

**SCUBA DIVING AS AN OCCUPATION IN REDUCING POSTTRAUMATIC  
STRESS DISORDER SYMPTOMS IN FEMALE AMERICAN VETERANS**

A Thesis submitted to the faculty at Stanbridge University in partial fulfillment of the  
requirements for the degree of Master of Science in Occupational Therapy

by

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September 2021

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## Certification of Approval

I certify that I have read *Scuba Diving as an Occupation in Reducing Posttraumatic Stress Disorder Symptoms in Female Veterans* by Krystal Hernandez, Kyla Miller, Brian Ponce, and Jessica Walters, and in my opinion, this work meets the criteria for approving a thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Occupational Therapy at Stanbridge University.



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### **Abstract**

The United States Department of Veterans Affairs (VA) provides veterans mental health services relating to posttraumatic stress disorder (PTSD), depression, and anxiety. However, the male-oriented culture in the VA often leaves female veterans feeling uncomfortable in accessing necessary care. As part of the services provided by the VA, occupational therapy has been found to be beneficial in addressing mental health conditions using alternative forms of therapy such as scuba diving. This pilot research study explored the effectiveness of scuba diving as an occupation in female veterans with PTSD symptoms through qualitative survey responses. A total of eight female veterans participated in an online survey consisting of 16 open-ended style questions regarding their participation in scuba diving as an alternative form of therapy. Our findings support the hypothesis that scuba diving is an occupation that can help female veterans manage their mental health and PTSD symptoms, as well as improve their sense of purpose, motivation, and roles. These improvements facilitate participation in their daily occupations and roles, which can lead to an increased quality of life.

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## **Assessing the Effectiveness of Scuba Diving as an Occupation in Reducing Posttraumatic Stress Disorder Symptoms in Female Veterans**

The Office of Research and Development (2021) reported that in 2018 that roughly 1.7 million veterans were receiving treatment for a mental health condition through the veteran affairs programs. They also reported the most common conditions affecting these veterans are posttraumatic stress disorder (PTSD), depression, and anxiety. Based on the severity of these conditions, female veterans' quality of life may decline when attempting to transition back into civilian life, due to a decrease in occupational participation and life satisfaction (Plach & Sells, 2013). Living with PTSD poses distress in the lives of veterans which inevitably affects their mental well-being, coping strategies, and daily functioning. Additionally, female veterans seem to be the invisible members of the military, resulting in more difficulties for them to access mental health care. According to the survey by the United States Government Accountability Office (2011), some female veterans shared that the Veterans Affairs (VA) health care is male oriented, so they do not feel comfortable accessing the services. Additionally, veterans are choosing to not utilize traditional psychotherapy and medical management for their PTSD symptoms due to the surrounding stigma. Consequently, there seems to be a need for additional resources for female oriented mental health services, as well as other alternative treatment options.

Nonconventional based therapy options have been rising in veterans because of the dissatisfaction of conventional treatment and the adverse side effects caused by some medications (Kroesen et al., 2002). It was estimated in 2013 that around 45% of veterans had used a nonconventional treatment method for their mental health (Goertz et al.,



2013). These treatment options consist of nature therapy, mindfulness techniques, music therapy, art therapy, and exercise therapy. According to Craig et al. (2020), leisure activities can help motivate veterans and military personnel with PTSD towards personal transformation and posttraumatic growth. Leisure can also be a self-protective resource for emotion and problem-focused coping with negative life events. One nonconventional leisure activity that has been shown to have positive effects on veterans' well-being is scuba diving. Scuba diving is a unique high-intensity leisure activity because it takes place in a gravity-free, sensory stimulating, breathing restricted environment that encourages an individual to focus on their underwater breathing skills, their awareness of their sensory perceptions, and their underwater surroundings. Additionally, positive effects of scuba have been shown to translate over into veterans' daily lives by improving mood, decreasing agitation, and decreasing stress and anxiety (Krpalek et al., 2020).

The purpose of this research was to understand the effects of scuba as an occupation on female veterans who have PTSD. In order to understand these effects and how scuba can impact their daily life, this research study utilized a qualitative survey to answer this question: Is scuba as an occupation effective in reducing PTSD symptoms for female veterans and improving their quality of life through participation in meaningful occupations?

## **Literature Review**

### **PTSD**

PTSD is a distressing condition that constitutes various levels of depression, anxiety, isolation, avoidance, and flashbacks of a traumatic event (American Psychiatric

Association, 2013). Many of these struggles are commonly experienced by many who serve in the military due to life-threatening episodes that occur during combat. These episodes can include witnessing the loss of a fellow serviceman, attacks in combat, as well as sexual assault. An average of 10-15% of veterans who served in Operation Iraqi Freedom, the Gulf War, or the Vietnam War have a diagnosis of PTSD (National Center for PTSD, 2018). If left untreated, PTSD can cause a multitude of health issues. Individuals suffering from this condition may have higher levels of sympathetic activation. This can be displayed by an elevated heart rate/blood pressure, as well as increased hormone levels (Cushing et al., 2018). This activation of the sympathetic nervous system has been linked to biological disturbances such as coronary heart disease and damage to the arterial vessels.

The indicators of PTSD not only include symptoms of physiological and psychological distress, but also causes social and behavioral disturbances between them and their family members and loved ones. A study by Bennett et al. (2014) found that personal relationships of family members, friends, or significant others were negatively impacted with veterans suffering from a diagnosis of PTSD compared to veterans without a diagnosis. These negative effects involved conflicts within these familial dynamics and further isolated veterans from obtaining support from loved ones and seeking assistance for their internal traumas. Furthering this isolation can also be promoted by the stigma that is faced by these individuals from society (Cushing et al., 2018). When veterans face these issues, the effects can be detrimental to one's health. As Jasbi et al. (2018) found, veterans suffering from PTSD experience struggles with their personal interests, short- and long-term memory, and stress in various areas of their lives. Additionally, many

veterans lack coping strategies and experience heightened levels of anxiety, depression, and struggle to relate to others once returning from combat. When addressing these overwhelming symptoms and lack of coping mechanisms, Craig et al. (2020) found that therapeutic leisure activities can have a positive effect on veterans with PTSD. Through leisure activities, veterans felt a restored sense of control, that they developed better coping mechanisms to deal with daily stressors, and overall that leisure activities can decrease the negative effects of PTSD with this population.

### **Mindfulness**

Alternative forms of therapy have become increasingly common in treating mental health conditions not only in the general population, but also in veterans (Goertz et al., 2013). Specifically, mindfulness-based interventions can be a beneficial alternative treatment in the population of veterans with PTSD. The goal of mindfulness-based training is to help the client to decrease their symptoms by focusing their thoughts on the present moment without judgement or shame, and to allow all other thoughts of their life to flow in and out as they naturally do (Polusny et al., 2015). Mindfulness strategies have been found to decrease the symptoms of PTSD because it focuses on encouraging the acceptance of thoughts and experiences without avoiding them, whereas the avoidance of thoughts and feelings is a common factor in the development of PTSD (Lang et al., 2012). Some types of mindfulness-based interventions include yoga, progressive muscle relaxation, deep breathing exercises, meditation, and mindful eating.

Two studies have utilized mindfulness-based stress reduction therapies on veterans with PTSD (Polusny et al., 2015; Seppälä et al., 2014). The interventions focused on meditation, controlled breathing, and gentle stretching, with an emphasis on

having the veterans maintain focus on their bodies and the present moment. The Polusny et al. (2015) study had greater focus on body scans and body awareness, while the Seppälä et al. (2014) study was designed around Sudarshan Kriya yoga and had a greater focus on deep breathing techniques. Both studies showed that the experimental group receiving the mindfulness-based interventions had greater improvement in their PTSD symptoms such as depression and anxiety than the control group. Specifically, Polusny et al. (2015) reported a 48.9% improvement in the experimental group compared to the control group who improved 28.1%. In Seppälä et al.'s study (2014), the experimental group improved by 18.3%, whereas the control group did not improve. Additionally, the study by Polusny et al. (2015) reported a greater improvement in mean scores of the experimental group on the World Health Organization Quality of Life-Brief. The group improved their mean scores from 75.6 to 80.2, whereas the control group did not improve their scores.

Mindfulness-based interventions were also used in two separate studies on veterans with PTSD, but these studies added an additional component in which they incorporated mindful thinking (Jasbi et al., 2018; Marzabadi & Zadeh, 2014). Both studies had similar interventions—which involved progressive muscle relaxation, deep breathing, and awareness of the body—but by utilizing mindful thinking, they incorporated cognitive behavioral therapy alongside mindfulness. Jasbi et al. (2018) incorporated mindfulness-based thinking that involved participants identifying the areas of their life that elicited stress responses and identifying the thoughts that arose during these times. They then aided the participants in understanding that these thoughts are just thoughts, and they are not facts. Marzabadi and Zadeh (2014) trained their participants on

mindfulness-based thinking by teaching them how to scan their mind to identify positive and negative thoughts and analyze if they were desirable or undesirable, then to allow these thoughts to come in and out as they pleased. Jasbi et al. (2018) used the Post-Traumatic Checklist for Diagnostic and Statistical Manual for Mental Disorders (Blevins et al., 2015) and the Depression Anxiety Stress Scale (Lovibond & Lovibond, 1995) to monitor any changes in symptoms. They found that the participants' PTSD symptoms, depression, anxiety, and stress had improved. The scores of the experimental group on the Post-Traumatic Checklist had decreased by 20.25, whereas the scores of the control group decreased by 4.24. When assessed using the Depression Anxiety Stress Scale, the experimental group decreased their scores by 14.54, whereas the control group decreased by 2.41. Marzabadi and Zadeh (2014) utilized the World Health Organization Quality of Life-Brief to analyze changes in quality of life in which they found the experimental group's quality of life had improved from the initial baseline assessment. The experimental group had improved their mean scores by 24.71, while the control group improved their scores by 3.93. Both studies showed that using mindfulness-based interventions alongside mindful thinking had positive effects on the PTSD symptoms in veterans. Additionally, the participants reported they were now more in tune with their subconscious thoughts and feelings and improved their ability to cope with their present situation.

### **Scuba**

Scuba has gained increased interest among the therapeutic community as researchers have discovered its beneficial effects as an alternative to traditional psychotherapy interventions. A study conducted by occupational therapists (OTs)

Krpalek et al. (2020) reported the positive outcomes of scuba in male veterans were that they can increase their ability to regulate mood and decrease stress and anxiety by increasing the diver's focus and concentration. The study went on to mention that participants felt calmer during their scuba experience and used that calmer feeling during stressful situations as a resource for them to reduce feelings of agitation. Another study by Carreño et al. (2020) addressed the findings that moderate levels of physical activity in blue spaces or water environments may be associated with better general health and wellbeing. This study found that as little as 1-hour in this environment can have a positive influence on a person's mental state and wellbeing when comparing pre-and post-Profile of Mood State questionnaires. They also found that this exposure can be significantly beneficial for those who take medication regularly for a psychiatric or chronic illness, suggesting that nature-based therapies can be a healthy alternative or addition to conventional treatments of mental illness.

A study conducted by Bennett et al. (2014) suggests that leisure holds an effect on coping with traumatic experiences. This should be addressed in the context of personal transformation following traumatic experiences. Additional research involving high-intensity leisure in ocean environments, similar to scuba, may also be applicable in treating PTSD. The study by Rogers et al. (2014) states that high-intensity sports may be a successful treatment for the veteran population as those sports can reflect military culture and offer engagement in activities meant to challenge them physically, psychologically, and environmentally within a safe and nonjudgmental setting. The study went on to mention that involvement in leisure activities can offer alternatives to risk

taking behaviors and allow veterans to acquire new skills in a “safe but unpredictable environment, such as the ocean” (Rogers et al., 2014, p. 397).

### **Quality of Life**

An individual's quality of life is subjective to personal preferences. Quality of life is a person's own unique standard of health and happiness experienced by them. The quality of life of American veterans is greatly affected after being on tour. Upon returning from active duty, one study estimated about one-third of veterans returning home reported having mental health issues such as posttraumatic stress disorder, traumatic brain injury, and major depression (Plach & Sells, 2013). Due to these mental health concerns, this study illustrated veterans are at risk for experiencing problems with engaging with daily occupations of living and their ability to reintegrate back into civilian life has an impact on their loved ones and society. Furthermore, one other study found that veterans had reported their transition back to civilian life to be hard. Returning home resulted in losing certain parts of military services, which used to fill their lives with purpose and positive experiences (Kinney, Graham, & Eakman, 2020). When these veterans return home, they may lose their sense of purpose or ability to participate in regular civilian duties such as being a parent, husband/wife, or community member. This implies mental health problems and reintegration back into civilian life to be factors that determine a veteran's quality of life.

There are a number of effective treatments found for improving quality of life. These include therapy, mindfulness techniques, and psychotropic medications. Although one study found that of the veterans taking psychotropic medications for treatment, only

30% experienced complete symptom cessation (Barnes et al., 2016). The use of these medications is often neglected because these veterans may feel inadequate in their daily occupations or social relationships.

Besides occupational therapy (OT), there is growing evidence that suggests other alternative interventions can help improve quality of life and familial relationships. In a study by Bennett et al. (2014) have suggested that being involved in a couples adaptive sport, along with self-reflective journaling, can create unique positive experiences, help reduce PTSD symptoms, and improve marital relationships. Organizing opportunities for couples to participate in leisurely activities can help address the negative effects of PTSD and build better relationships with their significant other. Another study suggests that introducing a high intensity sport, such as scuba diving, can increase participation in daily living and improve physical and mental health by exploring the required demands for this sport (Aganovic, 2019). Additionally, another study indicated that veterans who engage in outdoor activities increase the chances of socializing with others, which may help them realize a greater meaning in participation (Kinney, Schmid, et al., 2020) Participating in social and community-based events may help veterans to create an experience that is meaningful to them, and engagement in such activities has been shown to be tied with better quality of life and satisfaction.

### **Gaps in Research**

According to the Office of Data Governance and Analytics (2017), there are approximately 2 million female veterans in the United States, representing 9.4% of the total U.S. veteran population. While this may be a small percentage of all veterans, it is notable that female veterans have a higher prevalence of PTSD than men by about 5.44%



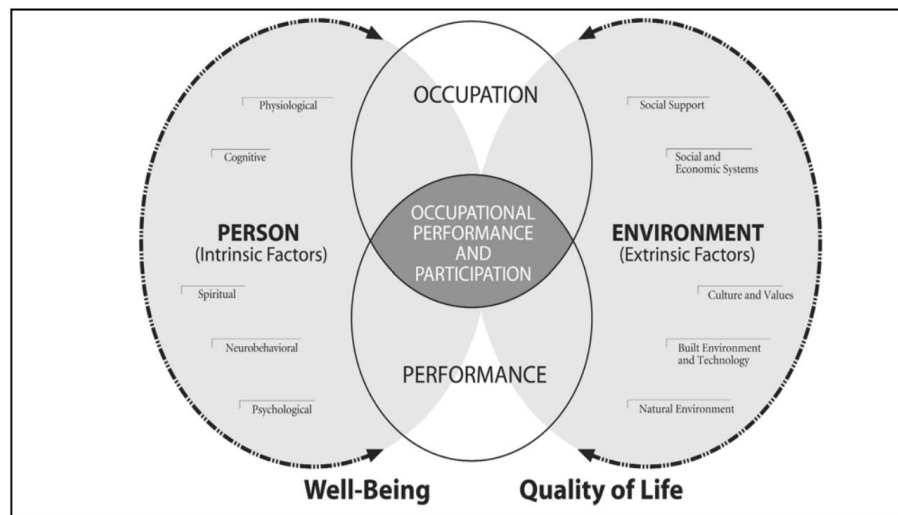
(Lehavot et al., 2018). Female veterans face obstacles which include dangerous combat operations, family conflicts, unemployment/homelessness, and sexual trauma, all of which significantly impact their transition into civilian life (Fedcap, 2018). It is evident that female veterans with PTSD symptoms are significantly underrepresented in research. These symptoms can create challenges in their reintegration process, therefore requiring the need for accessible alternative treatments. An alternative treatment such as scuba has been shown to have promising effects on improving PTSD symptoms of male veterans, however, it has not yet been extensively researched with female veterans.

### **Theoretical Framework**

The Person-Environment-Occupation-Performance (PEOP) was the chosen theoretical model utilized in this study (Christiansen, et al., 2005). The PEOP framework suggests an interactive approach of different components: the person, the environment, the occupation, and the performance (see Figure 1). These four components include the relationships between the person's story, their environment, chosen occupations, and personal factors that will impact their occupational performance and participation. These intrinsic factors reside within the person (Christiansen et al., 2005). According to Christiansen et al. this model views the person as a unique, dynamic being that has different personal factors which influence their roles in life and how they pursue their occupations of daily living. The different personal factors include neurobehavioral, physiological, cognitive, psychological, emotional, and spiritual well-being. The environment can be defined as being an extrinsic factor that encompasses one's social, physical, and natural habitat. This model incorporates the various realms that influence participation and the occupational performance of the individual. The occupational

component of this model looks at the meaningful activities, tasks, or roles people want or need to do in their lives. The performance component is the physical act of doing and participating in the occupations that are meaningful to them. The functional interworking relationship between each component influences the performance of the person. If any of these components cannot functionally interact with each other, it results in a limitation of occupational performance, also called occupational dysfunction (Cole & Tufano, 2020).

The PEOP model considers psychological factors that affect how one's performance may contribute to a person's sense of self, emotional wellbeing, and self-esteem. In this study, we assessed how the participants' involvement in a nature-based occupation can help them improve their quality of life through experiences learned in scuba. Our study utilized this model by focusing on the person component, the female veterans with documented PTSD symptoms. The environments in our study were the ocean and their place of occupation. The occupations highlighted for this study included scuba diving, which encompasses mindfulness techniques as an alternative form of treatment. Outcomes from participating in scuba were assessed through a series of 16 open-ended questions in an online survey format intended to list any changes in PTSD symptoms, social participation and relations, and any changes in their quality of life. Scuba within the occupational component of this model served as a tool to foster a relationship between the veterans and other significant people in their lives to improve occupational performance and participation in the activities that bring meaning to their lives.

**Figure 1***PEOP Model*

*Note.* From “PEOP Model,” by C. Christiansen, C. Baum, and J. Bauss-Haugen. (2005).

*Occupational therapy: Performance, participation, and well-being* (3rd ed.).

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### **Methodology**

We obtained an Institutional Review Board approval to conduct this study on scuba diving experiences for female American veterans suffering from PTSD. This study was in partnership with the Wounded American Veterans Experience Scuba (WAVES) Project. The WAVES Project is located in Temecula, CA, and is a non-profit organization that works with American veterans with a VA rated disability to experience the benefits of water and scuba diving. The WAVES Project program consists of a free open water certification which includes 3–5 dives. The participants for this study were recruited through the email list and flyers distributed by the WAVES Project.

Participation was voluntary and informed consents were collected. The participants had 4

weeks to complete the survey until the link was closed. Dedoose was utilized to sort each female veteran's response to the corresponding questions.

### **Study Design and Protocol**

This study used a qualitative, descriptive design to explore scuba as an occupation that may decrease symptoms of PTSD in female American veterans. The design allowed for a qualitative description that was grounded in the diverse, lived experiences of the participants. An online survey was created based on the PEOP theoretical framework. The survey was trialed with a pilot group of OT students and members of the WAVES Project leadership. After this review, the final online survey was sent to participants. The questions centered around the female veterans' lived experiences prior to and after diving, highlighting any meaningful occupations and changes to it. The questions also included how the female veterans rated their PTSD before and after diving. The WAVES Project provided email addresses of female veterans who volunteered and agreed to participate in the study. The information was kept confidential and private throughout the duration of the study. Each participant provided their informed consent. The online survey was launched through a Health Insurance Portability and Accountability Act compliant Google Forms. Google is in a business associate agreement with the Health Insurance Portability and Accountability Act which requires Google to provide assurance that the privacy, security, and breach notification rule requirements are followed. The form was available for the participants for four weeks. An email reminder to complete the survey was sent out to each participant seven days before the survey date closed.

The survey consisted of 20 questions: four multiple choice questions regarding participant background information, and then 16 open-ended questions. The background

information was used to establish demographic information, including any confounding variables such as current medications. The 16 open-ended questions provided insight into each female veteran's experiences during scuba, their PTSD symptom prevalence, occurrence, severity, and their main occupations or roles in their daily life. It included any experiences prior to the dives, during the dives, and any effects or changes they had in their daily lives before or after the dives. We then reviewed each female diver's responses and responses were directly entered and organized in Dedoose.

We carefully reviewed and cross checked each response to minimize any bias. Member checks were then implemented to ensure accuracy of information placed in Dedoose. A visual representation of how many times a response or statement was identified for each question, thus allowing the us to distinguish most common and prevalent responses amongst the participants during their scuba experiences, PTSD symptoms, and meaningful occupations.

### **Participants**

A total of nine participants were initially recruited by the WAVES Project and agreed to participate in the study, however one participant did not complete the online survey, so eight participants were included in the final study.

### **Inclusion**

The inclusion criteria were female veterans between the ages of 18 and 65 years old, had a VA PTSD rating, and must have been a certified scuba diver with at least four dives, and each participant had to be proficient in English.

### **Exclusion**

Male divers were excluded. Participants were also excluded if they did not have a

VA Department PTSD rating and did not have an open water SCUBA certification.

## **Analysis and Results**

### **Demographic Information**

A convenience sample of eight female veterans participated in this pilot study. Demographic information was obtained during the beginning of the survey. Of the eight, seven were in the age group of 36-45 years old and one was in the age group of 46-55 years old. Four participants identified as White or Caucasian, two identified as Black or African American, one identified as Asian or Pacific Islander, and one identified as Hispanic. Four participants were married, two were single, and two were divorced. Four of the participants indicated they were currently not on any medications whereas the other four indicated they were on some form of medication. Specifically, two participants were on both anti-anxiety and anti-depression, one was on only anti-anxiety, and one was on a medication identified as “other.”

### **Question One: Therapy Services Receiving**

The first open-ended question on the survey was about the participants’ current traditional therapy status. This aimed to identify if they were receiving any current services as well as what type of services they were. Five of the eight participants indicated they were receiving services. The most common response was mental health, with three participants reporting they were receiving this service. Two participants said they were receiving physical therapy. Additionally, one participant who said they were receiving services reported currently receiving three different types including chiropractor, mental health, and physical therapy.

### **Question Two: Alternative Forms of Therapy Receiving**

The second question addressed any forms of alternative therapy the participants may be receiving, whether in conjunction with the traditional therapy or independently. The question specifically asked if they were currently participating in any other forms of alternative therapy such as yoga or deep breathing exercises. Six out of the eight participants said they were currently receiving alternative therapy. The most common form was yoga, with two participants indicating they use yoga. Additionally, one participant said they use meditation, and one said they use prayer. The other two participants who said they did use alternative therapy did not indicate what types of services they use.

### **Question Three: Number and Frequency of Dives**

Question three asked how many dives they have completed so far and how often they dive. The most common number of dives completed amongst the participants were four dives, with three participants reporting this number. The remaining participants reported that they had dived only once. A follow up question was asked about how frequently they dived: three participants reported not often, one reported monthly, one reported few times a year, and one reported few times a year. The other two participants did not respond to this part of the question about how often they dive.

### **Question Four: Main and Valuable Roles**

The fourth question asked the participants to identify the main roles in their life as well as which ones were the most important to them prior to being scuba certified and why. The responses for their main roles included: advocate, aunt, daughter, employee, friend, mentor, mother, partner, pet owner, religious member, sister, and veteran. Of these results, the top three most common roles identified amongst the participants were:

mother, partner, and veteran. Six out of the eight participants identified partner and veteran as one of their main roles, and five out of eight identified being a mother as one of their main roles. The second part of the question asked the participants to then identify which of those roles were the most important to them and why. Four of the eight participants responded to this part of the question. The roles named as most important by these participants were: employee, mother, pet owner, and veteran. Their reasons for identifying them as the most important were reported as joy, love, purpose, and being a role model. The most common reason for these four themes was purpose, as two out of the four participants named this.

#### **Question Five: A Typical Day**

The fifth question asked the participants to describe their daily lives prior to being scuba certified and asked for them to share their typical day. The responses included: work, instrumental activities of daily living, leisure, pain, mental health, and time constraints. Within these, the most common included their daily lives consisting of working/volunteering, leisure, and coping with their mental health. It was reported that four out of the eight participants identified with their daily lives being work, volunteering, or leisurely activities prior to being scuba certified. It was also reported that three out of the eight participants identified their days consisting of coping with their mental health, while two out of the eight reported instrumental activities of daily living and time constraints, and one participant identified their daily life with being in pain.

#### **Question Six: Reactions to Negative Emotions**

The sixth question asked the participants to identify what they do in situations



when they are either anxious, depressed, angry, or sad. The responses were: mindfulness, meditation, holistic practices, exercise, coping mechanisms, and medications. The most common responses that were prevalent amongst the participants included coping mechanisms and practicing mindfulness. It was reported that five out of the eight participants reported using coping mechanisms during emotional situations, and four out of the eight reported practicing mindfulness. In addition, two participants identified with practicing meditation and exercise, while one participant reported utilizing a holistic practice.

#### **Question Seven: Discovery of Scuba Diving**

The seventh question focused on asking the participants to describe how they discovered scuba diving with the common answers including: internet, word of mouth, article, direct source, and previous encounters. Four out of the eight participants reported they found scuba diving on the internet, while two found it from word of mouth, and another two participants found it in research articles. One participant discovered scuba through a direct source, while one other participant found it through a previous encounter with the WAVES Project.

#### **Question Eight: Motivation to Participate in Scuba**

The eighth question addressed what motivated the participants to start participating in scuba. The common responses found were spouse, positive emotions, self-fulfillment, and being influenced. It was reported that three out of the eight participants identified with being motivated by positive emotions. It was also reported that another three out participants described self-fulfillment being their motivational factor to start scuba. Two out of the eight participants reported a spouse motivating them

to start scuba, while another two participants described being influenced by others.

### **Question Nine: Challenges of Scuba**

Question nine asked the participants what part of scuba they found to be most challenging. Responses ranged from physical to mental challenges with the most common reports about descending into the water, buoyancy control, and managing or trusting the equipment. There were reports of PTSD challenges, existing injuries, scheduling of dives, and sensory challenges, which included limited visibility and equalizing ears.

### **Question Ten: Rewards of Scuba**

Question ten asked the participants what they found most rewarding about scuba. Six out of the eight participants mentioned calming feelings, making that the most common answer. Following this was a sensory stimulation response which included four responses about the sights, sounds, and sensations they experienced while underwater. The third most common answer was weightlessness, which was reported by two participants. One participant mentioned that they felt a stronger sense of purpose while scuba diving. One participant specifically mentioned faith in God as the most rewarding.

### **Question Eleven: Emotions During Dives**

This question asked participants to describe emotions that came up during the last time they dived. The question specified between pre-dive, during the dive, and post-dive emotions, but most participants did not specify which portion of the dive they were referring to when describing their emotions. Two participants did mention that they felt anxiety before diving and calming feelings after diving. Anxiety was mentioned by four participants. Another common response by four participants was calm. Additionally, two

participants mentioned feelings of excitement. One said that she felt motivated. One participant mentioned a previous trauma that affected her most recent time diving; they went on to explain how this caused anxiety, and towards the end of the dive talked about how it was a calming and healing experience for her.

#### **Question Twelve: Symptom Occurrence After Scuba**

This question asked the participants how often they experience anxiety, depression, anger, or sadness in a day, week, or month. This question also did not receive very specific feedback about which emotion was felt. The most common response was having any of these feelings occurring monthly, which three participants mentioned. Two participants mentioned experiencing these daily and one mentioned weekly. One additional response that was hard to quantify was “occasionally,” as that can be interpreted many ways. Another participant mentioned that scuba has helped drastically. Two participants mentioned that although they experienced these emotions, they experienced them less, or not at all after participating in scuba.

#### **Question Thirteen: Influence of Scuba on Emotional Responses**

This question focused on if scuba diving has changed their response or approach to challenging situations in their regular life, and also how it has done so. The common responses included coping mechanisms, motivation, self-awareness, sense of purpose, and mental health. The most common responses were prevalent coping mechanisms, motivation, and self-awareness. It was reported that five out of the eight participants use coping mechanisms during challenging situations. Two participants reported motivational factors while the other two reported increased self-awareness.

**Question Fourteen: Impact of Scuba on Daily Life**

The fourteenth question asked if the clients had felt if scuba has impacted their daily life and to explain how it has. As with the previous question, responses include coping mechanisms, self-awareness, motivation, self-fulfillment, and mixed responses. The most prevalent answers were coping mechanisms, motivation, self-awareness, and self-improvement. Four out of eight again acknowledged the use of coping mechanisms in their daily life, three of eight responded that they had better motivation after being involved in scuba, two reported improvements with their self-awareness, and two reported self-fulfillment after engaging in scuba.

**Question Fifteen: Scuba Impact on Valued Roles**

The fifteenth question asked if scuba diving impacted their most valued role. The most common responses included spirituality, relationship improvement, self-fulfillment, and self-improvement. Four out of eight participants mentioned self-improvement to be the most impactful, while two of eight reported their relationships were impacted in a positive way. The most prevalent response was self-improvement. One out of eight reported that scuba has a positive impact on her career, while another reported their immense impact on her spirituality.

**Question Sixteen: Pros and Cons of Scuba**

The last question focused on listing the advantages and disadvantages of scuba diving. The most common responses on advantages of scuba included therapeutic, adventurous, improvement in mental health, spirituality, relationships, self-awareness, stimulating, mindfulness, and lifestyle changes. Four out of eight participants reported feeling adventurous when engaging in scuba diving. Four out of eight reported

improvement in their mental health. Two out of eight saw improvement in their relationships at home. In regard to their self-awareness, five out of eight reported improvements when it came to awareness their own surroundings. Four reported that scuba was therapeutic in their lives, and three participants described it as very stimulating. On the other hand, when it came to listing the disadvantages of scuba diving, six out of eight participants reported that scuba was expensive, four reported the concern of safety when engaging in scuba, and three out of eight reported that it was hard to find a partner to engage and share this experience.

In summary, the survey included a total of eight participants that responded to different questions regarding the effects of scuba diving on their mental health and how it impacts their daily occupations. The majority of the participants indicated that they have utilized alternative therapies in conjunction with traditional therapy. It was found that many of these participants utilized scuba diving more than just a few times a year since their diagnosis. A few of their roles included being a mother, employee, pet-owner, and veteran. These roles were identified as crucial parts of their lives because it brought them joy, love, the feeling of being a role model, and most importantly, purpose. When it came to facing challenging situations, many participants reported utilizing mindfulness techniques and coping mechanisms to manage their PTSD symptoms. It was found that scuba diving also gave the participants motivation while engaging in these sports, along with self-fulfillment. The participants reported that scuba diving challenges their physical and mental capacity, but these participants also mentioned that when scuba diving, they experienced calming feelings, stimulating sensation during this activity, and connected some to their spirituality. Some of the positive benefits reported included improvement in

self-awareness, increased motivation, and better relationships with their spouse or other household members. Overall, there were a number of the participants who reported various pros of scuba diving, but the majority reported that scuba diving was costly, limited partner availability, and had concerns about their safety during the dives. In conclusion, scuba diving as an occupation can be beneficial for this specific population, but there is still a need for further research.

### **Ethical and Legal Considerations**

#### **AOTA Code of Ethics**

The American Occupational Association Therapy Association (AOTA) Code of Ethics was sustained by applying beneficence, justice, and fidelity to prevent any form of harm to the participants throughout the duration of this study (AOTA, 2020).

#### **Beneficence**

Variables that may cause harm to the participants such as emotional distress and symptoms of PTSD whilst completing the survey were minimized through offering the principal investigator as a contact who is a licensed occupational therapist trained in trauma informed care. Moreover, to assist others in the areas of occupational performance that clients desire to increase, this study promotes OT values of altruism, equality, freedom, truth, dignity, prudence, and justice (AOTA, 2020).

#### **Justice**

To ensure fairness and objectivity was implemented throughout the duration of this study, the participants were not required to pay to participate in this study and were not given any financial incentives to participate. To ensure fairness was implemented, the survey was sent out to each participant at the same time, and they all had the same

amount of time to complete the survey. We were supervised and guided by a registered and licensed occupational therapist during the data retrieval process to ensure objective and fair results were obtained. Lastly, approval from Stanbridge University's Institutional Review Board under application number MSOT10-11, as well as approvals required from the participants, team members, and volunteers were obtained before the study began (AOTA, 2020).

### **Fidelity**

All personal information regarding the participants was kept private in multiple ways to maintain confidentiality. Participant names and any other identifiers were not required to be filled out on the survey ensuring their responses remained anonymous. The email addresses collected from the participants to send the survey and flyer remained private and confidential and were not shared. All electronic data regarding the responses from the survey were password protected, the password only being known by the researchers. No physical copies of the data were kept, and to ensure confidentiality, all physical documentation was shredded. Respect was also implemented by letting the participants know that they have the right to stop the survey or withdraw from the study at any time if they began to feel overwhelmed or started to experience any PTSD symptoms. In order to maintain being truthful and respectful, it was encouraged to promote an interactive-collaborative environment with all parties involved in this study. Lastly, all policies and protocols were followed by every team member during the research process to allow for an accurate and unbiased representation of data, and to accurately represent the profession at the completion of the research (AOTA, 2020).

**Potential Benefits**

The potential benefits of participating in the study included utilizing the survey to reflect on personal experiences of scuba as an occupation to decrease symptoms of PTSD in female veterans, improve social support, and increase self-esteem and self-worth. Participants may also demonstrate how to apply mindfulness meditation learned during scuba training to other stressful situations of everyday life to decrease symptoms of PTSD such as depression and anxiety. Self-confidence may improve through scuba involvement as feelings of accomplishments can be associated with learning these new skills and receiving the scuba certification. Participants will complete a survey to share about their experiences of their involvement with the WAVES Foundation, giving them the opportunity to express any changes they have seen after participating in dives and reflect on how these experiences have impacted their daily lives outside of scuba.

**Potential Risks**

The potential risks involved may include psychological distress or trigger of PTSD symptoms. Participants were provided information to reach out to our thesis advisor in the event they experienced any distress while taking the survey.

**Minimization of Potential Risks**

In order to minimize the risks associated with participation in this study, each participant was required to fully read the consent form and understand the risks that may be involved with this survey. The participants were allowed to discontinue participation at any time.



### **Limitations**

As this was a pilot study, we had a convenience sample size, which was limited to those using the services provided by the WAVES Project. Additionally, this study did not have an experimental design resulting in no control group. This limited our ability to compare and determine results to a controlled group to determine if scuba truly made an impact on the female veterans' lives. Other limitations include the geographical accessibility, the expense of scuba, and the COVID-19 pandemic.

This study focused on the lived experiences of female veterans utilizing scuba as an occupation, and how PTSD symptoms and meaningful occupations may be impacted. Due to the nature of this study and at the time of the COVID pandemic, the design called for an online survey to be conducted to get the most detailed responses and a true understanding of their experiences. However, the way the questions were constructed posed a major limitation to our study. Multiple questions had two parts to the question, aiming to investigate further and get a more detailed understanding about their experience of scuba as well as the prevalence, occurrence, and severity of symptoms. However, this caused a number of participants to not answer the question entirely, or to not provide a very descriptive response.

Many also responded with one-word answers with no further elaboration. Both of these developments in trends of how the participants responded caused a significant limitation in listing and describing their responses. It hindered our ability to obtain complete information from each participant making it difficult to devise accurate thematic coding to determine if scuba was the major factor influencing any changes in their daily lives.

### **OT Implications and Conclusion**

Posttraumatic stress disorder has been a major concern for the female veteran population and the military in general. With the increasing number of veterans needing mental health access, it is imperative that OT is involved in helping to alleviate the mental health issues veterans face by finding occupations that can address this. This pilot study shows a positive initial response. Future studies should create a larger sample size to determine whether there is a difference between female and male veterans who have PTSD who utilize scuba as a therapeutic activity, and whether scuba diving can be used as an occupation to significantly improve their mental health and their engagement in meaningful occupations of daily living. Furthermore, future studies should investigate the use of OT along with scuba diving as an occupation to enhance the understanding of alternative therapies for veterans with PTSD.

Creating an alternative form of therapy for female veterans such as scuba diving in conjunction with OT can be beneficial as OT can tailor the occupation of scuba to the female veteran's specific needs. OTs' expertise in occupations and activity analysis to improve quality of life, participation, and engagement in meaningful occupations can definitively provide positive support to scuba instructors, female veterans, and their partners engaged in diving. The findings of this study further suggest that engaging in scuba as an occupation has a positive influence on female veterans' quality of life and reduces their PTSD symptoms. Through this study, participants were able to reflect on their experiences with scuba and gain an introspective understanding of what may benefit their mental and physical health. Engagement in alternative forms of therapy was a common response from our participants, as well as feelings of peace, calm, and sense of

purpose and meaning after participating in scuba. Utilizing an OT framework to expand the alternative therapies available for those who have PTSD allows for more client-centered care and individualized treatment planning. Leisure and social participation are influential areas of occupation that affect one's physical and mental health as well as quality of life and should be considered as part of the care plan when working with someone who has PTSD.

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**Appendix A**

**Institutional Review Board Approval**

04/28/2021

Re: IRB Application Number MSOT10-11

Dear Dr. Achondo and Research Team,

The Stanbridge University Institutional Review Board has completed a review of your application entitled, "A Pilot Study on SCUBA Diving as an Occupation in Reducing Post Traumatic Stress Disorder Symptoms in Female Veterans." Your research protocol MSOT10-11 is fully approved and categorized as full board.

Should you wish to make modifications to this approved protocol, please submit a modification form for IRB review and approval. No changes may take place without IRB approval.

Sincerely,

Dominique N. Wascher, Ph.D.  
IRB Chair

Appendix B

Participant Demographics

