Exploring Therapeutic Sailing as an Intervention for the Veteran Population

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Therapeutic recreation, also known as Recreational therapy, uses recreational activities such as sailing to improve the physical, cognitive, emotional, and social functioning of individuals with illnesses or disabilities (Stumbo & Peterson, 2009). Sailing utilizes mindfulness and nature to create a therapeutic environment for clients to thrive and grow in, while addressing their diverse needs. Dr. Marchand from the VA states that "the concept is really combining a mindfulness program with something else that is healing like nature exposure and using it to engage Veterans" (Richman, 2021). Therapeutic sailing can be used for recreation as well as competitive sport. However, participation in sailing by people with disabilities is regarded to have positive outcomes on quality of life, yet evidence-based research is lacking (Autry & Anderson, 2022, 2023).

Veterans are a unique population in which they tend to need treatment in the psychological, emotional, physical, and social domains. There is research on veterans and outdoor interventions like fishing and boating; however, little exists on sailing as an intervention for this population. Several reviews promise that exposure to nature and outdoor recreation can improve "attention and cognition, memory, stress and anxiety, sleep and quality of life" (Wheeler, et al., 2020). One pilot study reviewed outdoor recreational activity experiences and the improvement of psychological wellbeing of veterans with post-traumatic stress disorder (PTSD). After the veterans four month follow up from the outdoor recreational activity experience, 12 of the veterans made reliable psychological improvement while six veterans did not have reliable psychological improvement. Not a single veteran reported deterioration (worsening) in their PTSD symptoms (Wheeler, et al., 2020). Since sailing has benefits in being

connected to nature and an outdoor activity (Boarini et al., 2024), one can infer that sailing can be a recreational activity that promotes similar psychological improvement for veterans.

Literature Review

The purpose of this literature review is to conduct a cursory exploration of the different health and disability statues that therapeutic sailing can impact. Due to limited research on the veteran population, the literature review will consist of different populations that share similarities. Veterans may face physical, psychological, emotional, and cognitive disabilities and conditions. To understand the complexity of the veteran population, one must understand their challenges and uniqueness. Veterans are a "multifaceted population with a distinct culture that includes, but is not limited to, values, customs, ethos, selfless duty, codes of conduct, implicit patterns of communication, and obedience to command" (Olenick, et al., 2015). With the complexity of the veteran culture and backgrounds in military service, there are multiple limitations they may face such as: PTSD, substance abuse, mental health, suicide, physical health, TBI, hazardous exposures, and rehabilitation.

To use key terms for conducting research and articles, identifying the main concepts of *Therapeutic Sailing for Veterans* was essential. One needs to extract relevant nouns from the topic and expand on what domains and aspects are related. Thus, key terms that were used to locate adequate sources consist of: therapeutic, recreation, sailing, veteran, psych, psychology, mental, health, physical, self-efficacy, benefits, social, adaptive, recreational, therapy, substance use, abuse, anxiety, self-esteem, nature, community.

There are seven studies that will be reviewed in this paper to help inform the exploration of therapeutic sailing as an adequate intervention for the veteran population. Three articles were discarded as to the populations, thus finding it difficult to draw conclusions based on symptoms

and diagnoses for veterans. The sample sizes of these final studies varied. Additionally, they included a range of types of studies from pilot studies to cross over randomized controlled trials. The results of the studies are consistent with aiding in the support that therapeutic sailing is an adequate intervention for veterans.

Psychological and Emotional Benefits

Self-efficacy is defined as someone's belief in themselves to complete a task effectively and efficiently (Waddington, 2023). Self- efficacy is essential to how one perceives themselves and increased levels of general self-efficacy, problem-oriented coping strategy and internal locus of control will improve mental health (Rabani Bavojdan et al., 2011).

The first study by Marchand et al. (2022), found mindfulness-based therapeutic sailing (MBTS) for veterans with psychiatric and substance use disorders (SUD) increases psychological flexibility and state mindfulness. State mindfulness is defined as the daily variation from a person's average level of mindfulness (National Center for Complementary and Integrative Health, 2016). Additionally, psychological flexibility refers to the ability to adapt to changing circumstances, thoughts, and emotions. Psychological flexibility uses self-as-context, thus understanding oneself as a flexible, evolving being rather than identifying solely with one's thoughts, feelings, or situations. It also makes someone more aware and engaged in the present. When there is psychological flexibility, a patient can potentially decrease their mental health and psychological symptoms as well as being able to adapt and cope with the symptoms, thus increasing levels of self-esteem, efficacy, and decreasing anxiety and depression.

The MBTS is a three-session program that combines nature exposure thought recreational sailing and mindfulness training. The sample size consisted of 25 veterans (23 males and 2 females) who participated in MBTS. Data were collected for 1-year pre- intervention and 1-year

post – intervention for between subject analyses (Marchand et al., 2022). All participants in this study had at least "one psychiatric disorder or SUD and most (92%) had two or more conditions, with the most common being any SUD (76%) and PTSD (72%)" (Marchand et al., 2022, p. e445). Instruments used to evaluate pre to post psychological changes were the *Acceptance and Action Questionnaire II* (AAQII), *Toronto Mindfulness Scale* (TMS), the *Five Facet Mindfulness Questionnaire* (FFMQ), and *The Physical Activity Enjoyment Scale* (PACES). Results revealed significant mean pre to post intervention increases in the AAQII ($P = 0.04$) and the TMS ($P = 0.009$). Unfortunately, the FFMQ scores increased but the change was nonsignificant ($P = 0.12$). In conclusion, MBTS is associated with increases in psychological flexibility, measured by the AAQII, and state mindfulness measured by TMS. The intervention was perceived as pleasurable by participants by PACES and is potentially associated with decreased substance use (Marchand et al., 2022). While the results are preliminary, the finding supports the results from a previous pilot study and emphasizes that MBTS is a complementary intervention that aids the veteran population. Therefore, this study supports therapeutic outcomes of sailing for veterans.

The second study that will be reviewed evaluates the effectiveness of a sailing and a learning-to-sail rehabilitation protocol in a "sample of patients diagnosed with severe mental disorders" (Carta et al., 2014). The study involves 40 patients in a randomized, crossover, waiting-list controlled trial. The patients had diagnosis of Schizophrenia, affective psychoses, or severe personality disorders according to the ICD 10 criteria (World Health Organization, 2001). It was mentioned that the sample of 40 was extracted from 53 patients. Thirteen of the patients were excluded due to their health and inability to go to the open sea. Group A and Group B were assigned by randomization via a coin toss. Group A's study ran from May 2010- October 2010 (six months of sailing rehabilitation) followed by six months of no expeditions in the open sea

from November 2010- April 2011. The crossover was from May 2011 to October 2011 where six months of sailing occurred for rehabilitation in Group B (Carta et al., 2014). One limitation that the study had was that "patients often talked of their experience in the open sea, blinding was difficult to preserve" (Carta et al., 2014, p. 74). In terms of assessment, clinical status of the patients was measured at monthly intervals by the *Health of the Nation Outcome Scale* (HoNOS). To assess behavioral problems and disability, the *24-Brief Psychiatric Rating Scale* (BPRS) was used. The patients exposed to sailing during a series of guided and supervised sea expeditions significantly improved statistically in their clinical status and in their general functioning. In continuation, patients with severe mental disorders showed a psychopathological improvement on both the BPRS and the HoNOS. In conclusion, rehabilitation with sailing seems a good adjunctive treatment for patients with severe mental disorders, but the improvement is limited to the period of exposition. Although the sample research size is considered preliminary, and needs to be further confirmed (Carta et al., 2014), the research looks very promising in its implications in how sailing can be used as a therapeutic means for veterans with similar mental health diagnoses.

The last study reviewed that relates to the psychological & emotional benefits of sailing is how therapeutic sailing was used as an intervention for adolescents with epilepsy. Adolescents diagnosed with epilepsy tend to have psychological health issues (Cappelletti et al., 2020). The aim of this study was to examine the empowerment effects on Quality of Life (QoL) of adolescents with epilepsy attending sailing activities. The method included 58 patients diagnosed with epilepsy and their intellectual level was based on the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition Criteria (DSM-5) (Cappelletti et al., 2020). Adolescence is characterized by physical and psychological changes, identify building, and self- identity. Thus,

these traits of adolescence can similarly relate to veterans as they can have psychological and physiological changes as well as self-identity struggles that commonly occur with adjustment disorder and PTSD. Additionally, there are Veterans who have epilepsy due to TBI's. However, in this case, veterans without epilepsy still struggle with self-identity and physical and psychological changes. Reyes-Miranda et al. (2020), discovered that the implementation of patient self-management programs to improve seizure control may decrease the impact of epilepsy for veterans and decrease the healthcare utilization Veterans Affairs (VA). They also found that the Personal Impact of Epilepsy Scale (PIES) was useful to measure outcomes of self-management interventions for veterans with epilepsy. Therefore, the therapeutic use of sailing and how it encompasses and is accomplished through self-management techniques provides direct implications for sailing as an intervention for veterans with various conditions including, epilepsy.

Psychological interventions are known to benefit adults with epilepsy in terms of quality of life, emotions, and fatigue. While therapeutic sailing is not solely a psychological intervention, the psychological domain is affected by treatment. The results of the study by Cappelletti et al. (2020) concluded that empowerment activities are crucial to reduce the burden of epilepsy in adolescents by improving the quality of life of these patients and can represent a critical factor for a smooth transition to adulthood. Similarly, veterans may experience an adjustment disorder when going through major changes in their lives (U.S. Department of Veterans Affairs, 2023a, 2023c).

In conclusion, the mental health benefits of outdoor therapy, like therapeutic sailing, are beneficial forms of therapy for veterans. Therapeutic sailing allows veterans to reconnect with nature and allows for state mindfulness, psychological flexibility, self-esteem and self-

management. It can also be known to treat PTSD, which many veterans are diagnosed with. As Dr. Zev Schuman-Olivier reported, state mindfulness allows for anxiety and depression symptoms to be accurately treated and allows the mind to be focused on the present which in turn improving quality of life and reducing mental health symptoms (National Institutes of Health, 2021).

Physical Benefits

Therapeutic sailing can positively benefit a veteran's physical health. Blue Mind Theory as defined by Dr. Allison, Kobie, states that the visual and auditory stimuli from being around water triggers a calming effect in the body (Vieira, 2024). Additionally, hearing the soothing sounds of waves or flowing water, and seeing the reflections of light on water serve as sensory inputs that signal the brain to activate the parasympathetic nervous system (Vieira, 2024). The parasympathetic nervous system (PNS) is well known as the "rest and digest system" that slows the heart, dilates blood vessels, decreases pupil size, increases hydrochloric acid and other digestive juices, and relaxes muscles (National Cancer Institute, n.d.). The sole purpose of the PNS is to help the body save energy and counterbalance the sympathetic nervous system (SNS).

The PNS and the SNS are the two components of the autonomic nervous system. The autonomic nervous system controls involuntary bodily functions, thus when the SNS is activated by external factors turns on the flight or fight response. Bedford et al. (2022) researched heightened autonomic reactivity to negative affective stimuli among active-duty soldiers with PTSD and opioid-treated chronic pain. Using the "shared vulnerability model, proposed by Asmundson et al. (2002), states that there may be a shared vulnerability for pain and PTSD whereby individuals with high levels of anxiety sensitivity, defined as the fear of anxiety-

related symptoms (Reiss et al., 1986), are more likely to develop one or both conditions. In this model, individuals who are predisposed to become fearful in response to symptoms of anxiety may experience more intense emotional reactions to traumatic stressors and/or physical pain" (Bedford, et al., 2022, p. 2). Thus, veterans tend to be predisposed due to a diagnosis of PTSD or chronic pain during their time of service and active duty. At some point 7 out of every 100 Veterans will have PTSD (U.S. Department of Veterans Affairs, 2023b). Furthermore, when Blue Mind Theory is taken into consideration, when one is near or on the water, the PNS is activated and physical changes occur, decreased heart rate, lower blood pressure, easier breathing, improved digestion, and an overall general sense of relaxation (Vieira, 2024). To summarize, veterans tend to have an overreactive autonomic nervous system that favors the SNS. Veterans tend to have diagnoses of either PTSD and chronic pain, which symptoms of either diagnosis can decrease when on or near the water, creating a decrease of physical wear on the body.

Sailing engages the body physically by requiring balance, situational awareness, neuroplasticity, strength, and endurance (Autry & Anderson, 2020, 2023). In a study conducted by Autry and Anderson (2022), participation in a virtual reality sailing simulator (VRSS) program increased participants' simulator sailing standard scores: which contains cognitive and physical skills, overall increase quality of life. Physical skills consisted of balance, posture, gross motor, fine motor, strength, endurance, hand-eye coordination, and tracking (Autry & Anderson, 2020, 2022).

The Virtual Reality Sailing Simulator (VRSS) at East Carolina University (aka Sailing Vessel (SV) "Bonny") is used to facilitate "interventions for people with disabilities and in youth development to increase quality of life" in main domains: physically, cognitively, socially, and

emotionally (Autry & Anderson, 2020, 2022). By focusing on these domains, one can produce evidence through research in the field of recreational therapy. The lab is a member of the Sim Sailing International Research Consortium of 8 countries and includes 25 members and 7 universities and/or research institutes (Autry, 2024).

In Autry and Anderson's (2022) research the sample size was eight participants with physical disabilities. Four of the participants were diagnosed with a spinal cord injury (SCI): one with quadriplegia, three with paraplegia, two of the participants were diagnosed with cerebral palsy, and two were diagnosed with spina bifida. While one participant was a veteran, for reference "roughly 42,000 people with SCIs are Veterans" (U.S. Department of Veterans Affairs, 2023c).

The VRSS program for the eight participants consisted of eleven sessions. Each session lasted one to two hours depending on the level of the participants disability and stamina.

> The VRSS is an actual boat with a steering mechanism, mainsail sheet, and a computer screen. The boat is on a frame and is able to move and tilt (heel) like a sailboat on water (i.e., an example of a 3D simulation and haptic experience). The computer screen allows for visual and auditory access (i.e., the digital virtual reality experience) to steering, sail trim, wind direction and gusts, boat speed, buoys, obstacles, and location via a geographical setting, which includes a famous body of water with landmarks. (Autry & Anderson, 2022, p. 181)

Participants learned a sequence of skills to sail "Bonny" in the lab. This included steering, trimming sail, heeling, reading the wind, points of sail, tacking and jibing. With these learned sailing skills, participants sailed Bonny on a course with buoys and on an Olympic racecourse. This new set of skills gives the participant a new language, the nautical language. The program is

run by at least one certified instructor with the US Sailing Association and at least one instructor certified and licensed in Recreational Therapy (Autry & Anderson, 2020, 2022).

For the data analysis, the methodology consists of measuring quantitative and qualitative results for participants of the VRSS Program. There are four quantitative instruments to measure participant competence and growth. The *World Health Organization Quality of Life- BREF* (WHOQOL-BREF) (1997) is used pre and post VRSS Program to measure physical health, psychological health, social relationships, and environment domains. Additionally, Sailing Standards are measured. There is a pre study requirement- participants can never have sailed before. The sailing standards includes the skills and knowledge of how to sail and the parts of the VRSS/sailboat and identifying and knowing what various parts of the dinghy are and do. The third instrument used is the Functional Reach Test: Modified Functional Reach (Katz-Leurer et al., 2009). The purpose of this instrument is to measure the degree in movement focused on balance and core strength developed when "Bonny" heels pre and post the VRSS program. Lastly, observation of completion of learned tasks per VRSS session was used to evaluate the effectiveness of the VRSS Program and what the participant has learned and can do without help or reminder.

Qualitative data is used to evaluate the effectiveness of the VRSS Program as well as participant satisfaction. Instruments used are interviews for post VRSS program. The interview guide includes four categories of questions focused on leisure, quality of life, the VRSS program, and sailing on the water. Observation included formative evaluation and notes per session.

The preliminary findings resulted in seven of the participants completing and passing the sailing standard (cognitive and physical/practical skills). One could not complete the entire program due to external limitations beyond the participant's and researchers' control.

Additionally, all eight participants reported that the VRSS Program contributed to their quality of life. Lastly, six of the participants qualified to move onto Phase II, Virtual Reality to Reality: Adapted Sailing Program.

The treatment protocol for the Virtual Reality to Reality: Adapted Sailing Program consists of six sessions that are two hours long. The first session(s) are for refresher/practice in the VRSS/Bonny and for pre data collection using the WHOQOL-BREF and Sailing Standards. Four sessions are on the water. Lastly, one session of post program data collection. Sequence of skills and nautical language are challenged on the water. This includes preparation on land, reading the wind and weather, navigation, transferring in and out of the sailboat, leaving and returning to the dock, steering, and trimming sail, heeling, points of sail. After these skills have been properly completed, sailing on a course with tacking and jibing with buoys is next and additionally sailing on an Olympic racecourse. This program is run with at least one certified instructor with the US Sailing Association, at least one certified and licensed in Recreational Therapy, and at least one volunteer who has had extensive instruction on sailing.

In relation to veterans, if the VRSS program benefits the quality of life of participants with SCI, cerebral palsy, and spina bifida, then the veteran population would benefit as well. Sixty to eighty percent of spinal cord injury patients experience pain (Masri & Keller, 2012). Additionally, 1/5 of veterans report persistent pain, and 1/3 of veterans have been diagnosed with a condition related to chronic pain (Frank et al., 2019). As physical benefits can be combined with the emotional benefits in such areas as mindfulness as mentioned above, the implications for therapeutic sailing are applicable for veterans with various conditions and within multiple domains, including the social domain which will be covered next.

Social Benefits

Therapeutic sailing requires communication between participants. Communication starts with the participant/patient and the healthcare provider. A study reports that "participants develop collaboration and effective communication skills by working together to maneuver the boat" (Aprile et al., 2016; Palumbo & Federico, 2020). Additionally, sailing allows individuals with varying abilities to participate, thus, "fostering social cohesion and reducing stigmatization" (Labbé et al., 2019; Stephens et al., 2020). Furthermore, sailing in larger boats requires teamwork. Collaboration and communication are essential to sailing. Another study found that nature-based therapy improves motivation and social interaction (Joschko et al., 2023). Referring to Autry and Anderson's research, the authors stated that the social benefits of therapeutic sailing are team building, cooperation, decision-making, community engagement, and environmental awareness (Autry & Anderson, 2020, 2023).

Rehabilitation

Rehabilitation is the culmination of psychological, emotional, physical, and social domains targeted in therapeutic sailing. Different sports and outdoor recreational activities, including sailing can enhance self- confidence, self-esteem, participation in group dynamics, communication, and better knowledge and awareness of the body. When one gains better functional mobility, more stability of the mind, and better relationships, one's quality of life will increase. It is well-known that participation in sailing by people with disabilities is widely regarded as having positive outcomes on self-esteem and general health of the participants (Recio et al., 2013). Thus, rehabilitation is essential for a veterans' functional independence and quality of life.

Discussion

This literature review analyzes whether therapeutic sailing is an adequate intervention for veterans. After reviewing the physical, psychological, and social domain, this review and discussion of implications shows sailing can positively affect rehabilitation and a smoother transition back into civilian life for veterans.

This literature review was conducted independently with the assistance of Dr. Cari Autry. Dr. Autry has dedicated her education to therapeutic recreation/recreational therapy in the concentration of adaptive sailing. Her current research with the Sailing Simulation Lab at East Carolina University focuses on people with physical disabilities. For the future, this literature review is to aid the expansion of participant populations within the Sailing Simulation Lab. "Participation in the virtual reality sailing simulator (VRSS) program will result in an increase in participants' simulator sailing standard scores: knowledge (cognitive) and skills (physical), which is the competence level required for on-the-water sailing, and their quality of life (QOL) score" (Autry & Anderson, 2020, 2022).

As a student in the Honors College, the opportunity to be a part of this research not only gives me the ability to learn more about therapeutic sailing and the veteran population. It also allows me to learn about the research process and how to expand research parameters and the steps to get there. While this research on therapeutic sailing as an intervention for veterans is limited, the conclusions drawn shows promise of sailing as an effective treatment for veteran populations. Additionally, my research would be a good fit for publishing since there is lack of evidence to support therapeutic sailing as an effective intervention for Veterans.

Conclusion

Therapeutic sailing is a non-pharmacological intervention that treats the physical, psychological, emotional, and social domains in therapeutic recreation, or recreational therapy. Veterans are a unique population in which they have complex needs which tend to occur in the four domains that therapeutic sailing treats. Therapeutic sailing shows promising results to effective treatment for veterans by targeting psychological, emotional, physical, and social needs, which are essential to rehabilitation for those veterans with various disabilities or limitations. Focusing on these domains through therapeutic sailing can help facilitate a greater quality of life.

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