

Regular Paper

Exploring Changes in Depression and Meaning in Life through River Rafting for Veterans with PTSD

Taylor Hooker
Susan McCool
Sarah R. Fischer
Clemson University

Deborah Tysor
Douglas College

N. Qwynne Lackey
SUNY Cortland

Abstract

As part of a larger research program examining the impacts of nature-based experiences on veterans with posttraumatic stress disorder, this study focused on changes in their depression and meaning in life after participation in four-day group river rafting trips. These group trips allowed for a sense of community among participants with similar life experiences during river rafting, camping, and other trip activities. Results showed that there were statistically significant improvements over time for both depression scores and meaning in life scores. Results also indicated a weak statistically significant, negative association between depression and presence of meaning in life. The study's results are useful for clinical practitioners who may be considering nature-based programs for their clients, as well as researchers seeking to better understand the psychological health benefits of group, nature-based recreation.

KEYWORDS: *River rafting, veterans with PTSD, depression, meaning in life, nature-based program*

Introduction

The number of United States military veterans diagnosed with posttraumatic stress disorder (PTSD) in a given year ranges from 11% to 20% (National Center for PTSD, 2018). PTSD often exists in conjunction with myriad other comorbidities that further compound and complicate the lives of veterans aiming to lead healthy, robust lives (Armenta, 2018). Additionally, the increasing number of veteran suicides and the increased risk of suicidal behavior among veterans with PTSD is concerning (Sareen et al., 2005). Advances in understanding these comorbid disorders during the ongoing Global War on Terror have highlighted the need for an integrative approach to recovery and wellness after the onset of PTSD. Most notably, correlations between PTSD, suicidality, and meaning in life (MIL) provide clear opportunities for reinforcing veterans' sense of meaning in their lives as a protective factor against suicidal ideation and behavior (Braden et al., 2015; Corona et al., 2019). With the growing use of and interest in, nonpharmacological approaches, and more specifically nature-based programs (NBP) for veterans (Dustin et al., 2016), this study aimed to identify what impacts a four-day group river rafting trip with community experiences had on PTSD, depressive symptoms, and MIL for veterans with PTSD.

Literature Review

PTSD is a complex psychiatric disorder that affects approximately 8 million people every year and may result after having observed or experienced a traumatic event (American Psychiatric Association, 2013; National Center for PTSD, 2019). Referred to historically as shell shock, war neurosis, and soldier's heart, PTSD rates in veterans can be two times higher than the general U.S. population (Crocq & Crocq, 2000; National Center for PTSD, 2018; National Center for PTSD, 2019). The casualties and stresses of war put veterans at risk for developing PTSD, compounded by other comorbidities such as depression, anxiety, traumatic brain injuries, and somatic injuries (Knowles et al., 2019; Stander et al., 2014). Veterans with PTSD are at an increased risk of suicidal ideation (11%) than those without (2%) (Arenson et al., 2018). Veterans living with comorbid PTSD and major depressive disorder are at an even greater risk of suicidal behavior (Armenta et al., 2018). According to a 2016 VA report, on average, 20 veterans committed suicide each day from 2001 to 2014 (Office of Suicide Prevention, 2016).

Depression

According to the DSM-V, major depressive disorder (furthermore referred to as depression) consists of depressed mood, loss of interests, sleep disturbances, feelings of worthlessness, and fatigue among other symptoms (American Psychiatric Association, 2013). While veterans are not more likely to be diagnosed with depression than their civilian counterparts, veterans with other psychological comorbidities, like PTSD, may be at increased risk for experiencing depression (Gould et al., 2015; Stander et al., 2014). Nearly half (49%) of veterans with comorbid PTSD and depression exhibit suicidal ideation more than peers with only one, or none, of these diagnoses (Arenson et al., 2018). In addition, veterans with depression exhibit a decreased presence of meaning in their lives (Blackburn & Owens, 2014; Owens et al., 2009).

Meaning in Life

Steger et al. (2006) highlight the variations in definition and routes of achieving meaning in life across the field of counseling. The authors further emphasize the critical nature of MIL as a means to achieve an authentic and satisfying life (Park et al., 2010). Meaning in life and its pursuit is a deeply personal concept, defined and achieved depending on an individual's understanding of a meaningful life (Steger et al., 2006). A recent study of adults over 50 years of age indicated lower rates of mortality for those leading a purposeful life (Alimujiang et al., 2019).

A meaningful life has been shown to promote overall psychological well-being and serves as a suicide resiliency factor (Braden et al., 2015; Corona et al., 2019; Ho et al., 2010; Kleiman & Beaver, 2013; McMahan & Renken, 2011). For veterans specifically, strength in meaning of life is associated with fewer depression symptoms (Blackburn & Owens, 2014) and serves as a protective factor against suicidal ideation for those with PTSD and depression (Sinclair et al., 2016). Consequently, the Veterans Health Administration (VHA) has embraced a system redesign dubbed “Whole Health,” that places emphasis on personal motivations for health improvement (Krejci et al., 2014). As part of the VHA’s primary and specialty care, the questions “What really matters to you in life?” and “What brings you a sense of joy and happiness?” guide a veteran’s health care conversations (Office of Patient Centered Care and Cultural Transformation, 2019). Questions of this nature indicate that a meaningful life is attainable, and that healthy living is supported by, and builds upon, the presence of and search for meaning in life. The interconnected nature of PTSD, depression, and MIL highlight an opportunity to create treatment options that address these needs.

Typical Treatment Options

The VHA is responsible for providing primary health care and specialty services to millions of veterans each year. As the largest health care organization in the United States, the VHA utilizes evidence-based clinical treatments including pharmacotherapy, psychotherapy, and cognitive behavioral and processing therapies, eye-movement desensitization and reprocessing (EMDR), and other trauma-informed therapies (U.S. Department of Veterans Affairs, 2020). Despite treatment efficacy, many veterans do not seek continued treatment through standard channels (i.e., the VHA) due to stigma, limited access, and lack of desire for traditional group therapy (Bowersox et al., 2013). Therapeutic approaches that require confrontation of traumatic memories may be inaccessible to those unable or unwilling to recount these emotionally charged and jarring experiences (Zayfert et al., 2005). Among a sample of 200 veterans referred for psychotherapy, only 12% completed their full therapy regimen, and 38% never sought care (DeViva, 2014). Typical treatment options are complicated by attrition, access to services, side effects of medications, and veterans not viewing therapies as effective (Hawkins et al., 2016).

Growing Use of Non-pharmacological Approaches

As a result of continued barriers (both personal and societal) and limitations in traditional means of health care that veterans may encounter, nonpharmacological approaches, including complementary and integrative modalities, recreation-based interventions, and nature-based interventions have increased (Bryan & Bryan, 2016; Townsend et al., 2014). The provision of meaningful NBP may be a catalyst for improving overall MIL, which in turn mitigates the effect of PTSD and depression, therefore reducing the likelihood of suicide. The attractiveness and affordability of NBP coupled with evidence of improvements in coping, mood, depression, anxiety, and stress, highlight the value of NBP as a complement to traditional care (Hawkins et al., 2016; Vella et al., 2013). Overall interest in NBP has grown (Cordell, 2008), and this increase has led to researchers exploring the impacts and benefits associated with NBP (Krasny et al., 2010).

Benefits of Nature-Based Programs

NBP result in myriad psychological, cognitive, physiological, social, and spiritual benefits to individuals (Keniger et al., 2013). There are numerous physical health benefits associated with participation in physically rigorous NBP, including lower blood pressure, which leads to decreased risk of chronic health conditions related to cardiovascular disease such as stroke and heart attack (Duncan et al., 2014; Shanahan et al., 2016). In addition, those who engage in nature

experiences report increased participation in physical activity leading to additional cardiovascular and physiological benefits (Shanahan et al., 2016).

Early theoretical work posits that natural environments may contribute to psychological health and well-being (Kaplan, 1995). Studies highlight the role of nature in improving cognition (Berman et al., 2008; Duvall & Kaplan, 2014), and the benefits of nature-based programs also include several emotional benefits such as stress reduction (Kuo, 2001), increased positive emotions (Duncan et al., 2014; Duvall & Kaplan, 2014; Vella et al., 2013), and reduced depressive symptoms (Shanahan et al., 2016; Vella et al., 2013). A growing body of literature indicates nature can improve and support mental health (Burls, 2007; Snee, 2007). Furthermore, NBP have often brought together individuals with similar interests. To this end, NBP can contribute to greater social cohesion and improved sense of community and belonging (Kingsley & Townsend, 2006; Moore et al., 2006; Shanahan et al., 2016).

Within the veteran population, the sense of community and belonging plays a vital role in an individual's recovery. For the purpose here, community is defined as a social unit "with diverse characteristics who are linked by social ties [and] share common perspectives" despite geographical locations (Bradshaw, 2008; MacQueen et al., 2001). Community members often share common experiences, beliefs, preferences, needs and risks. Veterans have developed their own sense of community, with those having PTSD forming a sub-community. They share common experiences, such as: serving their country; encountering dangerous and stressful situations; living with the trauma and/or injuries; and adjusting back to civilian life. In addition, veterans engaging in group-based NBP reported improved social connectedness and decreased feelings of isolation and loneliness (Duvall & Kaplan, 2014).

Many veterans look for alternative resources for treatment, with NBP serving as an attractive option (Held et al., 2016). Given the attractiveness and potential value of NBP, as well as barriers to traditional care, health care professionals should explore non-traditional approaches to improve well-being and help veterans cope with transitioning to civilian life (Duvall & Kaplan, 2014). Recent calls for more rigor in outdoor adventure programs and NBP abound in disciplines adjacent to recreation and those allied health professions concerned with the lack of efficacy for these programs as standalone treatments (Davis-Berman et al., 2018). While some studies have found immediate benefit in psychological outcomes from involvement in community centric offerings in sport and NBPs, prolonged impact is limited, potentially indicating a need for sustained participation (Bettmann et al., 2019; Greer & Vin-Raviv, 2019; Poulsen, 2017; Walter et al., 2021). Blue spaces, a term defining all visible surface waters in space, have implications for health and well-being (Völker & Kistemann, 2011). In particular, engagement in blue spaces and river rafting present a unique opportunity for veterans seeking out NBP for wellness.

Blue Spaces and River Rafting

Blue spaces are visible, outdoor, natural surface waters that have the potential to improve human health and well-being (Britton et al., 2020). Traditionally falling under the umbrella of green spaces, blue spaces have begun to find their own spotlight in the literature. Britton et al. (2020) conducted a systematic review to determine the therapeutic effect of blue spaces on health and well-being. The authors found blue space interventions had a positive and weak association with health and well-being; in addition to increased social connectedness both during and after interventions (Britton et al., 2020). However, it is important to note that many of the studies including blue space interventions had small sample sizes, multiple biases, and did not operate with controls or standardized protocols. These limitations make it difficult to transfer, generalize, or replicate findings across future studies and programs for veterans.

River rafting as a therapeutic modality is an example of a blue space intervention for promoting health outcomes. While little research has been conducted on the impact of river rafting on mental health and well-being, it is important to understand the foundations of the existing

research. River rafting experiences contribute to general restorativeness, with low-risk trips offering positive associations between the experience, relaxation, and nature appreciation (Garg et al., 2010). Intermediate and high-risk trips exhibit positive association with physical fitness and adventure (Garg et al., 2010). One study indicated a group of veterans with PTSD perceived a reduction in symptoms during a river rafting experience (Dustin et al., 2011). Anecdotal evidence indicated a decrease in re-experiencing symptoms over time, progression downstream replacing avoidance and numbing with cheer and happiness, and physical activity fatigue and the peacefulness of natural surroundings lessening the effects of hyper-arousal (Dustin et al., 2011).

Growing interest in NBP in the veteran populace, their associated benefits, and the desire to establish a robust evidence base coalesced to form the impetus for studying the impacts of a four-day group river rafting trip for veterans with PTSD. Therefore, the purpose of this study was to better understand how river rafting impacts depression and the search for and presence of meaning in life for veterans with PTSD. To guide this research, we proposed the following research questions:

1. For veterans with PTSD, do depressive symptoms change over time after participation in a four-day group river rafting trip?
2. For veterans with PTSD, do perceptions of meaning in life change over time after participation in a four-day group river rafting trip?
3. For veterans with PTSD, does a relationship exist between depressive symptoms and perceptions of meaning in life after participation in a four-day group river rafting trip?

Methods

Research Design

This study was conducted as a subset of a larger body of research exploring nature's therapeutic effects for veterans and their families. This study specifically focused on the effects of a four-day group river rafting experience on the depression symptoms and perceived meaning in life of veterans with PTSD. This study followed a quasi-experimental, longitudinal design with a quantitative focus on pre- and post-trip data (at one-, three-, six-, and nine-month follow-up intervals). At each of these time points, two psychometric tests offered insight into the depressive symptoms and perceived meaning in life of veterans with PTSD. Pre-tests were administered one month prior to the trip.

Veterans with PTSD participated in a guided, group river-rafting trip on the Green River located in Dinosaur National Monument in Colorado and Utah. Managed by the National Park Service, Dinosaur National Monument is a popular historical, cultural, and natural destination that features over 1,500 fossils, petroglyphs, mountains, desert, and flowing rivers. Popular for its hiking trails, river rafting, and cultural significance, the monument spans over 210,000 acres and is home to the Green and Yampa rivers (Dinosaur National Monument, 2020). With views of sagebrush, canyons, and cliffs, the natural surroundings provide a variety of natural splendor. The channels, drops, and obstructions create challenging rapids on the rivers in addition to beach access where kayakers and visitors can retreat and rest (Dinosaur National Monument, 2020). The trip lasted four days, with an intentional lack of programmatic debriefing in order to identify the effects of purely participating in an outdoor adventure experience. Trips occurred over a four-year period during the month of September with approximately 10 veterans per trip. Trips were offered at no cost to participants with support from grant funding for program and research activities. River rafting and nightly camping comprised the central activities during the trip and provided an opportunity for experiences as a community of veterans with PTSD. In addition, attendees were given the opportunity and choice to engage in other outdoor rec-

recreation opportunities, including guided hikes, fishing, kayaking, and sun and/or river bathing. During these moments of casual leisure participation, attendees were free to engage and dialogue with one another without any structured therapeutic intervention by program facilitators. While specific measurements did not capture the community and camaraderie built and felt during the trip, participants were noted engaging in conversations specific to their shared experiences unique to the military service that unified them.

Recruitment and Sampling

Study participants were recruited through mixed-purpose sampling using maximum variation and purposeful snowball sampling (Johnson & Onwuegbuzie, 2004; Onwuegbuzie & Collins, 2007). To diversify the sample, informational flyers were provided to Veterans Affairs (VA) hospitals as well as nonprofit organizations serving veterans. Broad calls were shared within veteran serving organizations that provide programs for veterans with disabilities. Additional targeted, paid advertisements on Facebook were used to reach a more expansive audience.

Veterans with PTSD expressing an interest in the study were encouraged to share information about the study with friends and family members, peers, coworkers, and community members who might also qualify for participation in the study. This purposeful snowballing allowed us to access veterans who might not have been reached through our initial VA and community avenues or Facebook ads.

Eligibility and safety protocols were utilized to ensure potential participants met basic study qualifications and to promote safety. Screening procedures included proof of veteran status, no current substance dependence, no recent suicidal behavior, and no recent hospitalizations. Also, the Clinician-Administered PTSD Scale (CAPS-5) was used to determine participants' PTSD diagnoses via an interview with a trained clinician from the National Center for Veterans Studies at the University of Utah. Individuals who had a current PTSD diagnosis based on the CAPS-5 interview and met the study criteria were invited to participate.

Informed Consent

All participants completed informed consent that aligns with the expressed requirements of the Institutional Review Board at the University of Utah. To encourage participation, participants were offered a \$25 gift card upon completion of each post-trip survey as well as an additional \$25 gift card if they completed all post-trip surveys.

Participants

Participants on this four-day group river rafting trip were required to meet aforementioned inclusion criteria by confirming a clinical diagnosis of PTSD and a proof of veteran status. In addition to these criteria, the sample can be further described by their demographic makeup in order to determine how these results may or may not be extrapolated to the larger population of veterans with PTSD. Demographics in Table 1 indicate our sample was predominantly white (88%), male (71%), and heterosexual (88%). In regard to their family dynamics, 57% of respondents identified as married and 83% reported having children. On average, program attendees had two or more children. Participant ages ranged from 25 to 55 years of age, with 74% being under the age of 45. Related to their military service, typical deployments were to combat zones with minimal engagement in humanitarian, support, or peacekeeping deployments.

Table 1

Descriptive Statistics of Categorical Data collected from Veterans with PTSD

	Variable	N	Frequency	Percent
River Trip Participants		35		
	Year 1		7	20
	Year 2		4	11.4
	Year 3		12	34.3
	Year 4		12	34.3
Age		35		
	25-33 years		11	31.4
	34-45 years		15	42.9
	46-54 years		7	20.0
	55+		2	5.7
Gender		35		
	Male		25	71.4
	Female		10	28.6
Spanish/Hispanic/Latino?		35		
	No		30	85.7
	Yes		5	14.3
Race		35		
	White			
	American Indian or Alaskan Native		31	88.6
	Black or African American		1	2.9
	White & American Indian or Alaskan Native		1	2.9
	White & Black or African American		1	2.9
Sexuality		35		
	Heterosexual or straight		31	88.6
	Bisexual		2	5.7
	Gay or lesbian		2	5.7
Marital Status		35		
	Single, not in a relationship		2	5.7
	Married		20	57.1
	Separated/Divorced		5	14.3
	Dating, engaged, in committed relationship		8	22.9
Have Children?		35		
	No		6	17.1
	Yes		29	82.9

Data Collection

This study sought to determine how the depressive symptoms and perceived meaning in life changed over time for veterans with PTSD after participation in a group river rafting trip. Researchers utilized two primary measures: the Meaning in Life Questionnaire (MLQ) and the nine-item Patient Health Questionnaire (PHQ-9). These measures were distributed to the participants via email using Qualtrics.

Patient Health Questionnaire-9 (PHQ-9)

The PHQ-9 measures DSM-IV depression criteria and asks participants how often they have been bothered by their symptoms over the past two weeks. Participants are asked to indicate a numerical value with scores ranging from “0,” indicating that the criterion is not at all present, to “3,” indicating that the criterion is evident nearly every day (Kroenke et al., 2001). For example, veterans with PTSD were asked to identify their difficulty with “poor appetite or overeating” and “feeling tired or having little energy” (Kroenke et al., 2001), among other questions. Scores for individual criteria were combined and re-tallied to create a composite score. The total scores on the PHQ-9 range from 1-27, indicating a range of minimal to severe depression (Kroenke & Spitzer, 2002).

Used as a screening and monitoring tool, the PHQ-9 can be both self- and clinician-administered. This measure can be printed and completed using a pen-and-paper method in addition to being put into an electronic survey. The PHQ-9 has both construct and criterion validity and is useful as a palatable measure for clients needing frequent reassessment (Kroenke et al., 2001).

Meaning in Life Questionnaire (MLQ)

The MLQ is a 10-item measure focused on assessing both (a) the presence of and (b) search for meaning in life (Steger et al., 2006). Of the 10-item scale, five items each comprise the subscales of presence of and search for meaning in life. The MLQ is intended to be self-administered but can be administered by a clinician if necessary. This brief, three- to five-minute questionnaire can be completed through a paper-and-pencil or electronic survey format (Steger et al., 2006). Clients are asked to reflect on each of the 10 items, asking themselves what makes their life important to them. Each item is ranked on a Likert-scale ranging from “1,” indicating absolutely untrue, to “7,” indicating absolutely true (Steger et al., 2006). For example, items state “I am always looking to find my life’s purpose” (searching domain) and “I understand my life’s meaning” (presence domain) (Steger et al., 2006).

The Presence of Meaning subscale measures the fullness of meaning in one’s life while the Search for Meaning subscale measures how committed individuals are to their quest for and better understanding of meaning in life (Steger, 2010). Scoring above a 24 in either subscale indicates a level of strength within that particular subscale, whereas scoring below 24 indicates a deficit. Scoring above or below 24 in either category provides insight into the stability of one’s perceived meaning in life and their actions to either improve or sustain their search for meaning (Steger, 2010). The two subscales report some intercorrelation ($r = -.19$) and high levels of internal consistency between the two subscales (Steger et al., 2006). In addition, the MLQ has good test-retest stability and significant discriminant and convergent reliability for both subscales (Steger et al., 2006). Notably, the searching subscale is the only scale of its kind assessing the quest and/or search for meaning in life. (Steger, et al., 2006). Mostly applied in meaning and quality of life literature, few intervention studies utilizing the MLQ have been completed (Steger & Shin, 2010). With regard to the military and veteran population, relationships between PTSD, meaning in life, and depressive symptoms were noted in a 2009 study utilizing the MLQ (Owens, et al., 2009).

Data Analysis

Utilizing SPSS, we ran descriptive statistics for our sample. The research team then created composite scores for each of the PHQ-9 and the MLQ measures. Composite scores were computed according to each assessment’s guide or handbook. Attrition was not noted in this study; however, some post-tests contained missing data. In this instance, we utilized group means to account for missing data.

Since PHQ-9 and MLQ data were not normally distributed, we used Friedman’s ANOVA and the Wilcoxon Sign Test to answer research questions 1 and 2. For research question three,

since the data were interval, had paired observations, and were monotonic, we were able to conduct a Spearman's Rank-Ordered Correlation to check the association between presence of, and search for, meaning in life and depression. See Table 2 for descriptive statistics of all the variables utilized in this analysis.

Table 2
Descriptive Statistics for Each Measure of Time

	N	Mean	Std. Dev.	Min.	Max.	Median
Depression Over Time						
Pre-test	35	15.714	5.085	4.00	26.00	16.000
1 month	35	12.733	5.719	1.00	27.00	12.733
3 month	35	13.059	5.541	4.00	24.00	13.059
6 month	35	13.929	6.024	3.00	26.00	13.929
9 month	35	12.207	5.187	2.00	27.00	12.207
Presence of Meaning in Life Over Time						
Pre-test	35	17.629	6.958	7.00	32.00	17.000
1 month	35	18.967	6.930	2.00	32.00	18.967
3 month	35	18.294	6.229	7.00	31.00	18.294
6 month	35	17.536	7.485	3.00	34.00	17.536
9 month	35	19.517	6.295	6.00	33.00	19.517
Search for Meaning in Life Over Time						
Pre-test	35	28.886	4.555	20.00	35.00	30.000
1 month	35	27.200	5.669	10.00	35.00	27.200
3 month	35	25.588	4.864	13.00	35.00	26.000
6 month	35	27.036	5.933	6.00	35.00	27.036
9 month	35	27.172	4.073	17.00	35.00	27.172

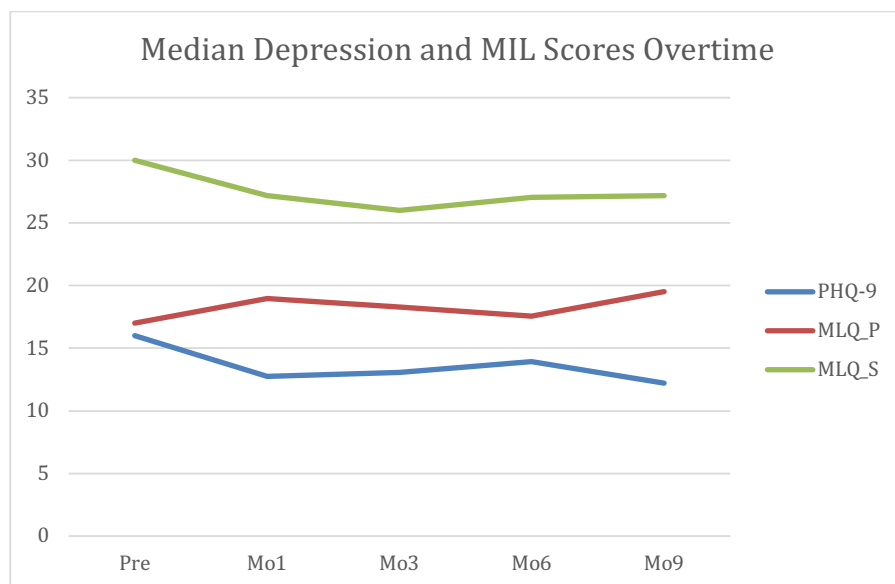
Results

Following guidance outlined in our methodology, we set out to interpret the results of our overarching research questions. For research question one, a Friedman's ANOVA was performed to compare the impact of river rafting on depressive symptoms of veterans with PTSD over time. It was determined that differences in mean PHQ-9 depression scores were statistically significant between time points, $\chi^2(4) = 13.233, p = 0.01$. An asymptotic sign test revealed that participating in the group river rafting trip did decrease median depression scores from the pre-test to the one-month follow up by 3.267 points (16.0 vs 12.733, respectively) with statistical significance ($p < .05$), indicating reductions in depression severity from moderately severe to moderate. There was a statistically significant decrease again from pre-test to the six-month follow up by 2.071 points (16.0 vs 13.929, respectively; $p < .05$) and from pre-test to the nine-month follow up by 3.793 points (16.0 vs 12.207, respectively, $p < .05$). It is important to note the median scores increased slightly from the one-month follow up to the three-month follow up (12.733 vs 13.059, respectively; $p = .860$), and again from the three-month follow up to the six-month follow-up (13.059 vs 13.929, respectively; $p = .472$), without statistical significance. Therefore, we can conclude that there was a statistically significant change in depression scores over time in veterans

with PTSD after participation in a four-day group river rafting trip. For a visual reference, the scores over time are demonstrated in Figure 1.

Figure 1

A Graph Depicting Median Depression and Meaning in Life Scores Over Time



To address the second research question, a Friedman's ANOVA was performed to compare the impact of river rafting on the perceptions of meaning in life (presence of and search for meaning) of veterans with PTSD over time. It was determined that differences in mean MLQ Presence scores were statistically significant between time points, $\chi^2(4) = 13.126$, $p = .01$. An asymptotic sign test revealed that participating in the group river rafting trip did increase the median MLQ Presence scores from the six-month follow-up to the nine-month follow-up by 1.981 points (17.536 vs 19.517, respectively) with statistical significance ($p < .05$). While there was an increase in median scores, the median scores still stayed under the 24-point threshold; indicating overall, participants still felt as though their lives lacked meaning or value (Steger, 2010). Although not statistically significant, it is important to point out that the presence of meaning median scores showed a slight increase from the pre-test to the one-month follow-up (17.0 vs 18.967, respectively; $p = .072$), but decreased slightly from the one-month follow-up to the three-month follow up (18.967 vs 18.294, respectively; $p = .361$) and the three-month follow-up to the six-month follow-up (18.294 vs 17.536, respectively; $p = .296$). See Figure 1 for a visual reference. We can conclude that there was a statistically significant change in the presence of meaning in life scores over time in veterans with PTSD after participation in a four-day group river rafting trip.

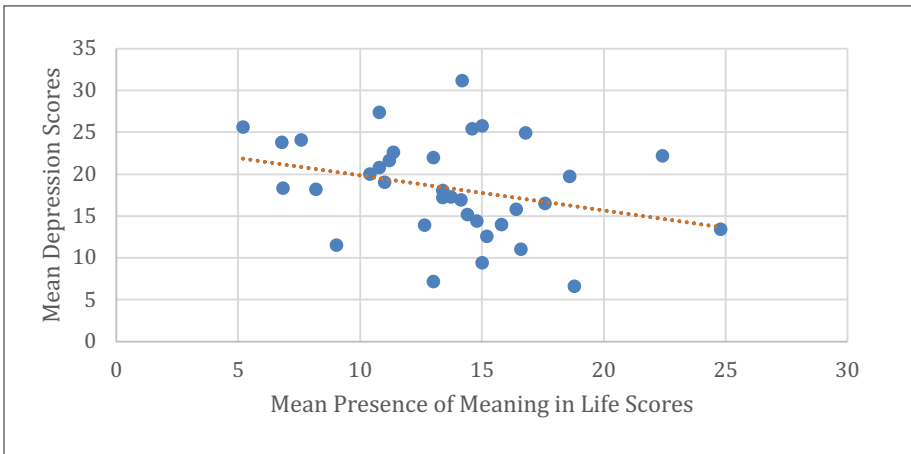
A Friedman's ANOVA determined that differences in mean MLQ Search scores were statistically significant between time points, $\chi^2(4) = 14.528$, $p = .006$. An asymptotic sign test revealed that participating in the group river rafting trip decreased the median MLQ Search scores with, statistical significance, from the pre-test to the three-month follow up (30.0 vs 26.0, respectively, $p < .05$). There was a statistically significant increase between search for meaning scores from the three-month to the six-month scores (26.0 vs 24.036, respectively; $p < .05$). See Figure 1 for a visual reference. Overall, median scores dropped from pre-test to 1 month and 1-month to

3-month follow-ups and then increased from the 3-month to the 6-month and the 6-month to the 9-month follow-ups, although only two of those changes were statistically significant. However, they did stay consistently above the 24-point threshold; indicating overall, participants were searching for something or someone that would give their life meaning (Steger, 2010). We can conclude that there was a statistically significant change in the search for meaning in life scores over time in veterans with PTSD after participation in a four-day group river rafting trip.

The third research question sought to examine if there was any type of relationship over time between the depressive symptoms of veterans with PTSD and their perceptions of meaning in life (including both presence of and search for meaning). A Spearman's rank-order correlation was conducted to assess the presence of this relationship. There was a weak, negative, monotonic correlation between mean PHQ-9 scores and mean MLQ Presence scores, which was statistically significant ($r_s(33) = -.348, p = .040$). As the presence of meaning in life increased, depression decreased. A weak, positive, monotonic correlation was present between the mean PHQ-9 scores and mean MLQ Search scores, but was not statistically significant ($r_s(33) = .230, p = .184$). As the search for meaning increased, depression also increased, but the relationship between these changes were not statistically significant. Figures 2 and 3 represent the relationship between depression and the presence of and search for meaning in life.

Figure 2

A Graph Depicting the Association between Depression and the Presence of Meaning in Life

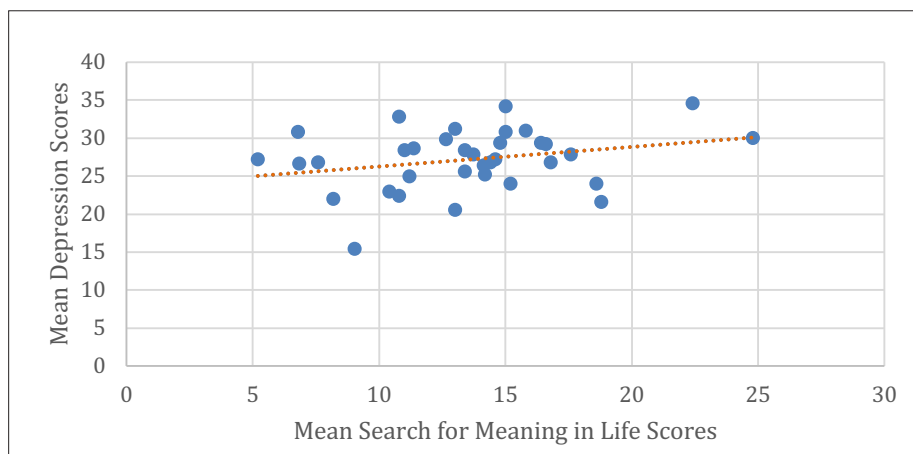


Discussion

The primary purpose of this study was to better understand how river rafting impacts symptoms of depression and the search for and presence of MIL for veterans. This study's findings establish a preliminary understanding of how group river rafting trips may impact depression symptomology and MIL. With the known relationships between MIL and depression, NBP programs targeting meaningful experiences have great potential to promote one's sense of meaning and purpose. While little is known about the implications of therapeutically designed and facilitated group river rafting trips, this study aimed to provide insight into baseline impacts for veterans with PTSD engaging in group river rafting trips. With a purposeful absence of structured therapeutic programming and processing, the results of this study provide insight into the impact of purely participating in NBP in blue spaces and potential for systematic improvements to NBP for veterans with PTSD. Further, NBP for veterans support the camaraderie and subsequent community that is inherent to recreation and leisure experiences. The bonding and

Figure 3

A Graph Depicting the Association between Depression and the Search for Meaning in Life



connections built on a group river rafting trip both during the rafting components and in the rest periods on the river embankment, communal lunches, and post-trip farewells all influence the connectedness and community of veterans with PTSD. Considered together, these results highlight both statistical and clinical significance that seem to concur with the findings of both Shanahan et al. (2016) and Vella et al. (2013) of reduced depressive symptoms. Our sample reported pre-existing deficiencies in MIL, meaning that even with statistically significant improvements in MIL, post-trip levels were still not optimal. Notably, these already minimized effects decrease over the time period of the study with a delayed increase that cannot, with certainty, be exclusively attributed to the group river rafting trip itself due to the unknown variables regarding veterans' experience post-trip and inherent study limitations.

Similar to Blackburn and Owens (2014), our study indicated decreased depression symptoms correlate with a higher presence of Meaning in Life. A unique contribution of our study was the identification of an inverse (though weak, and not statistically significant) relationship between the search for MIL and depression as a result of a group river rafting trip. As veterans increased their search for meaning in life, their depression symptoms worsened, consistent with Park et al.'s (2010) findings where depression symptoms worsen due to heightened awareness of deficits and feelings of inadequacy related to not finding one's sense of meaning. Taken as a whole, the noted improvement of depression and meaning in life scores after engagement in a four-day group river rafting trip renders further inquiry into how NBP might lead to a lessening of suicidal thoughts among veterans with PTSD given the interrelated nature of MIL, Depression, and PTSD. As referred throughout this manuscript, novelty may contribute to the immediate improvements in symptoms as previous research indicates myriad health benefits from engagement in natural spaces.

Strengths and Limitations

The current study has several strengths that build upon the existing literature. Though there is a growth in popularity of NBP, limited literature is available to support NBP within clinical applications to the veteran population, particularly blue space NBP. This study helps to provide a preliminary understanding of the potential benefits of these programs at a time when evidence to NBP is needed for funding, efficacy, and access.

Despite known complications with quantifiably measuring NBP, this study was experimental and longitudinal in nature. This intentional design increases the level of validity for NBP and improves our ability to track trends over time. To date, there have been very few, if any, similar studies performed over time assessing the impact of river rafting on veterans with PTSD. This study establishes a baseline of data to which future research can be compared. Also, several reputable measures, namely the PHQ-9 and MIL scale, were utilized to assess changes in depressive symptoms and perceptions of meaning in life for veterans with PTSD. This allows for replication and comparison with both traditional therapeutic treatment as well as other NBP. The continued use of reputable measures across NBP research will help to provide consistency in results and understanding of program impact. Additionally, this study was more rigorous in the selection process using the CAPS-5 to screen veterans, which is the gold standard for diagnosing PTSD. This ensured that all participants had a current PTSD diagnosis and improves the generalizability of findings to the larger population of veterans with PTSD.

In addition to the aforementioned steps taken to improve the rigor of this study, the study population was more racially diverse and had more female participants than similar veteran studies. Despite these demographic findings, generalizability is limited to veterans with PTSD and may not necessarily apply to all veterans.

Although findings of this study support previous literature and a number of strengths have been highlighted, there are limitations that should inform future research and program development. For example, this study used a non-randomized self-selection process, which may bias the findings. The self-selection process and voluntary nature of the program likely influenced our small sample size and overall findings given that those who participated in this program are likely interested in river rafting versus the broader population of veterans with PTSD. The average age of program participants was under the age of 45, which may explain a desire for active, more intense outdoor activities. The inability to randomly assign participants into either control or experimental groups limits our capacity to definitively attribute the statistically significant improvements to the river trip itself. Future studies could utilize a waitlist control design to improve the experimental rigor of analyzing river-rafting trips. In addition, demographic questions did not capture to what extent our sample was engaged in additional therapies or services that may impact depression symptoms or changes to MIL. These factors collectively limit the generalizability of findings.

At the programmatic level, the use of group river rafting trips as the intervention of choice presents potential barriers to replication in practice. In an effort to provide equal access to programs, it is imperative that researchers and programmers are mindful of the likely restrictive costs of a group river rafting trip and may consider more readily available and affordable interventions in the future. In addition, noting these high costs may prompt program facilitators to weigh the costs of a program against noted benefits or lack thereof. As is common with group river rafting trips, and NBP in general, there are variations in program length, types of core and ancillary activities, environments, facilitator experiences, number of participants, and group dynamics. These variations, even if subtle, might affect the outcomes of such programs.

Implications and Recommendations

Given the baseline understanding of group river rafting trips for veterans with PTSD provided by this study, researchers and programmers alike should consider the aforementioned limitations and strengths of this study for future research and programmatic decision making. The advancement of research for NBP, specifically those in blue spaces, will help inform funding and relevance of nonpharmacological approaches to wellness. It is also worth questioning if the outcomes might differ by including a therapeutic intervention during the trip. Future studies would benefit from specific focus on how deliberate community building and camaraderie can bolster well-being during NBP for veterans. Future studies should examine the role of self-

guided programs, given the overwhelming number of studies that are situated in social contexts and are guided by skilled professionals. Further inquiry is needed into how solo trips may impact MIL as the search for and presence of meaning in life is a highly personal process. Future studies might build upon these findings by including qualitative aspects to determine which elements of group river rafting trips (both processing based and purely experiential) drive improvements in depression and MIL.

While the longitudinal nature of this study is a strength, future research should consider administering the pre-test several weeks or months prior to the trip to lessen the anticipatory effects associated with looking forward to an exciting trip (Luo et al., 2018; Starr & Hershenberg, 2017). However, providing the pre-test well before the trip proves complicated as changes in attendee schedules, weather, and a myriad of other factors may ultimately impact a veteran's ability to participate. In addition, the salience of the experience may be best captured immediately post-trip as relevance and emotions experienced may be heightened immediately post-trip and subsequently wane over time. Given the initial increase, marked decrease, and delayed 6- to 9-month increase in presence of meaning, dosage may help to sustain improvements in outcomes over time (Shanahan et al., 2016).

Conclusion

The results of this study suggest that group river rafting trips with community experience opportunities may have some immediate constructive effects on the meaning in life and significant immediate improvements on depression symptoms of veterans with PTSD. With the current, and growing, large community of veterans with PTSD, understanding of dosage and long-term, latent benefits for group river rafting trips with this population deserves ongoing investigation. Researchers and program directors should consider the cost-benefit analysis of facilitating group river rafting trips and may consider the potential added value of incorporating purposeful, therapeutic processing. Continued research is needed to better understand how group river rafting trips that include processing might benefit this population. Additionally, future researchers should consider comparing results with a waitlist control group to enhance the generalizability of findings. Overall, this research has contributed to the baseline knowledge of how blue space NBP positively impacts veterans with PTSD through identifying the preliminary outcomes of group river rafting trips.

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