

Being Here and Now: Mindfulness as Means to Reduce Anxiety and Relapse

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Abstract

Substance use disorder has been increasing in the United States year after year. Modern treatments fail as often as they succeed. The current standards of practice fail to provide patients with the ability to harness thoughts and control anxiety. Mindfulness practices are currently being adapted as a therapeutic technique to address some of these concerns. An exhaustive literature review was conducted to investigate how various mindfulness techniques impact substance use disorder. Ten high-quality studies were retained and synthesized to show current understandings of the effectiveness of a mindfulness therapeutic technique. An evidence-based intervention is suggested for implementing mindfulness-based relapse prevention into a residential treatment facility. The intervention created incorporates the self-efficacy theory and an adapted health-belief model. Adults in a residential treatment facility for substance use disorder were given eight mindfulness sessions over the course of four weeks. Participants were given pre- and post-intervention screenings for mindful attention and anxiety. The data analysis after two-tailed paired T-tests showed that anxiety significantly decreased ($\alpha=.05$, $p<.001$) and mindful attention increased significantly ($\alpha=.05$, $p=.015$). Overall, mindfulness shows promise in its potential to reduce substance abuse.

Keywords: Mindfulness, Substance Use Disorder, Relapse Prevention, Residential Treatment

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Anxiety is felt universally, but especially by those who fear a relapse from substance abuse. People who have fought addiction in the past struggle with controlling thoughts and thus behaviors. When the brain has been taught that drinking alcohol, abusing prescription medication, or taking illicit substances can reduce or eliminate anxiety, hope and fear begin to wrestle with each other. This is beginning of substance use disorder (SUD). Unfortunately, too many people have lost this fight. Hope remains though for those willing to seek it, and for the providers who aim to help, mindfulness practices may be just the advantage needed.

Problem Statement

Substance use disorder (SUD) was responsible for over 70,000 overdose deaths in the United States in 2019 (Mattson et al., 2021). Arizona saw an increase in overdoses by 12.6% that same year (Mattson et al., 2021). This staggering number does not include the number of lives that were shortened due to the myriad medical problems associated with SUD. Nor do these numbers describe the number of families that were destroyed, the amount of financial hardship endured, the homelessness and crime associated with SUD. Even with the myriad of treatment options available, as many as 60% of people struggling with SUD will relapse within their first year of sobriety (McLellan, 2000).

Completing residential treatment is a key factor associated with preventing relapse as well as preventing substance use related deaths (Decker et al., 2017). Patients who moved to residential treatment programs instead of going straight to outpatient programs were three times more likely to complete treatment when accounting for other variables (Stahler, 2015). During residential treatment, patients spend approximately four weeks in therapy in a controlled environment to help learn the skills needed to succeed, but best practices for residential treatment centers (RTCs) have not been determined (de Andrade et al., 2019). Patients who discharge against medical advice (AMA) from an RTC tend to relapse quickly and show little ability to

prevent impulsive thoughts from becoming impulsive actions (Davis et al., 2019). Controlling anxiety may prove key to helping people who struggle with SUD from leaving AMA and thus increasing the chance for success (Willinger et al., 2002). One method of controlling anxiety and impulsivity is through the practice of mindfulness (Davis et al., 2019).

Purpose and Rationale

Overcoming addiction requires significant behavioral and cognitive changes (Vadivale & Sathiyaseelan, 2019). Teaching new skills and behaviors in only four weeks in a way that can be practiced and repeated effectively when a patient returns to the stressors of life is the challenge. The patient must also be able to complete the full course of treatment to support refraining from their drug of choice, learn therapeutic skills, and have a sense of accomplishment (Davis et al., 2019). The purpose of this paper is to explore mindfulness as a therapeutic intervention and evaluate the feasibility of implementing mindfulness into an RTC for SUD.

Background and Significance

In the landmark study of McLellan et al. (2000), it was found that the majority of people who attempt to quit using any drug of abuse would fail within a year. Traits of impulsivity and anxiety are often correlated with SUD (Davis et al., 2019; Garami et al., 2017). The impulsive nature combined with the euphoria that can be felt from taking an addictive substance leaves patients at a severe disadvantage of changing behavior. Along with this impulsivity comes the cognitive stumbling blocks that can lead to relapse including affect volatility, cravings, rumination, and guilt (Spears et al., 2017; Vidrine et al., 2016). Implementing mindfulness has the potential to relieve some of the cognitive weight patients carry.

Population-Adults in RTC for SUD

The highest level of achievement for SUD treatment is life-long sobriety, but SUD is a chronic condition that creates real and sometimes permanent changes in the brain (Substance Abuse and Mental Health Services Administration, 2016). As with many other chronic diseases,

people suffering from SUD may have difficulty adhering to treatment, may relapse, and success is often based off a myriad of factors including social, environmental, physical, and genetic. The road to recovery is not quick and patients have to remember that a significant amount of time was spent training the brain to respond to specific stimuli, as such, it will take a long time to retrain it.

While patients are in the acute phase of detoxification, naturally will have great difficulty learning or practicing any therapeutic techniques, and this is why completing an RTC program is so critical for success (de Andrade, 2019). After the acute phase of detoxification, a patient will likely experience post-acute withdrawals (PAWS) which include depression, anxiety, mood swings, difficulty concentrating, and irritability (American Addiction Centers, 2021). Expecting someone to be successful in their recovery with PAWS with little to no practice of new therapeutic techniques may be short-sighted and why integrating therapeutic modes of relapse prevention during an RTC can prove beneficial. (de Andrade, 2019). RTC programs allows for four weeks of time to see how the patient responds without substances and how to manage stress in a semi-controlled environment.

Intervention-Mindfulness

Mindfulness treatments are adapted from Buddhist spiritual practices of enlightenment (Vadivale & Sathiyaseelan, 2019). In Buddhist teachings, it is believed that cravings lead to suffering, and through mindful practice, the cravings of this world are abandoned. Mindfulness works by focusing one's mind on the present moment in a nonjudgmental manner (Amaro & Black, 2017). These practices often contain a meditative portion, but rather than tuning out the present, mindfulness as a therapeutic modality focuses a person into the here and now. Mindfulness helps a person focus on the present and filter out the "noise" of life: past regrets, future worries, shame, and doubt. The techniques help a person identify feelings and place them appropriately.

Spears et al., (2017) presents several ways in which mindfulness can help with certain features of SUD that might lead to relapse: affective volatility, cravings, rumination, and guilt. Affective volatility often occurs as part of PAWS and can result in a patient making rash decisions potentially leading to relapsing. Mindfulness helps a person investigate and process current feelings and emotions. Cravings work in a similar way: by identifying a craving, a person is able to take away some, if not all, of its power. This can also help a person notice situations that may increase cravings and thus avoid them. Rumination can be fought through mindfulness by taking control of one's thoughts and letting worries be set free. Guilt is also addressed through the nonjudgmental portion of mindfulness. Vidrine et al. (2016) adds that while relapse is common with SUD, practicing the nonjudgmental portion of mindfulness can help a patient back on the road to recovery. Witkiewitz et al. (2014) found that patients who practiced mindfulness experienced 96% less drug use days. An individual may still relapse, but can return to sobriety faster.

On a neurologic level, practicing mindfulness has shown to cause observable changes in brain activity (Yang et al., 2016). Using an fMRI, researchers were able to see neuroplastic changes in brain activity after 40 days of mindfulness practice. The change in brain activity was similar to taking an antidepressant medication. Participants also reported decreased anxiety symptoms (Yang et al., 2016).

Comparison-Cognitive Behavioral Therapy

Mindfulness has been combined in several ways with cognitive behavioral therapy (CBT) to be used effectively today. There are several "flavors" of mindfulness such as mindfulness-based acceptance and commitment therapy for sex addiction, mindfulness-based sobriety, mindfulness-based addiction therapy, and mindfulness-based relapse prevention. (Fraumeni-McBride, 2019; Turner et al., 2014; Spears et al., 2017). No one treatment has yet shown to be better than others and each practice shares more in common than they differ.

In many ways, mindfulness-based interventions would not exist without CBT, but several studies have been done to confirm it is more effective than CBT alone (Witkiewitz et al., 2014; Bowen et al., 2014; Spears et al., 2017). There have been some studies that have not shown any improvement of mindfulness over regular CBT (Vidrine et al., 2016). This incongruence in literature shows that more research is needed.

Outcome-Reduced Anxiety or Reduced PAWS

As mentioned previously, the ultimate goal of SUD treatment is lifelong sobriety, but researching this trajectory is not feasible. Without considering the myriad of factors that would be required to keep an extended study going, the longer the period of monitoring is performed, the more variables of a person's life begin to affect the outcomes. Anxiety, however, is easily measured and is often a predictor of relapse (Garami et al., 2017; Willinger et al., 2002). Reducing anxiety can theoretically improve RTC completion for patients and thus improve overall outcomes. Mindfulness can also show a significant impact on reducing PAWS in patients. A questionnaire for PAWS could be implemented to easily track changes pre/post intervention.

Tracking AMA discharges would also be a potential measurement for success, but they often occur because of increased anxiety and unaddressed PAWS (Willinger et al., 2002). The results would also be binary, there would be no level of change to be tracked. Even though it would be objective data instead of subjective, coupled with an anxiety questionnaire, it could provide short-term outcomes of the intervention that are feasible to measure.

Summary

The current information shows that mindfulness as a therapeutic intervention in RTC for SUD could be highly effective in increasing the health outcomes. The common themes throughout the literature review show that mindfulness is effective for SUD, that it helps

counteract anxiety and PAWS that patients face, and that relatively low levels of practice are required to have an effect.

Internal Evidence/Setting

The organization is a 20-bed RTC for SUD located in the Southwestern United States. The facility maintains a supportive environment to address this type of concern and prides itself on having a small number of patients so that it can truly personalize a patients' recovery. The organization reports concerns regarding early discharge against medical advice (AMA), often stemming from a patient having anxiety episode that ultimately leads to an AMA discharge. When this happens, because the facility is small, it routinely causes other patients discomfort and can even lead to a domino effect of more AMA discharges. The facility currently tracks AMA discharges as single events, but does not currently track anxiety or PAWS symptoms in an organized manner; although nurses and therapists will routinely question patients on these symptoms, the data is not aggregated into an accessible form for meaningful use.

PICOT Question

The problems faced internally at the facility hosting this project are endemic to other RTCs. With the concerns of AMA discharges which are a precursor to relapse, a new intervention is needed. Based on current mindfulness-based research, this additional therapeutic modality can support treatment as usual, and reduce anxiety, cravings, and premature AMA discharges in a residential treatment center for individuals experiencing substance use disorder. The PICOT question to be answered is: In adults in residential treatment for substance use disorder (P), how does mindfulness-based therapeutic interventions (I) compared to standard cognitive behavioral therapy (C) affect anxiety and impulsivity (O).

Search Sources and Process

With a preliminary search, mindfulness has been clearly studied as a therapeutic intervention for multiple scenarios. Finding data about mindfulness as it relates to substance use

disorder in a residential treatment setting was more limited. The most effective keywords used were *substance use disorder*, *residential treatment*, *mindfulness*. Other terms that were initially used and then phased out due to low result yield included *anxiety*, *mindfulness based recovery*, *mindfulness based sobriety*, *mindfulness based addiction therapy* and *mindfulness based relapse prevention*. Three databases were searched: Pubmed, Cumulative Index of Nursing and Allied Health (CINAHL), and the Cochrane Library. The titles and abstracts were assessed for results of less than 50 results. An additional search of grey literature was done to inform the background and significance. This search included government publications by the Center for Disease Control, the Arizona government, and professional healthcare association practice guidelines. Additionally, a hand ancestry of the current references was conducted to ensure the inclusion of landmark studies.

Pubmed

Pubmed was the initial database searched using the keywords *substance use disorder*, *residential treatment*, *mindfulness*, and *anxiety*. The Boolean connector “and” was utilized for each term. This resulted in only six articles, one of which was an appropriate randomized control trial (RCT). The next search changed the keyword *mindfulness* to *mindfulness based recovery* which resulted in no results. The third search utilized keywords based on the various mindfulness therapeutic techniques including *mindfulness based sobriety*, *mindfulness based addiction therapy*, and *mindfulness based relapse prevention*. The Boolean connector “or” was used. This resulted in 553 results, which when filtered by the last five years returned 303 results; a meta-analysis stood out immediately and was selected, but then terms were refined. The fourth search utilized some of the original search terms of *mindfulness*, *residential treatment*, and *substance use disorder* using the “and” connector. The *anxiety* term was dropped as most articles were looking at more than just anxiety and this seemed too limiting. This resulted in 19 results after filters were applied. Four studies were selected, each being an RCT.

CINAHL

The final search terms used in Pubmed (*mindfulness, residential treatment, and substance use disorder*) were used to begin the CINAHL search. The results were filtered by publication within five years as well as full text available on the site. This returned only four results which were previously on the Pubmed search. CINAHL recommended changing the *substance use disorder* term to *substance use disorder or substance abuse or drug abuse*. The change created a single extra result which was not applicable to this PICOT. Expanding the results to include last ten years resulted in 14 studies. After filtering through previously reviewed articles, a single RCT and a cohort study relevant to the PICOT were identified.

Cochrane Library

The three key terms were implemented again *mindfulness, residential treatment, substance use disorder*. No Cochrane Reviews resulted from this search, but 19 articles were retrieved. Of the relevant articles, each one was previously found in another database. Another search was performed including *substance use* and *mindfulness*. This resulted in six Cochrane Reviews, two of which were appropriate.

Critical Appraisal and Synthesis of Evidence

Relevant studies found from the literature review were evaluated using a rapid critical appraisal tool to determine their quality (Melynk & Fineout-Overholt, 2019). Ten studies which were determined to be of high quality were then included in the final analysis (see Appendix A, Table A1). Evaluation included examining study design, variables, assessment tools, findings, bias, and implications. Each study chosen used quantitative data. There were seven RCTs, two systematic reviews, and a cohort study. Each study was performed in a residential treatment facility, except for the systematic reviews which had various locations. Study populations ranged from 79 to 286. The major results of the studies were then synthesized for comparison (see Appendix A, Table A2). The key finding is that mindfulness interventions decrease the overall

number of substance use days. Mindfulness practice seems to be correlated with lower anxiety and impulsivity. The results on average show trends towards improvement but will require more research. Cravings and treatment retention did not show consistent, statistically significant results to prove effectiveness.

Problems arose in each study with assessment, bias, patient population, and setting. Assessment tools for mood, disposition, and self-reports of substance use are derived from patient provided information. Every tool used in the studies selected was examined to determine validity and reliability. Each tool includes a study showing its effectiveness in the evaluation table, but even a valid and reliable test can be manipulated. In residential treatment, the patient will often form a relationship with the caregiver which might bias participants to report answers one way or another. Bias is also seen in that there really is no way to have a blind study for this type of therapeutic technique. Blinding the participants would require the researchers to provide a sham therapy session which would be unethical.

Attrition was a major issue for studies that incorporated a follow up. These studies showed a large percentage drop in participants which is a problem when assessing for substance use disorder. When a patient withdrew from a study, the chances that the patient relapsed were very high, but instead the patients were simply not included in the data most of the time. The results would likely have been different assuming the patients relapsed. Mindfulness therapeutics were not found to increase the likelihood of patients leaving treatment. Given the attrition rates, biases, and low sample populations, the systematic reviews were unable to give a modest degree of certainty after analysis.

Many of the outcomes analyzed did not show statistically significant improvements in outcomes, but frequently were able to show a trend toward improvement. It is important to discuss the difference between significance and relevance. Statistical significance is not the same thing as relevance, impact, or importance. Significance is based on an arbitrary score that

predicts the likelihood that an effect would occur randomly and is usually set at 5% or $p < 0.05$ (Cochrane, 2013). For this reason, the Cochrane Library of Systematic Reviews does not recommend using statistical significance when conducting their reviews. The random chance arbitration is even harder to prove when considered in the setting of residential treatment. Therapy is expected in residential treatment and depending on the facility, patients may spend hours each day learning and practicing different therapeutic techniques. In these instances, “treatment as usual” is an innocuous term that includes hundreds of hours of professional aid. With this type of control, the effects of mindfulness may be masked by alternate treatments. In these instances, trends may hold a great deal of relevance.

Conclusions

The ultimate goal of any SUD therapeutic technique is to decrease substance use. For this reason, there is great potential in implementing mindfulness therapeutics. Decreased anxiety and impulsivity also appear to be correlated with mindfulness practice. With these factors, it can be concluded that mindfulness therapies should be taught in residential treatment. Not every therapeutic technique is effective for every patient which is why facilities often incorporate a variety of techniques. Mindfulness should be added to this list, rather than taking away another therapeutic modality. Since there is no risk associated with implementing mindfulness, if a facility has the capacity to provide it, it should be done. Mindfulness-based relapse prevention showed more consistent results than moment-by-moment mindfulness in this review. Bias is seemingly unavoidable due to the inability to blind an intervention and the subjective nature of questionnaires, but it should still be identified and minimized.

Theory and Model

Bandura’s self-efficacy theory will guide the proposed intervention. Self-efficacy theory revolves around the premise that people need to believe they have the power to impact and change their life (Bandura, 1977). This core belief creates motivation, ingenuity, and hope. Self-

efficacy is lacking in many people struggling with SUD. Individuals often feel a slave to the addiction, with no control over their lives, and powerless to change. Self-efficacy will guide the intervention by focusing on how mindfulness can be used in everyday situations as a tool for change. Mindfulness techniques will be performed, modeled, and taught for self-instruction to improve performance accomplishments, counteract negative self-instruction, and investigate and mitigate sources of emotional arousal when appropriate (see Appendix B, Figures 1 and 2).

The Health Belief Model will also be implemented to improve mindfulness practice. The Health Belief Model asserts that the likelihood of people engaging in a health-promoting behavior is determined by perceptions about the severity of a threat, susceptibility to that threat, a potential intervention, and barriers (Carpenter, 2010). A threat in this case could be a relapse or another factor such as anxiety. The level of threat is determined by a person's perception of how serious the situation is as well as how likely it is to happen to them. Both factors must be perceived as high to pose a real threat. Most people agree that cancer is a serious problem, but if they do not believe that it is likely to happen to them, they have a low likelihood of requesting a screening. In the proposed project, all participants are in treatment, so likely would have an understanding that substance use is a serious problem but may need help with understanding the threat of relapse, anxiety, and impulsivity. The intervention could be perceived by a patient in unknown ways. For this reason, it should be presented factually with current understanding of neuroplasticity and psychological theories. Barriers and benefits will be evaluated by the patient. If the barriers seem more inconvenient than the perceived outcomes, the patient will likely not engage. This will be addressed by giving participants handouts that can be used for a quick mindfulness practice.

The original health belief model is commonly adapted to fit extraneous variables that were not considered 80 years ago when it was first developed (Carpenter, 2010). This project will adapt the model slightly by incorporating self-efficacy, cues to action, and addiction cues

(see Appendix B, Figures 3 and 4). Self-efficacy was mentioned previously as important, but for people who are trapped in SUD and have possibly had multiple relapses and multiple inpatient stays, this must be rebuilt. Cues to action are the impetus that spurs a person to make a change now. A person may not have gotten a pneumonia vaccine, but after a friend gets pneumonia, they have a change of heart. In recovery, this may be an intervention, a job loss, or any number of factors. Because this cannot be determined, it will instead be used to explore ways that patients have seen SUD, anxiety, and impulsivity negatively impact them. With the combination of motivational interviewing, it may be possible to illicit a cue to action. Finally, addiction cues are likely to overrule any motivation for change. It is here where mindfulness has the potential to shine and where data will be analyzed.

The Model for Improvement will be used in this project (see Appendix B, Figure 5). The Model for Improvement has three initial steps then a four-part repeating process (Institute for Healthcare Improvement, n.d.). The preliminary work has already been completed through the creation of the PICOT, literature review, and synthesis of evidence. The model begins by deciding what the goal will be (in this case reduced anxiety/impulsivity), then determine how to know if the goal is successful (decreased AMAs and questionnaires), and finally decide on the change to be implemented (mindfulness based therapeutic technique). The next part is a repeating cycle of plan, do, study, act. The repeating cycle is important because every project can be improved over time. When this project is finished, suggestions for change will be passed on so it may be reworked until a process is formed that fits the institution's needs.

Methods

Participants

The Arizona State University Institutional Review Board approved all methods carried out during this project. The project was conducted at a 20-bed RTC in the Southwestern United States. All potential participants were provided with a flier upon admission to the RTC

describing the project and were given time with co-principal investigator (CO-PI) to discuss the project prior to giving informed consent. Inclusion criteria included being 18 years of age or older, diagnosis of a substance use disorder, English speaking, and able to read and write in English. Exclusion criteria were being under 18 years of age, being actively in withdrawal until cleared by the medical provider, adults who were unable to provide consent, and being non-English speaking.

Intervention

After obtaining informed consent, participants were given two mindfulness sessions each week for four weeks in addition to the RTC treatment as usual. The sessions were an hour long and included discussions, mindfulness meditations, and grounding techniques (see Appendix C). The sessions were adapted from *Mindfulness-Based Relapse Prevention for Addictive Behaviors: A Clinician's Guide* (Bowen et al., 2021). Due to ongoing enrollment at the RTC, it was not very likely that participants would begin at session 1, thus each session was adapted both to fit within the one-hour timeframe as well as to be an individual unit and not rely on previous sessions.

The project was designed to engage the nursing staff at the RTC both to ensure the staff have techniques at their disposal to aid when patients are feeling impulsive or anxious, as well as ensure it can continue after the project ends. The intervention was created to be easy to use and each session came in a pre-printed binder with scripts that the nurses could read directly from, utilize discussion topics, and even contained video links for meditations if they did not feel comfortable reading aloud. The project lasted 12 weeks and was divided into three parts. The first four weeks, sessions were led by the CO-PI with the nursing staff present to learn. The second four weeks were led by the nurses with the CO-PI present to assist. The last four weeks were led by the nursing staff with the CO-PI available for support.

Data Collection and Measurements

Each participant was given an initial series of questionnaires immediately following informed consent. Participants received a post-intervention questionnaire during their discharge process. All participant data was encrypted by creating a patient code which consisted of the last two digits of their birth year and the last two digits of their phone number.

The pre-intervention screening contained a demographic questionnaire, the Burns Anxiety Inventory (BAI), and the Mindful Attention Awareness Scale (MAAS). The post-intervention questionnaire included the BAI and the MAAS. The BAI is a 33-item questionnaire which assesses feelings, thoughts, and symptoms of anxiety. The BAI showed a high internal reliability with $\alpha = .94$ and high correlation with other anxiety scales (Burns & Eidelson, 1998). The MAAS is a 15-item questionnaire which measures trait mindfulness to assess if clients are able to apply the mindfulness they are learning to their day-to-day experience. The MAAS was tested in college students and general adults (internal consistency $\alpha = .82$ and $\alpha = .87$ respectively) and test-retest reliability was performed showing no statistically significant differences (Carlson & Brown, 2005). It was also tested against similar scales that test for openness, self-reflection, and other traits that are associated with mindfulness. AMA discharge rates are tracked by the RTC already and will be compared pre-intervention and during the project time frame.

Budget

There was no external funding received for this project. The total project cost came to \$487.50 and was paid for by the CO-PI. Costs were primarily for materials to operate the project (see Appendix D). Staff and participants were not compensated based on their participation in this project.

Results

Descriptive Statistics

The average age of all participants was 43.83 ($SD = 14.27$, $Min = 22.00$, $Max = 69.00$, $Mdn = 42$, $Mode = 41$) Gender was well distributed with slightly more males than females

($n = 14$, 58.33%). Race was heavily biased towards Non-Hispanic whites ($n = 21$, 87.50%). The majority were married ($n = 16$, 66.67%). Half of the participants had a college education ($n = 12$, 50.00%). The majority had never practiced mindfulness before ($n = 14$, 58.33%). Half had been in treatment before ($n=12$, 50%), and the majority had relapsed before ($n = 18$, 75.00%). Of those who had been to treatment before, most had been to treatment more than five times ($n=7$, 29.17%). Frequencies and percentages are presented in Tables 1 and 2.

Table 1*Frequency Table for Descriptive Statistics*

Variable	<i>n</i>	%
Gender		
Male	14	58.33
Female	10	41.67
Missing	0	0.00
Race		
White	21	87.50
Amer Indian	2	8.33
Mixed	1	4.17
Missing	0	0.00
Ethnicity		
Non-Hisp	21	87.50
Hispanic	3	12.50
Missing	0	0.00
Marital Status		
Married	16	66.67
Divorced	2	8.33
Single	6	25.00
Missing	0	0.00
Education Level		
College	12	50.00
HS-Grad	11	45.83
Less than HS	1	4.17
Missing	0	0.00
Previous Mindful Practice		
Yes	10	41.67
No	14	58.33
Missing	0	0.00
Previous Relapse		

Table 1
Frequency Table for Descriptive Statistics

Variable	<i>n</i>	%
No	6	25.00
Yes	18	75.00
Missing	0	0.00
First Time in Treatment		
Yes	12	50.00
No	12	50.00
Missing	0	0.00
Total Treatments		
2	3	12.50
More than 5	7	29.17
3 to 5	2	8.33
First Time	12	50.00

Note. Due to rounding errors, percentages may not equal 100%.

Table 2
Summary Statistics for Age

Variable	<i>M</i>	<i>SD</i>	<i>n</i>	Min	Max	<i>Mdn</i>	Mode
Age	43.83	14.27	24	22.00	69.00	42.00	41.00

Note. '-' indicates the statistic is undefined due to constant data or an insufficient sample size.

Statistical Analysis

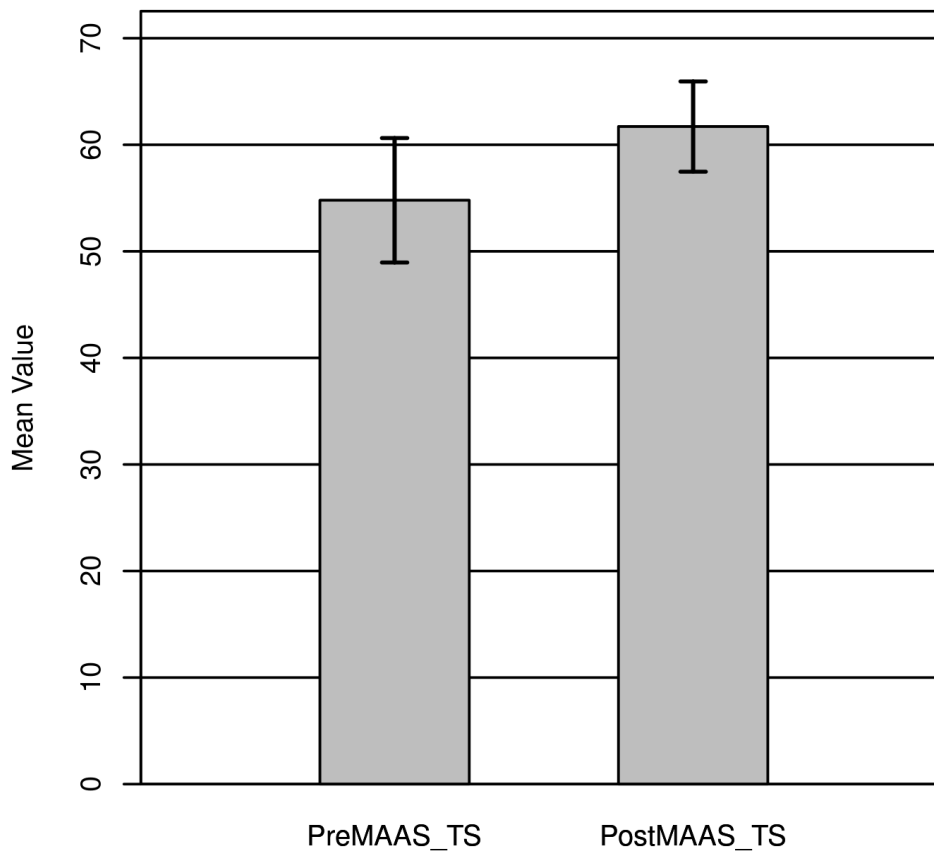
The total enrolled participants for this project was $n=40$. Several factors resulted in 10 participants not being included in the final amount which included AMA discharges, participants mislabeling their patient identifiers so that pre and post surveys did not match, as well as some post-intervention forms being forgotten by staff. The total number of participants that accurately completed the full program was $n=24$.

Mindful attention was analyzed using a two-tailed Wilcoxon signed rank test due to normality being skewed from the Shapiro-Wilk test ($\alpha=.05$, $W = 0.84$, $p = .001$). The results were significant $\alpha=.05$, $V = 59.50$, $z = -2.39$, $p = .017$. This indicates that the differences between pre-mindful attention and post-mindful attention are not likely due to random variation.

The median score on the MAAS was 52.50 prior to the intervention and 61.50 post-intervention. Figure 1 presents a boxplot of the ranked values of MAAS scores.

Figure 1

The means of PreMAAS and PostMAAS with 95.00% CI Error Bars



Anxiety was analyzed using a two-tailed paired samples *t*-test. Normality was established using via the Shapiro-Wilk test ($\alpha=.05$, $W = 0.93$, $p = .083$). The results were significant $\alpha=.05$, $t(23) = 4.62$, $p < .001$. The mean of BAI prior to the intervention was significantly higher than the mean BAI after the intervention. The results are presented in Table 3. A bar plot of the means is presented in Figure 2.

Table 3

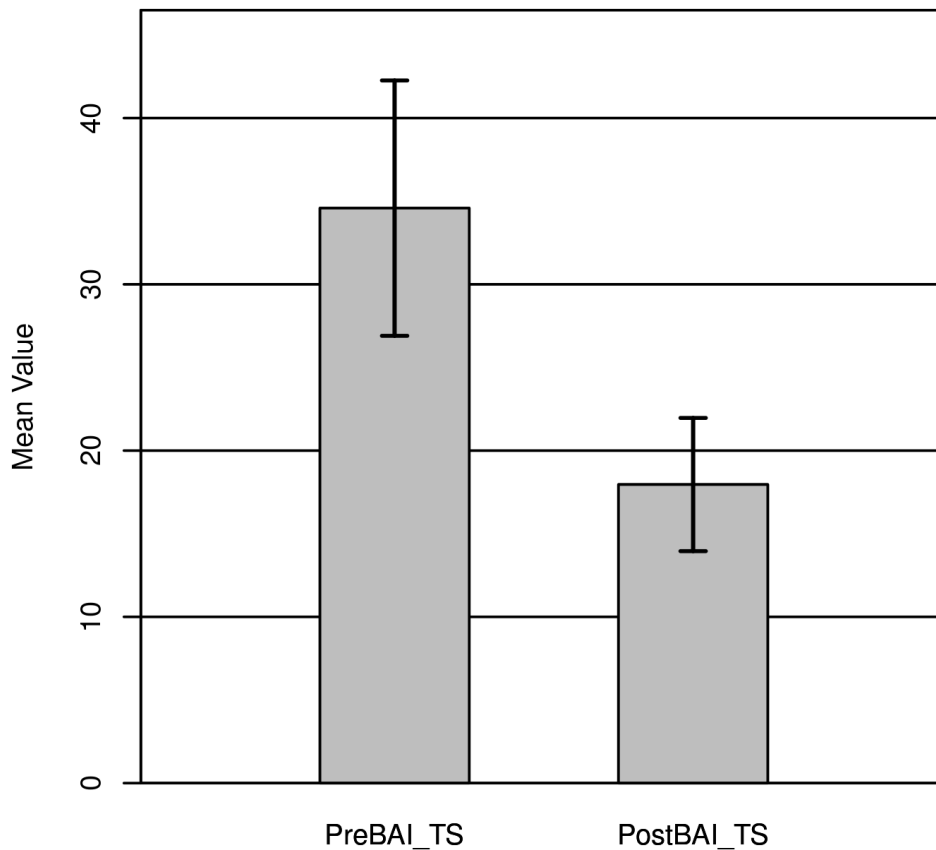
Two-Tailed Paired Samples t-Test for the Difference Between PreBAI_TS and PostBAI_TS

PreBAI_TS		PostBAI_TS		<i>t</i>	<i>p</i>	<i>d</i>
<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
34.58	19.19	17.96	10.02	4.62	< .001	0.94

Note. N = 24. Degrees of Freedom for the *t*-statistic = 23. *d* represents Cohen's *d*.

Figure 2

The means of PreBAI_TS and PostBAI_TS with 95.00% CI Error Bars



Discharge AMA rates were increased during the time that this project was run. The average AMA rate for the Hope House for the previous two years was 11.75%. During the quarter that this project was run, the AMA rate was higher than average at 15%.

Staff Response

Three out of four nurses were very invested in this project. They attended meetings and ran the groups appropriately. These nurses reported enjoying the content and also reported that they believed it to be helpful for the participants. Many participants requested extra sessions and though participants occasionally missed a session every patient for the Hope House agreed to participate.

One nurse was unwilling to participate, and the Co-PI ran the sessions that fell during her shifts. This nurse stated that she had too much work as it was. The group sessions are a mandatory part of the nurses duties, and despite attempts to re-engage, the nurse ultimately refused.

This mindfulness sessions are still being run despite the projects official end. Nurses are still choosing to voluntarily run the sessions. The nurses have found some grounding techniques and meditations that they prefer and have adapted the sessions slightly now that have been given permission to change it. This project will be handed off to another Doctoral student for the next year, Bryan Reddick. He will undoubtedly adapt and refine it in his own unique way.

Discussion

The major findings of this study are that the sessions appear to have improved mindful attention as well as anxiety. It is important to keep in mind that the project can not fully claim credit for decreases in anxiety as the participants were still receiving treatment as usual. The change in mindful attention would likely be caused by the sessions. There was contemplation of giving patients who did not want to participate in the mindfulness sessions pre and post evaluations to compare, but every patient at The Hope House wanted to attend the sessions.

The findings are in line with other studies on mindfulness such as Shorey et al. (2017). Black and Amaro (2019) were able to show an improvement in treatment retention, but that was not the case in this study.

The major limitation of this study was the number of forms that could not be matched. The unique patient identifier was sufficient in anonymizing patients to the level that when forms did not match, the investigators were unable to determine who filled them out. Attrition was therefore artificially inflated as these volunteers truly finished the project, but could not be referenced in the data.

The large rate of AMA discharges could be attributed to factors unrelated to this project. The Hope House had some facility problems that led to discharges as well as multiple AMA discharges prior to the patient ever attending a mindfulness session. This project was run through the winter holidays and these typically have high rates of AMAs as well due to patients wishing to leave early to be with their families.

Future projects may want to incorporate a way to analyze the differences between mindfulness sessions and standard care. This might be done by performing the sessions at one of the houses instead of both and checking for differences in scores for the houses. Including reason for discharge might also help identify if mindfulness sessions might be effective.

Mindfulness shows great promise in helping people struggling with addiction. This project shows how mindfulness sessions could be implemented by nursing staff to aid in the anxiety of patients. The Hope House staff have voluntarily chosen to continue these sessions. Patients can use every advantage available in the fight against addiction.

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Appendix A

Evaluation Table

Table A1
Evaluation Table for Quantitative Studies

Citation:	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	LOE Application to practice/ Generalization
<p>Amaro & Black, (2021).</p> <p>Country: USA</p> <p>Funding: National institute on drug abuse and National Institute of Alcohol Abuse and Alcoholism.</p> <p>Bias: The authors state they have no conflicts of interest, but developing a specific treatment modality inherently biases the researchers.</p>	<p>Self-efficacy</p>	<p>Design: Quantitative RCT</p> <p>Purpose: Test if moment-by-moment MB interventions reduce relapse over an extended period of time.</p>	<p>N= 200</p> <p>Demographics: Adult women admitted into treatment for substance use. 58% Hispanic, 20% Black. Majority with no high school degree.</p> <p>Setting: Residential treatment</p> <p>Exclusion: inability to comprehend forms or sign informed consent, untreated psychotic disorders, suicidal</p>	<p>IV: 12 sessions of Moment-by-moment, 80 minutes</p> <p>Control: Neurobiology of addiction</p> <p>DV 1: Time until first use</p> <p>DV 2: Abstinence, lapse, or relapse</p> <p>Definitions:</p> <p>Abstinent: No use during the study period</p> <p>Lapse: Used post-intervention, but not in previous</p>	<p>Tools: TLFB to measure days and amounts used</p> <p>Validity/Reliability: TLFB was shown to have a reliability rate between .73 to .91 p<.0001 (Robinson et al., 2014).</p>	<p>Statistical Tests Used: Timeline follow back information categorized and then analyzed using Cox regression hazard ratio</p>	<p>DV 1: Favored MB intervention, but not significant P values between .30 and .49.</p> <p>DV 2: Again, favoring MB, but not significant p=.39</p>	<p>Level 1-RCT</p> <p>Strengths: Low rate of attrition for a SU study.</p> <p>Weakness: The study does not report the number of sessions attended by participants, but later states they saw a positive correlation in the number of sessions attended and time until lapse/relapse.</p> <p>Feasibility: This study would be feasible to replicate with a different</p>

Key: **AAQ-SA**-18-item acceptance and action questionnaire for substance abuse; **CB**-cognitive behavioral; **CI**-confidence interval; **DASS**-Depression Anxiety, and Stress Scale; **DERS**-Difficulties in Emotional Regulation Scale; **DTS**- Distress Tolerance Scale; **DV**-dependent variable; **FP**-follow up; **IV**-independent variable; **LOE**-level of evidence; **MAAS**-Mindful Attention Awareness Scale; **MB**-mindfulness based; **PACS**-Penn Alcohol Cravings Scale; **PDSQ**-Psychiatric Diagnostic Screening Questionnaire; **RCT**-randomized control trial; **RP**-relapse prevention; **SU**-substance use; **TAU**-treatment as usual; **TLFB**-timeline follow-back; **UA**-urine analysis

Citation:	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	LOE Application to practice/ Generalization
			<p>in the past 30 days, over 65 years of age, pregnant more than 6 months.</p> <p>Attrition: Immediate posttest attrition of 16 (8%). 8.5month FP attrition of 20 (10%).</p>	<p>amount for less than one day in three.</p> <p>Relapse: Returned to regular use or use of at least one day in three.</p>				<p>population. The specific MB intervention used is designed to only apply to women.</p> <p>Application: This study shows mixed results, but still was promising with the juxtaposition of the neurobiology of addiction. The sample is also not similar to those at the facility selected.</p>
<p>Black & Amaro, (2019).</p> <p>Country: USA</p> <p>Funding: National institute on drug abuse and National Institute of</p>	<p>Self-efficacy</p>	<p>Design: Quantitative RCT</p> <p>Purpose: Test the efficacy of a moment-by-moment MB intervention on residential treatment retention and substance use relapse.</p>	<p>N= 200</p> <p>Demographics: Adult women admitted for substance use disorder. 18-65 years old</p>	<p>IV1: 12 sessions of Moment-by-moment, 80 minutes</p> <p>Control: Neurobiology of addiction</p> <p>DV1: Discharge status</p>	<p>Tools: DTS DERS DASS PACS inclusive of multiple substances</p> <p>Validity/ Reliability: DTS- was tested for internal reliability</p>	<p>Statistical Tests Used:</p> <p>Power analysis determined sample size needed.</p> <p>Kaplan-Meier survival</p>	<p>DV1: 43 completed with intervention vs 31 in control (adjusted OR = 0.51, CI: 0.25–1.07, p = .08)</p> <p>DV2-4: There was no significant</p>	<p>Level 1-RCT</p> <p>Strengths: Able to stay in touch with patients that did not choose to complete. Despite no significant improvement in the two separate groups on</p>

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Citation:	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	LOE Application to practice/ Generalization
<p>Alcohol Abuse and Alcoholism.</p> <p>Bias: Authors declare no conflicts of interest. The fact that payment was given to participants may skew outcomes. Due to repeated testing, participants may be biased in answering questions due to repetitive nature.</p>			<p>Setting: Residential treatment facility</p> <p>Exclusion: Not English fluent, cognitive impairment, untreated psychotic disorder, severe mental health condition, reported suicidal ideation in previous 30 days, more than 6months pregnant</p> <p>Attrition: Those who could not be reached: 16.</p> <p>Not enough class sessions: 30.</p>	<p>DV2: emotion regulation</p> <p>DV3: psychological distress</p> <p>DV4: Drug and alcohol cravings.</p> <p>Definitions:</p> <p>Mindfulness-a teachable state of being that, by definition, involves attending to one's experiences on a moment-to-moment basis with openness and the intention to cultivate non-judgmental, non-reactive states of awareness</p> <p>MB Interventions-</p>	<p>against other symptoms $\alpha=.89$, $P=.015$, (Simons & Gaher, 2005).</p> <p>DERS each symptom has been shown to correlate well with its intended outcome $\alpha=.80$ to $.89$ (Gratz & Roemer, 2004)</p> <p>DASS- correlated well with other similar tests $r=0.74$ and $r=0.81$, $P<.05$ (Lovibond & Lovibond, 1995)</p> <p>PACS- showed high internal reliability $\alpha=.92$ (Flannery et al, 1999)</p>	<p>analysis using an intent-to-treat (ITT) approach.</p> <p>Pearson R to test correlation</p>	<p>improvement in any (p range = .15-.86).</p>	<p>secondary characteristics, both groups showed improvement in the characteristics.</p> <p>Weakness: There was no way to blind the study without providing fake treatment.</p> <p>Feasibility: There is some training required to provide moment by moment in women's recovery specific training. This is possible to implement with dedication, however.</p> <p>Application: The basic principles of this study appear sound, but an MB</p>

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Citation:	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	LOE Application to practice/ Generalization
				the family of interventions that include mindfulness as their central therapeutic practice				intervention may be as effective as the adapted version specific to women.
<p>Bowen et al., (2014)</p> <p>Country: United States</p> <p>Funding: National Institutes of Health and National Institute on Drug Abuse</p> <p>Bias: Two of the authors receive payment for conducting MB therapies, they would have some incentive to see favorable results in the study.</p>	Self-efficacy	<p>Design: Quantitative RCT</p> <p>Purpose: determine long-term efficacy of MB RP vs. CBRP vs. psychoeducation.</p>	<p>N=286</p> <p>Demographics: Adults who successfully completed detox for SUD. Ages from 18-70. Majority male, 42% were of racial minority.</p> <p>Setting: private, nonprofit chemical dependency aftercare program.</p> <p>Exclusion: Inability to attend treatment, active psychosis or suicidality, failed to attend baseline appointment</p>	<p>IV1: 8 sessions of MB RP, 120 minutes</p> <p>Controls: CBRP, psychoeducation</p> <p>DV1: Drug use days</p> <p>Definitions: MB relapse prevention-a therapeutic intervention based on evidence that decreases the probability and severity of relapse. It</p>	<p>Tools: TLFB to track drinking/using days.</p> <p>UA and alcohol screens.</p> <p>Validity/Reliability: TLFB was shown to have a reliability rate between .73 to .91 p<.0001 (Robinson et al., 2014).</p> <p>Internal validity was done for urinalysis drug and alcohol screens by sending to an external lab for verification and this showed a 20.8% false negative and a 5% false positive.</p>	<p>Statistical Tests Used:</p> <p>Cox proportional hazards regression for treatment group differences in days until relapse.</p> <p>Generalized linear models were used to examine association between number of using days between the groups.</p>	<p>Compared to psychoeducation, MB RP and CBRP showed a 54% greater chance to refrain from drinking at 3 months. CBRP was shown to work 21% better than MB RP at this point. At 6 months there were 31% fewer days of drinking in the MB RP and CBRP categories, and there was no difference within them.</p>	<p>Level 2-RCT with <80% completion.</p> <p>Strengths: A long-term study that compared multiple styles of treatment. Showed that MB RP was more likely to relapse initially, but as time went on SU days and heavy SU days decreased in the MB RP population.</p> <p>Weaknesses: The high attrition rate of participants. They could have</p>

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			<p>Attrition: over 12 months, 89 participants failed to complete out of the initial 286 for an attrition of 31%</p>	<p>focuses on skills practice.</p>			<p>At 12 months, MB RP participants showed 31% less using days compared to CBRP.</p>	<p>dropped out due to returning to SU and not be tracked which would likely make the outcomes less significant.</p> <p>Feasibility: Implementing 8 sessions of MB RP could be easily performed, though most residential facilities are 4 week programs, so instead of weekly, it would be biweekly.</p> <p>Application: This study should be incorporated in the example of harm reduction. For most SU treatment, we can not control the</p>

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Citation:	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	LOE Application to practice/ Generalization
								outcome, we can only limit the
<p>Davis et al, (2018) Country: United States</p> <p>Funding: National Institute on Drug Abuse, Fahs-Beck Fund for Research and Experimentation, Campus Research Board</p> <p>Bias: The authors declare no conflicts of interest. The authors show bias in those participants that failed to complete were not analyzed in the statistics. Those people likely relapsed,</p>	<p>Neurocognitive Model</p>	<p>Design: Quantitative RCT</p> <p>Purpose: Examine the addition of MB RP on perceived stress, craving, and substance use vs. TAU</p>	<p>N= 79</p> <p>Demographics: Young adults with a SU disorder diagnosis. Mean age was 25.3, majority white. Majority unemployed.</p> <p>Setting: Residential treatment</p> <p>Exclusion: None</p> <p>Attrition: 4 failed to initiate the intervention, 7 more failed to complete intervention, 17 more were unable to be reached for FP (Final attrition of 25 or 31.6%)</p>	<p>IV 1: 8 sessions of MB RP, 90 minutes</p> <p>Control: TAU</p> <p>DV 1: Cravings</p> <p>DV 2: Stress</p> <p>DV 3: SU</p> <p>Definitions: Stress-an individual’s subjective appraisal of an event as threatening or otherwise harmful.</p>	<p>Tools: 14 step questionnaire taken from the GAIN assessment tool for cravings</p> <p>Substance Use Frequency Scale-a version of a TLFB to measure average percent of days of use, amount, and problems associated with substance use</p> <p>Perceived stress scale</p> <p>Validity/Reliability: GAIN was shown to have a greater likelihood for patients to report accurately compared to other assessment tools, but this test only used 14</p>	<p>Statistical tests used:</p> <p>Bi-linear spline latent growth models to show changes over time.</p> <p>Cohen’s d used at 4 different times to see effect size.</p>	<p>DV1: Following treatment, the two groups diverged significantly with small to large effect sizes (d=-.58 at completion, d=-1.6 at 12 weeks, d=-.28 at 28 weeks).</p> <p>DV2: Moderate to large effect sizes showing decrease in stress for MB RP group (d=-.77 at completion, d=-1.7 at 12 weeks, d=-1.3 at 28 weeks.)</p> <p>DV3: MB RP diverged from TAU by</p>	<p>Level 2-RCT with <80% completion</p> <p>Strengths: Authors create an easily replicated study with significant effects at multiple time periods post intervention.</p> <p>Weaknesses: High attrition rate with a small sample size. No urine drug screens to ensure accuracy of reports.</p> <p>Feasibility: Implementing this study only requires the MB RP workbook</p>

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<p>but since this data is not available, they do not include it. If those participants did relapse, the analysis would likely be very different.</p>					<p>questions from it with an internal reliability of $\alpha=.80$ (Dennis et al., 2003).</p> <p>Substance Use Frequency Scale showed reliability of $\alpha=.7$ to $.8$ (Dennis et al, 2004)</p> <p>Perceived stress scale internal reliability of $\alpha=.84$ in this sample.</p>		<p>moderate and large effect sizes based on time frame ($d=-0.58$ at completion, $d=-1.8$ at 12 weeks, $d=-1.1$ at 28 weeks.</p>	<p>which could easily be acquired.</p> <p>Application: The decrease in cravings, stress, and substance use all would promote risk reduction for a similar population chosen for this project.</p>
<p>Davis et al, (2019) Country: United States Funding: National Institute on Drug Abuse, Fahs-Beck Fund for Research and Experimentation, Campus Research Board</p>	<p>Neurocognitive model</p>	<p>Design: Quantitative RCT Purpose: Test if MB RP is effective in reducing impulsivity and SU vs. TAU</p>	<p>N=79 Demographics: Young adults with a SU disorder diagnosis. Mean age was 25.3, majority white. Majority unemployed. Setting: Residential treatment</p>	<p>IV 1: 8 sessions of MB RP, 90 minutes Control: TAU DV 1: Impulsivity broken up into five categories, see results column. DV 2: SU Definitions:</p>	<p>Tools: SUPPS-P Impulsive Behavior Scale to measure impulsive traits. Substance Use Frequency Scale-a version of TLFB to measure average percent of days of use, amount, and problems associated with substance use. Validity/Reliability:</p>	<p>Statistical tests used: Bi-linear spline models Linear regressions.</p>	<p>DV 1: Separated into 5 categories: Negative urgency $b=-0.41$ $p<0.00$ Positive urgency $b=-0.20$ $p=.20$ Lack of premeditation $b=-0.26$ $p<.00$</p>	<p>Level 2-RCT with <80% completion Strengths: Differentiation in impulsivity characteristics. Literature review and analysis of impulsivity is well documented. Weaknesses: All data on DV2 was not mentioned.</p>

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<p>Bias: Authors declare no conflicts of interest. The authors show bias in those participants that failed to complete were not analyzed in the statistics. Those people likely relapsed, but since this data is not available, they do not include it. If those participants did relapse, the analysis would likely be very different.</p>			<p>Exclusion: None</p> <p>Attrition: 4 failed to initiate the intervention, 7 more failed to complete intervention, 17 more were unable to be reached for FP (Final attrition of 25 or 31.6%)</p>	<p>Impulsivity-tendency towards rapid or unplanned action with a suboptimal regard for future consequences.</p>	<p>SUPPS-P Impulsive Behavior scale showed internal consistency $\alpha=.74$ to $.88$ $p<.0001$ (Cyders et al, 2014)</p> <p>Substance Use Frequency Scale showed reliability of $0.7-0.8$ $p<.01$ (Dennis et al, 2004)</p>		<p>Lack of Perseverance $b=-0.12$ $p=.01$</p> <p>Sensation seeking $b=-0.13$ $p=.03$</p> <p>DV 2: Only statement is that there is a 0.84 to 0.89 change in standard deviation of likelihood of use post treatment.</p>	<p>This study had a previous analysis with different variables which contain the data.</p> <p>High attrition rate.</p> <p>Feasibility: The rolling nature and amount of time each patient received treatment makes this study ideal for replication at the site chosen for this project.</p> <p>Application: The decrease in impulsivity for several months shows impulsive traits can be adapted.</p>
<p>Goldberg et al., (2021).</p> <p>Country: United States</p>	<p>Intervention Review</p>	<p>Design: Systematic Review and Meta-analysis</p>	<p>N=35 studies with a total of 2825 patients.</p>	<p>IV: MB interventions</p>	<p>Tools: GRADEPro GDT 2015 software.</p> <p>Validity/Reliability:</p>	<p>Statistical tests used:</p> <p>Risk ratio</p>	<p>All treatment effects were calculated with a 95% CI and</p>	<p>Level 1- Systematic review</p>

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<p>Funding: National Institutes of Health, USA Forel Klinik, Switzerland</p> <p>Bias: Authors declare no conflicts of interest except for Dr. Zgierska who is a member of the board of directors for the American Society of Addiction Medicine.</p>		<p>Purpose: Determine the various effects of MB interventions in substance use.</p>	<p>Study characteristics: RCTs that tested MB interventions compared to either TAU, another intervention, or no intervention.</p> <p>45% studied multiple substances, the remainder studied a specific substance.</p>	<p>Control: TAU or no treatment.</p> <p>DV 1: Continuous abstinence post treatment.</p> <p>DV 2: Continuous abstinence at 4-month FP</p> <p>DV 3: Percent days with substance use post treatment.</p> <p>DV 4: Percentage days with substance use at 4-month FP</p> <p>DV 5: Consumed amount post treatment.</p> <p>DV 6: Cravings post treatment.</p>	<p>GRADE has been selected by the Cochrane review as their tool for operating systematic reviews (Higgins & Thomas, 2019).</p>	<p>Standardized mean difference</p> <p>GRADE considerations for grades of evidence.</p>	<p>given a GRADE of very low, low, medium, and high certainty.</p> <p>For RR and SMD, lower numbers favor the MB intervention.</p> <p>DV 1: no treatment RR=0.96, very low; alternative RR= 0.80, very low</p> <p>DV 2: no treatment RR=1.04, very low; alternative RR= 0.57, very low</p> <p>DV 3: no treatment SMD=0.05, very low; alternative SMD= -0.21, Low</p>	<p>Strengths: Large number of studies included.</p> <p>Able to offer a strong analysis with recommendation for various aspects that are frequently assessed with mindfulness.</p> <p>Weaknesses: Despite some decent effect sizes within the findings, the recommendations tended to be “low” or “very low” due to every study being identified as high risk for performance bias, and many had a high risk for detection bias as well.</p>

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				<p>DV 7: Craving at FP (3-6 months)</p> <p>DV 8: Treatment acceptability (Attrition)</p>			<p>DV 4: no treatment SMD= 0.21, very low; alternative SMD= -0.39, low</p> <p>DV 5: no treatment SMD 0.10, very low; alternative SMD= -0.42, very low</p> <p>DV6: no treatment SMD= 0.10, very low; alternative SMD= -1.43, very low</p> <p>DV 7: no treatment SMD could not be determined; alternative SMD= -2.07, very low</p>	<p>Feasibility: This test would be beyond the scope of this project, but is highly appropriate for the inclusion for literature review.</p> <p>Application: Despite no strong connection, the results show when compared to other treatments, MB interventions may slightly reduce days with substance use. Mindfulness was not shown to increase attrition, so it would not be a harmful intervention.</p>

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							<p>DV 8: no treatment RR=1.04, high; alternative RR=1.06, high.</p>	
<p>Perry et al., (2019).</p> <p>Country: United Kingdom</p> <p>Funding: The Department of Health (UK), National Institute of Health Research (UK)</p> <p>Bias: Authors declare no conflicts of interest.</p>	<p>Intervention Review</p>	<p>Design: Systematic Review and Meta-analysis</p> <p>Purpose: Identify therapies that may reduce SU and criminal activity.</p>	<p>N= 13 studies with a total of 2,606 participants</p> <p>Study Characteristics: All RCTs that focused on people with criminal activity in some way, seven of which focused on substance use, two of which were MB interventions</p>	<p>IV 1: MB interventions</p> <p>Control: Cognitive skills</p> <p>DV 1: Self-reported frequency of marijuana use</p> <p>DV 2: Arrest frequency over 36 months</p> <p>DV 3: Time to first arrest</p> <p>DV 4: Positive drug screen or refusal to provide drug screen.</p>	<p>Tools: GRADE handbook for assessing the quality of the evidence</p> <p>Validity/Reliability: GRADE has been selected by the Cochrane review as their tool for operating systematic reviews (Higgins & Thomas, 2019).</p>	<p>Statistical tests used:</p> <p>Mean Difference</p>	<p>All studies were completed with a 95% CI</p> <p>DV 1: MD= -1.05, very low</p> <p>DV 2: MD= -0.66, very low</p> <p>DV 3: MD=0.87, very low</p> <p>DV 4: MD= -0.7, very low</p>	<p>Level 1- Systematic Review</p> <p>Strengths: Able to aggregate data from a difficult to treat population.</p> <p>Weaknesses: Only 13 studies total, most of which did not share any interventions. Only two studies focused on mindfulness.</p> <p>Feasibility: The analysis done in this study is beyond the scope of this project but introducing mindfulness</p>

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								interventions is still applicable. Application: While some of the variables were not directly related to this PICOT, arrest frequency and time to first arrest could be related to substance use as well as impulsive actions.
Shorey et al, (2015). Country: United States Funding: National Institutes on Alcohol Abuse and Alcoholism Bias: The researchers declared no biases and used multiple authors not engaged in	Personality and social behavior theory.	Design: Quantitative Cohort study Purpose: Examine the relationship of moment-to-moment mindful attention traits and anxiety in young adults with SU.	N= 148 Demographics: Young adults ages 18-25. 66% male, 96% Caucasian. 53% opioid dependence, 26% polysubstance dependence, 14% alcohol dependence. Setting: Private residential treatment facility.	IV1: Moment-by-moment mindful attention traits. DV1: Anxiety Definitions: Mindfulness- Paying attention in a particular way: on purpose, in the present moment, and	Tools: MAAS-determine trait mindfulness PDSQ-for measuring anxiety Validity/Reliability: MAAS-Had an internal reliability of $\alpha=0.88$. External studies showed validity at $\alpha=0.79$ $p<0.001$ (Brown et al., 2011)	Statistical Tests Used: Multiple regression analyses using gender, age, education, alcohol use, drug use, and panic. Then the MAAS scale was	The MAAS scales were negatively and significantly related to anxiety and panic (β -.19, $P<.05$ and β -.25 $P<.01$ respectively).	Level 2-Cohort study. Strengths: This study found a relationship between a negative relationship between a trait of mindfulness and anxiety. Weaknesses: Correlation does not mean

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the data collection to interpret results to avoid bias.			<p>Exclusion: No inclusion or exclusion criterion was provided save that the participants had to be attending the residential treatment facility.</p> <p>Attrition: Only a single study was performed, no attrition occurred.</p>	non-judgmentally.	PDSQ has shown internal consistency and test-retest reliability through $\alpha=0.79$ (Zimmerman & Mattia, 2001).	incorporated as a predictor.		<p>causation. Every participant attended the same treatment facility. Almost no variability in race/ethnicity. The MB practice used only focuses on moment-to-moment attention and not the other aspects of MB practice.</p> <p>Feasibility: This study is well performed and could be replicated easily. It should be with a more diverse population.</p> <p>Application: If the traits of mindfulness are actually causative of reduced anxiety, then it would hold that mindfulness</p>

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								practices may reduce anxiety symptoms of patients.
<p>Shorey et al, (2017).</p> <p>Country: United States</p> <p>Funding: National Institutes on Alcohol Abuse and Alcoholism</p> <p>Bias: The researchers received compensation for consulting with Cornerstone of Recovery which might bias them to show improved results based on data. This compensation was not part of the research</p>	<p>Self-efficacy</p>	<p>Design: Quantitative RCT</p> <p>Purpose: Determine the effect of MB RP combined with acceptance-based therapy cravings and psychological flexibility.</p>	<p>N=117</p> <p>Demographics: Adults admitted to SU treatment program. Medically healthy and cleared from withdrawal. 74% male, 92.2% Caucasian, 58.8% alcohol as primary substance.</p> <p>Setting: Residential treatment</p> <p>Exclusion: Psychotic symptoms, cognitive impairment</p> <p>Attrition: 8 were not able to complete, but were</p>	<p>IV 1: 8 sessions of MB RP and acceptance-based therapy, 90 minutes</p> <p>Control: 12-step</p> <p>DV 1: alcohol cravings</p> <p>DV 2: drug cravings</p> <p>DV 3: psychological flexibility</p> <p>DV 4: dispositional mindfulness</p> <p>Definitions:</p> <p>Psychological flexibility- The ability to contact the present moment more</p>	<p>Tools: PACS for both alcohol and drug cravings.</p> <p>AAQ-SA to determine psychological flexibility</p> <p>Validity/Reliability: PACS- showed high internal reliability $\alpha=.92$ (Flannery et al, 1999)</p> <p>AAQ-SA showed internal consistency of $\alpha=0.85$ for substance users $p<.001$ (Luoma et al., 2011)</p>	<p>Statistical tests used:</p> <p>Multivariate analysis of variance to determine groups at baseline vs. discharge.</p> <p>Cohen's D to determine effect size</p>	<p>DV 1: $d=0.07$ no effect</p> <p>DV 2: $d=0.23$ small effect</p> <p>DV 3: $d=0.20$ small effect</p> <p>DV 4: $d=0.08$</p>	<p>Level-1 RCT</p> <p>Strengths: Low attrition rate for a SU population.</p> <p>Weaknesses: dispositional mindfulness did not increase between the two groups which would suggest that the participants in the IV group did not understand or incorporate the practice.</p> <p>Feasibility: Incorporating this specific MB intervention as done in this study would not be too plausible for this</p>

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project, however.			still used in analysis.	fully as a conscious human being in order to change or continue behavior when doing so serves a valued end.				PICOT as it requires a trained therapist, but other versions might be appropriate. Application: It is possible that the traditional 12-step programs are highly effective as well and thus taking them away in favor of MB interventions is not as helpful as hoped for. Having the MB intervention in addition might be more beneficial.
Witkiewitz et al., (2014). Country: United States Funding: Washington	Self-efficacy	Design: Quantitative RCT Purpose: Determine the effect of MB RP on drug use for women referred by the	N =105 Demographics: Adult women referred to SU treatment by the criminal justice system. 51% white, 89.5% unstable housing	IV 1: 8 sessions of MB RP, 50 minutes Control: RP DV 1: Days of substance use	Tools: TLFB for days used. Validity/Reliability: TLFB was shown to have a reliability rate between .73 to .91 p<.0001 (Robinson	Statistical tests used: Negative Binomial regression models	DV 1: 96% fewer drug use days compared to RP (CI 95%, p<.001)	Level-2 RCT with <80% completion. Strengths: Each session of MB RP is well documented and the primary

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<p>State University-Vancouver</p> <p>Bias: Authors declare no conflicts of interest. The results are biased, however as people who failed to complete have a high likelihood of having relapsed, but this can not be calculated without reaching the patient. If the attrition was counted as a relapse for each participant, the results would have likely been very different.</p>		<p>criminal justice system.</p>	<p>67.5% with less than 12 years education.</p> <p>Setting: Residential treatment</p> <p>Exclusion: Unable to read and write in English, cognitive deficits</p> <p>Attrition: 34 failed to complete the intervention 32%. 51 failed FP questions 49%.</p>	<p>Definitions:</p> <p>Addiction- Engaging in a behavior that leads to physiological and/or psychological dependence on the behavior as well as a significant impairment in an individual’s ability to function in important areas of their life.</p> <p>Mindfulness- Intentionally bringing awareness to experience as it arises, with an open receptivity toward and curiosity about phenomena.</p>	<p>et al., 2014). This study ran an internal consistency which showed $\alpha=0.93$</p>			<p>outcome. Internal consistency checks provide validity for the study.</p> <p>Weaknesses: High rate of attrition. Many reports of missing data as some participants would complete some, but not all assessments.</p> <p>Feasibility: The current group was a closed 8-session group. This would not be appropriate for the facility that will host this project as patients arrive and leave daily.</p> <p>Application: The well documented topics for each session could be</p>

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				<p>Relapse prevention- Intervention applied with an individual in the recovery/ maintenance phase of addiction that focuses on skill-building to prevent the re-occurrence of the addictive behavior.</p>				<p>very useful in planning the creation of this project. The high rate of success also shows the ability for this intervention to be impactful for some people.</p>

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Table A2:

Synthesis Table

Citation	Amaro & Black (2021).	Black & Amaro (2019)	Bowen et al., (2014)	Davis et al., (2018)	Davis et al., (2019)	Goldberg et al., (2021).	Perry et al., (2019)	Shorey et al., (2015)	Shorey et al., (2017)	Witkiewitz et al., (2014)
LOE-Design	Level 1-RCT	Level 1-RCT	Level-2 RCT with <80% completion	Level-2 RCT with <80% completion	Level-2 RCT with <80% completion	Level 1-systematic review	Level 1-systematic review	Level 2-cohort study	Level 1-RCT	Level-2 RCT with <80% completion
Study Characteristics										
Sample										
N=subjects	200	200	286	79	79	35 studies, 2825 participants	13 studies, 2606 participants	148	117	105
Population	Adult women	Adult women	Adults	Young adults	Young adults	None	None	Young Adults	Young Adults	Adult Women
Setting	Residential	Residential	Residential	Residential	Residential	Various	Various	Residential	Residential	Residential
Measurement tools	TLFB	DTS, DERS, DASS, PACS	TLFB, UA, Alcohol screens	Modified GAIN, TLFB, Perceived stress scale	SUPPS-P Impulsive Behavior Scale, TLFB	GRADE	GRADE	MAAS, PDSQ	PACS, AAQ-SA	TLFB
Interventions										

Key: **AAQ-SA**-18-item acceptance and action questionnaire for substance abuse; **CB**-cognitive behavioral; **CI**-confidence interval; **DASS**-Depression Anxiety, and Stress Scale; **DERS**-Difficulties in Emotional Regulation Scale; **DTS**- Distress Tolerance Scale; **LOE**-level of evidence; **MAAS**-Mindful Attention Awareness Scale; **MB**-mindfulness based; **PACS**-Penn Alcohol Cravings Scale; **PDSQ**-Psychiatric Diagnostic Screening Questionnaire; **RCT**-randomized control trial; **RP**-relapse prevention; **TAU**-treatment as usual; **TLFB**-timeline follow-back; **UA**-urine analysis

Citation	Amaro & Black (2021).	Black & Amaro (2019)	Bowen et al., (2014)	Davis et al., (2018)	Davis et al., (2019)	Goldberg et al., (2021).	Perry et al., (2019)	Shorey et al., (2015)	Shorey et al., (2017)	Witkiewitz et al., (2014)
MB RP			X	X	X	X	X		X	X
Moment-by-moment	X	X				X	X	X		
Other MB intervention						X	X		X	
Duration of intervention	12 sessions 80minutes	12 sessions 80minutes	8 sessions 120 minutes	8 sessions 90 minutes	8 sessions 90 minutes	Various	Various	No intervention	8 sessions 90 minutes	8 sessions 50 minutes
Control	Neurobiology of addiction	Neurobiology of addiction	CBRP, Psychoeducation	TAU	TAU	TAU or no intervention	Cognitive Skills	None	12-step	RP
Outcomes (Arrows indicate an increase or decrease in that value with the mindfulness intervention. Filled arrows are statistically significant)										
SU days	↓		↓	↓		↓ low certainty	Mixed Results, very low certainty			↓
Treatment retention		↑								
Time until first use	↑					Mixed Results, very low certainty				
Cravings		↓		↓		Mixed Results, very low certainty			↓	
Anxiety	Mixed							↓		
Impulsivity					↓		Mixed Results, very low certainty			
Misc. Psychological distress	Mixed	Mixed		↓					↓	

Key: **AAQ-SA**-18-item acceptance and action questionnaire for substance abuse; **CB**-cognitive behavioral; **CI**-confidence interval; **DASS**-Depression Anxiety, and Stress Scale; **DERS**-Difficulties in Emotional Regulation Scale; **DTS**- Distress Tolerance Scale; **LOE**-level of evidence; **MAAS**-Mindful Attention Awareness Scale; **MB**-mindfulness based; **PACS**-Penn Alcohol Cravings Scale; **PDSQ**-Psychiatric Diagnostic Screening Questionnaire; **RCT**-randomized control trial; **RP**-relapse prevention; **TAU**-treatment as usual; **TLFB**-timeline follow-back; **UA**-urine analysis

Appendix B

Bandura's Self-Efficacy Theory

Figure 1: Difference between efficacy expectations and outcome expectations (Bandura, 1977)

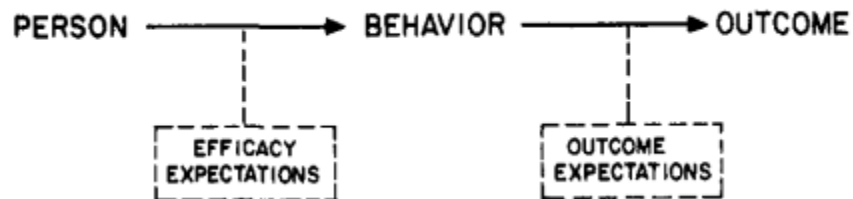
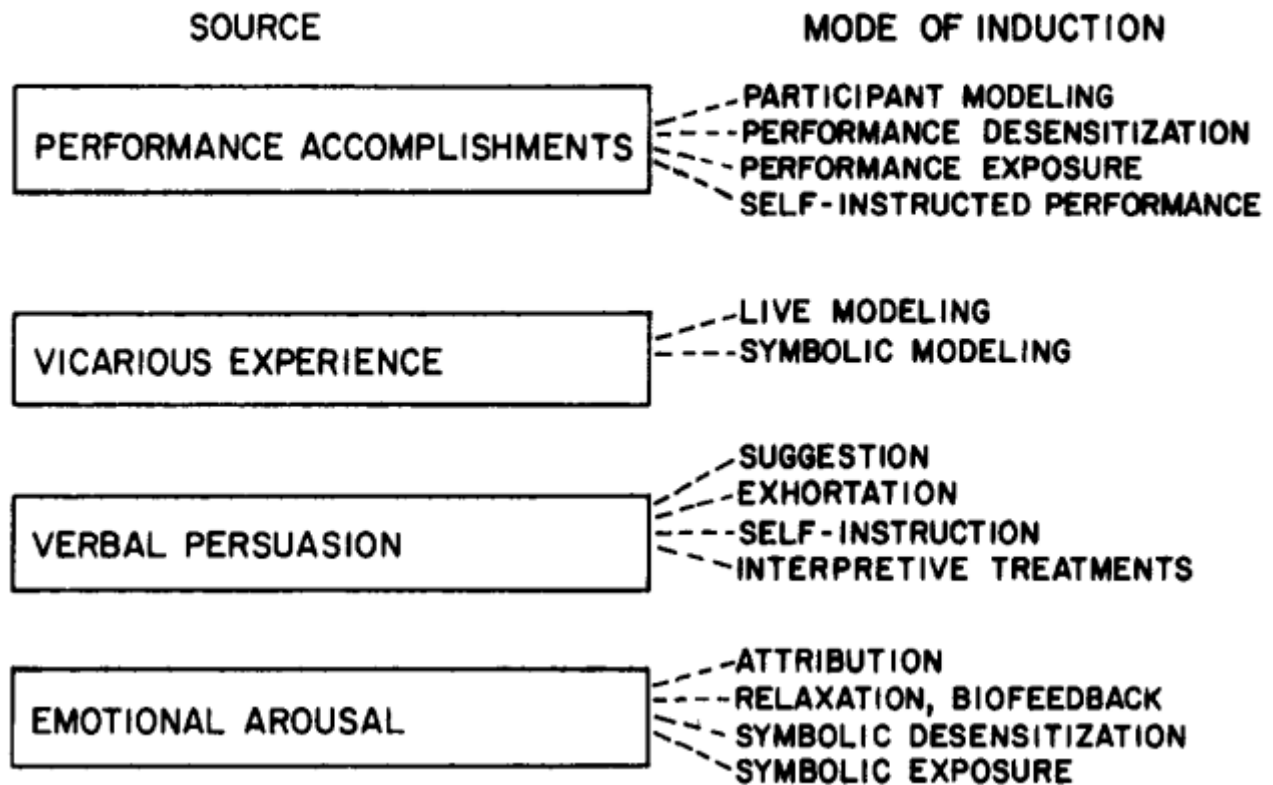


Figure 2: Sources of efficacy information (Bandura, 1977)

EFFICACY EXPECTATIONS



Health Belief Model

Figure 3: Modified Health Belief Model

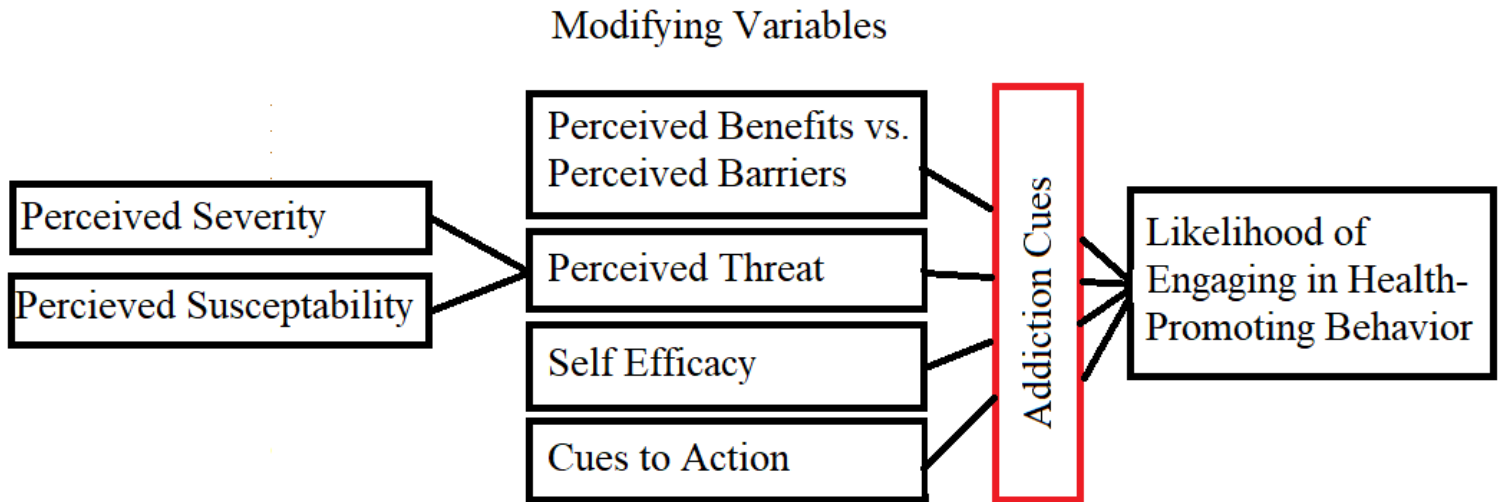


Figure 4: Applied Health Belief Model

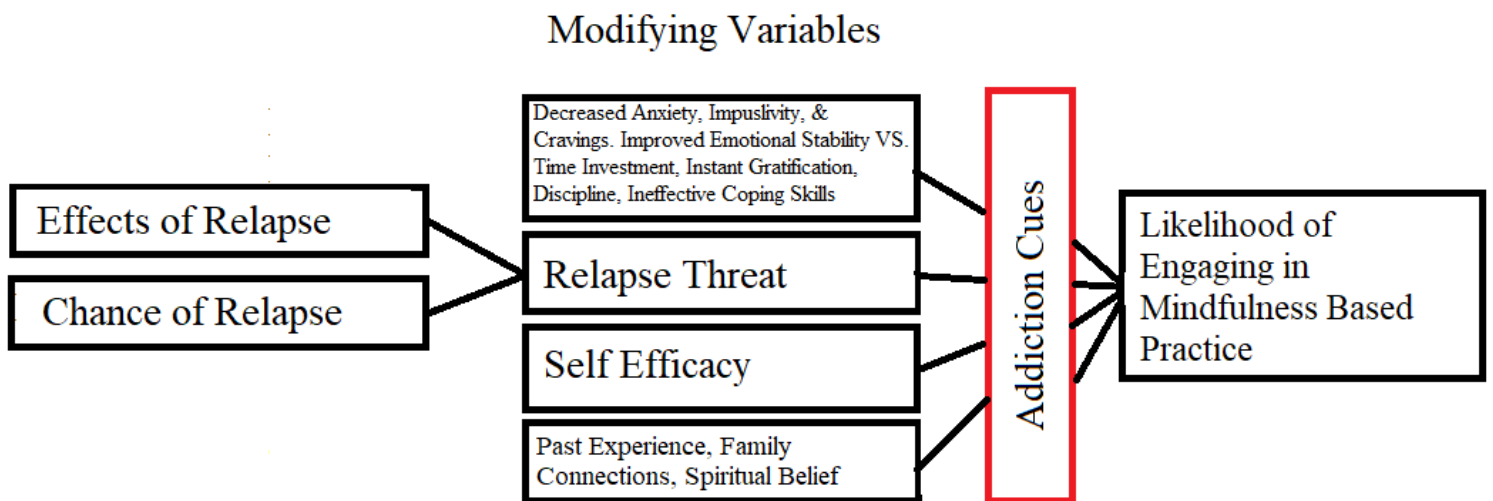
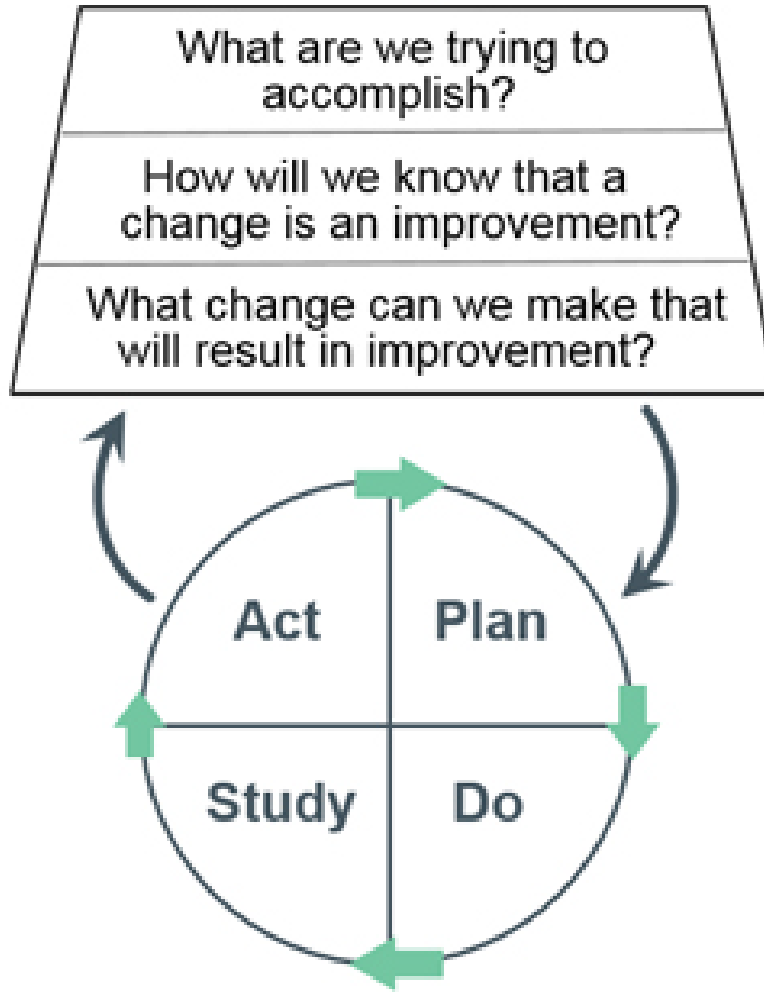


Figure 5: Model for Improvement

(Institute for Healthcare Improvement, ND)

Model for Improvement



Appendix C

Session Outlines

Note: Every “exercise” follows with a brief discussion about what patients experienced or noticed during the exercise

Session 1: Automatic pilot and mindful awareness

Exercise: Mindful Eating

Discussion: What is Mindfulness?

Exercise: Body Scan

Session 2: A new relationship with discomfort

Exercise: Breathing Meditation

Discussion: Challenges when trying to engage in mindful practice

Exercise: Urge Surfing

Exercise: Mountain Meditation

Session 3: From reacting to responding

Exercise: Leaves on the Stream

Exercise: False Refuge-Needs Underlying Cravings

Exercise: SOBER Space

Session 4: Mindfulness in challenging situations

Exercise: Sitting meditation-Sound, Breath, Sensation, Thoughts

Discussion: Individual and Common Relapse Risks

Exercise: SOBER Space with a Challenging Situation

Exercise: Walking Meditation

Session 5: Acceptance and skillful action

Exercise: Sitting meditation-Sound, Breath, Sensation, Thoughts, Emotion

Exercise: SOBER Space Practice with a Partner

Session 6: Seeing thoughts as thoughts

Exercise: Identifying thoughts

Discussion: Separating thoughts, emotions, and interpretations

Exercise: Leaves on the Stream

Exercise: Mindful Movement

Session 7: Supporting and sustaining well-being

Exercise: Body Scan

Discussion: How to Continue Practicing Mindfulness

Exercise: Mountain Meditation

Session 8: Everyday mindfulness

Exercise: Seeing Meditation

Discussion: Are We Mindful?

Exercise: 5-Senses

Appendix D**Project Expenses**

Locking File Cabinet	\$71.17
144 Pack of pens	\$21.60
3 Ring Binders	\$22.18
3 Hole Punch	\$19.18
Page Dividers	\$28.95
Printing Fees	\$110.16
Portable Speakers	\$173.22
<i>Mindfulness Based Relapse Prevention for Addictive Behaviors: A Clinicians Guide</i>	\$41.04
Total	\$487.50