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Robi C. Hopp  
*Belmont University*

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The Effects of a Brief Yoga Intervention on Psychologic and Physiologic Measures in Women

Recovering from Substance Abuse Disorders

Robin C. Hopp

Belmont University

Project Faculty Advisor: Elizabeth Morse

Project Team Members: Martha Buckner

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### **Abstract**

Women are the fastest-growing population experiencing substance use disorders (SUDs) in the United States. Multiple barriers e.g., mental health disorders, reduced self-efficacy, lack of social support have been identified and negatively impact acute and sustainable recovery efforts. The aim of this project was to evaluate the effects of yoga on mood status, biometrics, and self-efficacy toward yoga in a cohort at The Next Door, a substance abuse treatment center for women only. This was a quasi-experimental research approach with 14 women completing a total of 8 weekly yoga sessions over a ten-week period. Appropriate demographic data was collected. Measurements were obtained with a pretest/posttest method using validated tools. All participants reported co-occurring mental health disorders and addiction to alcohol, illicit drugs, or both. Statistically significant improvements were noted in mood status, self-efficacy, and diastolic blood pressure measurements. Findings from this project substantiate results from similar studies and may offer insight into future research. Improving mood states and self-efficacy through yoga addresses identified barriers to treatment and may promote sustainable recovery efforts. More research is needed to identify which yoga parameters are most beneficial for this population e.g., phase of recovery, frequency of participation, type of yoga practice.

*Keywords:* women, addiction, recovery, yoga, barriers, depression, anxiety, self-efficacy

## Introduction

Women are the fastest-growing population experiencing substance use disorders (SUDs) in the United States with 7.3 percent over the age of 12 abusing drugs and 7.4 percent abusing alcohol (National Institute of Health [NIH], 2016; Substance Abuse and Mental Health Services Administration [SAMHSA], 2013; Iliff, 2012). Women die at younger ages, progress to addiction faster, and generally have more difficulty achieving and maintaining sobriety (Iliff, 2013; Black, 2011). Women differ significantly from men in why they start abusing, how they become addicted, and their determinants for relapse (Iliff, 2013). The triggers and risk factors for SUDs are different for women and they face unique challenges e.g., shame and stigma, lack of support, physical and sexual abuse histories, and mental health disorders that complicate recovery and increase the risk of relapse (Taylor & Ozietta, 2010; Covington, 2008).

The societal stigmatization of addiction tends to be greater toward women (Taylor & Ozietta, 2010). This stigma contributes to feelings of shame and guilt for addicted women, diminishes their self-efficacy, and can lead to fractured relationships that negatively impact their support system (Taylor & Ozietta, 2010; SAMHSA, 2009). Additionally, mothers with abuse histories may have compounding feelings of shame and guilt stemming from the way they treated their children when addicted.

Links between trauma and addiction for women were first proposed in the early 80's (Vogeltanz et al., 1999; Wilsnack & Wilsnack, 1995; Hurley, 1991). Women are more likely to be victims of sexual abuse than men, with rates ranging from 15 to 25 percent (Centers for Disease Control and Prevention, 2012; Leserman, 2005). According to the National Institute on Drug Abuse (2009), approximately 80 percent of women seeking treatment for substance abuse report having a history of physical or sexual trauma.

Addiction negatively impacts physical and mental health as demonstrated by an increased risk for cardiovascular and lung disease, cancer, HIV/AIDS, and hepatitis in addicted populations as well as brain changes that over time can lead to paranoia, depression, hallucinations, and aggression (NIH, 2012). Co-occurring mental disorders, such as depressed mood or negative feelings, can have adverse effects on substance abuse recovery and may threaten long-term sobriety. The consideration of mental health is particularly relevant for women, who have higher rates of co-occurring mood and anxiety disorders than men (McHugh & Greenfield, 2010). According to Sack (2016), untreated psychiatric disorders are one of the top five reasons why women relapse.

Historically, substance abuse treatment was developed around interventions primarily aimed at men. Due in part to the women's movement during the 1970s, researchers began to focus on gender differences in substance abuse (Harvard Medical School, 2010; Greenfield & Grella, 2009; Covington, 2008). Interventions aimed at the unique needs of women must be based on a holistic, woman-centric approach that acknowledges their unique physical and psychosocial needs (Orwin, Francisco & Bernichon, 2001; Grella, Joshi & Hser, 2000; Grella, 1999).

A 2010 meta-analysis found that integrated recovery programs addressing mental health disorders along with addiction provide a positive synergistic effect on substance abuse recovery (Milligan et.al., 2010). Specifically, incorporating regular exercise during and after treatment has demonstrated beneficial effects for men and women with co-occurring SUDs and mental illness (Haglund et al., 2014; Williams & Streat, 2004; Zsuche, Heinz, & Strohle, 2011). Early research has shown that various forms of yoga improve anxiety and depression in women with SUD (Zhuang et. al., 2013; Posadski et. al., 2014). Yoga is a recognized form of mind-body medicine

that produces positive mental and physical effects on the human body through asanas (poses), gentle stretching, breath control, and meditation. Evidence supports yoga as a powerful therapeutic tool for improving overall health (Posadzki et. al., 2014; Woodyard, 2011; Kirkwood, Rampes, Tuffrey, Richardson, & Pilkington, 2005; Riley, 2004). Current research demonstrates that successful implementation of a yoga practice is a useful adjunct for treatment and relapse prevention in substance abuse with co-occurring mental health disorders (Khanna & Greeson, 2013; Posadzki et. al., 2014). Yoga targets clinically relevant measures of psychosocial, biological, and behavioral function, all of which are described in the pathophysiology of addiction (Khanna & Greeson, 2013).

### **Problem Statement**

Women who suffer from both poorly managed mood disorders and active substance use disorders face multiple challenges across the continuum of care for substance abuse. Women are more likely to abuse drugs because of low self-esteem, peer pressure, or mood disorders (Columbia University, 2003). The integration of mental health treatment into a comprehensive woman-centered recovery model is central to sustainable recovery (Volkow, 2010; Covington, 2008). Although yoga has demonstrated beneficial effects in a variety of populations with substance use disorders, there remains a paucity of studies investigating yoga as an intervention for women with co-occurring substance abuse and mental health disorders (Zhuang et. al., 2013). Current evidence also fails to demonstrate consistent methodologies when using yoga as an intervention (Khanna & Greeson, 2013). Further research is needed to better define what types of yoga and mindfulness-based interventions work best for women in recovery.

### **Purpose/Objectives/Aims**

The purpose of this project is to evaluate the impact of yoga on anxiety, depression, and self-efficacy scores toward yoga in a small cohort of women (N=22) enrolled in the Residential Transition Center or the Freedom Recovery Community at The Next Door (TND). The aim of the study is to measure how participation in 8, weekly sessions of yoga practice influences yoga self-efficacy, anxiety, and depression in a cohort of women enrolled in a residential treatment program for substance use disorder. Validated tools were used to assess anxiety and depressive symptoms along with yoga self-efficacy before and after the intervention.

### **Review of Evidence**

#### **Yoga and the Human Body**

Health benefits of yoga are realized largely through improved musculoskeletal function and autonomic nervous system (ANS) regulation. Through asanas, yoga gently stretches muscles, tendons, and connective tissue resulting in improved flexibility, increased muscle tone and strength, and skeletal stabilization. Additionally, weight-bearing asanas improve bone strength and health (Lu, Rosner, Chang, Fishman, 2016). Musculoskeletal conditioning combined with ANS regulation potentiates health benefits.

Several studies document the effect yoga has on the hypothalamic-pituitary-axis (HPA) and the sympathetic nervous system (Pascoe, 2015; Telles et al., 2013; Streeter, Gerbarg, Saper, Ciraulo, & Brown, 2012; Woodyard 2011). Researchers hypothesize that yogic breathing modulates the stress response system through activation of stretch inhibitory signals in the lungs, baroreceptors, and chemoreceptors (Streeter, Gerbarg, Saper, Ciraulo, & Brown, 2012; Jerath, Edry, Barnes, & Jerath, 2006). Deactivation of the SNS is evidenced by a decrease in heart rate and blood pressure along with easing of respirations. Studies measuring the physiologic impact

of yoga show significant reductions in circulating stress hormones like cortisol and increased levels of calming neurotransmitters like GABA (Yoshihara, Hiramoto, Oka, Kubo, & Sudo, 2014; Streeter, Gerbarg, Saper, Ciraulo, & Brown, 2012). In other words, yoga moves the body from a hyper to a hypo metabolic state. Malik, Shah, Hasan, and Bilal (2011) found that yogic breathing significantly reduced mean values for heart rate, systolic and diastolic blood pressure, and increased peak expiratory flow rates.

### **Yoga and Anxiety and Depression**

Yoga has been studied in a variety of co-morbid health conditions associated with anxiety and depression. Statistically significant improvements in quality of life (QOL) and overall improvement in symptoms of anxiety, depression, and fatigue were found in breast cancer patients (Rahmani & Talepasand, 2015; Zhang, Yang, Tian, & Wang, 2012). Multiple studies reported significant decreases in depression scores among cohorts of women with prenatal depression (Gong, Ni, Shen, Wu, & Jiang, 2015; Field, Diego, Delgado, & Medina, 2013). Women with chronic conditions like multiple sclerosis (MS) and low back pain were found to have improved QOL scores and fewer symptoms of anxiety and depression (Rogers & McDonald, 2015; Groessl, Weingart, Johnson, & Baxi, 2012). In particular, women with MS reported that yoga imparted a positive life influence that improved their general feeling of well-being.

### **Yoga and Addiction Recovery**

Yoga interventions used in addiction aim to improve physical and mental health barriers that preclude sustainable recovery. The literature supports different forms of yoga as a method to improve overall health, self-esteem, craving reduction, and to decrease symptoms of anxiety and depression among substance abusers (Devi & Singh, 2016; Ross & Thomas, 2010).



Additionally, yoga provides an opportunity to connect with a community of peers that can offer positive social support (Posadzki, Choi, Lee, & Ernst, 2014; Witkiewitz & Bowen, 2010).

Posadzki, Choi, Lee, and Ernst (2014) conducted a systematic review of eight randomized control trials (RCTs) that used yoga in addiction recovery programs. Seven of the eight RCTs found yoga lead to improved anxiety and depression scores, quality of life measures, craving reduction, and sustainable recovery. For the present study, it is important to note that two of the studies within the systematic review were female cohorts with tobacco addiction. The researchers reported significant improvements in cessation rates and craving reduction. Findings from the systematic review have been substantiated by recent research.

In a male cohort (N=66) with a variety of substance addictions, yoga was reported to promote positive self-esteem and improve scores for depression (Devi & Singh, 2016). Furthermore, a mindfulness-based program with a co-ed group of 168 participants, demonstrated a link between improved depression scores and increased rates of sustainable recovery (Witkiewitz & Bowen, 2010).

Although not highly investigated to this point, evidence supports yoga as an intervention leads to improved anxiety and depression scores for women in recovery (Yoshihara, Hiramoto, Oka, Kubo, & Sudo, 2014). In a randomized controlled trial with women (N=81) undergoing detoxification for heroin addiction, Zhuang, An, and Zhao (2013), reported those women participating in a nondescript yoga practice had greater improvement in anxiety and depression scores than the control group. Li et al. (2013) also reported improved scores for depression in their cohort of 70 heroin-addicted women participating in Tai Chi but only at the 60-day interval of measurement.

### **Theoretical Model**

Frequently used health promotion models, like Bandura's Social Cognitive Theory (SCT), can lead to improved intervention strategies through a richer understanding of addictive behaviors (Webb, Sniehotta, & Michie, 2010; Bandura, 1986). SCT assumes that learning and behavior adaptation occur in a social context through a dynamic and reciprocal interaction of person, environment, and behavior (Bandura, 1986). Self-efficacy, a pivotal construct in SCT, affects an individual's goals and aspirations, and shapes outcome expectations (Bandura, 1986).

Self-efficacy is the belief one has in their ability to achieve goals or desired outcomes (Bandura, 1986). Individuals with greater self-efficacy toward a task are more likely to adopt that behavior (Bandura 1994; Bandura 1986). For example, women who believe they are capable of sustaining long-term sobriety are more likely to abstain from using drugs and alcohol. Conversely, when self-efficacy expectations are low, a woman may be less likely to abstain because she does not believe she is capable of staying sober in the long term. Thus, recovery programming that provides opportunities for clients to practice skills in a controlled setting fosters the development of confidence in the short term, thereby supporting long term self-efficacy.

Self-efficacy is supported by four sources of information: 1) mastery, 2) vicarious experiences, 3) verbal persuasion, and 4) self-appraisal. According to Bandura (1994), the most effective way to instill a strong sense of efficacy is through mastery experiences. Mastery, behavior success, bolsters one's belief in their ability to continue that behavior. Vicarious experiences support self-efficacy through the observation of successful peers who can serve as social models. Verbal persuasion is positive vocal feedback from others that supports an individual's belief in their own abilities. Self-appraisal is the individual's assessment of their

capabilities through reflection on past action. Figure 1 demonstrates the relationship between information sources, self-efficacy, and behavior adoption.

Yoga has demonstrated multiple beneficial effects on psychological and physical factors influencing sustainable recovery particularly with anxiety, depression, and craving reduction (Posadzki, Choi, Lee, & Ernst, 2014; Zhuang, An, & Zhao, 2013; Marefat, Peymanzad, & Alikhajeh, 2011; Witkiewitz & Bowen, 2010). According to Bandura (1986), women's increased confidence in their ability to perform yoga will influence the degree to which yoga is used as a stable element in their long-term in their recovery regimens.

### **Project Design**

A quasi-experimental research approach with a pretest-posttest design was used to measure the impact of an eight-week yoga intervention on depression, anxiety, and yoga self-efficacy. A group of twenty-two women currently enrolled in the Residential Transition Center and the Freedom Recovery Community at The Next Door (TND) were invited to participate.

Participation was voluntary. The intervention was designed and led by Mary Schmeisser-White, MSN, FNP, RYT-200. Ms. White completed a 230-hour yoga teacher training through the Asheville Yoga Center and a 200-hour Foundations of Yoga Therapy teacher training, through her primary teacher, Dolphi Wertenbaker, M.D. The Belmont University Institutional Review Board under the rules for expedited review approved the project.

### **Clinical/Practice Setting**

The project took place at The Next Door in Nashville, Tennessee. The Next Door is a non-profit that serves to support women through addiction recovery and re-entry into life after treatment. The program was originally designed to address the physical, mental, and spiritual needs of women coming from incarceration with the goal of reducing recidivism. TND now

supports five levels of treatment recovery that range from acute detoxification, transitional support, to fully integrated outpatient programming (The Next Door, 2016).

Eligible participants for this study were enrolled in one of TNDs programs, either the Residential Transition Center or the Freedom Recovery Community. The Residential Transition Center is a structured 6-month program offering residential treatment for up to twenty women who are admitted by application and referral on a rolling basis. Goals of RTC include: 1) healing and balance, 2) change in thoughts and attitudes that merge into new behaviors, 3) better understanding of addiction and co-occurring mental illness with recognition of relapse triggers, and 4) skill acquisition for relapse prevention and living life addiction free. The RTC clients are required to participate in a highly structured curriculum that includes individual, group, and family therapy, peer and community support, case management, psychiatric evaluation and medication management, relapse prevention and life skills groups, spiritual development opportunities, and creative expression and wellness activities. For recovering mothers either transitioning from RTC or other treatment facilities, The Next Door offers the Freedom Recovery Community.

The Freedom Recovery Community provides permanent apartment living for women in recovery and their children. The opportunity to continue recovery services within a supportive peer environment is the aim of FRC. The FRC is less structured than RTC and offers employment assistance, group therapy, educational opportunities, peer and community support, case management, cognitive behavioral therapy and family literacy.

The Chief Clinical Officer approved the yoga intervention as an elective activity during regular programming on Tuesday evenings that was considered part of the programs allocated

group activity time. The project leader supplied yoga mats, towels, and water bottles. Devices required for measuring blood pressure, heart rate, and oxygen saturation were brought to the site.

### **Project Population**

The managers for RTC and FRC shared with their clients the opportunity to participate in the eight-week yoga class. Inclusion criteria include being a woman 18 years of age or older, addiction history, at least 6 months substance free, willingness to work to pay for the TND program fees of \$125 weekly, and negative drug screen upon admission. Forty-two women were enrolled in the combined programs and met the inclusion criteria. Schedule conflicts (e.g., workforce, parenting classes) prevented 19 women from participating in the study. Women who were eligible to participate in the yoga intervention (N=23) met with the project leader in a semi-private area to discuss and complete the informed consent (Appendix 1) prior to the study start date.

### **Sources of Data/ Instruments/Measurements**

A chart review was completed for demographic data and relevant past medical and social history including age, education, marital status, number of children, chronic physical and mental illnesses, and current medications (Appendix 2). The Depression Anxiety Stress Scale 42(DASS-42) was used to measure negative emotional states (Appendix 3). The DASS42 is a set of three self-report scales, each containing 14 items, developed to measure the core symptoms of anxiety, stress, and depression. The DASS 42 subscales have been examined in clinical and nonclinical samples with Cronbach alphas reported as 0.94 for depression, 0.87 for anxiety, and 0.91 for stress (Antony, Bieling, Cox, Enns, & Swinson, 1998). The Yoga Self Efficacy Scale (YSES) was used to measure self-efficacy for yoga practice (Appendix 4). Birdee, Sohl, and Wallston (2016) developed and examined the psychometric properties of the YSES and found the scale to

have a Cronbach alpha of 0.93. Biometric data e.g., blood pressure, heart rate, respiratory rate, and SaO<sub>2</sub>, were collected (Appendix 5). Mood was measured before and after each weekly yoga session using the circumplex model of affect (Appendix 5). Graphics of the model depict the horizontal axis representing valence e.g., positive or negative mood and the vertical axis representing arousal or degree of activation. This model provides an experimental framework for exploring the neural basis of affect as well as a theoretical basis for understanding comorbidities among mood and anxiety disorders (Posner, Russell, & Peterson, 2005).

### **Data Collection Process/Procedures**

The chart review was completed at The Next Door prior to intervention start date. The participants completed the DASS-42 twice, immediately after informed consent was obtained and again at the termination of the study. Weekly, as participants entered the yoga room and assumed a sitting position, their blood pressure, heart rate, respiratory rate, and SaO<sub>2</sub> were measured. At this point, the participants also identified a feeling word on a hard copy of the circumplex chart. The reverse of this procedure was carried out at the end of the yoga practice with the participants remaining in their closing yoga position. Participants completed the Yoga Self Efficacy Scale at the end of each yoga session.

### **Results**

**Participants.** Twenty-three women met criteria for inclusion and 22 were consented by the project leader. Of the individuals who signed the consent, seven women withdrew from the study and one was dismissed, leaving a complete sample of 14 women who attended eight weekly yoga sessions over a 10-week period, and completed all pre and post intervention instruments.

*Demographic status of the participants (Table 1).* The mean age of the participants was 43.5 years (SD 9.43, n=14) and ranged from 29-58. Less than half (42.9%) of the group had completed high school; none of the participants were married; 78.6% had children. Of those with children, 42.9% retained custody. Homelessness was reported by 78.6 % of the group prior to entering treatment.

*Clinical characteristics of the participants (Table 2).* All of the participants reported having a mood disorder characterized by anxiety (57.1%), depression (35.7%), or a combination of both (7.15%) with 64.3% taking prescription medications. Three women (21.4%) reported a history of at least one suicide attempt. All participants reported experiencing some form of abuse, 85.7% reported domestic assault and 57.1% reported sexual assault.

Two women reported having primary hypertension treated with prescription medications e.g. lisinopril, clonidine. Hepatitis C was the most frequently reported chronic medical condition (28.6 %, n = 4). None of the women were pregnant at the time of the study.

*Characteristics of the participants' substance abuse (Table 3).* The women's profiles were examined for individual histories of alcohol and/or drug use, drug of choice, age started, and personal perception of addiction. Of the 14 participants, 92.9% reported abusing alcohol, 57.1% felt addicted to alcohol as reported through a yes/no question on the TND intake form, the mean age for first exposure was 15.85 years. All participants reported illicit drug use, 92.9% felt addicted to drugs as reported on the TND intake form, mean age for first exposure was 18.36 years, and 50% reported using more than one drug.

**Co-occurring mental health diagnosis.** Wilcoxon Signed Ranks test was used to compare results. Statistically significant differences were found for each of the three subscales in the DASS-42 (Table 4). Baseline stress scores (median=22.00) compared to final stress scores

(median=6.50) at the end of the 8-week intervention ( $p$ -value .001). Baseline anxiety scores (median=10.00) compared to ending anxiety scores (median =5.50,  $p$ -value .011). Baseline depression scores (median=7.50) compared to ending depression scores (median=1.50,  $p$ -value .003).

Significant differences were also noted between the scores for yoga self-efficacy (Table 5). When comparing yoga self-efficacy scores (median=69.00) before the first class to yoga self-efficacy scores (median=84.00) after the final class, scores improved ( $p$ -value of .006).

**Biometric data.** A Paired Samples T-test was used to compare results from the biometric data. Statistical significance ( $p$ -value of .030) was only noted in diastolic blood pressure measurements taken before the first class (mean=87.79, SD 10.453) compared to measurements taken (mean=78.93, SD 8.109) at the end of the last class. Although not significantly different, the remaining biometric measurements improved over the course of the 8-week intervention with the following mean differences observed: 1) systolic blood pressure decreased from 137.43 to 127.36, 2) heart rate decreased from 80.43 to 77.64, 3) respiratory rate decreased from 18.43 to 17.14, and 4) oxygen saturation improved from 97.14% to 97.71%.

**Measurement of mood data.** Although the Circumplex Model of Affect was used to collect each participant's mood, it was difficult to find a metric to quantify the collected data due to the small number of participants. The Circumplex model (Figure. 2) uses feeling words e.g. excited, happy, serene, angry, distributed along a circular continuum that is further divided into horizontal and vertical axes. The participant is described as being activated or deactivated combined with pleasant or unpleasant depending on their word choice. When the participant chooses a word like content, relaxed, or calm they are determined to be in a deactivated and pleasant state. Over the continuum of the yoga period, approximately 50% of the RTC cohort



recorded two to three sessions out of the eight where mood states did not move in a favorable direction. Anecdotally, on those occasions the individual participants also reported difficulties with “group therapy”, conflicts over holiday leave, and physical illness. The FRC community consistently moved to a more deactivated, pleasant position over the entire yoga period. During the final class, 13 participants moved from a more activated or unpleasant state to a deactivated and pleasant state. The one participant not moving to a more deactivated and pleasant state chose the word fatigue as her mood descriptor before and after class but also reported that she was not feeling well.

### **Discussion**

The participants for this scholarly project were women enrolled in a treatment program for substance use disorders. All were single, most had children, and most reported homelessness prior to entering treatment. These findings are in line with results from previous studies where lack of social support was identified as a barrier to recovery (Taylor & Ozieta, 2010; SAMHSA, 2009). All participants reported histories of abuse, either domestic, sexual, or both. This finding is similar to previous reports that identified abuse histories as a risk factor for SUDs (Taylor & Ozieta, 2010; Covington, 2008). It is important to note that victimization may lead to impulsivity as a maladaptive behavior. As a result, victims engage in impulsive behaviors e.g., substance abuse, eating disorders, gambling without regard to potential negative consequences (Estevez, Ozerinjauregi, Herrero-Fernandez, & Jauregi, 2016).

All participants reported anxiety, depression, or both and most were taking prescription anti-depressants. Three of the women had attempted suicide at least once. All fourteen abused illicit drugs and reported feeling addicted to those substances. Of the fourteen participants, thirteen reported alcohol abuse and eight felt addicted. These findings corroborate results from

previous studies reporting links between co-occurring mental health disorders and substance abuse (Sack, 2016; McHugh & Greenfield, 2010). Sack (2016) also noted that untreated mood disorders were a major predictor of relapse.

The present study demonstrated yoga as an adjuvant to treatment significantly improved symptoms of anxiety, depression, and stress in the cohort under investigation. The results are supported by previous studies where yoga interventions were reported to improve anxiety and depression scores in cohorts with co-occurring mental health disorders and addiction (Posadski et. al., 2014; Yoshihara, Hiramoto, Oka, Kubo, & Sudo, 2014; Zhuang et. al., 2013).

Most of the participants recorded an improved mood state on the feelings chart after each yoga session. This finding may be reflective of similar reports where the body was demonstrated to move from a hyper to a hypo metabolic state through a significant reduction in circulating stress hormones and increased levels of calming neurotransmitters (Yoshihara, Hiramoto, Oka, Kubo, & Sudo, 2014; Streeter, Gerbarg, Saper, Ciraulo, & Brown, 2012). Although not quantifiable, affirmation of improved mood by the participants' further supports the benefit of yoga among those with co-occurring mood disorders and addiction.

Significant improvements were also noted in participants' self-efficacy related to their yoga practice, which may impart a two-fold benefit. First, embedded in Bandura's (1986) social cognitive theory is the idea that improved self-efficacy through yoga may serve as a starting point for improved overall self-efficacy. Reduced self-efficacy has been identified as a risk factor for sustainable recovery. Second, improved self-efficacy toward yoga may potentiate the continued use of the practice as a treatment modality.

Although most of the findings related to biometric data were not statistically significant, improvements were noted across all measurements. This finding is substantiated by previous

yoga studies that reported participant's moving from a hyper to hypo metabolic state demonstrated through significant changes in biometric measurements (Yoshihara, Hiramoto, Oka, Kubo, & Sudo, 2014; Streeter, Gerbarg, Saper, Ciraulo, & Brown, 2012; Malik, Shah, Hasan, and Bilal, 2011).

### **Strengths and Limitations of the Study**

Several limitations should be addressed. The sample size for analysis (n=14) was small. Therefore, the results may not be generalized to all women with SUDs. The short duration of the intervention period could have influenced outcomes given comparable studies ranged from 12 weeks to 6 months in duration (Yoshihara, Hiramoto, Oka, Kubo, & Sudo, 2014; Li et al., 2013; Zhuang, An, & Zhao, 2013). The women were at various stages of recovery, which may have impacted their attitude and abilities toward yoga. Previous experiences with yoga, although not measured, could have influenced perception and level of participation.

The significant findings in this study may be attributed to additional factors. First, the participants were enrolled in an intensive recovery program where a high level of compliance was expected. Second, although participation was voluntary, the yoga intervention was held during normal programming hours, which may have influenced attendance. Finally, based on Bandura's tenets of self-efficacy, providing the women with an opportunity to socialize and receive encouragement from peers and project leaders may have lead to a synergistic effect on mood and recovery efforts. Anecdotally, the women in this cohort reported using the yoga practice in their daily lives and, more specifically, at moments of intense stress e.g., one participant reported using the breathing asana when feeling anxious. The group was encouraged to keep their mats along with an illustrated description of the yoga practice to promote continuation of their individual practices.

**Conclusion**

This project highlighted the complex overlapping risk factors that increase risk for SUD and complicate recovery for women. Project outcomes demonstrate the beneficial effects of yoga on selected barriers to recovery for women enrolled in a substance abuse treatment center. Based on the results, treatment facilities should consider yoga as an adjunct to current therapeutic recovery modalities, understanding that doing so is an important way of supporting women to develop adaptive coping to manage underlying depression and anxiety that is so common in this vulnerable population. Since the group was encouraged to continue the yoga practice, a follow up to this project would be of interest to see what percent of the cohort continued the practice as well as their recovery outcomes. Further research is needed to support these findings and to identify what types of yoga practice is best suited for this population and to what extent practicing as a group and the benefit of peer support amplifies the pure effect of yoga alone. Also, an exploration of the effect of yoga self-efficacy as a platform for improving overall self-efficacy may offer insight into future recovery programming.

### References

- Antony, M. M., Bieling, P. J., Cox, B. J., Enns, M. W., & Swinson, R. P. (1998). Psychometric properties of the 42- item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. *Psychological Assessment, 10*(2), 176-181.
- Bandura, A. (1994). Self-efficacy. In V. S. Ramachaudran (Ed.), *Encyclopedia of human behavior, 4*, 71-81. New York: Academic Press.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Birdee, G. S., Sohl, S. J., & Wallston, K. (2016). Development and psychometric properties of the yoga self-efficacy scale (YSES). *BMC Complementary and Alternative Medicine, 16*(3).
- Doi: 10.1186/s12906-015-0981-0
- Black, C. (2011). *Women and addiction: From Betty Ford to Amy Winehouse: Addiction is a terminal illness, people literally die from it*. Retrieved from <http://www.psychologytoday.com/blog/the-many-faces-addiction/201107/women-and-addiction-betty-ford-amy-winehouse>
- Centers for Disease Control and Prevention. (2012). *Sexual violence*. Retrieved from [www.cdc.gov/ViolencePrevention/pdf/sv-datasheet-a.pdf](http://www.cdc.gov/ViolencePrevention/pdf/sv-datasheet-a.pdf)
- Columbia University. (2003). *The formative years: Pathways to substance abuse among girls and young women ages 8-22*. Retrieved from [www.files.eric.ed.gov/fulltext/ED473171.pdf](http://www.files.eric.ed.gov/fulltext/ED473171.pdf)
- Covington, S. (2008). Women and addiction: A trauma –informed approach. *Journal of Psychoactive Drugs, 377-385*. Retrieved from

[www.stephaniecovington.com/assets/files/Covington%20SARC.pdf](http://www.stephaniecovington.com/assets/files/Covington%20SARC.pdf)

- Devi, N. J., & Singh, T. B. (2016). A randomized control trial of the effect of yoga on quality of sleep, self-esteem and depression in substance abuser. *International Journal of Multidisciplinary Approach and Studies*, 3(4), 11-17.
- Estevez, A., Ozerinjauregi, N., Herrero-Fernandez, D., & Jauregui, P. (2016). The mediator role of early maladaptive schemas between childhood sexual abuse and impulsive symptoms in female survivors of CSA. *Journal of Interpersonal Violence*, 1-22.  
Doi: 10.1177/0886260516645815
- Field, T., Diego, M., Delgado, J., & Medina, L. (2013). Yoga and social support reduce prenatal depression, anxiety, and cortisol. *Journal of Bodywork and Movement Therapies*, 17(4). 397-403.
- Gong, H., Ni, C., Shen, X., Wu, T., & Jiang C. (2105). Yoga for prenatal depression: a systematic review and meta-analysis. *BMC Psychiatry*, 15(1), 14.
- Greenfield, S. F., & Grella, C. E. (2009). What is “women-focused” treatment for substance use disorders? *Psychiatric Services*, 60(7), 880-882. Doi:10.1176/appi.ps.60.7.880.
- Grella, C. (1999). Women in residential drug treatment: Differences by program type and pregnancy. *Journal of Health Care for the Poor and Underserved*, 10(2), 216-229.
- Grella, C., Joshi, Vi, & Hser, Y. (2000). Program variation in treatment outcomes among women in residential drug treatment. *Evaluation Review*, 24(4), 364-383.
- Groessl, E. J., Weingart, K. R., Johnson, N., & Baxi, S. (2012). The benefits of yoga for women veterans with chronic low back pain. *The Journal of Alternative and Complementary Medicine*, 18(9), 832-838.

- Haglund, M., Ang, A., Mooney, L., Gonzales, R., Chudzynski, J., Cooper, C. B., Dolezal, B. A., Gitlin, M., & Rawson, R.A. (2014). Predictors of depression outcomes among abstinent methamphetamine-dependent individuals exposed to an exercise intervention. *The American Journal of Addictions, 24*, 246-251. Doi: 10.1002/ajad.12175
- Harvard Medical School. (2010). *Addiction in women*. Retrieved from [www.health.harvard.edu/newsletter\\_article/addictoin-in-women](http://www.health.harvard.edu/newsletter_article/addictoin-in-women)
- Hurley, D. L. (1991). Women, alcohol, and incest: An analytical review. *Journal of Studies on Alcohol, 52* (3), 253-268.
- Iloff, B. (2013). *Addiction: Are women at greater risk?* Retrieved from [www.hazelden.org/web/public/addiction\\_women\\_risk.page](http://www.hazelden.org/web/public/addiction_women_risk.page)
- Iloff, B. (2012). *Addiction and gender: Recovery for women*. Retrieved from [www.psychologytoday.com/blog/remarkable-recovery/201203/addiction-and-gender-recovery-women](http://www.psychologytoday.com/blog/remarkable-recovery/201203/addiction-and-gender-recovery-women)
- Jerath, R., Edry, J. W., Barnes, V. A., & Jerath, V. (2006). Physiology of long pranayamic breathing: Neural respiratory elements may provide a mechanism that explains how slow deep breathing shifts the autonomic nervous system. *Medical Hypotheses, 67*(3), 566-571. Doi: <http://dx.doi.org/10.1016/j.mehy.2006.02.042>
- Khanna, S., & Greeson, J. M. (2013). A narrative review of yoga and mindfulness as complementary therapies in addiction. *Complementary Therapies in Medicine, 21*(2), 244-252. Doi: 10.1016/j.ctim.2013.01.008
- Kirkwood, G., Rampes, H., Tuffrey, V., Richardson, J., & Pilkington, K. (2005). Yoga for anxiety: a systematic review of the research evidence. *British Journal of Sports*

- Medicine*, 30, 884-891. Doi: 10.1136/bjism.2005.019069
- Leserman, J. (2005). Sexual abuse history: Prevalence, health effects, mediators, and psychological treatment. *Psychosomatic Medicine*, 67(6), 906-915.
- Li, D., Zhuang, X., Zhang, Y., Guo, H., Wang, Z., Zhang, Q., Feng, Y., & Yao, Y. (2013). Effects of tai chi on the protracted abstinence syndrome: A time trial analysis. *The American Journal of Chinese Medicine*, 41(1), 43-57.
- Lu, Y., Rosner, B., Chang, G., & Fishman, L. M. (2016). Twelve-minute daily yoga regimen reverses osteoporotic bone loss. *Topics in Geriatric Rehabilitation*, 32(2), 81-87.
- Malik, S., Shah, M., Hasan, S., & Bilal, M. (2011). The physiological responses of yogic breathing techniques: A case-control study. *Journal of the American Society of Exercise Physiologists*, 14 (3), 74-79.
- Marefat, M., Peymanzad, H., & Alikhajeh, H. (2011). The study of the effects of yoga exercise on addicts' depression and anxiety in rehabilitation period. *Procedia of Social and Behavioral Science*, 30, 1494-1498.
- McHugh, R. K. & Greenfield, S. F. (2010). Psychiatric symptom improvement in women following group substance abuse treatment: Results from the women's recovery group study. *Journal of Cognitive Psychotherapy*, 2(1), 26-36.
- Milligan, K., Niccols, A., Sword, W., Thabane, L., Smith, A., & Liu, J. (2010). Maternal substance use and integrated treatment programs for women with substance abuse issues and their children: a meta-analysis. *Substance Abuse Treatment, Prevention, and Policy*, 5(1). Doi: 10.1186/1747-597X-5-21



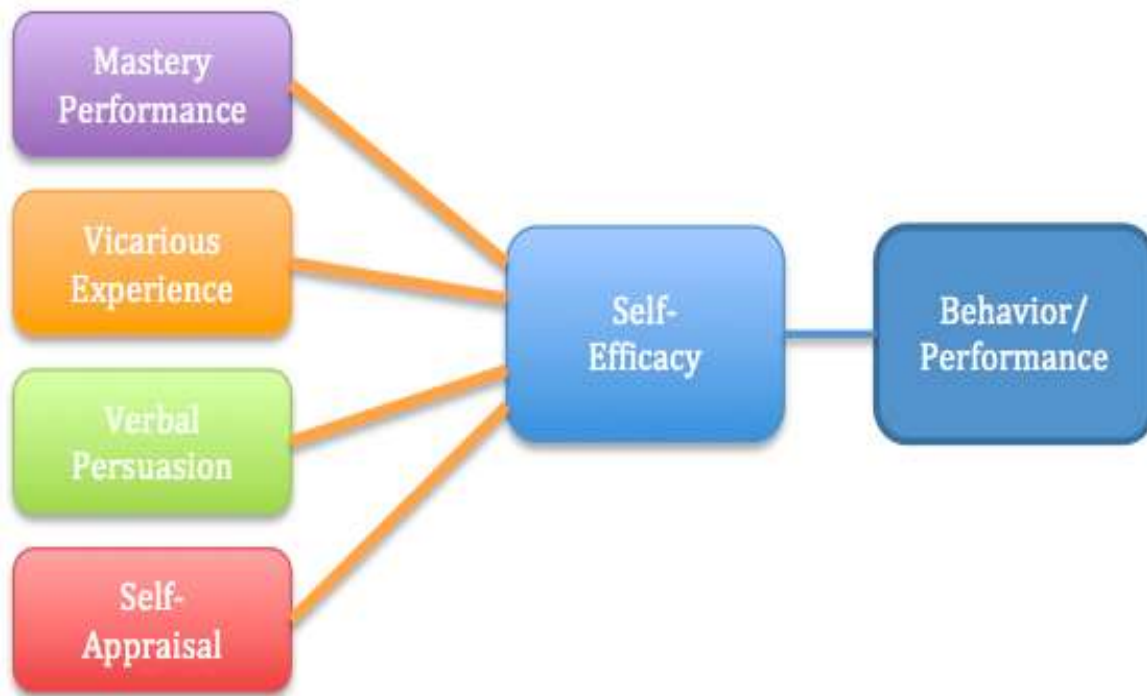
- National Institute of Drug Abuse. (2009). *Women's treatment for trauma and substance use disorders*. Retrieved from <https://www.drugabuse.gov/about-nida/organization/cctn/ctn/research-studies/womens-treatment-trauma-substance-use-disorders>
- National Institute of Health (2016). *Alcohol facts and statistics*. Retrieved from <https://www.niaaa.nih.gov/alcohol-health/overview-alcohol-consumption/alcohol-facts-and-statistics>
- National Institute of Health. (2012). *Medical consequences of drug abuse*. Retrieved from <https://www.drugabuse.gov/publications/medical-consequences-drug-abuse/mental-health-effects>
- Orwin, R. Francisco, L. & Bernichon, T. (2001). *Effectiveness of women's substance abuse treatment programs: A meta-analysis*. Rockville, MD: National Evaluation Data Services, Center for Substance Abuse Treatment.
- Pascoe, M. C., & Bauer, I. E. (2015). A systematic review of randomized control trials on the effects of yoga on stress measures and mood. *Journal of Psychiatric Research*, 68, 270-282.
- Posadzki, P., Choi, J., Lee, M. S., & Ernst, E. (2014). Yoga for addictions: a systematic review of randomized clinical trials. *Focus on Alternative and Complementary Therapies*, 19(1), 1-8. Doi: 10.1111/fct.12080
- Posner, J., Russell, J. A., & Peterson, B. S. (2005). The circumplex model of affect: An integrative approach to affective neuroscience, cognitive development, and psychopathology. *Developmental Psychopathology*, 17(3), 715-734.

Doi: 10.1017/S0954579405050340

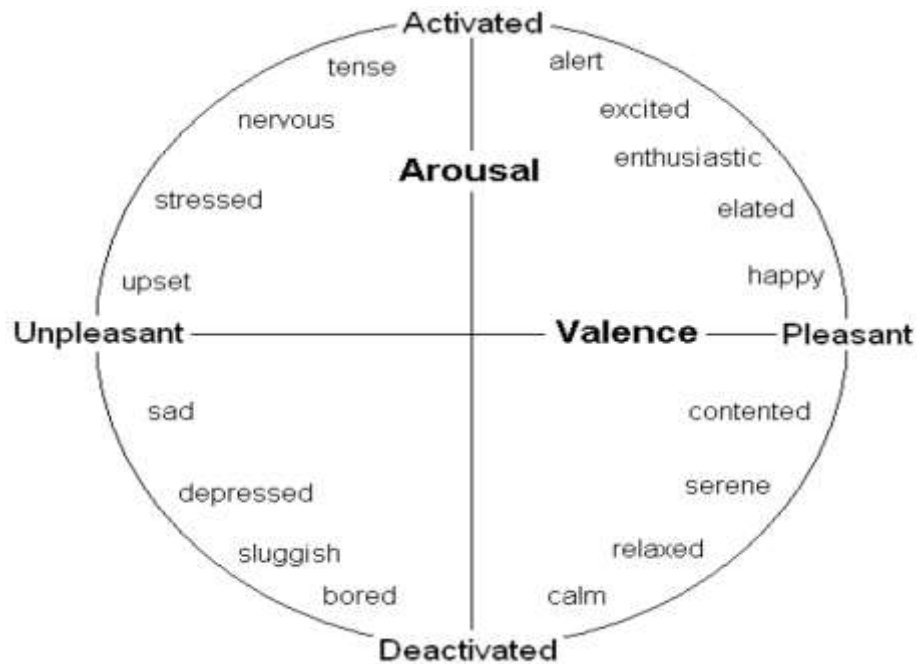
- Rahmani, S., & Talepasand, S. (2014). The effect of group mindfulness-based stress reduction program and conscious yoga on the fatigue severity and global and specific life quality in women with breast cancer. *Medical Journal of the Islamic Republic of Iran*, 29, 1-12.
- Rogers, K. A., & MacDonald, M. (2015). Therapeutic yoga: symptom management for multiple sclerosis. *The Journal of Alternative and Complementary Medicine*, 21(11), 655-659.
- Ross, A., & Thomas, S. (2010). The health benefits of yoga and exercise: a review of comparison studies. *The Journal of Alternative and Complementary Medicine*, 16(1), 3-12.
- Sack, D. (2016). Top 5 reasons women relapse. *Psych Central*. Retrieved from <http://blogs.psychcentral.com/addiction-recovery/2012/05/top-5-reasons-women-relapse/>
- Streeter, C. C., Gerbarg, P. L., Saper, R. B., Ciraulo, D. A., & Brown, R. P. (2012). Effects of yoga on the autonomic nervous system, gamma-aminobutyric-acid, and allostasis in epilepsy, depression, and post-traumatic stress disorder. *Medical Hypotheses*. Doi: 10.1016/j.mehy.2012.01.021
- Substance Abuse and Mental Health Services Administration. (2013). *Results from the 2013 national survey on drug use and health: Summary of national findings*. Retrieved from [www.samsha.gov/data/site/default/files/NSDUHresultsPDFWHTML2013/Web/NSDUHresults2013.htm#2.5](http://www.samsha.gov/data/site/default/files/NSDUHresultsPDFWHTML2013/Web/NSDUHresults2013.htm#2.5)
- Substance Abuse and Mental Health Services Administration. (2009). *Substance abuse treatment: Addressing the specific needs of women*. Retrieved from [www.ncbi.nlm.nih.gov/books/NBK83252/pdf/Bookshelf\\_NBK83252.pdf](http://www.ncbi.nlm.nih.gov/books/NBK83252/pdf/Bookshelf_NBK83252.pdf)

- Taylor, O., & Ozieta, D. T. (2010). Barriers to treatment for women with substance use disorders. *Journal of Human Behavior in the Social Environment, 20*(3), 393.
- Telles, S., Raghavendra, B. R., Naveen, K. V., Manjunath, N. K., Kumar, S., & Subramanya, P. (2013). Changes in autonomic variables following two meditative states described in yoga texts. *Journal of Alternative and Complementary Medicine, 19*(1), 35-42.
- The Next Door. (2016). *Services*. Retrieved from [www.thenextdoor.org](http://www.thenextdoor.org)
- Vogeltanz, N. D., Wilsnack, S. C., Harris, T. R., Wilsnack, R. W., Wonderlich, S. A., Kristjanson, A. F. (1999). Prevalence and risk factors for childhood sexual abuse in women: National survey findings. *Child Abuse and Neglect, 23*, (6), 579-592.
- Volkow, N. D. (2010). Comorbidity: Addiction and other mental illnesses. *National Institute on Drug Abuse*. Retrieved from <https://www.drugabuse.gov/publications/research-reports/comorbidity-addiction-other-mental-illnesses/letter-director>
- Webb, T. L., Sniehotta, F. F., & Michie, S. (2010). Using theories of behaviour change to inform interventions for addictive behaviours. *Addiction, 105*, 1879-1892.  
Doi: 10.1111/j.1360-0443.2010.02028.x
- Williams, D.J., & Streat, W.B. (2004). Physical activity as a helpful adjunct to substance abuse treatment. *Journal of Social Work Practice in the Addictions, 4*(3), 83-94.  
doi:10.1300/J160v04n03\_06
- Wilsnack, S. C. & Wilsnack, R. W (1995). Drinking and Problem Drinking in US Women: Patterns and Recent Trends. In M. Galanter (Ed.), *Recent developments in alcoholism: Women and alcoholism* (pp. 29-60). New York: Plenum Press.

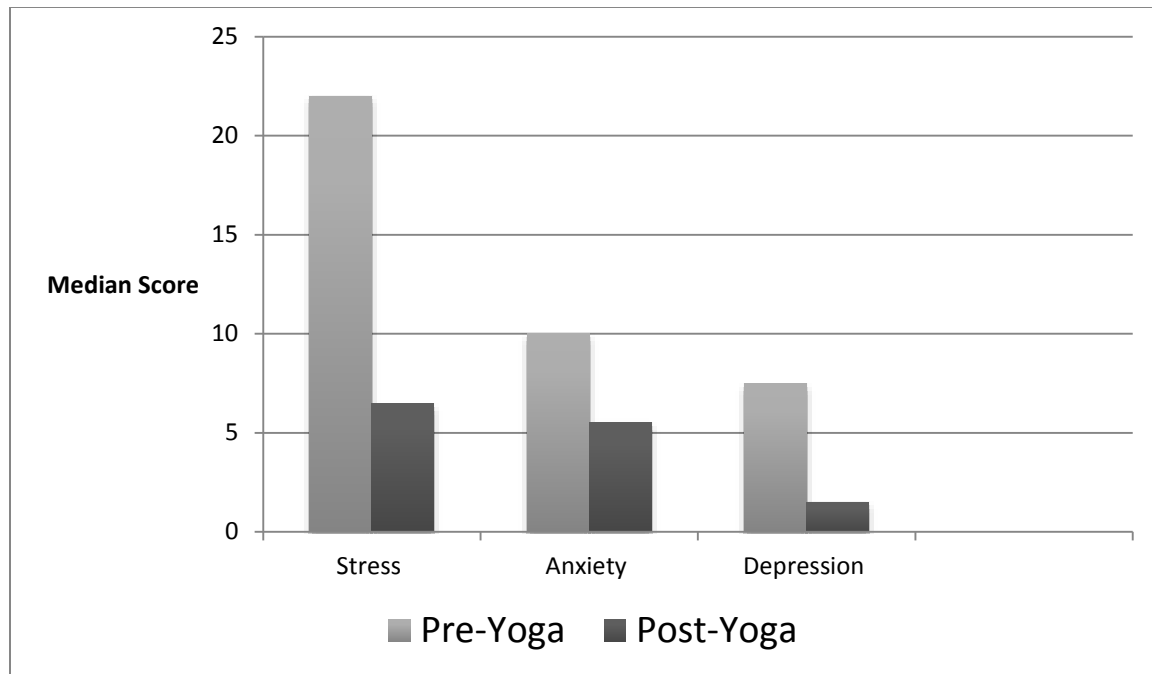
- Witkiewitz, K., & Bowen, S. (2010). Depression, craving, and substance use following a randomized trial of mindfulness-based relapse prevention. *Journal of Consulting and Clinical Psychology, 78*(3), 362-374.
- Woodyard, C. (2011). Exploring the therapeutic effects of yoga and its ability to increase quality of life. *International Journal of Yoga, 4*, 40-51. Doi: 10.4103/0973-6131.85485
- Yoshihara, K., Hiramoto, T., Oka, T., Kubo, C., & Nobuyuki, S. (2014). Effect of 12 weeks of yoga training on the somatization, psychological symptoms, and stress-related biomarkers of healthy women. *BioPsychoSocial Medicine, 8*(1), 1-9. Retrieved from <http://www.bpsmedicine.com/content/8/1/1>
- Zhang, J., Yang, K., Tian, J., Wang, C. (2012). Effects of yoga on psychologic function and quality of life in women with breast cancer: A meta-analysis of randomized controlled trials. *Journal of Alternative & Complementary Medicine, 18* (11), 994-1002.
- Zhuang, S., An, S., & Zhao, Y. (2013). Yoga effects on mood and quality of life in chinese women undergoing heroin detoxification. *Nursing Research, 62*(4), 260-268.  
doi:10.1097/NNR.0b013e318292379b
- Zsuche, E., Heinz, Al, & Strohle, A. (2011). Exercise and physical activity in the therapy of substance use disorders. *The Scientific World Journal, Article ID901741*.  
Doi: 10.1100/2012/901741

**Figures/Tables/Appendices**

*Figure 1.* Self-Efficacy. Adapted from “Social Foundations of Thought and Action: A Social Cognitive Theory”, by A. Bandura.



*Figure 2.* Circumplex Model of Affect. Reprinted from “The Circumplex Model of Affect: An Integrative Approach to Affective Neuroscience, Cognitive Development, and Psychopathology”, by J. Posner, J. A. Russell, & B. S. Peterson, 2005, *Developmental Psychopathology*, 17(3) 715-734. 2005 Cambridge University Press.



*Figure 3.* Changes in median scores for stress, anxiety and depression before and after yoga

Table 1

*Demographic Status of the Yoga Group*

| Characteristics     | Yoga-training group<br>(N=14) |
|---------------------|-------------------------------|
| Age (years)         |                               |
| Mean                | 43.50                         |
| SD                  | 9.428                         |
| Range               | 29-58                         |
| Education (%)       |                               |
| Some High School    | 21.4                          |
| High School Diploma | 42.9                          |
| Some College        | 14.3                          |
| College Degree      | 21.4                          |
| Marital Status (%)  |                               |
| Single              | 64.3                          |
| Separated           | 14.3                          |
| Divorced            | 21.4                          |
| Children (%)        |                               |
| Yes                 | 78.6                          |
| No                  | 21.4                          |
| Custody (%)         |                               |
| Yes                 | 42.9                          |
| No                  | 35.7                          |
| N/A                 | 21.4                          |
| Homeless (%)        |                               |
| Yes                 | 78.6                          |
| No                  | 21.4                          |



Table 2

*Clinical Characteristics of Participants*

| Characteristics              | Yoga-training group<br>(N=14) |
|------------------------------|-------------------------------|
| Pregnant (%)                 |                               |
| Yes                          |                               |
| No                           | 100.0                         |
| Co-Morbidity (%)             |                               |
| Anxiety                      | 57.1                          |
| Depression                   | 35.7                          |
| Both                         | 7.1                           |
| Suicide Attempt (%)          |                               |
| Yes                          | 21.4                          |
| No                           | 78.6                          |
| Domestic Violence Victim (%) |                               |
| Yes                          | 85.7                          |
| No                           | 14.3                          |
| Sexual Violence Victim (%)   |                               |
| Yes                          | 57.1                          |
| No                           | 42.9                          |

Table 3

*Characteristics of Substance Abuse*

| Characteristics                    | Yoga-training group<br>(N=14) |
|------------------------------------|-------------------------------|
| History of Alcohol Abuse (%)       |                               |
| Yes                                | 92.9                          |
| No                                 | 7.1                           |
| Mean Age first alcohol use (years) | 15.85                         |
| Range                              | (13-21)                       |
| Feel addicted to alcohol (%)       |                               |
| Yes                                | 57.1                          |
| No                                 | 35.7                          |
| N/A                                | 7.1                           |
| History of Drug Abuse (%)          |                               |
| Yes                                | 100.0                         |
| Mean Age first drug use (years)    | 18.36                         |
| Range                              | (13-25)                       |
| Drug of Choice (%)                 |                               |
| Marijuana                          | 14.3                          |
| Opiates                            | 14.3                          |
| Heroin                             | 14.3                          |
| Methamphetamines                   | 7.1                           |
| Combination                        | 50.0                          |
| Feel addicted to drugs (%)         |                               |
| Yes                                | 92.9                          |
| No                                 | 7.1                           |

Table 4

*Comparison of DASS Scores Before and After Yoga Intervention*

| Measurement        | N  | Median | SD    | Min | Max | Z-score (Post-Pre) | p-Value (Post-Pre) |
|--------------------|----|--------|-------|-----|-----|--------------------|--------------------|
| PreYoga Stress     | 14 | 22.00  | 11.18 | 4   | 38  | -3.234             | .001*              |
| PostYogaStress     | 14 | 6.50   | 4.48  | 0   | 16  |                    |                    |
| PreYogaAnxiety     | 14 | 10.00  | 8.54  | 0   | 28  | -2.552             | .001*              |
| PostYogaAnxiety    | 14 | 5.50   | 3.29  | 0   | 10  |                    |                    |
| PreYogaDepression  | 14 | 7.50   | 9.48  | 0   | 32  | -2.941             | .003*              |
| PostYogaDepression | 14 | 1.50   | 4.70  | 0   | 16  |                    |                    |

\*( $p < .05$ )

| Measurement                                 | Mean Rank Negative | Mean Rank Positive | Negative | Positive | Ties |
|---|--------------------|--------------------|----------|----------|------|
| Total Post Stress - Total Pre Stress        | 8.00               | 1.00               | 104.00   | 1.00     | 0    |
| Total Post Anxiety- Total Pre Anxiety       | 7.15               | 3.25               | 71.50    | 6.50     | 2    |
| Total Post Depression- Total Pre Depression | 6.00               | .00                | 66.00    | .00      | 3    |

Table 5

*Comparison of YSES Scores Before and After Yoga Intervention*

| Measurement | N  | Median | SD    | Min | Max | Z-score<br>(Post-<br>Pre) | p-Value<br>(Post-<br>Pre) |
|-------------|----|--------|-------|-----|-----|---------------------------|---------------------------|
| PreYSES     | 14 | 69.00  | 24.63 | 12  | 96  | -2.725                    | .006*                     |
| PostYSES    | 14 | 84.00  | 13.99 | 51  | 96  |                           |                           |

\*(p&lt;.05)

| Measurement                         | Mean Rank<br>Negative | Mean Rank<br>Positive | Negative | Positive | Ties |
|-------------------------------------|-----------------------|-----------------------|----------|----------|------|
| Total Post YSES -<br>Total Pre YSES | 2.50                  | 6.35                  | 2.50     | 63.59    | 3    |

Table 6

*Comparison of Biometric Measurements Before and After Yoga Intervention*

| Measurement     | N  | SD     | Mean   | Significance |
|-----------------|----|--------|--------|--------------|
| SBPPreYogaWk1   | 14 | 21.292 | 137.43 | .134         |
| SBPPostYogaWk8  | 14 | 12.977 | 127.36 |              |
| DBPPreYogaWk1   | 14 | 10.453 | 87.79  | .030         |
| DBPPostYogaWk8  | 14 | 8.109  | 78.93  |              |
| HRPreYogaWk1    | 14 | 11.319 | 80.43  | .313         |
| HRPostYogaWk8   | 14 | 13.054 | 77.64  |              |
| RRPreYogaWk1    | 14 | 2.593  | 18.43  | .148         |
| RRPostYogaWk8   | 14 | 1.292  | 17.14  |              |
| SaO2PreYogaWk1  | 14 | 1.167  | 97.14  | .165         |
| SaO2PostYogaWk8 | 14 | .994   | 97.71  |              |

## Appendix 1

### *Informed Consent*

#### **CONSENT TO PARTICIPATE IN RESEARCH**

The Effects of Yoga on Anxiety and Depression in Women Recovering from Substance Use Disorders

*We invite you to participate in a research study conducted at The Next Door by Robin Hopp. Your participation in this study is voluntary. You should read the information below, and ask questions about anything you do not understand, before deciding whether or not to participate.*

#### **PURPOSE OF THE STUDY**

The purpose of this project is to evaluate the impact of yoga on depression and anxiety in women enrolled in the Residential Treatment Center (RTC) at The Next Door. Validated tools will be used to assess mood, anxiety, and depressive symptoms before and after the intervention. The aim of the study is to measure how an eight-week yoga intervention influences mood, anxiety, and depression for a cohort of women enrolled in a residential treatment program for substance use disorder.

#### **DURATION AND LOCATION**

Your participation in this study will last for approximately 10 weeks. This study will be conducted at The Next Door.

#### **PROCEDURES**

*If you volunteer to participate in this study, we would ask you to do the following things: List exactly what each subject will experience in chronological order.*

##### **Guidelines:**

- 1.) Three surveys will be taken before starting the yoga class. The surveys will ask questions about anxiety, depression, and self-efficacy. Self-efficacy is how confident someone feels that they can complete a task or reach a goal. The same surveys will be taken again after completing 8 yoga classes. The yoga classes will meet weekly on Wednesday evenings. Before and after each yoga class your blood pressure, pulse, respiratory rate, and oxygen saturation will be measured. Oxygen saturation is one measure of how well someone is breathing. You will also be asked to circle a feelings word before and after each class. Examples of the surveys and the feelings chart are available if you would like to look over them.  
Your application to the Residential Treatment Center provides all the information that is necessary for you to be included in this study.
- 2.) All of the women enrolled in the Residential Treatment Center will be invited to participate in this study. The 8 yoga classes will meet on Wednesday evenings at the Residential Treatment Center and will last approximately 90 minutes.
- 3.) Comfortable, loose clothes should be worn. A yoga mat and water bottle will be provided.
- 4.) You will be asked to complete the surveys, participate in the yoga class, and allow the researcher to measure your vitals signs and oxygen saturation.

#### **POTENTIAL RISKS AND DISCOMFORTS**

- 1.) The yoga class will be lead by a licensed yoga therapist. She will design a class that will consist of breathing, gentle stretching, and meditation. She intends for the class to be very nourishing.
- 2.) There is the potential that minor soreness could be experienced from the mild stretching. Answering the survey questions could possibly bring up memories that are uncomfortable. Measures will be taken to keep your answers to the surveys confidential but there is always a risk that confidentiality could be lost.
- 3.) Participation in yoga can sometimes bring up feelings and emotions that are unexpected and uncomfortable. If at anytime you are experiencing uncomfortable emotions, let the yoga instructor or myself know and we will find the appropriate TND staff to help you with those feelings.

#### **ANTICIPATED BENEFITS TO SUBJECTS**

- 1.) Yoga has been shown to have physical and emotional benefits. Some potential benefits include improved immune system, sounder sleep, reduction in feelings of stress and anxiety, better breathing, less depression, and improved bone, joint, and muscle health. There are no guarantees that the participant will experience any of the described benefits.

#### **ALTERNATIVES TO PARTICIPATION**

- 1.) If you decide not to participate in the study, you will continue on with the regularly scheduled Wednesday evening program at the Residential Treatment Center. Your participation is voluntary.

**MEDICAL CARE FOR RESEARCH RELATED INJURY**

*In the event of an injury resulting from the research procedures, no form of compensation is available from Belmont University. Medical treatment may be provided at your own expense; or at the expense of your health care insurer, which may or may not provide coverage. If you have questions, you should contact your insurer.*

*In the event of emergency resulting from the research procedures The Next Door will have the nurse on duty assess the injury. If further medical treatment is needed The Next Door will offer assistance with scheduling a visit to a clinic.*

**CONFIDENTIALITY**

*When the results of the research are published or discussed in conferences, removing any identifying information will protect your identity.*

A form designed for the study will be used to collect information from your chart that is important to the study. The form is available if you would like to see it. The form and surveys that you will take will be given a code unique to each client. No identifying information will be taken from the chart. They key to the code will be kept separate from the coded information. Both will be kept under lock and key at the researchers home. The collected information will be kept for three years after the study is completed and then it will be incinerated.

**Statement from Subject:**

I \_\_\_\_\_ freely consent to the use of photographs, audio, and video recording of my words and/or actions as described above in this study. I understand that the recordings may be used as described in presentations, research reports, and other formats, and I waive the right to inspect or approve use of this material as incorporated in the work. I acknowledge that investigators shall be under no obligation to use the recordings in the work.

I release investigators, sponsors and successors from any claims that may arise regarding the use of the recordings, including any claims of defamation, invasion of privacy, or infringement of moral rights, rights of publicity or copyright. I acknowledge that I have no ownership rights in the recordings or the research.

**PARTICIPATION AND WITHDRAWAL**

*Your participation in this research is voluntary. If you choose not to participate, that will not affect your relationship with the Residential Treatment Center at The Next Door or your right to health care or other services to which you are otherwise entitled. If you decide to participate, you are free to withdraw your consent and discontinue participation at any time without prejudice.*

**WITHDRAWAL OF PARTICIPATION BY THE INVESTIGATOR**

*The investigator may withdraw you from participating in this research if circumstances arise which warrant doing so. If you become ill during the research, you may have to drop out, even if you would like to continue. The investigator will make the decision and let you know if it is not possible for you to continue. The decision may be made either to protect your health and safety.*

**NEW FINDINGS**

*During the course of the study, you will be informed of any significant new findings (either good or bad), such as changes in the risks or benefits resulting from participation in the research or new alternatives to participation, which might cause you to change your mind about continuing in the study. If new information is provided to you, your consent to continue participating in this study will be re-obtained.*

**IDENTIFICATION OF INVESTIGATORS**

*In the event of a research related injury or concern please let the yoga instructor or the researcher know immediately during the class and appropriate action will be taken*

**RIGHTS OF RESEARCH SUBJECTS**

*You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, please contact Dr. Beverly Schneller, Associate Provost for Academic Affairs, 615 460-5630.*

**OFFER TO ANSWER QUESTIONS**

*If you have any questions about this study, you may call: Dr. Elizabeth Morse at 615-460-5779*

*If a research related injury occurs, you should contact Dr. Beverly Schneller, Associate Provost for Academic Affairs, 615 460-5630 and Dr. Martha Buckner at 615-460-6139*

**SIGNATURE OF RESEARCH SUBJECT**

*I have read the information provided above. I have been given an opportunity to ask questions and all of my questions have been answered to my satisfaction. I have been given a copy of this form.*

\_\_\_\_\_  
*Name of Subject*

\_\_\_\_\_  
*Signature of Subject* \_\_\_\_\_ *Date*

\_\_\_\_\_  
*Address*

**SIGNATURE OF WITNESS**

*My signature as witness certifies that the subject signed this consent form in my presence as his/her voluntary act and deed.*

\_\_\_\_\_  
*Name of Witness*

\_\_\_\_\_  
*Signature of Witness* \_\_\_\_\_ *Date*

**SIGNATURE OF INVESTIGATOR**

\_\_\_\_\_  
*Signature of Investigator* \_\_\_\_\_ *Date*



Appendix 2

*Demographic Data Tool*

Demographic/PMH/PSH Data Collection Tool  
 The Effects of Yoga on Anxiety and Depression in Women Recovering from SUD

Participant ID:  
**DEMOGRAPHIC/PMH**

1. Age:
2. Highest Level of Education:        GED:
3. Marital Status: Married/Divorced/Separated/ Widowed/Life Partner
4. # of Children:                    Custody: YES/NO
5. Homeless prior to RTC: YES/NO
6. Pregnant: YES/NO                    If yes, DOC:

7. Current medications:

| Medication | Reason for Taking | Dosage | Times per Day | Date Prescribed |
|------------|-------------------|--------|---------------|-----------------|
|            |                   |        |               |                 |
|            |                   |        |               |                 |
|            |                   |        |               |                 |
|            |                   |        |               |                 |

\*Verified self-report with medical record

8. HIV/AIDS: YES/NO
9. Current Problem(s) List:
10. Chronic Medical Condition(s):
11. Chronic Mental Health Conditions:
  - Dx(s):
  - Hospitalization(s):
  - Suicide attempt(s):

**SUBSTANCE ABUSE HX**

- Alcohol: YES/NO
- Start-
  - Why-
  - Last drink-
  - Feel addicted to ETOH: YES/NO
- Drug Use: YES/NO
- Drug of choice-
  - Feel addicted to DRUGS: YES/NO

Previous treatment(s) for ETOH/DRUG: YES/NO  
 If yes,        WHEN:

WHERE:

**VIOLENCE ABUSE HX**

Victim of domestic violence: YES/NO

Victim of sexual assault/ rape/incest: YES/NO

Appendix 3

*DASS-42 Tool*

| DASS  | Name:  | Date:      |
|---|--|------------|
| <p>Please read each statement and circle a number 0, 1, 2 or 3 that indicates how much the statement applied to you <i>over the past week</i>. There are no right or wrong answers. Do not spend too much time on any statement.</p> <p><i>The rating scale is as follows:</i></p> <p>0 Did not apply to me at all<br/>                     1 Applied to me to some degree, or some of the time<br/>                     2 Applied to me to a considerable degree, or a good part of time<br/>                     3 Applied to me very much, or most of the time</p> |  |            |
| 1   | I found myself getting upset by quite trivial things   | 0 1<br>2 3 |
| 2   | I was aware of dryness of my mouth   | 0 1<br>2 3 |
| 3   | I couldn't seem to experience any positive feeling at all  | 0 1<br>2 3 |
| 4   | I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion) | 0 1<br>2 3 |
| 5   | I just couldn't seem to get going  | 0 1<br>2 3 |
| 6   | I tended to over-react to situations   | 0 1<br>2 3 |
| 7   | I had a feeling of shakiness (eg, legs going to give way)  | 0 1<br>2 3 |
| 8   | I found it difficult to relax  | 0 1<br>2 3 |
| 9   | I found myself in situations that made me so anxious I was most relieved when they ended                                 | 0 1<br>2 3 |
| 10  | I felt that I had nothing to look forward to   | 0 1<br>2 3 |
| 11  | I found myself getting upset rather easily   | 0 1<br>2 3 |
| 12  | I felt that I was using a lot of nervous energy  | 0 1<br>2 3 |
| 13  | I felt sad and depressed   | 0 1<br>2 3 |
| 14  | I found myself getting impatient when I was delayed in any way (e.g., elevators, traffic lights, being kept waiting)     | 0 1<br>2 3 |
| 15  | I had a feeling of faintness   | 0 1<br>2 3 |

|    |  |   |   |
|----|--|---|---|
| 16 | I felt that I had lost interest in just about everything   | 0 | 1 |
|    |  | 2 | 3 |
| 17 | I felt I wasn't worth much as a person   | 0 | 1 |
|    |  | 2 | 3 |
| 18 | I felt that I was rather touchy  | 0 | 1 |
|    |  | 2 | 3 |
| 19 | I perspired noticeably (e.g., hands sweaty) in the absence of high temperatures or physical exertion | 0 | 1 |
|    |  | 2 | 3 |
| 20 | I felt scared without any good reason  | 0 | 1 |
|    |  | 2 | 3 |
| 21 | I felt that life wasn't worthwhile   | 0 | 1 |
|    |  | 2 | 3 |

*Reminder of rating scale:*

0 Did not apply to me at all

1 Applied to me to some degree, or some of the time

2 Applied to me to a considerable degree, or a good part of time

3 Applied to me very much, or most of the time

|    |  |   |   |
|----|--|---|---|
| 22 | I found it hard to wind down   | 0 | 1 |
|    |  | 2 | 3 |
| 23 | I had difficulty in swallowing   | 0 | 1 |
|    |  | 2 | 3 |
| 24 | I couldn't seem to get any enjoyment out of the things I did   | 0 | 1 |
|    |  | 2 | 3 |
| 25 | I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat) | 0 | 1 |
|    |  | 2 | 3 |
| 26 | I felt down-hearted and blue   | 0 | 1 |
|    |  | 2 | 3 |
| 27 | I found that I was very irritable  | 0 | 1 |
|    |  | 2 | 3 |
| 28 | I felt I was close to panic  | 0 | 1 |
|    |  | 2 | 3 |
| 29 | I found it hard to calm down after something upset me  | 0 | 1 |
|    |  | 2 | 3 |
| 30 | I feared that I would be "thrown" by some trivial but unfamiliar task  | 0 | 1 |
|    |  | 2 | 3 |
| 31 | I was unable to become enthusiastic about anything   | 0 | 1 |
|    |  | 2 | 3 |
| 32 | I found it difficult to tolerate interruptions to what I was doing   | 0 | 1 |
|    |  | 2 | 3 |
| 33 | I was in a state of nervous tension  | 0 | 1 |
|    |  | 2 | 3 |
| 34 | I felt I was pretty worthless  | 0 | 1 |
|    |  | 2 | 3 |

|    |   |        |        |
|----|---|--------|--------|
| 35 | I was intolerant of anything that kept me from getting on with what I was doing | 0<br>2 | 1<br>3 |
| 36 | I felt terrified  | 0<br>2 | 1<br>3 |
| 37 | I could see nothing in the future to be hopeful about                           | 0<br>2 | 1<br>3 |
| 38 | I felt that life was meaningless  | 0<br>2 | 1<br>3 |
| 39 | I found myself getting agitated   | 0<br>2 | 1<br>3 |
| 40 | I was worried about situations in which I might panic and make a fool of myself | 0<br>2 | 1<br>3 |
| 41 | I experienced trembling (e.g., in the hands)                                    | 0<br>2 | 1<br>3 |
| 42 | I found it difficult to work up the initiative to do things                     | 0<br>2 | 1<br>3 |

Appendix 4

*YSES Tool*

When I practice yoga...

1. I am able to remain as comfortable as possible while doing movements.

|                   |          |                     |                 |           |              |                  |       |                |
|-------------------|----------|---------------------|-----------------|-----------|--------------|------------------|-------|----------------|
| Strongly Disagree | Disagree | Moderately Disagree | Mildly Disagree | Undecided | Mildly Agree | Moderately Agree | Agree | Strongly Agree |
| (1)               | (2)      | (3)                 | (4)             | (5)       | (6)          | (7)              | (8)   | (9)            |

2. I am able to keep my mind focused on movements of my body.

|                   |          |                     |                 |           |              |                  |       |                |
|-------------------|----------|---------------------|-----------------|-----------|--------------|------------------|-------|----------------|
| Strongly Disagree | Disagree | Moderately Disagree | Mildly Disagree | Undecided | Mildly Agree | Moderately Agree | Agree | Strongly Agree |
| (1)               | (2)      | (3)                 | (4)             | (5)       | (6)          | (7)              | (8)   | (9)            |

3. I can coordinate the movements of my body with my breath.

|                   |          |                     |                 |           |              |                  |       |                |
|-------------------|----------|---------------------|-----------------|-----------|--------------|------------------|-------|----------------|
| Strongly Disagree | Disagree | Moderately Disagree | Mildly Disagree | Undecided | Mildly Agree | Moderately Agree | Agree | Strongly Agree |
| (1)               | (2)      | (3)                 | (4)             | (5)       | (6)          | (7)              | (8)   | (9)            |

4. I am able to move my body smoothly.

|                   |          |                     |                 |           |              |                  |       |                |
|-------------------|----------|---------------------|-----------------|-----------|--------------|------------------|-------|----------------|
| Strongly Disagree | Disagree | Moderately Disagree | Mildly Disagree | Undecided | Mildly Agree | Moderately Agree | Agree | Strongly Agree |
| (1)               | (2)      | (3)                 | (4)             | (5)       | (6)          | (7)              | (8)   | (9)            |

5. I am able to maintain a feeling of stability in my body.

|                   |          |                     |                 |           |              |                  |       |                |
|-------------------|----------|---------------------|-----------------|-----------|--------------|------------------|-------|----------------|
| Strongly Disagree | Disagree | Moderately Disagree | Mildly Disagree | Undecided | Mildly Agree | Moderately Agree | Agree | Strongly Agree |
| (1)               | (2)      | (3)                 | (4)             | (5)       | (6)          | (7)              | (8)   | (9)            |

When I practice yoga...

6. I am able to keep my breath smooth and continuous.

|                   |          |                     |                 |           |              |                  |       |                |
|-------------------|----------|---------------------|-----------------|-----------|--------------|------------------|-------|----------------|
| Strongly Disagree | Disagree | Moderately Disagree | Mildly Disagree | Undecided | Mildly Agree | Moderately Agree | Agree | Strongly Agree |
| (1)               | (2)      | (3)                 | (4)             | (5)       | (6)          | (7)              | (8)   | (9)            |

7. I am able to remain comfortable while regulating my breath.

|                   |          |                     |                 |           |              |                  |       |                |
|-------------------|----------|---------------------|-----------------|-----------|--------------|------------------|-------|----------------|
| Strongly Disagree | Disagree | Moderately Disagree | Mildly Disagree | Undecided | Mildly Agree | Moderately Agree | Agree | Strongly Agree |
| (1)               | (2)      | (3)                 | (4)             | (5)       | (6)          | (7)              | (8)   | (9)            |

8. I am able to focus my mind on my breath.

|                   |          |                     |                 |           |              |                  |       |                |
|-------------------|----------|---------------------|-----------------|-----------|--------------|------------------|-------|----------------|
| Strongly Disagree | Disagree | Moderately Disagree | Mildly Disagree | Undecided | Mildly Agree | Moderately Agree | Agree | Strongly Agree |
| (1)               | (2)      | (3)                 | (4)             | (5)       | (6)          | (7)              | (8)   | (9)            |

9. I am able to make my breath longer and deeper without feeling anxious.

|                   |          |                     |                 |           |              |                  |       |                |
|-------------------|----------|---------------------|-----------------|-----------|--------------|------------------|-------|----------------|
| Strongly Disagree | Disagree | Moderately Disagree | Mildly Disagree | Undecided | Mildly Agree | Moderately Agree | Agree | Strongly Agree |
| (1)               | (2)      | (3)                 | (4)             | (5)       | (6)          | (7)              | (8)   | (9)            |

During my yoga practice...

10. If distracted, I can re-focus my mind.

|                   |          |                     |                 |           |              |                  |       |                |
|-------------------|----------|---------------------|-----------------|-----------|--------------|------------------|-------|----------------|
| Strongly Disagree | Disagree | Moderately Disagree | Mildly Disagree | Undecided | Mildly Agree | Moderately Agree | Agree | Strongly Agree |
| (1)               | (2)      | (3)                 | (4)             | (5)       | (6)          | (7)              | (8)   | (9)            |

11. If asked, I am able to visualize or have an impression of an object in my mind.

|                   |          |                     |                 |           |              |                  |       |                |
|-------------------|----------|---------------------|-----------------|-----------|--------------|------------------|-------|----------------|
| Strongly Disagree | Disagree | Moderately Disagree | Mildly Disagree | Undecided | Mildly Agree | Moderately Agree | Agree | Strongly Agree |
| (1)               | (2)      | (3)                 | (4)             | (5)       | (6)          | (7)              | (8)   | (9)            |

12. I am able to remain focused on a meditative object or point.

|                   |          |                     |                 |           |              |                  |       |                |
|-------------------|----------|---------------------|-----------------|-----------|--------------|------------------|-------|----------------|
| Strongly Disagree | Disagree | Moderately Disagree | Mildly Disagree | Undecided | Mildly Agree | Moderately Agree | Agree | Strongly Agree |
| (1)               | (2)      | (3)                 | (4)             | (5)       | (6)          | (7)              | (8)   | (9)            |

Appendix 5

*Biometric Data and Mood Collection Tool*

The Effects of Yoga on Anxiety and Depression in Women Recovering from SUD

**Pre-Yoga/Post-Yoga Class Data Collection Tool**

| Participant ID # | Pre-Yoga | Post-Yoga |
|------------------|----------|-----------|
| <b>BP</b>        |          |           |
| <b>HR</b>        |          |           |
| <b>RR</b>        |          |           |
| <b>SaO2</b>      |          |           |
| <b>FEELING</b>   |          |           |

**FEELINGS CHART**

