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\*Corresponding author: Jasmine Townsend, Department of Parks, Recreation, & Tourism Management, Clemson University, Clemson, SC, USA  
E-mail: [jntowns@clemson.edu](mailto:jntowns@clemson.edu)

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## HEALTH PSYCHOLOGY | RESEARCH ARTICLE

# Preliminary long-term health outcomes associated with recreation-based health and wellness programs for injured service members

Jasmine Townsend<sup>1\*</sup>, Brent L. Hawkins<sup>1</sup>, Jessie L. Bennett<sup>2</sup>, Jamie Hoffman<sup>3</sup>, Tamar Martin<sup>4</sup>, Elaine Sotherden<sup>1</sup> and William Bridges<sup>1</sup>

**Abstract:** Recreation-based health and wellness programs for military service members are currently a topic of significant interest in the recreation and health industries. This study examined the health outcomes associated with participation in Project Sanctuary, a week-long recreation-based health and wellness family retreat for injured military service members. Linear mixed modeling was used to examine changes in health outcomes over four time points, and considered multiple covariates. One-hundred twenty-seven service members participated. Statistically significant reductions in total scores for Post-Traumatic Stress Disorder Checklist (PCL) measures were found, as well as notable improvements in Depression, Anxiety, and Atrass Scale (DASS) and mental health functioning immediately following the intervention. No changes were found in physical health functioning. Trends demonstrated that participants maintained the positive psychological health changes over the three and six month time points. Veteran's Administration (VA) disability rate was the only significant covariate associated with health outcome change across timepoints. Implications for future practice and research are discussed in the article.

### ABOUT THE AUTHORS

The majority of the authors of this article are therapists with years of experience working with injured military service members. Currently, Jasmine Townsend and Brent Hawkins are assistant professors at Clemson University, Jessie Bennett is an assistant professor at the University of New Hampshire, Jamie Hoffman is an assistant professor at Sacramento State University, and Tamar Martin is a visiting lecturer at Hunter College-CUNY. Elaine Sotherden, a doctoral candidate, and William Bridges, an emeritus professor, are both at Clemson University as well. The lines of research of these faculty are varied but center around helping service members recover and reintegrate into their homes and communities through the use of recreational therapy. This research aims to help strengthen the programs available for injured service members, and to provide the necessary evidence for various stakeholders to make appropriate and evidence-based recommendations for future program funding and development.

### PUBLIC INTEREST STATEMENT

Support and recovery programs for injured service members are emerging at a rapid pace, and are becoming popular supplements and alternatives to Department of Defense (DoD) or VA-related treatment services. Preliminary evidence suggests positive short term outcomes stemming from recreation-based health and wellness programs, but very little evidence has examined long-term outcomes. The purpose of treatment services for injured service members is to help them recover, rehabilitate, and reintegrate into their homes and communities, but without sufficient evidence of the efficacy of these types of program, we are limited in our ability to make claims about their long-term effects. The purpose of this study was to extend the existing literature by exploring the long-term psychological and emotional health outcomes of a recreation-based health and wellness program. It is hoped that information such as this can enhance our knowledge about these types of programs, and augment our ability to make recommendations to them.

**Subjects: Outdoor Recreation; Mental Health; Psychological Disorders - Adult; Mood Disorders in Adults - Depression, Mania, Bi-polar; Post-traumatic Stress Disorder in Adults; Stress in Adults; Anxiety in Adults; Allied Health; Rehabilitation Medicine; Rehabilitation Medicine**

**Keywords: health outcomes; recreational therapy; military service members; post-traumatic stress; mental health functioning; depression; anxiety; stress; reintegration; veterans**

## 1. Introduction

Understanding the recovery and reintegration outcomes of injured military service members is an important task facing the allied health professions. Due to advances in technology, body armor, and battlefield healthcare, many service members injured in theater and non-deployment over the last 15 years have survived injuries that would have been fatal in past wars (Dolan et al., 2012). Post-traumatic stress (PTS) and traumatic brain injury (TBI) are considered the signature injuries of Operations Enduring and Iraqi Freedom (OEF and OIF) with injury prevalence rates estimated at 17.1 and 12–20%, respectively (Dohrenwend et al., 2006; Richardson, Frueh, & Acierio, 2010; Schneiderman, Braver, & Kang, 2008; Tanielian & Jaycox, 2008). Relatively high rates of substance abuse, homelessness, suicide, family problems, divorce, unemployment, and incarceration suggest that service members, defined in this study as individuals at any stage in their service history, are not successfully reintegrating into society (Hawkins, McGuire, Britt, & Linder, 2015; Resnik, Gray, & Borgia, 2011; Sayer et al., 2010; Tanielian & Jaycox, 2008).

Spouses, partners, and children of service members also experience significant repercussions associated with being in a military family. The stresses of deployment, discharge and the associated military transition process, rehabilitation from injury, and adjustment to disability compound stress on the family. Many service members and their families feel overwhelmed as they transition through these phases and seek necessary health and reintegration resources (Butler, Linn, Meeker, McClain-Meeder, & Nochajski, 2015; Danish & Antonides, 2013; Lester & Flake, 2016; Paley, Lester, & Mogil, 2013; Sayers, 2011; Sayers, Farrow, Ross, & Oslin, 2009). These considerations highlight the importance of supporting service members and their families and providing them with the resources and coping strategies necessary to withstand the stressors associated with military life. In addition to the family, individual service members benefit from family support programs designed to help families thrive and persevere through difficult transitions. In sum, there is a relationship between family reintegration and service member health (Sayers, Farrow, Ross, & Oslin, 2009), but to date, very little research has examined the health outcomes associated with programs that aim to help in recovery and reintegration.

### 1.1. Support programs for military service members

Medical services available to individuals with the most severe traumatic injuries are typically provided in a polytrauma/TBI system of care facility (US Department of Veterans Affairs, 2015). Once an injured service member is considered unfit for duty, he or she is often referred to a Warrior Transition Unit and begins the process of discharge from the military. The Veteran's Administration (VA) is the largest provider of health care to veterans of the Iraq and Afghanistan conflicts and has served approximately 62% of the current generation of veterans (US Department of Veterans Affairs, 2017). However, not all veterans choose to solely utilize services provided by the Department of Defense (DoD) and VA for their medical, rehabilitation, and reintegration needs. Through resources provided by a government medical center or through their own efforts, service members often connect and utilize the services of nonprofit community-based organizations for support.

In this regard, the number of community-based nonprofit programs continues to grow across the US. The GuideStar Directory of Charities and Non-Profits lists over 80,000 organizations that have the words military, veteran, vets, or warrior in their title, implying that they serve some element of the military community (GuideStar, 2016). This estimate does not include other organizations who do

not include these terms in their name but serve the military population nevertheless. Services offered by these organizations range from “as-needed” services like employment and housing assistance (e.g. Combat Vets to Careers and Honor House), special events like memorial celebrations (e.g. Honor Flights), and week-long retreat-style trips (e.g. Higher Ground and Project Sanctuary), to long-term ongoing programming in the veteran’s local community (e.g. Hooves for Heroes and Project Healing Waters). Some programs offer services at no cost to the participants, some require a payment for services, others offer payment on a sliding scale based on ability to pay, and others request a small donation. Programs may also vary on eligibility requirements, with many prioritizing enrollment based on participant need (i.e., severity of disability).

### **1.2. Recreation-based support programs**

Military support programs are varied in their targeted outcomes and the methods they use to achieve them (see Griffiths & Townsend, 2018; for a brief discussion). Many military-focused non-profit organizations use recreation, leisure, or sport as their primary services. For example, America’s Warrior Partnership’s Four Star Alliance serves as a resource for service members and their families looking for alternative support programs (America’s Warrior Partnership’s, 2018). Members of the Four Star Alliance are organizations that provide adaptive sports, recreation (therapeutic or non-therapeutic), and other support services to military service members, veterans, and their families. Recreation can be used as a means to rehabilitate and reintegrate service members into their homes and communities (Hawkins et al., 2015). A small but growing body of literature is establishing evidence of the beneficial outcomes of participation in these types of recreation programs. Recreation in the form of adapted sport and outdoor recreation (e.g. fly-fishing, river running, kayaking) has been associated with various beneficial outcomes for injured service members. These benefits include, but are not limited to, improved mood states (Lundberg, Bennett, & Smith, 2011), decreases in PTSD, depression, and anxiety symptoms (Bennett, Piatt, & Van Puymbroeck, 2017; Caddick & Smith, 2014; Dustin, Bricker, Arave, Wall, & Wendt, 2011; Scherer, Gade, & Yancosek, 2014), increases in motivation, social support and camaraderie (Bennett, Van Puymbroeck, Piatt, & Rydell, 2014; Caddick & Smith, 2014; Duvall & Kaplan, 2013; Hawkins, Cory, & Crowe, 2011; Mowatt & Bennett, 2011; Rogers, Loy, & Brown-Bochicchio, 2016; Sporer et al., 2009), improved perceived health and perception of disability (Hawkins et al., 2011), increased marital satisfaction (Bennett, Lundberg, Zabriskie, & Eggett, 2014), improved psychosocial well-being (Vella, Milligan, & Bennett, 2013), and community reintegration (Hawkins et al., 2015).

The majority of these studies examined only immediate impacts of the programs and are not able to speak to the sustainability of these health outcomes over longer time periods. Therefore, the long-term outcomes of these recreation-based health and wellness programs remain relatively unknown. Further research is necessary to determine the long-term impacts of recreation-based health and wellness programs for service members. Program administrators and participants should be informed of the anticipated outcomes associated with participation in these types of programs. Understanding program impact will also aid military care providers when suggesting or prescribing participation in programs to address specific concerns. Therefore, the purpose of this study was to examine the health outcomes of participation in Project Sanctuary, a recreation-based health and wellness program, for injured service members in the following areas: (a) PTSD, (b) depression, (c) anxiety, (d) stress, (e) physical health functioning, and (f) mental health functioning. Our hypothesis was as follows:

H<sub>0</sub>: There was no significant change across the time points in (1) PTSD scores, (2) depression, anxiety, and stress scores, (3) physical health functioning scores, or (4) mental health functioning scores.

## **2. Methods**

This study utilized an exploratory, longitudinal, quasi-experimental design and was approved by the Clemson University Institutional Review Board. These data were part of a larger study that explored outcomes of participation from four recreation-based programs affiliated with the Four Star Alliance.

Of the four programs, only one program, Project Sanctuary, returned enough usable data to adequately allow for hypothesis testing; therefore, they were the only program selected into this study.

### **2.1. Project sanctuary**

Project Sanctuary is a no-cost, recreation-based, health and wellness program for injured military service members and their significant others. Services are delivered in a one-week retreat style setting, and six to 12 couples are served at each retreat. Retreats are implemented at Project Sanctuary's primary location in Colorado; however, they also partner with other organizations within the Four Star Alliance to implement their programming across the nation. The majority of participants do not live in close proximity to a Project Sanctuary site and travel for the week-long retreats. The goal of Project Sanctuary is to assist military couples in their recovery through an evidenced-based therapeutic program that focuses on physical, emotional, and spiritual healing. Their program model implements five-day retreats that use a combination of recreational therapy, education, and couple and marriage counseling to address the needs of their military families. Recreational therapy sessions used recreation activities and experiences appropriate to the season (e.g. snowmobiling, rafting, equine activities, fishing, hiking) and are designed to help couples manage emotions and develop coping skills for stress management. Licensed professional counselors, certified recreational therapists, medical social workers, trained peer mentors, and a registered nurse are present at all sessions to assist with therapeutic processing. Education sessions are focused on developing the tools that military families need to thrive during the reintegration process; sessions include marriage classes aimed at developing communication and relationships and financial management classes aimed at developing skills from basic budgeting to investment management. Over the course of the five-day retreats, sessions last between two and six hours, depending on the activity (i.e. healthy marriage session and white water rafting, respectively). Typically, each day consists of at least three to four distinct therapeutic sessions (Project Sanctuary, 2016).

Following the retreat, the participants are provided ongoing support at no charge for two years to continue the healing and adjustment process. Follow-up services include referrals to other military support programs such as Operation Homefront, other Four Star Alliance organizations, and members of America's Warrior Partnership's national network. At any time, families can contact Project Sanctuary and request assistance in areas such as counseling for any family member, emergency financial assistance, ongoing financial education, assistance with housing solutions, and assistance with employment solutions.

### **2.2. Data collection**

Data were collected using convenience sampling from service member participants of Project Sanctuary over a 14-month period during 2015–2016. Individuals registered for upcoming retreats were informed of the study by a Project Sanctuary administrator and invited to enroll. Declining involvement in the study did not change their status as a participant at Project Sanctuary. The principal investigator trained the Project Sanctuary administrator in recruitment and data collection procedures prior to the start of the study. Training occurred over the phone and consisted of discussions about appropriate ways to inform and recruit participants, as well as the timeline associated with sending out the survey links. The principal investigator notified the Project Sanctuary administrator one week before every testing period.

Participants who agreed to be in the study were administered the surveys by Project Sanctuary staff at four time points: pre- and post-retreat, and three and six months after completion of the retreat. Participants were emailed a link to the survey one week before they attended the retreat. Upon arrival, if they had not completed the survey online, they were given the opportunity to complete it in paper format before the implementation of the therapeutic retreat services. Participants were given the choice of completing the post-test in paper format at the conclusion of the retreat before returning home, or completing it online when they returned home. All participants completed the post-test at Project Sanctuary in paper/pencil format. Participants received a survey web link to the three and six month follow-up surveys at appropriate times based on when they initially

**Table 1. Number of responses over all testing periods**

	Pre	Post	3-month	6-month
Project sanctuary responses	106	69	56	44
Empty responses	21	58	71	83

attended the program. Gift card incentives were given to individuals who completed the follow-up surveys (\$10 for three month, \$20 for six month). Number of responses over all testing periods is reported in Table 1.

Data were collected using three instruments. First, the PTS Disorder Checklist-Military (Weathers, Litz, Henmin, & Keane, 1993) was completed by participants. The PCL-M is a 17-item self-report measure that includes three subscales coinciding with symptom clusters as specified in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (American Psychiatric Association, 2000). The subscales include hyperarousal, avoidance, and re-experiencing. The measure has demonstrated strong internal consistency (Cronbach's  $\alpha = .97$ ) (Weathers et al., 1993). Second, the Depression, Anxiety, and Stress scale (DASS) is a 21-item self-report questionnaire that measures the severity of a range of symptoms common to depression and anxiety (Gomez, 2016; Henry & Crawford, 2005). Previous research has reported acceptable reliability for total DASS scores, (Cronbach's  $\alpha = .93$ ; Henry & Crawford, 2005). Last, the Veterans RAND Health Survey (VR-12) is a 12-item short form that measures self-reported physical and mental health functioning (Selim et al., 2009). The measure demonstrates good construct validity, content validity, and internal consistency (Selim et al., 2009), and has demonstrated acceptable reliability for both the physical ( $\alpha = .90$ ) and mental health ( $\alpha = .76$ ) component scores (Eisen et al., 2012). These measures and constructs were chosen based upon the Four Star Alliance and Project Sanctuary's interests in understanding the symptomatology and health impacts on service member participants who attend their program.

While Project Sanctuary's services focus specifically on couples, given the exploratory nature of this study and available resources, data were only collected from the service member, as opposed to service member and their spouse/partner. A variety of personal and military related demographics were collected including gender, marital status, ethnicity, employment, and income, as well as branch of military, rank, duty status, wars served, VA benefits rating (as a proxy of severity of disability), number of months deployed, and number of years served. Descriptive health information was also reported, including current health conditions, time since most recent combat-related injury, and use of non-recreation based treatment services. Demographic data were collected across all time points to capture changes in demographic information (e.g. health condition, marital status); however, only pre-test responses were reported in Tables 2 and 3, and Figure 1.

### 2.3. Data analysis

The data analysis was driven by our primary objective to determine change in health outcomes across time. As previously described, we measured 10 outcomes: four main outcomes from the Post-Traumatic Stress Disorder Checklist (PCL), DASS, and VR-12, of which PCL and DASS are combined scores, each with three sub-measures of, respectively, re-experiencing, avoidance, and hyperarousal, and depression, anxiety, and stress. The VR-12 has two component scores, one for physical health functioning (PCS) and one for mental health functioning (MCS). Descriptive statistics were performed on personal, military, and health demographic data. Based on clinical knowledge about this population, eight covariates were selected from the collected demographic information, and included gender, employment, income, branch, rank, VA benefits rate (VARate), time since injury (timeinjury), and receipt of other treatment services (txserv).

### 2.4. Model sequence

Five sets of models were used to explore the changes in health outcomes over time. The models varied from a very simple model (Model A) that included only fixed effect terms of participant and



**Table 2. Demographics for the participants of project sanctuary**

	Total	Percentages (%)
	N = 127	
<i>Gender</i>		
Female	16	12.6
Male	98	77.2
Did not respond	13	10.2
<i>Marital status</i>		
Single, never married	4	3.1
Separated or divorced	7	5.5
Married	103	81.1
Widowed	1	0.8
Serious relationship	1	0.8
Did not respond	11	8.7
<i>Ethnicity</i>		
African-American	10	7.9
Asian-American	1	0.8
Caucasian	80	63
Hispanic	17	13.4
Native American	3	2.4
Pacific Islander	1	0.8
Other	3	2.4
Did not respond	12	9.4
<i>Employment</i>		
Full-time	59	46.5
Part-time	7	5.5
Unemployed	49	38.6
Did not respond	12	9.4
<i>Median household income</i>		
Ranged from < \$14,000 to > \$125,000	\$45,000-\$54,999	

time, to a more realistic model (Model E) that included terms for a random effect of participant, a fixed effect of time, and a selected covariate that was related to the response variables (see Table 4).

### 3. Results

#### 3.1. Model results

The final model chosen for analysis was Model E with VA rate as the only significant covariate included (see Table 4). Using this model, a significant difference was observed in the pre-test outcome means as compared to the outcome means at times 2, 3, and 4 for PCL-M and hyperarousal (see Table 5). The final model also indicated a significant difference in the posttest outcome mean as compared to the outcome mean at times 1, 3, and 4 for the outcome MCS. None of the other outcome measures demonstrated any statistically significant changes over time. For trend graphs on outcome measures PCL, DASS, PCS, and MCS (sub-scales not included), refer to Figures 2–5.

#### 3.2. Response rates

During the study time period, 144 couples attended Project Sanctuary, and all were invited to participate in the study; 127 individuals completed the pre-test (88.2% initial response rate), 69 completed the post-test (53.4%); 56 completed the three month follow-up (44.1%), and 44 completed the six

**Table 3. Military related demographics for the participants of project sanctuary**

	<b>Total</b>	<b>Percentages (%)</b>
	<b>N = 127</b>	
<i>Branch</i>		
Air force	18	14.2
Army	80	63
Marines	11	8.7
Navy	6	4.7
Did not respond	12	9.4
<i>Current duty status</i>		
Active duty	39	30.7
Guard/Reserve	7	5.5
Active guard/Reserve	2	1.6
Retired/Discharged	67	52.8
Did not respond	12	9.4
<i>Conflicts served</i>		
Desert shield/Storm	16	12.6
OEF	80	63
OIF	81	63.8
New Dawn	19	15
Other*	9	7.1
<i>Highest rank achieved</i>		
E-3	5	3.9
E-4	21	16.5
E-5	38	29.9
E-6	26	20.5
E-7	10	7.9
E-8	2	1.6
E-9	1	0.8
W-2	1	0.8
W-3	1	0.8
O-2	2	1.6
O-3	5	3.9
O-4	2	1.6
O-5	1	0.8
Did not respond	12	9.4
<i>Approximate time since combat-related injury</i>		
Between 1987–2000	2	1.6
Between 2001–2008	50	39.4
Between 2009–2014	27	21.3
Did not respond	48	37.7
<i>Currently using non-recreation based treatment services</i>		
Yes	63	49.6
No	43	33.9
Did not respond	21	16.5

(Continued)



**Table 3. (Continued)**

	Total	Percentages (%)
	N = 127	
	Range	Mean
Months deployed	0–132 Months	22.52 Months
VA rating	10–100%	80.9%
Years of service	3–26 years	10.97 years

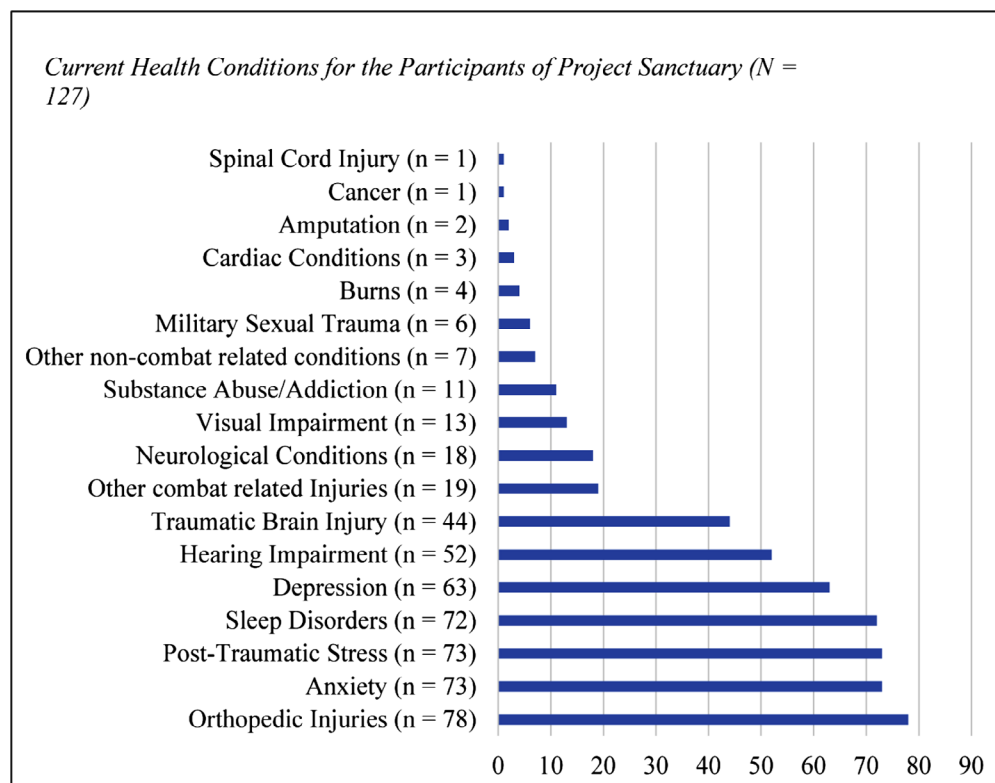
\*Notes: Other conflicts served category includes Kosovo, Operation Inherent Resolve, Operation Jump Start, Operation Odyssey Dawn, Operation United Assistance, Panama, Korea DMZ, Strategic Intelligence Operations.

two follow-up response rates were relatively high given the survey length (30–40 min) and how many times it was completed over the study time period.

Each of the 127 participants provided responses with either no demographic information ( $n = 52$ ), partial demographic information ( $n = 65$ ), or full demographic information ( $n = 10$ ). Each participant had the opportunity to complete the survey at four time points: Pre (time 1), Post (time 2), three months (time 3), and six months (time 4). Of these, very few participants gave complete responses and complete demographic (covariate) information at all four time periods ( $n = 14$ ). An empty response was defined as either a survey not returned or a survey returned with no response information. There was a notable increase in the number of empty surveys in the later time periods; for each time there were, respectively, 21, 58, 71, and 83 empty surveys (see Table 1). Cronbach's  $\alpha$  scores were calculated for the PCL-M and DASS total scales, and were within acceptable ranges (Cronbach's  $\alpha$  of .97 each).

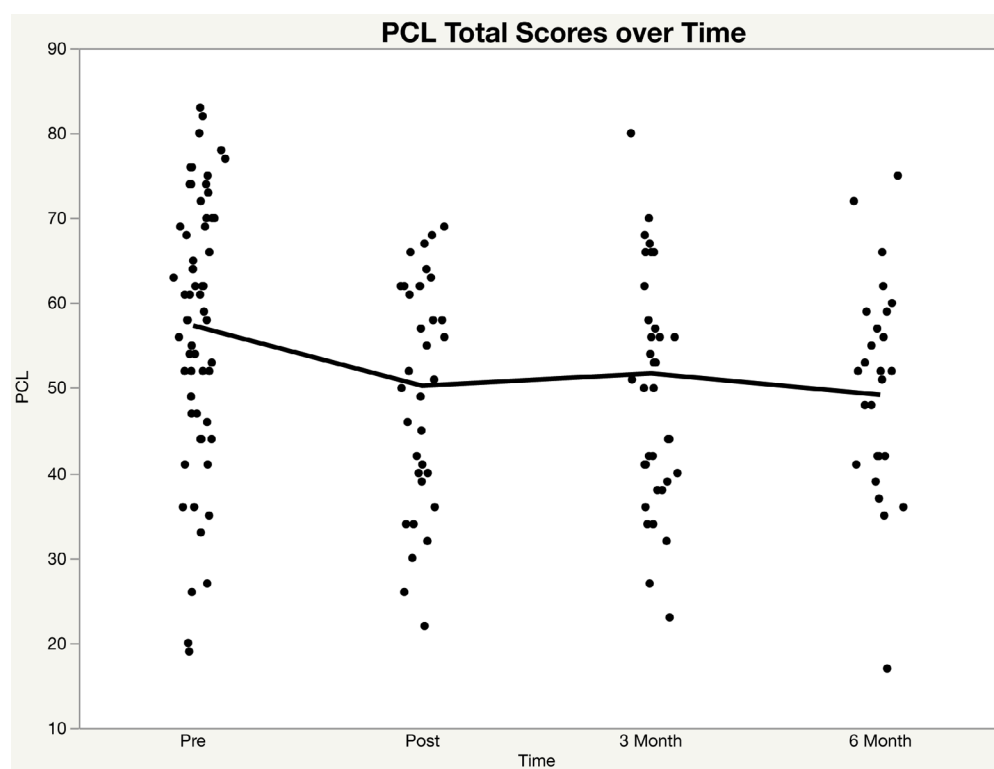
**Figure 1. Current health conditions for the participants of project sanctuary (N = 127).**

Notes: Other combat-related injuries include gunshot wounds, shrapnel, etc. Other non-combat related injuries include frostbite, fibromyalgia, kidney stones, Type 2 diabetes, chronic back pain, frostbite, and SCI. Pre-test reports of health conditions were used to create this figure.



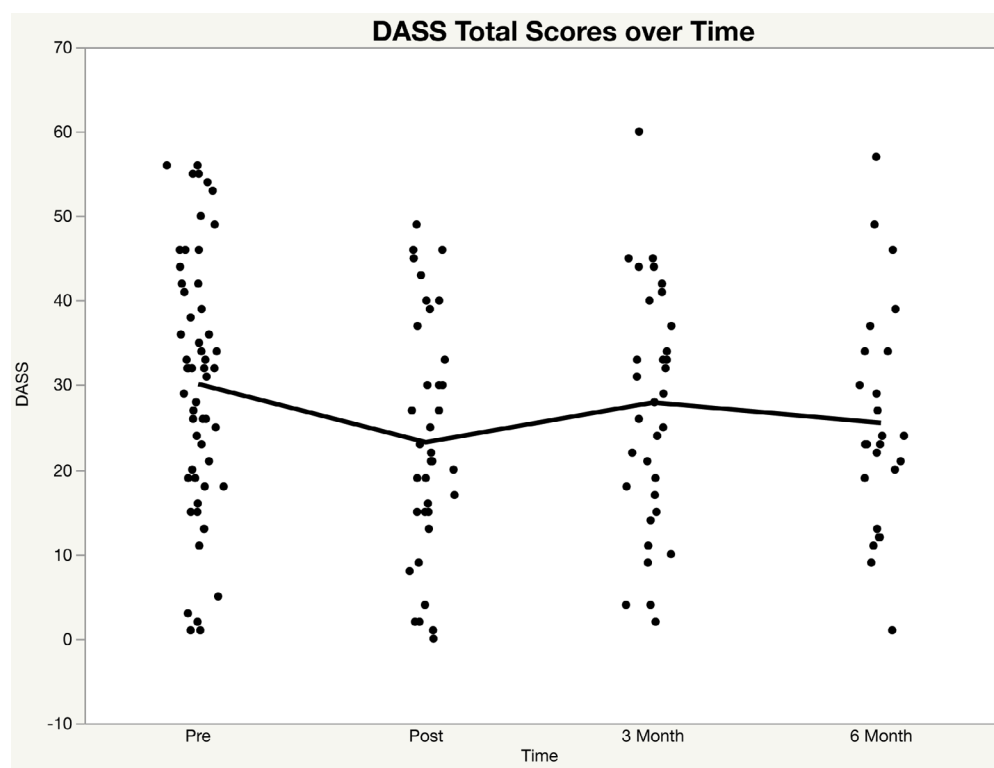
**Figure 2. PCL total scores over time.**

Notes: The figure show raw outcome measures for those respondents who provided a VA rate. Each respective line demonstrates how the estimated average outcomes change across time.



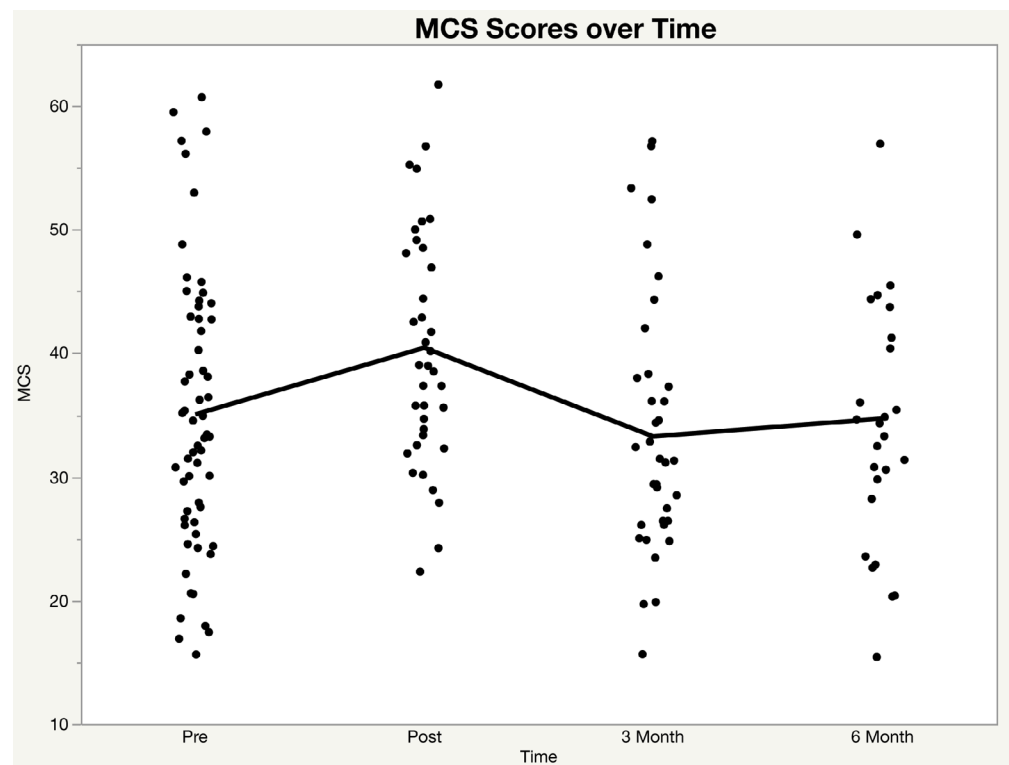
**Figure 3. DASS total scores over time.**

Notes: The figure show raw outcome measures for those respondents who provided a VA rate. Each respective line demonstrates how the estimated average outcomes change across time.



**Figure 4. MCS scores over time.**

Notes: The figure show raw outcome measures for those respondents who provided a VA rate. Each respective line demonstrates how the estimated average outcomes change across time.



The data were screened for unusual response patterns to determine if elimination of responses was necessary. An unusual survey profile was defined as those who did not provide a given response at any of the four times, those who only gave a response for times three or four, or those who only returned the survey at times three and four. Contextually, these respondents were not tracked across time. There was no systemic change in the analysis by removing participants with non-responses, so their survey results were included in the analysis. Further, investigation found no obvious indication that participants who were more or less inclined to return the surveys had systematically higher or lower responses; this removed concerns about systematic non-response across time. Therefore, no data were discarded due to non-response.

### 3.3. Sample characteristics

Participants in this study were predominantly male (77.2%), white (63%), and married (81.1%). Approximately 52% of the participants were employed part or full-time, with a median household income range of \$45,000–\$54,999. All branches of the US armed services were represented except the Coast Guard, with the majority being in the Army (63%) and serving in OIF (63.8%) and/or OEF (63%). Most of the participants were retired or discharged (52.8%) and had served an average of 10.97 years in the military. Orthopedic injuries (61.4%), anxiety (57.5%), PTS (57.5%), sleep disorders (56.7%), depression (49.6%), hearing impairments (40.9%), and TBI (35.6%) were the most self-reported health conditions for the participants of Project Sanctuary (see Tables 2 and 3, and Figure 1 for more detailed demographic information).

### 4. Discussion

The intention in this study was to explore the long-term outcomes associated with participation in a recreation-based health and wellness program for service members. Results from this study are consistent with the previous literature demonstrating immediate positive impacts (c.f., Bennett, Lundberg, et al., 2014; Lundberg et al., 2011), but extend the literature by identifying improvements in psychological symptoms sustained over a six-month timeframe (see Figure 2). While not all measures and their subscales demonstrated statistically significant results, the trends over time reveal positive and sustained reductions in posttraumatic stress symptoms. These findings may be the first to demonstrate that changes in posttraumatic stress can be sustained to some degree following a one-week retreat.

**Table 4. Sequential models**

Model	Model components
A	RESPONSE ~ PARTICIPANT + TIME
B	RESPONSE ~ Random(PARTICIPANT) + TIME
C	RESPONSE ~ Random(PARTICIPANT) + TIME + all COVARIATES
C1	RESPONSE ~ Random(PARTICIPANT) + TIME + all COVARIATES (equally scaled)
C2	RESPONSE ~ Random(PARTICIPANT) + TIME + all COVARIATES (centered for sample)
D1-10	RESPONSE ~ Random(PARTICIPANT) + TIME + Stepwise Selection
E (final)	RESPONSE ~ Random(PARTICIPANT) + TIME + VARate

While positive changes in emotional and mental health were found at post-test, they were not sustained over time. In fact, scores on these measures were worse at three months, followed by slight improvements again at six month, with the exception of the MCS scores. The score fluctuation at three months may be due to changes in the service members personal life (e.g. changes in medications or treatments, employment or marital status, holiday stress) that negatively impacted emotional and mental health. Changes in six months may be due to a variety of reasons as well (e.g. using coping skills gained at Project Sanctuary, participation in other treatments or programs, natural improvement after difficult times). Approximately 60% of participants were receiving other treatments while participating in Project Sanctuary, and these may have contributed to the fluctuation in scores over time. Future research should attempt to control for or keep track of confounding treatment services received and the occurrence of stressful life events during the course of the study period.

Physical health scores showed no significant decrease or increase across time periods despite the use of physically engaging recreation activities in programming at Project Sanctuary. It may be that the effect of these activities is reflected more in psychological functioning than physical functioning. Furthermore, Project Sanctuary is not a physical rehabilitation program and, therefore, is not designed to impact physical health.

Out of the eight covariates included in the models, only the VA benefits rate contributed to the variance in outcome measures. The VA benefits rate is used to determine the amount of financial compensation provided to injured service members who are separated from the military and takes into account the severity of disability resulting from their military-related injuries or health conditions (US Department of Veterans Affairs, 2018). For the purposes of this study, it was used as a proxy for severity of disability: higher rates indicate more severe disabilities or health conditions. Participants in our study who had a higher VA benefits rate, also had high scores on the PCL and DASS at pre-test. It would be important for future work to explore the relationship between the VA benefits rate and treatment outcomes. With larger sample sizes and more complete responses across all measures and time points, an analysis could include comparisons of outcomes between high and low VA rate groups (50% cut point; Edens, Kaspro, Tsai, & Rosenheck, 2011). Group comparisons may help determine which service member group has better outcomes over time. Military-focused health and wellness programs may find this type of information helpful when determining prospective participant enrollment to maximize health outcome achievement.

Our sample had a large proportion of individuals who did not provide a VA benefit rate (48%), which made further examination of the covariate difficult. A potential reason for the low response rate on this item may have been due to the ambiguity in the item wording (i.e. If you are retired or discharged, what is your VA disability rating, if any?). This may have led participants with no VA benefit rate to leave their response blank, rather than respond with “none” or “zero” to indicate no VA benefit rate. Consequently, it was impossible to determine if blank responses were participants who did not have a VA benefit rate (zero) or participants who intentionally did not respond even though

**Table 5. Model E (final) results**

Response	Pre	Post	3 Months	6 Months
PCL	57.54 (1.57)*	50.45 (1.99)	51.91 (1.97)	49.39 (2.22)
Re-experiencing	16.47 (0.56)	14.75 (0.66)	15.28 (0.67)	13.81 (0.74)
Avoidance	22.37 (0.73)	19.97 (0.92)	20.28 (0.93)	19.71 (1.05)
Hyperarousal	18.74 (0.52)*	15.99 (0.65)	16.53 (0.65)	15.95 (0.74)
DASS	30.26 (1.62)	23.37 (1.91)	28.08 (1.97)	25.66 (2.18)
Depression	8.93 (0.65)	6.01 (0.77)	9.02 (0.8)	7.73 (0.87)
Anxiety	9.04 (0.58)	8.16 (0.68)	8.33 (0.7)	7.09 (0.77)
Stress	12.29 (0.61)	9.55 (0.73)	10.82 (0.75)	11.26 (0.83)
PCS	37.23 (1.32)	37.6 (1.59)	36.55 (1.61)	39.32 (1.82)
MCS	34.87 (1.20)	40.25 (1.47)*	33.08 (1.49)	34.52 (1.70)

Notes: Adjusted response means are listed with their respective standard errors for all four times in the form of LSMean (Std err.).

\*Indicates a significant difference between the average at the indicated time versus the averages at the remaining three times, as identified by Tukey's HSD.

they had a VA benefits rate. Additionally, VA benefit rates are only provided to individuals fully separated from the military and who are willing to seek to obtain a rate. Approximately 42% of our sample reported their duty status as active, guard, or reserve, meaning they were ineligible to receive a VA benefits rate at the time of the study, further complicating the understanding of the non-responses to the VA rate question. In light of these challenges, future research should continue to explore the use of the VA benefit rate as a proxy for severity of disability, as well as provide a more explicit response option to obtain a precise understanding of this variable and its relationship to outcomes. Additionally, our study determined that the VA benefit rate was a good summary of a variety of other military related variables (rank, income, and employment). When considering the burden of survey length for this population, having one variable that could explain significant amounts of variance in the response measures would be preferred over multiple variables that explain the same variance.

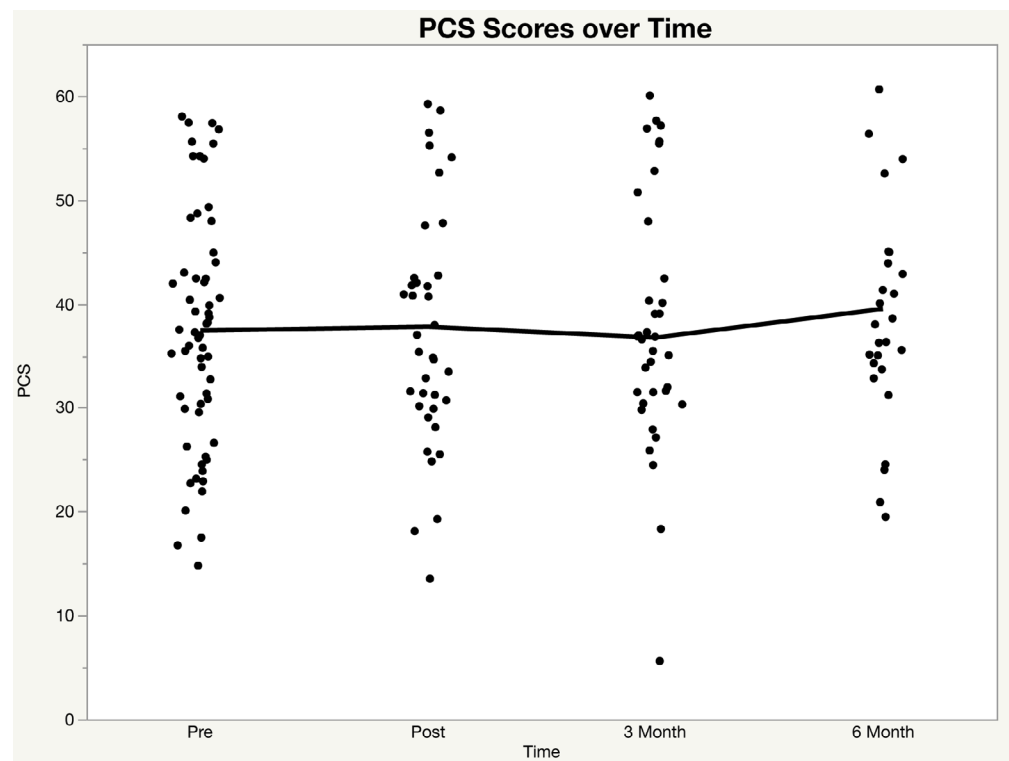
#### 4.1. Clinical interpretation of findings

The findings from this study yield numerous implications for practice. Participants in our study demonstrated an almost 7-point decrease in PCL total scores from pre- to post-testing, and an 8-point decrease from pre-test to six month follow-up. A 5-point change in total PCL scores is recommended for determining whether an individual responded to an intervention, and a 10-point change is considered a clinically meaningful difference (National Center for PTSD, 2012). This finding suggests that participants may have had significant positive responses in regards to posttraumatic stress symptoms during the intervention. There were slight fluctuations in scores over the follow-up time points, but the positive responses were maintained over time.

Similarly, clinically meaningful changes were demonstrated for the DASS scores; however, they were not consistently maintained over time. While there is no clinical severity cut-off for total DASS scores, individual subscales can be classified as either normal, mild, moderate, severe, or extremely severe (Gomez, 2016). Results showed reclassifications of the DASS scales at various time points. At pre-test, participants scored in the moderate range on the depression and stress scales and severe on the anxiety scale. At post-test, their scores improved to a mild classification on the depression and stress scales, while anxiety remained severe. In follow-up time points, the depression and stress scales reverted back to moderate classification, while anxiety improved to moderate at the six month time point.

**Figure 5. PCS scores over time.**

Notes: The figure show raw outcome measures for those respondents who provided a VA rate. Each respective line demonstrates how the estimated average outcomes change across time.



Finally, mental health functioning as measured by the VR-12 showed over a 5-point increase in scores from pre- to post-test. Previous research has indicated a 1-point increase in scores is associated with 7% lower health care expenditures, 4% lower pharmacy expenditures, 15% lower rate of hospital inpatient visits, and 4% lower rate of medical provider visits (Boston University School of Public Health, 2016; Kazis et al., 2004, 2006). This increase in mental health functioning at post-test may have resulted in better health care experiences for the participants immediately following their time at Project Sanctuary, but, for reasons that are unexplained by this study, positive health care occurrences were likely not experienced long-term. Mental health functioning at six month follow-up had reverted to levels found at pre-test. It is important to consider that our findings may reflect an improvement to some degree in specific mental health *symptoms* as measured by the DASS, but they do not reflect consistent improvements in mental health *functioning* (and related health care experiences) as measured by the MCS scale in the VR-12.

These clinical interpretations provide a more balanced understanding of the changes experienced by participants in the program, and should not be dismissed due to limited overall statistical significance in this study. From a clinical perspective, finding reductions in negative symptomology is a step forward in the process of recovery. Individuals start their recovery at different stages and progress at different rates. Our sample included individuals on the highest end of the scales for the PCL and DASS scores (i.e. most severe symptoms; see Figures 2 and 3), suggesting that some participants were in great need for services. Even incremental changes allow the individual to experience some reprieve from negative symptoms, and basing a program's impact solely on statistical evidence would be shortsighted.

#### 4.2. Limitations and recommendations

The primary limitation of this study concerns the small sample size and the amount of missing data on measures across the time points. Numerous attempts were made to keep attrition low including survey administration by a Project Sanctuary employee (trained by the researchers), periodic reminders over the study time period, and the use of incentives. Gift cards were offered for completion

of surveys at follow-up time points; nevertheless, attrition occurred at a rate that was not preferable in spite of these efforts. Sample size and attrition limited the ability to deeply analyze and explore the trends in the data, and to explore the relationships between covariates and outcomes by creating groups (i.e. high VA benefits rate vs. low VA benefits rate). As a result, generalizability is somewhat limited beyond this study.

Future research should focus on gathering more completed responses from participants across the study time points, which can take considerable effort. Many suggestions for maintaining participant involvement in research emerged from this study. Establishing a dedicated staff member from Project Sanctuary as a liaison to the research team was vital to the recruitment of participants and distribution of survey links at the appropriate times. However, there is a need for more personal follow-up with participants across all time points to promote survey completion after pre-test. Gift card incentives assisted with continued survey completion at follow-up time points; however, it is likely that they also contributed to the completion of follow-up surveys by participants who did not complete one or both of the pre- and post-tests, further complicating the data-set. A recommendation is to offer incentives for completion of all time points, in addition to personal follow-ups.

Due to the exploratory nature of this study, no control group was used which limits this study's ability to attribute health outcomes to Project Sanctuary's program. Future research examining the outcomes of military-focused health and wellness programs would benefit from including a control group to allow for stronger examinations of program outcomes.

Also, the relationship between health outcomes and Project Sanctuary's programmatic elements were not examined in this study. These elements should be explored in future work to determine the mechanisms of health outcome change. Furthermore, Project Sanctuary offers continued treatment and support services following the retreats. It is possible that some services were accessed, thus contributing to the outcome trends over time. Follow-up services would likely contribute to lasting effects in the months following the initial program, as would repeat experiences at the retreat (i.e. booster experiences). Gathering data on follow-up services, in addition to primary programmatic elements, would help explain the contributors to health outcomes over time.

Finally, this study examined the symptomology and overall health outcomes associated with Project Sanctuary. However, a primary purpose of Project Sanctuary is to help service members and their families with development of coping skills as well to improve overall family functioning. It is possible that the therapeutic activities used to achieve the aims of Project Sanctuary had no effect on the symptomology measured in the study, given that they are different, and may explain the lack of statistically significant changes over time. Future studies with Project Sanctuary, as with other programs, should measure outcomes that better match the intended programmatic outcomes and purpose of the program.

## 5. Conclusions

Taken as a whole, the results of this exploratory examination of health outcomes are positive and provide useful information to proceed with addressing the health needs of injured service members in programs and development of future research. However, findings should be considered preliminary given the study's limitations. Recreation-based health and wellness programs are emerging as complementary services for injured service members who seek options in addition to the standard treatments available through the VA and DoD. Recreation programs for service members exist throughout the country; however, it is recommended that recreation-based programs increase their availability within the communities where service members and their families reside. As witnessed at Project Sanctuary, participants had to travel from out-of-state to attend the retreat. Increasing the programmatic reach within service member communities will help address the gaps in care for injured service members (Kizer & Jha, 2014). These programs should be easily accessible to support ongoing recovery, adjustment, and reintegration.



Finally, only a small handful of studies exist that examine the outcomes of participation in these types of programs with little indication of the long-term outcomes (c.f., Bennett, Lundberg, et al., 2014; Lundberg et al., 2011). This study is unique in its contribution to the body of knowledge surrounding recreation-based health and wellness programs for service members by examining health outcomes over six months, which established a preliminary trend of sustained reductions in PTS symptoms. While limited in scope, results are promising; they contribute to our understanding of the effects of these types of programs for service members, and highlight the need for more rigorous research examining extended outcomes. Studies should be replicated using a variety of recreation-based health and wellness programs. This work would allow researchers to make stronger conclusions about the effects of these types of programs, further enhance the knowledge about these programs, and augment the ability of health professionals to make recommendations for these types of services.

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### Author details

Jasmine Townsend<sup>1</sup>  
 E-mail: jntowns@clemson.edu  
 Brent L. Hawkins<sup>1</sup>  
 E-mail: blhawki@clemson.edu  
 Jessie L. Bennett<sup>2</sup>  
 E-mail: jessie.bennett@unh.edu  
 Jamie Hoffman<sup>3</sup>  
 E-mail: jamie.hoffman@csus.edu  
 Tamar Martin<sup>4</sup>  
 E-mail: tmart@hunter.cuny.edu  
 Elaine Sotherden<sup>1</sup>  
 E-mail: sotherd@clemson.edu  
 ORCID ID: <http://orcid.org/0000-0002-6647-5530>  
 William Bridges<sup>1</sup>  
 E-mail: wbrdgs@clemson.edu

<sup>1</sup> Department of Parks, Recreation, & Tourism Management, Clemson University, Clemson, SC, USA.

<sup>2</sup> Department of Recreation Management and Policy, University of New Hampshire, Durham, NH, USA.

<sup>3</sup> Department of Recreation, Parks, & Tourism Administration, Sacramento State University, Sacramento, CA, USA.

<sup>4</sup> School of Education, Hunter College, CUNY, New York, NY, USA.

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