aspects of impulsivity for many of the participants. This is especially intriguing as researchers continue to establish the relationship between mindfulness and impulsivity and should inspire further work in this area.

The results from the qualitative interviews do indicate that the group itself appeared to have considerable impact on the cohesiveness of the participants at the residential facility where they lived during the course of the study. It eased communication and decreased friction. There was also a trend noted that anxiety was decreased as a result of the intervention. This might signify that clinicians involved in the ongoing support and recovery of this population might consider having ongoing support groups with different topics available for this population, which could help cohesiveness and increase empathy among the participants.

The intervention did not show any meaningful harmful effects on the participants. Many participants expressed that they truly appreciated the intervention and felt it made a significant positive impact on the quality of life and overall functioning. The results of this study should encourage mental health

providers and rehabilitation specialists to think of mindfulness as one of the options that might be helpful in the holistic rehabilitation of SUDs/TBI population. Many of the qualities of mindfulness fit especially well with the SUDs/TBI population range of disabilities and its application has excellent face and theoretical value for persons suffering from SUDs/TBI. Although the present study failed to demonstrate this in a convincing manner, it did nothing to disapprove it either.

It does appear important to adapt the mindfulness intervention to the needs of populations with distinctive needs, such as the TBI population, including limiting the amount of homework and reducing and simplifying didactic content. It also appears important to provide continued support for mindfulness practice after the end of the intervention itself. This might be in the form of a weekly or monthly follow up group, which may help with continued mindfulness practice. But maintaining the mindfulness practice proved a significant issue for many of the participants, and they did voice that ongoing support to practice would have been helpful to maintain and expand upon their practice. This difficulty of follow up with practice seems to have been less of an issue for other populations in past research studies and emphasizes the unique needs of the SUDs/TBI population (Grossman et al., 2004).

The qualitative interviews indicated that the participants enjoyed the mindfulness intervention and at the very least felt empowered by participating in

a non pharmaceutical based intervention to address their symptoms. Clinicians working in this field could consider mindfulness based interventions as one piece of many in the puzzle that is meeting the needs of the SUDs/TBI population. It is an inexpensive and safe method that appeared to fit the needs of the participants in this study well although the exploratory nature of this study and the lack of statistically significant results make any clear cut clinical recommendations premature.

Future Research

It would have been interesting to ascertain the severity of the TBI for the participants, but to adequately determine this, comprehensive access to the patient's medical records would have been needed, as well as reliance on the proper documentation of their injury (McCauley, 2001). The logistical issues involved in this, places this out of the scope and means of this research study.

The results of this study indicate that further examination is needed into the effects of mindfulness practice on impulsivity. As reviewed in previous chapters the positive effects of mindfulness practice on impulsivity has strong face value, but more work is needed on this subject. If mindfulness could even slightly improve levels of impulsivity it could dramatically affect the quality of life of many populations that suffer from this affliction. This includes persons

suffering from TBI, SUDs, ADHD and Borderline personality disorder to name a few. But impulsivity is a significant part of the disability of these populations.

Further work also needs to be done on what interventions or combination of interventions seem to fit the SUDs/TBI population well; starting with mindfulness. The results of this study indicate that mindfulness might over time earn a place as a part of the treatment plan for persons suffering from SUDs/TBI. But larger studies are needed, with a control group to isolate the effects of the mindfulness practice versus the effects of the group participation itself.

Future studies could be done on a further adapted mindfulness intervention for the SUDs/TBI population, where more support would be provided to participants to fill in practice logs and booster sessions would be held every other week to encourage continued mindfulness practice.

Conclusions

Although this study was not sufficiently powered to demonstrate a notable impact of mindfulness practice on quality of life, depression, anxiety and impulsivity, the qualitative interviews did reveal that the participants appreciated and enjoyed the mindfulness intervention. There were also many perceived noteworthy benefits from their participation in the program. This reveals that this population is hungry for different ways of getting better. They yearn for someone looking at their recovery holistically. It also illustrated further research, sufficiently powered, is worthwhile.

The intervention was adapted to the needs of the participants, both through a review of the literature and a trial and error process. There might be some room for improvement though still in the application of the program. Continued work on the adaptation of the MBSR program to fit the needs of the SUDs/TBI population is warranted. Ongoing support for the participants is also crucial and perhaps future groups need to be smaller so a more individual approach can prevail.

A compelling question remains if persons with traumatic brain injury can truly grasp the concepts of mindfulness to the extent that it benefits them. The answer is not to be found in the quantitative part of this study, but the qualitative interviews would indicate that this is the case. The participants did discuss many of the more subtle concepts of the mindfulness intervention. They described several known benefits of mindfulness practice, albeit using different words and concepts than are used to describe them in the research literature. This indicates an astute level of insight in to the intricacies and dynamics of mindfulness practice.

The findings from this study, as exploratory as they are in some aspects, do indicate that an adapted mindfulness intervention may be a viable treatment option for the SUDs/TBI population. The SUDs/TBI population suffers from many significant health issues, both physical and psychological. The adapted mindfulness intervention is an inexpensive, safe and fairly side effect neutral

intervention that might be considered in the future as a part of a holistic approach in the psychosocial rehabilitation of persons suffering from the co morbidities of substance use disorders and traumatic brain injury. However more evidence is needed, and building up an evidence base for an intervention always starts with one study.

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Appendix A

Probing Questions for Qualitative Interview with Participants

What about the effects of the intervention on your mood?

What about the effects of the intervention on your sleep?

What about the effects of the intervention on your anxiety levels?

What about the effects of the intervention on your relationships?

What about the effects of the intervention on your physical health levels?

What about the effects of the intervention on your activity levels?

What about the effects of the intervention on your energy levels?

What about the effects of the intervention on doing things without thinking them through?

What about the effects of the intervention on feeling restless?

How did the practice of mindfulness go for you during and after the group

Appendix C

Overview of the Adapted MBSR Curriculum (Created by Jean Haley, LICSW)

Session One

Goals:

Introduce concept of automatic pilot

Introduce mindfulness as means of becoming aware of when we're operating on automatic pilot so that we can make healthy choices in life

Experience the basic elements of mindful awareness: slowing down and paying attention to present-moment experience nonjudgmentally

Experience mindfulness through mindful eating and body scan exercises

Session outline.

10:30 Introductions

10:45 Ground rules, group structure and format

10:55 What is mindfulness?

11:00 Mindful Eating Exercise

11:15 Body Scan

11:25 Discussion

11:30 End

Home practice.

Mindful Eating 3x per week (breakfast, lunch, and dinner)

Body Scan 6x per week

Daily Tracking Sheet

Handouts

Groundrules

Definition of mindfulness

Homework Assignment

Body Scan CD

Session Two**Goals.**

Re-introduce concepts of automatic pilot and mindfulness

Continue to practice ability to slow down and pay attention through practice of the body scan

Introduce concept of perception: how we perceive an event affects how we react or respond.

Experience the effect of perception on how we think and feel through the

Walking Down the Street exercise

Session outline.

10:30 Welcome and discussion of homework and common challenges

10:45 Body Scan
11:05 Perception
11:15 Perception Exercise
11:25 Discussion
11:30 End

Homework

Body scan 6x per week
Noticing triggers 1x day
Daily Tracking Log
Noticing Triggers Worksheet
Handouts
Common Challenges Sheet
Trompe l'oeil pictures
Daily Tracking Log
Noticing Triggers Worksheet
Homework Assignment

Session Three

Goals.

Introduce mindful movement as another way to pay attention to the body and balance the energy before sitting meditation

Introduce mindfulness of breathing as a simple way to return to the present moment and bring awareness to what is happening in the present moment.

Introduce brief formal sitting practice as way to develop the “muscle of mindfulness”

Introduce the SOBER breathing space as way to drop into the present moment throughout the day to reduce stress and decrease reactive habit patterns

Session outline.

10:30 Welcome and discussion of homework

10:45 Mindful movement

11:00 Introduction to sitting meditation

11:05 Brief guided sitting meditation with awareness of the breath

11:15 Discussion

11:25 Sober Breathing Space

11:30 End

Homework.

Practice mindful movement 6x per week

Practice sitting meditation 6x per week

Practice sober breathing space at least 2-3x per day when feeling stressed

Daily Tracking Log

Handouts

Sitting meditation CD

Sober Space Handout

Daily Tracking Log

Homework Assignment

Mindful Movement Picture

Session Four

Goals.

Continue practice of mindful movement as way to calm the mind and body and be present to what is happening in the body

Continue practice of sitting meditation as way to develop ability to stay present

Continue discussion of how to use SOBER breathing space in challenging situations

Practice exercise related to using SOBER breathing space in challenging situations

Introduce mindful walking another way to be aware in daily life

Session outline.

10:30 Welcome and homework review

10:45 Mindful movement

10:55 Sitting meditation

11:10 SOBER breathing space in challenging situations

11:15 Exercise on SOBER breathing space in challenging situations

11:25 Discussion

11:30 End

Homework.

Practice sitting meditation 6x per day

Practice mindful movement 3x per day

Practice SOBER breathing space regularly and especially in challenging situations

Homework tracking log

Handouts

Homework Tracking Log

Homework Assignment

Walking Meditation Handout

Session Five

Goals.

Continue practice of mindful movement

Continue practice of sitting meditation

Introduce concept of mindful walking and practice it

Session outline.

10:30 Welcome and homework review

10:45 Mindful movement
10:55 Sitting meditation
11:10 Introduction to mindful walking
11:15 Mindful Walking
11:30 End

Homework.

Practice sitting meditation 6x
Practice mindful movement 3x
Practice mindful movement in place where regularly walk 4x
Practice sober breathing space throughout the day and especially during
challenging times
Handouts
Daily Tracking Log
Mindful Movement Pictures

Session Six

Goals.

Continue practice of mindful movement
Continue practice of sitting meditation
Introduce concept of mindfulness in interpersonal situations
Practice mindful communicating

Session outline.

- 10:30 Welcome and homework discussion
- 10:45 Mindful movement
- 10:55 Sitting Meditation
- 11:15 Mindfulness in interpersonal situations
- 11:20 Interpersonal mindfulness exercise
- 11:30 End

Homework.

- Practice mindful movement 3x
- Practice sitting meditation 6x
- Practice SOBER breathing space throughout day especially in challenging situations
- Practice staying mindful when communicating with others
- Handouts
- Homework Assignment
- Daily Tracking Log
- Guidelines for Mindful Communication

Session Seven**Goals.**

- Continue practice of mindful movement

Continue practice of sitting meditation

Introduce concept of lovingkindness towards ourselves and others

Practice lovingkindness

Session outline.

10:30 Welcome and homework review

10:45 Mindful movement

10:55 Sitting Meditation

11:05 Introduction to lovingkindness meditation

11:15 Lovingkindness practice

11:25 Discussion

11:30 End

Homework.

Practice mindful movement 3x

Practice sitting meditation 6x

Practice lovingkindness meditation 3x

Daily tracking log

Handouts

Homework Assignment

Lovingkindness CD

Daily tracking log

Session Eight

Goals.

Review course and how it relates to daily life

Discuss how individuals will make use of mindfulness to prevent relapse and stay healthy including regular practice, meditation buddies, etc.

Practice lovingkindness

Closure

Session outline.

10:30 Welcome and homework review

10:45 Review of course

11:00 Discussion of continuing practice

11:20 Lovinkindness

11:30 End

Appendix D

Consent Form

You are invited to be in a research study on the impact of a mindfulness program to be started soon at Vinland National Centers' supportive housing (Vinland). You were chosen to be a part of this study because you now live at Vinland. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study will be done by Gisli Kristofersson, RN, CNS, PhD student, University of Minnesota. He is the primary investigator of this study (PI). It is funded by The Trust for the Meditation Process.

Background Information

The purpose of this study is to assess the effects of a mindfulness group that will be started soon at Vinland. And to see if this is something that might help people that have a brain injury and have abused alcohol or drugs in the past.

Procedures

This study has two parts. The first part is participating in the mindfulness program. This means:

1. Participate in a mindfulness course with eight weekly classes, each lasting one hour to one and a half hours.
2. Participating in a two and a half hour meditation retreat towards the end of the course.
3. The program includes meditation exercises and mild stretches and movements. These will be done either standing up or sitting in a chair.
4. You will also get a telephone call every week while the program is going on. They will last about 5-10 minutes and will focus on how you are doing generally in the program and with the homework. Also whether you have any questions or concerns about the program.
5. The homework suggested will take anywhere from 5-25 minutes a day. It will involve activities that you have already tried in the class. You do not have to do the homework but it will likely help you get more out of the program.
6. You will also be asked to keep a log of the homework you do each week. This should only take you about 3-5 minutes a day. It involves writing

down how much time you spend each day on the homework during the course.

If you agree to be a part of the research part of the program, we would ask you to do the following things in addition to the activities stated above:

1. You will be asked to answer some multiple choice lists at the beginning of the program, at the end of the program and two months after the program is done. This will take about 30 minutes each time.
2. You will also be asked to answer a few questions about your experience with the group. This will be about a two months after you finish the course, in a one to one interview with the PI. This interview should not take more than 45 minutes. It will be audio recorded so the information you give us can be used better. Only the PI will have access to these recordings. They will be kept in a locked closet in the University of Minnesota, on a password protected hard drive.

Compensation

There is no compensation for participating in the mindfulness program only. Only those participants who decide to participate in the research part of the study will be compensated. They will receive a \$20 gift card for each multiple choice list they answer (three total). They will also receive a \$20 gift card for participating in

the interview which takes place about a month after the mindfulness program is done. Those who participate in all four of these activities will further receive a \$20 gift card. This means the highest amount you can receive for taking part in the research part of this study is \$100. If you want to drop out of the study at any time, you may keep and use the gift cards you have already received.

Risks and Benefits of being in the Study

The study has some risks. Mainly, that answering the forms and questions about the group might bring up some bad memories or thoughts. If this happens please let the researcher or Vinland staff know immediately.

The benefits to participation are: it is possible that you could feel better as a result of your participation in the group, both physically and emotionally. Also, you could help make the mindfulness group better with your participation in the research part of the program. This could help future residents better enjoy the group.

Confidentiality:

The records of this study will be kept private. In any sort of report we might publish, we will not include any information that will make it possible to identify you. Research records will be stored securely and only researchers will have access to the records. Your interview will be recorded, but these recordings will be deleted one year from the time of the study. No one will listen to this except for the PI of this study.

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your relationships with the University of Minnesota or your standing with Vinland or Vinland staff in any way. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships. If you do decide to drop out of the research part of the program you can still participate in the mindfulness program.

Contacts and Questions

The researcher doing this study is: Gisli Kristofersson, RN, CNS. You may ask any questions you have now. If you have questions later, **you are encouraged**

to contact him at krist050@umn.edu or, 612-968-5953. His academic advisor is Dr. Mary Jo Kreitzer, who can be contacted at kreit003@umn.edu or 6126253977. The address for Mr. Kristofersson and Dr. Kreitzer is: University of Minnesota, School of Nursing, 5-140 Weaver-Densford Hall, 308 Harvard Street SE, Minneapolis, MN 55455

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

You will be given a copy of this information to keep for your records.

Statement of Consent

I have read the above information. I have asked questions and have received answers. I consent to participate in the study.

Appendix E

Example of Analysis and Coding of Data

Examples of sentences coded based on content	Rationale for coding	Key concept (initial coding)	Main theme (final coding)	Sub theme (final coding)
"I've been sober a couple of times"	Discussion on sobriety	Past struggles	Personal Reflection	Sobriety
"we went to a wrestling match together and all that stuff and had a good time."	Discussion of formation of relationship	Relationships and communication	Relationships Formed	Community
"I am very happy what I have learned because it has gotten me to further myself in my exercise program."	Statement of satisfaction with program	The intervention	The mindfulness practice	Likes and dislikes
"My anxiety was pretty good at that time because I kind of, like I say, I accepted things, you know."	Direct mention of anxiety	Impact of intervention on conditions	Impact of the intervention	Anxiety