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## Safety and psychological impact of sailing adventure therapy among Veterans with substance use disorders

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### ABSTRACT

**Objectives:** Many Veterans suffer from substance use disorders (SUDs). Treatment challenges include poor treatment engagement and high relapse rates. Complementary interventions have the potential to enhance both. This study was a preliminary evaluation of sailing adventure therapy (SAT) for this population.

**Design:** Retrospective chart review. Participants in the intervention were 22 Veterans (20 male, 2 female) aged 22–65 who entered a Veterans Administration residential SUD treatment program. All subjects had two or more SUDs, and many had psychiatric (95%) and/or medical (77%) comorbidities. The age, gender and diagnosis-matched control group (n = 22) received residential SUD treatment as usual (TAU) in the same program but without SAT.

**Setting:** Residential SUD treatment program at a Veterans Administration Medical Center.

**Intervention:** Sailing adventure therapy.

**Main Outcome Measures:** Positive and Negative Affect Schedule (PANAS), State Trait Anxiety Inventory six-item short form (STAI: Y-6 item), Acceptance and Action Questionnaire II (AAQ II), Five Facet Mindfulness Questionnaire (FFMQ) and a locally developed patient survey. Outcome comparison among SAT plus TAU group versus TAU – only group included measures of successful completion of residential SUD treatment program as well as psychiatric hospitalizations and/or residential SUD treatment program readmissions within 12 months.

**Results:** Neither physical injuries nor increases in anxiety or negative affect occurred, as measured by the PANAS (positive change,  $p = 0.351$ ; negative change,  $p = 0.605$ ) and the STAI: Y-6 item ( $p = 0.144$ ) respectively. There was no significant change in FFMQ ( $p = 0.580$ ) but a significant increase occurred in AAQ II scores ( $p = 0.036$ ) indicating an increase in psychological flexibility. Survey responses indicated the participants perceived the experience to be both pleasurable and calming. The preliminary outcome evaluation revealed a significant between-group difference ( $X^2 = 5.34$ ,  $DF = 1$ ,  $p = 0.02$ ,  $r = 0.35$ ) indicating participating in SAT was associated with a greater likelihood of successfully completing residential SUD treatment. However, there were no significant between-group differences in number of psychiatric hospitalizations ( $X^2 = 1.09$ ,  $DF = 1$ ,  $p = 0.29$ ,  $r = 0.16$ ) or residential substance abuse treatment program readmissions ( $X^2 = 0.23$ ,  $DF = 1$ ,  $p = 0.64$ ,  $r = 0.07$ ) in the 12 months after discharge from the program.

**Conclusions:** Preliminary evidence suggests that SAT is physically safe and not associated with increased anxiety or negative affect. Participant's perceptions of the experience were positive. Preliminary outcome measures suggest associations between participation in SAT and increased psychological flexibility as well as successful completion of a residential SUD treatment program. Further research is indicated to determine whether SAT may be developed as an effective complementary intervention for Veterans with SUDs.

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## 1. Introduction

Studies<sup>1–5</sup> indicate high rates of substance use disorders (SUDs) among active duty military and Veterans. Given a prevalence of approximately 11%, the treatment of SUDs is an important mission of the Veterans Administration Healthcare System. Barriers include failures to enter and/or engage in treatment in both general<sup>6–8</sup> and Veteran populations.<sup>9,10</sup> Further, current treatments are often only partially effective<sup>11</sup> and relapse rates are high.<sup>12</sup> Thus, there is a need to develop novel adjunctive complementary interventions for SUDs aimed at enhancing treatment engagement and/or response. The aim of this study was to conduct a proof of concept evaluation of sailing adventure therapy (SAT) as a potential adjunctive intervention for Veterans with SUDs and to conduct a preliminary outcomes assessment.

Adventure Therapies (ATs) in general, according to Gass et al.<sup>13</sup> are “...the prescriptive use of adventure experiences provided by mental health professionals, often conducted in natural settings that kinesthetically engage clients on cognitive, affective, and behavioral levels.” Bowen and Neill<sup>14</sup> state that, “...adventure therapy is closely related to, or synonymous, with a variety of other terms, including wilderness therapy, wilderness adventure therapy, wilderness experience programs, bush adventure therapy, adventure based counselling, outdoor adventure intervention, therapeutic camping, and outdoor behavioral healthcare.”

There is evidence of positive outcomes from ATs in the general population. For example, a meta analysis of 197 studies<sup>14</sup> reported that the short term effect size for adventure therapy was moderate ( $g = 0.47$ ) but larger than for no treatment (0.08). The authors concluded that adventure therapy programs are moderately effective in facilitating positive short term change in psychological, behavioral, emotional, and interpersonal domains and that these changes appear to be maintained in the longer term. Regarding ATs used specifically for SUDs, the authors are aware of only one study of non Veterans.<sup>15</sup> This investigation reported on a mixed gender cohort of 13 individuals in SUD treatment who participated in a 3 day residential program experience based on AT, therapeutic camping, and relapse prevention. The control group consisted of 18 individuals who received relapse prevention treatment as usual. The authors reported significant improvements in autonomic arousal, frequency of negative thoughts, and alcohol craving among the treatment group.

There has been increasing interest in the use of complementary interventions,<sup>16</sup> including recreation therapy<sup>17,18</sup> and adventure therapy<sup>19–21</sup> for Veterans in recent years. However, despite evidence indicating benefits from ATs in the general population, there are few studies of ATs for Veterans. Qualitative reports of horseback riding,<sup>22</sup> river running,<sup>19</sup> fly fishing<sup>20</sup> and an adaptive sports program<sup>21</sup> have been published. The first<sup>22</sup> is an editorial discussing an exploratory study of 13 combat veterans participating in horsemanship activities. The participants in this study endorsed improved quality of life and decreased depressive symptoms. The second study<sup>19</sup> reported a four day river trip for 13 veterans with PTSD. The fly fishing paper<sup>20</sup> reported a narratological study of experiences of 67 Veterans who engaged in fly fishing for two days with a professional guide. The final study<sup>21</sup> used a qualitative design consisting of in depth interviews of 10 injured service members who had participated in recreation, sport and physical activity. Though all of these reports provide qualitative suggestion of benefit, none provided rigorous outcome or safety data.

One small study<sup>23</sup> that did provide quantitative outcome data utilized a pretest posttest investigation of an intervention using surfing in a five session, experiential, skills based program to support veterans with symptoms of posttraumatic stress disorder (PTSD). Fourteen veterans were enrolled and 11 completed the study. Clinically meaningful improvement in PTSD symptom severity (PTSD Checklist Military Version, Wilcoxon signed rank  $Z = 2.5$ ,  $p = 0.01$ ) and in depressive symptoms (Major Depression Inventory, Wilcoxon signed rank  $Z = 2.05$ ,  $p = 0.04$ ) was reported.

One particular type of AT is sailing adventure therapy. There are few reports in the scientific literature regarding sailing in general or what might be considered SAT. According to Carta et al.,<sup>24</sup> sailing has been used by some Public Mental Health Centers in Italy for individuals with psychiatric illness but no studies have been published. Of the limited scientific literature that addresses sailing in at all, one<sup>25</sup> discusses the adaptation of a sailing schooner so that youth with physical disabilities can participate in sailing excursions. Another,<sup>26</sup> describes a German social and educational intervention provided while sailing for 114 adolescents aged fourteen to eighteen with behavioral disorders. The authors report that more than half of the subjects showed an improvement in at least one of four domains; learning, social adaption, decreased delinquency or decreased psychiatric care. Finally, a study<sup>27</sup> reported a 12 wk pilot therapeutic sailing program using a sailing simulation system to help disabled individuals learn to sail. The authors report that after completion of the training, all subjects sailing skills increased.

The most relevant literature consists of two reports by Carta and co workers.<sup>24, 28</sup> These describe different aspects of one study conducted by the same investigators with the same subjects. The first paper<sup>24</sup> described the study and outcomes. The investigation was a randomized, controlled, crossover trial with each subject being randomized to a sequence of treatments which included either adjunctive therapy plus rehabilitation with sailing or adjunctive therapy with a traditional rehabilitation program. The sample consisted of 40 individuals with psychiatric illness as follows: 57.5% had a schizophrenia spectrum disorder; 27.5% had an affective psychosis, 15% had a personality disorder. There were 38 males and 2 females, mean age = 38. The clinical status of the patients was measured at monthly intervals with the Health of the Nation Outcome Scale (HoNOS) and the Brief Psychiatric Rating Scale (BPRS). Results indicated that those who received rehabilitation with sailing as an adjunctive treatment showed a statistically significant improvement on both the BPRS and the HoNOS. Functional status as measured by the Global Assessment of Functioning (GAF) also improved significantly. The second paper,<sup>24,28</sup> reports quality of life assessments conducted during the same study with the same participants using the World Health Organization BREF quality of life assessment (WHOQOL BREF). The authors found a statistically significant effect of time by group (treated cases versus controls) on the physical health, psychological health and environment subscales. None of the improvements were maintained after 12 months post intervention.<sup>24,28</sup> To our knowledge, there have been no studies of SAT interventions specifically for Veterans in general nor for Veterans or non Veterans with SUDs.

The theoretical underpinnings of ATs are that these interventions may lead to symptom reduction and/or positive behavior change mediated by psychological mechanisms including: 1) learning through experience; 2) presence of, and interaction with nature; 3) use of perceived risk to heighten arousal and to create a positive response to stress; 4) solution based focus on positive change and 5) psychosocial and group processes.<sup>14</sup> In addition to the above, ATs in general and SAT specifically might be beneficial for Veterans with SUDs for several reasons. First, it has been suggested that in order to improve treatment engagement, SUD treatments should go beyond a focus on eliminating substance and expand to include experiences that will be enjoyable to clients.<sup>29</sup> Also, there is evidence that stronger therapeutic relationships between counselor and patient contribute to better outcomes<sup>30</sup> and the authors hypothesized that having therapists and Veteran patients sail together might result in enhanced relationships. It has been reported that many Veterans who are transitioning from the military to civilian life experience a sense of disconnection from their community and Veterans frequently express a desire for connection with other Veterans.<sup>31</sup> SAT might provide a mechanism to enhance connectivity with both other Veterans and the community. Veterans working together in close proximity on a small boat might rapidly development of bonds of friendship. Also, Veterans who choose to continue to sail might develop

connections with their community through participating in local sailing club activities. Additionally, the authors theorized that SAT might impact treatment response via a mechanism of increasing psychological flexibility. Psychological inflexibility (PI), and a related concept, experiential avoidance, together refer to a personality characteristic that is rigidly guided by psychological reactions rather than direct contingencies as well as an unwillingness to experience unpleasant events.<sup>32</sup> PI is associated with SUDs and excessive substance use is thought to be a form of experiential avoidance.<sup>33</sup> Acceptance and Commitment Therapy,<sup>34</sup> aimed at decreasing PI has shown promise as an intervention for SUDs,<sup>35</sup> thus other interventions that decrease PI may be beneficial as an adjunctive treatment for SUDs. Further, there is a developing body of evidence that exposure to nature can have a positive benefit on both mental and physical health<sup>36–42</sup> and that exposure to nature can enhance mindfulness.<sup>43</sup> There is also evidence of a strong relationship between mindfulness and psychological flexibility.<sup>44</sup> The authors therefore posited that the intense exposure to nature (wind, water, boat movement, mountain scenery) associated with SAT on a mountain lake might result in either decreased PI and/or increased mindfulness. Finally, evidence is accumulating that brief interventions may increase mindfulness,<sup>45,46</sup> thus it is possible that a short exposure to SAT could decrease PI and/or increase mindfulness.

As stated above, this was a proof of concept study with a primary aim of determining the feasibility of utilizing SAT for Veterans with SUDs and comorbid medical and psychiatric conditions. If such an intervention can be feasibly used, then more rigorous follow up outcome studies would be warranted. Secondary aims were preliminary evaluations of the following hypotheses. SAT would: 1) not result in any physical injuries to participants or staff; 2) not result in increased short term anxiety or negative affect; 3) be associated with increased psychological flexibility and/or mindfulness; 4) be experienced as pleasurable by Veteran participants and 5) suggest preliminary evidence of improved outcomes.

## 2. Materials and methods

SAT was provided via a partnership between the Park City Sailing Association, a Park City, Utah based not for profit community sailing organization and the George E. Whalen Veterans Administration Medical Center (VAMC), located in Salt Lake City, Utah.

Three SAT interventions occurred, once per month during June, July and August of 2017. Each experience occurred during the afternoon and lasted approximately three hours. The activity began with a one half hour introduction to sailing lecture and a safety briefing given by a US Sailing certified instructor. Participants had the opportunity to ask questions about sailing and safety procedures. Each sailing activity occurred on the Jordanelle Reservoir near Park City, Utah. Three boats were used for each experience and were skippered by US Sailing certified instructors. The boats were either Rhodes 19s or J 22s, which were 19 or 22 ft long, respectively. Each boat carried up to four participants. George E. Whalen VAMC staff accompanied the Veterans during the experience and were on the boats with the participants. VAMC personnel were residential substance abuse program staff including a recreation therapist, registered nurse, registered dietitian and a psychiatrist. All staff and participants wore personal flotation devices whenever on the boats and near the water. The sailing activity lasted approximately two hours. Veterans participated in the activity by taking turns at various positions on the boat under the guidance of the skipper. These positions were helm (steering the boat), mainsheet (line used to control the mainsail) and the starboard (right) and port (left) jib sheets (line used to control the jib, which is the sail set forward of the mast and mainsail). Additionally, participants assisted with keeping watch for other boats and leaving and returning to the dock. Finally, some participants assisted in the basic steps of rigging and derigging the sailboats, such as hoisting and dousing the mainsail and unfurling and furling the jib. The activity concluded with a debriefing/discussion that

lasted approximately one half hour. During the debriefing, each Veteran, sailing instructor and staff member took turns describing what the experience had been like for them personally and were encouraged to share if they had learned anything about themselves from the experience. They were also encouraged to provide positive and/or negative feedback and recommendations for improvement.

SAT participants were 22 individual Veterans who were enrolled in the George E. Whalen Veterans Affairs Medical Center (VAMC) residential substance abuse treatment program at the time of the activity. Eleven Veterans participated in one sailing experience and 11 participated in two separate experiences (because their stay in the treatment program overlapped two experiences). The number of participants in each activity was 12, 10 and 11 for June, July and August respectively. The recruitment process involved offering Veterans enrolled in the residential SUDs treatment program the opportunity to participate in the SAT. Participation was voluntary. No Veterans were excluded from participating, however a few Veterans were unable to participate at each session due to conflicting appointments or similar issues.

The residential SUD treatment program is a 15 bed program located at the George E. Whalen VAMC in Salt Lake City, Utah. The program provides treatment for both SUDs and PTSD. Veterans in the study also participated in treatment as usual, which included a mix of individual psychotherapy, group psychotherapy, psychoeducational groups, self help recovery groups and, if indicated, pharmacologic interventions for SUDs and/or other psychiatric conditions.

SAT participants were 20 male and 2 female Veterans with an age range of 22–65. Medical, psychiatric and substance abuse diagnoses were obtained from a review of the electronic healthcare record. All of the participants had two or more substance use disorder as follows: alcohol use disorder (20, 91%); opioid use disorder (7, 32%); tobacco use disorder (15, 23%) and other SUDs (5, 23%). Additionally, 19 (86%) had one or more comorbid psychiatric conditions, the most common being PTSD (18, 82%) and major depressive disorder (3, 14%). Finally, 17 (77%) had one or more medical comorbidities the most common being chronic pain (8, 36%), gastroesophageal reflux disorder (7, 32%) and hypertension (7, 32%).

Twenty two Veterans who entered the same residential SUD treatment program and received treatment as usual (TAU), but not SAT, were selected as controls. Veterans were selected from those that entered treatment in close time proximity to the SAT cohort and such that the groups were closely matched for age, SAT mean age = 45.22, control mean age = 46.09 (non significant difference,  $p = 0.82$ ), gender (20 males and 2 females in each group) and diagnoses, all controls had 2 or more substance use disorders and 20 (91%) had psychiatric comorbidity.

As discussed in the introduction, a primary aim of this study was to evaluate the short term psychological impact of the SAT by determining if any increases in short term anxiety and/or negative affect occurred. Two instruments sensitive to state affect and anxiety were utilized immediately pre and post sailing. To assess changes in state anxiety, the STAI: Y 6 item<sup>47</sup> was utilized. It is a 6 question short version of the Spielberger State Trait Anxiety Inventory with higher scores indicating increased anxiety. It has a range of 20–80 and is sensitive to state anxiety fluctuations.<sup>47</sup> The Positive and Negative Affect Schedule (PANAS),<sup>48</sup> was utilized to determine whether changes in either positive or negative affect were associated with sailing. Both the positive and negative scales have ranges of 10–50. Higher scores on the positive scale indicates a higher level of positive affect while lower scores on the negative scale indicates a lower level of negative affect.

Another goal was to determine if there were SAT associated changes in PI/mindfulness and/or if the participants found the experience to be pleasurable as such changes might contribute to increased treatment engagement and/or response.

The AAQII is a 10 item instrument that measures PI.<sup>49</sup> This instrument has been shown to have adequate internal consistency and convergent and divergent validity.<sup>49</sup> The range is 10–70. Questions two,

three through five and seven through nine were reverse scored, thus in this report, higher scores indicate greater psychological flexibility or decreased PI. This instrument was used to determine if sailing might be associated with short term changes in PI.

The Five Facet Mindfulness Questionnaire (FFMQ)<sup>50</sup> was used to assess for pre to post sailing changes in mindfulness. It is a 39 question instrument with a range of 39–195 and higher scores indicate greater levels of mindfulness. It has five subscales that focus on different domains of mindful awareness. These are: observing; describing; acting with awareness; nonjudging of inner experience and nonreactivity.

The post sailing survey (Table 2) was designed to evaluate the participant's subjective experience of sailing. It consisted of nine questions, outlined in Table 2. As stated above, one aim of the survey was to determine if the participants experienced sailing as pleasurable. Other aims were to obtain feedback that could be used to modify future interventions and also to find out if the participants had subjective experiences of anxiety or calmness during the SAT.

The final goal of the study was to do a preliminary outcome assessment. For this analysis, the 22 Veterans who participated in SAT were compared to 22 age and gender matched controls who participated in residential SUD TAU, but not SAT. Three outcome variables were utilized: 1) successful completion of the residential SUD treatment program; 2) number of psychiatric hospitalizations within the 12 months following program completion and 3) readmission to the residential SIUD program within 12 months of program completion.

Data for this report includes pre and post sailing instruments and post sailing surveys completed by the 22 individual participants as well as additional information extracted from the medical record for both the individuals who participated in SAT and the 22 controls. For those that completed two sailing experiences, only the data from the first experience was used. Some participants did not complete all instruments.

Data analysis utilized paired, two tailed *t* tests to compare pre and post sailing instruments. Chi Square statistics were calculated to evaluate between group differences among the SAT versus control group. Effect sizes are reported for all results. Additionally, qualitative results of the locally developed survey are reported.

This retrospective study utilized data collected for clinical purposes to assess an SAT experience provided for Veterans during the summer of 2017. Data was also extracted from the medical record, which included demographic and diagnostic information. Diagnoses were extracted from the residential substance abuse program discharge note.

This investigation was approved by the University of Utah Institutional Review Board (IRB), which serves as the IRB for the George E. Wahlen VAMC, and by the George E. Wahlen VAMC Research and Development Committee.

### 3. Results

Regarding physical safety, there were no accidents or injuries to Veterans or staff during the three sailing activities (66 total participant sailing hours). Further, there were no events that would have been likely to result in injury.

Short term psychological impact was assessed by four instruments that were administered immediately pre and post sailing (Table 1). Results indicated non significant changes in: 1) affect as measured by the PANAS (mean positive increase from 29.9 to 32.3,  $p = 0.351$  and mean negative decrease from 16.2 to 15.6,  $p = 0.605$ ); anxiety as measured by the STAI: Y 6 item (decrease in mean anxiety scores from 42.6 to 37,  $p = 0.144$ ); and mindfulness as measured by the FFMQ (increase in mean scores from 107.2 to 108.4,  $p = 0.585$ ). The AAQ II indicated a significant ( $p = 0.036$ ) increase in psychological flexibility (or decrease in PI), mean scores changed from 33.4 to 35.5.

Perceived quality of the experience was assessed by the survey, which participants completed immediately after the activity. The survey questions and responses are listed in Table 2. The table indicates

**Table 1**

Participant ( $n = 22$ ) responses to psychological instruments.

	STAI: Y-6 item ( $n = 16$ )	PANAS ( $n = 19$ )		AAQ-II ( $n = 17$ )	FFMQ ( $n = 16$ )
		Positive	Negative		
Pre-mean (SD)	42.6 (13)	29.9 (9)	16.2 (5)	33.4(9)	107.2 (19)
Post-mean (SD)	37.0 (13)	32.3 (9)	15.6 (7)	35.5 (9)	108.4 (19)
df	15	18	18	16	15
t	1.543	0.959	0.527	2.284	0.566
p	0.144	0.351	0.605	0.036	0.580
d	0.385	0.219	0.121	0.554	0.141

**Table 2**

Participant responses to post-sailing survey ( $n = 22^a$ ).

Question	Responses (number of responses)	
What did you like most about the experience?	<ul style="list-style-type: none"> <li>Experiencing the outdoors, wind or water (8)</li> <li>Learning or experiencing something new (4)</li> <li>Relaxing, peaceful, serenity or similar (4)</li> <li>Boat handling (4)</li> </ul>	
What did you like least about the experience?	<ul style="list-style-type: none"> <li>Lack of wind (6)</li> <li>Nothing or NA (5)</li> <li>Activity too short (3)</li> <li>Completing surveys (2)</li> <li>More time sailing (10)</li> <li>Nothing or NA (5)</li> <li>More wind (5)</li> </ul>	
What would make the experience better?	<ul style="list-style-type: none"> <li>More time sailing (10)</li> <li>Nothing or NA (5)</li> <li>More wind (5)</li> </ul>	
Did anything that happened make you feel worried or nervous?	Yes (0) 0%	No (22) 100%
If yes, what exactly made you feel uncomfortable?	<ul style="list-style-type: none"> <li>Nothing or NA (22) 100%</li> </ul>	
Was there anything about the experience that made you feel calm or relaxed?	Yes (21) 95%	No (1) 5%
If yes, what exactly made you feel calm and relaxed?	<ul style="list-style-type: none"> <li>Experiencing nature or similar (17)</li> <li>Experience of sailing (6)</li> <li>Peacefulness of experience or similar (8)</li> </ul>	
Would you be likely to go sailing again if you had the opportunity?	Yes (20) 91%	No (2) 9%
How much did you enjoy the experience (Circle the best answer)?	Very little (1) 5%	A little (0) 0%
	A lot (5) 22%	Very much (16) 73%

<sup>a</sup> Numbers of responses may not equal sample size as some participants provided more than one response to some questions or did not answer some questions.

general themes of responses that were given by at least two or more participants.

A preliminary outcome assessment compared the 22 Veterans who participated in SAT to 22 age and gender matched controls who participated in residential SUD TAU on three outcome measures. Results indicated that 19 of those that participated in SAT successfully completed residential substance abuse treatment compared to 12 in the TAU group, which was a significant difference ( $X^2 = 5.34$ ,  $DF = 1$ ,  $p = 0.02$ ,  $r = 0.35$ ). There were no significant between group differences for psychiatric hospitalizations, 4 among the SAT group and 7 among the TAU ( $X^2 = 1.09$ ,  $DF = 1$ ,  $p = 0.29$ ,  $r = 0.16$ ) or residential substance abuse treatment readmission, 3 among the SAT group and 2 among the TAU ( $X^2 = 0.23$ ,  $DF = 1$ ,  $p = 0.64$ ,  $r = 0.07$ ) within the year following discharge.

### 4. Discussion

The primary aim of this study was to conduct a preliminary

evaluation of whether significant risks of physical injury and/or negative short term psychological impacts are likely to be associated with SAT. Secondary aims were to determine if SAT plus TAU was associated with changes in psychological flexibility, mindfulness and/or treatment engagement compared to TAU only

Given the small sample size and lack of randomization, all results must be considered preliminary. There were no accidents or injuries to Veterans or staff during the three SAT activities (66 total participant sailing hours). This is particularly notable given that 77% of the participants had one or more medical co morbidities, including 36% with chronic pain. Further, there were no self reports of any Veteran experiencing increased pain or worsening of any medical symptoms as a result of the intervention. Also, some Veterans had limitations of the ability to ambulate but were still able to participate fully and only required minimal assistance to board and disembark the boats.

Regarding risk of a short term negative psychological impact, the PANAS and STAI did not indicate any increases in either negative affect or anxiety. In fact, there were non significant trends towards more positive affect and decreased anxiety. Though further studies with a larger sample size are needed, this finding provides preliminary evidence that Veterans with SUDs can participate in therapeutic sailing without significant risk of a short term increase in emotional distress. This is particularly remarkable given that 95% of the cohort had one or more comorbid psychiatric conditions, the most common being PTSD (82%), all of which might increase the risk of emotional distress in a novel situation. To further assess for increased anxiety, participants were asked in the survey, “Did anything that happened make you feel worried or nervous?” The responses were 100% negative (Table 2), which supports the results of the STAI. Furthermore, 95% of the participants found the activity to be calm or relaxing (Table 2).

Though more rigorous studies with larger sample sizes are needed, these preliminary results suggest that SAT is not associated with a significant risk of either physical injury or short term psychological distress and may in fact be associated with a sense of tranquility.

The secondary aim of the study was to determine whether adjunctive SAT might be associated with outcomes that could enhance treatment engagement and/or response among Veterans with SUDs. As discussed in the introduction, adding a treatment focus on experiences enjoyable to clients may increase engagement in therapy.<sup>29</sup> These preliminary results suggest that SAT might be a potential intervention to increase patient engagement as 95% of participants indicated that they enjoyed sailing either “very much” or “a lot,” (Table 2).

Further, there was a significant ( $p = 0.04$ ) increase in the pre to post (33.4 35.5) AAQ II score. The AAQ II, which measures one’s level of psychological flexibility<sup>49</sup> was scored such that higher scores indicated decreased PI (i.e. increased flexibility). Though additional studies with larger sample sizes are needed, this result suggests that SAT may be associated with decreases in PI among the population studied.

Finally, preliminary results indicated that 19 of those that participated in TAU + SAT successfully completed residential SUD treatment compared to 12 in the TAU only group ( $X^2 = 5.34$ ,  $DF = 1$ ,  $p = 0.02$ ,  $r = 0.35$ ). This finding indicates a possible association between SAT + TAU and residential SUD treatment engagement and/or completion. However these results only indicate a potential association and do not prove cause and effect.

Taken together, these results provide preliminary evidence that SAT might increase treatment engagement through focusing on a pleasurable activity and/or enhancing treatment response by decreasing PI. Further, the outcome data suggest that adding SAT to TAU may increase the likelihood of completing residential SUD treatment for Veterans.

There are a number of limitations of this study that must be taken into consideration. First, it was a retrospective, non randomized pilot trial. The sample size was small and therefore the ability to detect statistically significant changes was limited. The findings of no increases in anxiety or negative affect pre to post sailing could be the

result of limited statistical power rather than supporting the null hypothesis. Therefore, the result could have indicated the intervention did not do harm when in fact it did. Also, participants were Veterans enrolled in a residential substance abuse treatment program and therefore there was significant selection bias. It is possible that results will not generalize to other populations, including the general population and other Veteran populations. Finally, the fact that this was a single session intervention is a limitation. It is likely that multiple dosages of sailing would be required to result in lasting changes. Additional more rigorous and multi dose studies will be needed to address these limitations.

Despite the limitations, further studies of SAT for Veterans with SUDs may be warranted. The first priority is additional studies of physical safety and psychological impact utilizing more rigorous methodology and larger sample sizes to better understand any risks associated with SAT. The second priority is more rigorous studies of potential benefits of this intervention.

## 5. Conclusions

To our knowledge, this is the first paper to report on SAT as an intervention for Veterans, or more specifically, for Veterans with SUDs. While there are a number of methodological limitations and findings must be considered preliminary, results suggest that SAT may be a low risk intervention for Veterans with SUDs and may enhance treatment response. Further studies are warranted to determine if SAT can be developed as a complimentary intervention for this population.

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# Nature adventure rehabilitation for combat-related posttraumatic chronic stress disorder: A randomized control trial

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## ABSTRACT

Chronic combat related posttraumatic stress disorder (CR PTSD) is a condition with many treatment barriers. Nature Adventure Rehabilitation (NAR) as a second line or as a supplemental intervention has the potential to overcome some of these barriers and incorporate aspects of successful treatment modalities for PTSD within an experiential learning paradigm. In a pre post controlled trial, CR PTSD veterans ( $n=22$ ) underwent a 1 year NAR intervention compared to a waiting list (WL) control group ( $n=20$ ). Posttraumatic symptoms (PTS), depression, functional problems, quality of life, perceived control over illness (PCI) and hope were measured by self report measures. PTS, emotional and social quality of life, PCI, hope and functioning improved significantly. Change in PTS was contingent upon change in PCI. The current study is the first to present NAR as a promising supplemental intervention for chronic CR PTSD. NAR seems to work through a process of behavioral activation, desensitization, gradual exposure to anxiety evoking situations and gaining control over symptomatology.

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## 1. Introduction

Chronic combat related posttraumatic stress disorder (CR PTSD) is a condition that appears in a significant proportion of war veterans. Most estimates put the lifetime prevalence of posttraumatic stress disorder (PTSD) between 9% and 31% for those exposed to combat (Center for Disease Control, 1988; Kulka et al., 1990; Southwick et al., 1993a,b; Card, 2000). Significant posttraumatic residues up to 20 years after combat, including high levels of distress, depression, anxiety, obsessive compulsive tendencies and hostility (Solomon et al., 1989; Solomon and Mikulincer, 2006) have been observed in veterans. CR PTSD is typically accompanied by multiple comorbid Axis I and II disorders (Southwick et al., 1993a,b; Keane and Wolfe, 1990; Bollinger et al., 2000; Dunn et al., 2004; Axelrod et al., 2005) as well as symptom chronicity (Gold et al., 2000). Furthermore, CR PTSD is also associated with extreme social maladjustment, including social avoidance or phobia, anger, violent behavior, family discord and interpersonal problems as well as unemployment (Frueh et al., 1996; Chemtob et al., 1997). Chronic CR PTSD is thus a prevalent, complex psychiatric disorder resulting in

considerable emotional distress and impaired social functioning and often constitutes a significant treatment challenge (Davidson, 2000).

There are many challenges and barriers while providing treatment to CR PTSD clients (Samuel et al., 2005). Among these challenges are engagement problems (Linden, 2008), high intensity anger, strong avoidance and difficulty in regulating emotions (Van der Kolk, 2002). These possible barriers require much effort, both from the clients and therapists to overcome lack of hope, fear and suffering while reliving the trauma (Figley, 1997). A further treatment barrier lies in the way mental health treatment is perceived by many PTSD veterans. Many veterans lack the trust in the mental health system and are afraid of being perceived as 'weak' (Hoge et al., 2004). They also seem to have difficulties in trusting anything government and army related (Glover, 1984; Glover et al., 1990; Mason, 1990; Kubany et al., 1994), including therapists working within administrations. Patients worry about confidentiality and fear that improvement in mental health status might lead the army to reduce the percentage of disability payment they receive (Frueh et al., 2007). Furthermore, chronic PTSD is often accompanied by important somatic symptoms, whereby regular verbal therapeutic work, may not always be the most efficient (Van der Kolk, 2002).

Even though there are excellent effective first line approaches for treating PTSD, such as exposure therapy (ET) and CBT

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(Foa et al., 2000; Schnurr et al., 2007; Rauch et al., 2009; Yoder et al., 2012), some clients might necessitate additional support and opportunities to apply and generalize newly learned understandings and skills. Indeed ET has been found to have had limited impact on negative symptoms of PTSD (e.g., social withdrawal, interpersonal difficulties) or anger control (Frueh et al., 1995). Because ET is mainly focused on anxiety, avoidance and fear reduction, and because of the chronic and all encompassing nature of this condition in many combat veterans, its effects do not appear to be broad enough to address the skill deficits, impaired relationships (Frueh et al., 2001) and problems of anger control (Chemtob et al., 1997) manifested by this patients group. Unfortunately, as with exposure therapy, CBT dropout rates may be significant in individuals with high levels of avoidance (Bryant et al., 2003; Marks et al., 1998), depression (Bryant et al., 2003; McDonagh Coyle et al., 2005) and alcohol use (Van Minnen et al., 2002). Furthermore treatment outcomes have been observed to be negatively affected by multiple previous traumas (Hembree et al., 2004) as well as the use of benzodiazepines (Van Minnen et al., 2002). In addition it might be difficult to 'sell' clients homework assignments (Helblig and Fehm, 2004). Research has also suggested that although CBT or ET can reduce symptomatology, there may not be sufficient clinical gain for veterans (Britvic et al., 2006). Furthermore a meta analysis has suggested that although there are viable and effective treatments for chronic PTSD, many do not profit from these interventions (Bisson et al., 2007).

As a second line of treatment for those not yet ready to engage, have not improved significantly or have been treatment dropouts of evidence based approaches such as CBT and ET, Nature Adventure Rehabilitation (NAR), as described hereunder, presents an intervention model that might potentially circumvent many of the described barriers to treatment, has an important somatic component and potentially has many of the ingredients found in the more successful approaches for treating chronic PTSD. NAR is a group therapeutic approach based upon the theoretical framework of experiential learning (Herbert, 1998) and uses activity based sport interventions in a way that provides opportunity for personal growth. It includes the use of perceived physical and psychological risk as an agent for change and for exploring the meanings of experiences and behaviors in coping with these risks through discussions following the activities. In most cases, NAR happens in a natural environment where participants are faced with a variety of pre planned tasks and strategies for affecting change (Cason and Gillis, 1994). These tasks are presented in a way that is designed to empower the person, to change negative self images, to enhance self efficacy, hope and the ability to enjoy life, and to develop control over symptoms, as well as improving social and emotional regulation skills (Kelley et al., 1997).

The basic working formula of NAR includes placing persons in unfamiliar task oriented positions, and building incremental challenges for the individual and the group. This is done with the professional crew members who modulate the activities' difficulty levels. The natural environment is used to set the challenges, cooperation between the participants is fostered and the participants' progress is monitored (Herbert, 1998). Although NAR can include many kinds of activities, the most common include trekking, wilderness adventure, camping, rope courses, canoeing, cycling, and sailing related activities (Lakshmi et al., 2006). Key therapeutic elements include its being inherently health oriented, instead of pathology oriented (Antonovsky, 1987). A second and central tenant is that the activities are "participant centered" requiring active participation (Ewert et al., 2001) in reality based outcomes (Gillis and Bonney, 1986; Gass, 1993) and as such being empowering and providing for real life feedback and learning. A third element lies in the principle of

"disequilibrium" (Nadler and Luckner, 1992), that is clients are faced with novel situations in which they need to develop new ways of thinking and acting. A related key element lies in the principle of dynamic "adaptation" whereby activities create the need to constantly adapt to changing conditions (Crisp, 1998) potentially creating a dynamic movement of change constantly pulling upon new, flexible and adaptive coping modes. A fifth element includes the creating of cognitive dissonance (Ewert et al., 2001), such as between perceived abilities or self assessment (for example: inability to take risk, low sense of self efficacy, and self appreciation) and actual behaviors (pro social behavior, and risk taking) or/and outcomes (success in doing a task) with the aim to change self assessment and behavior.

Although most NAR are performed with youth (Hill, 2007), the field has grown to incorporate therapeutic work with adult populations with mental problems. A limited number of sound empirical studies have suggested that NAR in the field of adult psychiatric recreation (Jerstad and Stelzer, 1973; Banaka and Young, 1985; Berman and Anton, 1988) provides useful, potent tools to effect significant changes in mental health related beliefs, attitudes and skills (Cason and Gillis, 1994; Chakravorty et al., 1995; Kelley et al., 1997). One non randomized case controlled study (Lakshmi et al., 2006) assessed the impact of adventure therapy which included a variety of sports and activities during a 8 month period, on a group of 23 patients with schizophrenia. They found that the intervention improved self esteem and functioning at the end of the intervention, as well as at 1 year follow up. One study assessed the impact of 5 day wilderness "outward bound" (OB) small group experiences ( $n=6$  12) with 111 CR PTSD clients (Hyer et al., 1996). Results of this study suggested that activities were enjoyed, the trust in the therapeutic staff improved, and some clinical improvements could be observed. However, OB did not significantly reduce PTSD symptomatology. As the authors of that study point out, the limited time frame of the intervention with clients with high levels of chronic dysfunctions and symptomatology could be one explanation for the lack of impact. Further explanations could be that the OB experience was too far removed from daily life experiences to have any real life impact for the participants.

Although the literature on NAR is still unclear regarding the nature of its therapeutic elements, it includes some of the ingredients present in PTSD treatment modalities. First, NAR includes some of the Behavioral Activation (BA) components found to be effective in reducing PTSD as well as depression in PTSD veterans (Wagner et al., 2007; Jakupcak et al., 2010), one of which is exposing individuals to anxiety evoking situations. BA for PTSD is based upon the rationale that individuals with PTSD tend to avoid situations and experiences that may elicit trauma related memories and associated affect, thereby reducing contact with reinforcers leading to temporary reductions in anxiety which increases and/or maintains anxiety. BA protocols reverse the pattern of avoidance and re engage the individual with reinforcing activities (Wagner et al., 2007). The experiential, adventurous nature of the activities challenges clients to repeatedly face up to anxiety and fears. With some resemblance to BA procedures, the pace and level of difficulty or exposure to challenges are set up in cooperation with the crew members and each participant is repetitively placed in challenging situations. For example individuals are made responsible for navigating the boat and thereby insuring the safety of the crew. It is different from BA in that at no time does the intervention focus specifically on traumatic anxiety evoking situations, nor are the activities per se accompanied by goal identification or behavioral analysis of avoidant behavior.

Second, the loss of ability to perform emotional regulation processes is a main feature of PTSD (Hussain and Bhushan, 2011).

Due to the fact that NAR usually proposes repeated cycles of action and rest during a session, such as maneuvering the boat, or hoisting or lowering sails followed by periods of passivity the participants are able to experience natural cycles of emotional regulation, making it easier to gain a better sense of control over their symptoms. Perceived control has long been known to be associated with better outcomes in traumatized individuals (Kushner et al., 1993; Frazier et al., 2004, 2011). Furthermore, studies with clients with severe mental illness have shown that developing a sense of control over one's symptoms was positively correlated with improvements in quality of life (Kravetz et al., 2000; Hasson Ohayon et al., 2006a). Third, NAR has a strong cognitive behavioral component, whereby the successful overcoming of fears challenges the client's deeply seated self derogatory belief system such as low self worth, or the belief that one can do nothing right. This may be challenged by succeeding at a sailing task and getting the approbation of the team. Furthermore, the group, as a witness, can also be instrumental in reinforcing the newly learned positive beliefs about the self. Fourth, as the activities are behavior oriented, and the level of difficulty is gradually built up, participation in activities permits a desensitization process. For example a participant can for the first sessions remain passive and possibly anxious during maneuvers and only do simple tasks such as fishing. Later this participant might help untying knots, recuperate a buoy and at a later time take the helm and even dock.

Fifth, avoidance as a main feature of PTSD, leads individuals to significantly restrict the span of coping means to passive, detached and emotional focused ones. This plays a pivotal role in PTSD symptom maintenance, while solution centered coping modes on the other hand are negatively related to symptom severity (Benotsch et al., 2000). Non trauma focused approaches have thus aimed at reducing traumatic stress (Berger et al., 2012) by helping trauma exposed individuals to both learn new coping modes as well as strengthen existing ones. Adventure activities repeatedly provide in vivo opportunities for participants to learn new coping modes and cope actively as well as proactively with potentially stressing situations. Going through safety preparations before sailing off is just one example of such an activity. In addition, the 'outdoor' character of the activities permits the development of the physical coping methods. For example, cleaning the boat, screaming or jumping in the water to cool down might be suggested as ways to cope with anxiety, rage and fear.

Sixth, groups have been observed to have great therapeutic potential for veterans (Makler et al., 1990; Foy et al., 2000). Groups can provide protection, stability and cohesiveness and permit self disclosure and sharing. In addition, groups of veterans have the potential to recreate an 'esprit de corps' found in combat units, strengthening solidarity and belonging, as well as developing a social network to provide practical tips related to daily living (e.g., how to handle certain situations), treatment related tips (e.g., which doctor to see) and may provide help and support outside of the intervention setting. A seventh important factor is that the crew members neither are official therapists, nor are they part of the army or government related administration. In the same vein, NAR is a sporting activity and not a "mental health therapy," with no stigma attached and is available in the community as a non therapeutic service. Finally, NAR provides active, physically and emotionally laden experiences, which can be discussed and developed with other therapeutic agents later on. Such experiences are important, as chronic PTSD clients often minimize their interactions with the environment and with people, rarely encountering 'real life' challenges and thus having little opportunity for either change or applying newly learned skills and understandings obtained in trauma focused interventions.

The present paper reports an assessment of the impact of a weekly group NAR program on individuals with chronic CR PTSD over a 1 year period. Based upon the reviewed literature we hypothesized an improvement in hope, quality of life and a reduction in functional symptoms, posttraumatic symptomatology (PTS) and depression in the intervention group compared to the control group. We also hypothesized that improvements in PTS would be contingent upon changes in sense of control over the illness (PCI).

## 2. Methods

### 2.1. Setting

The rehabilitation staff of the Israeli Defense Forces (IDF) were informed of the availability of a 12-month weekly sailing NAR for clients with chronic CR-PTSD. Meetings were set up between the IDF rehabilitation staff and the NGO 'Etgarim,' an organization working through outdoor challenging sports activities with special needs populations. The rationale, the inclusion criteria and the intervention setting, as well as the importance of the accompanying study, were explained. The rehabilitation staff then contacted all the relevant clients, and the phone numbers of those who consented to participate were then passed on to the lead crew member of Etgarim, who arranged for individual appointments. At the appointment, potential participants received explanations regarding the intervention, signed the consent form and filled in the questionnaire and participated in a short sailing experience. The study was approved by the Helsinki ethics board of the Lev Hasharon Mental health Center.

### 2.2. Subjects and procedure

Inclusion criteria were the presence of PTSD incurred as a result of active service (and therefore termed CR-PTSD), as diagnosed by an IDF clinical psychologist, a psychiatrist, and corroborated by an IDF medical commission. All traumatizations must have occurred during active duty and more than 5 years previously. Based upon the available intervention and waiting list slots (which were always less than the number of clients on the list) clients were randomly (coin flipping) directed to a waiting list (WL) or NAR. Over a 2-year period, a cumulative list of 73 clients was received from the IDF rehabilitation staff, of which 68 attended the appointments and 20 of these were randomly chosen to be part of a waiting list control group (WL).

Of the remaining 48 who attended the first appointment (which included the administration of the questionnaire and a 30 min sailing trip) 28 made it to the first session. A number of telephone interviews to those that did not come to the first meeting gave us the impression that most of them did not want to be part of a group, did not feel they were able to commit to coming every week, came to the meeting out of boredom (I didn't have anything else to do, and wanted to get out of the house), did not like sailing or did not really want to come in the first place. Of the 28 present at the first session 22 finished the 12-month program (NAR group). There were six drop-outs (DO). Four did not attend the second meeting and two did not attend the third meeting. The six who stopped participating reported not having enjoyed the sailing or expressed a lack of interest. All would-be participants filled in questionnaires at baseline, the NAR group also filled it in after 12 months of NAR activities. The WL control group filled in the questionnaire again, 1 year after baseline, and those who wished were then incorporated in the program, but were not part of the study. All NAR participants were present in at least 40 sessions.

### 2.3. Intervention

The study was ongoing during 2 years and took in new participants at different periods during the entire first year. Interventions were held weekly for 3 h in small groups of six to 10 people in one or two boats. The intervention was provided by four skilled volunteer staff members under the leadership of a project leader. None of the staff had health or social related academic degrees. Monthly supervision was received from a rehabilitation psychologist. During these meetings, the fidelity of the program was assessed, the content of the sessions was described, future plans were made, and difficulties were discussed.

Every NAR meeting started out on dry land—usually at the marina club house, with an opening talk to summarize what was learned in the previous sessions, to present the days' activities and to set the security precautions. Thereafter, and if weather permitted, a sailing boat was launched and different sea-related activities were performed. Finally, after returning to shore, a debriefing and discussion was held. During these discussions both sailing-related as well as personal issues were talked about, if these came up. Three sessions are presented to illustrate the content and processes that occurred during NAR (Box 1).

The orientation of the intervention is threefold: (1) to teach participants to sail; (2) to provide a safe haven where the individual has the opportunity to make

**Box 1**—Description of three sessions of NAR.**A Session at the beginning of the program**

The goal of the session was to let the participants be familiar with the new nautical and social surrounding. It included gathering together at the marina clubhouse, have the participants and the staff introduce themselves and share expectations from the program. Participants are free to introduce themselves in the way they wish. The staff then explained some basic elements of nautical skills such as how to recognize the direction of the wind, directions at sea and roles of crew members on board. Afterwards, the group set the sails, sailed out from the marina and back while learning about the wind and directions. During this time instructions regarding safety precautions were taught and practiced. After returning the staff leader summarized the theoretical and practical skills that were learned. Finally the participants got the opportunity to share their experience of the session. Questions accompanying this part were how they felt, what this experience gave them, how they assessed the communication between them, how they felt toward the group leader who sometimes gave them orders, whether they had difficulties and how they coped with the difficulties. Staff normalized reactions of the participants and encouraged them to express themselves.

**A Session midway in the program**

The goal of the session was to improve sailing abilities in extreme conditions. This included a preparation of the boat and crew to sail in high seas and strong winds, practicing a “man over board” drill and towing a boat in an emergency situation. All drills were first prepared on land and then practiced by the crew in the sea. Back on land the staff leader first debriefed the participants regarding their actions during the maneuvers. Thereafter personal questions relevant to the extreme experience were asked such as how each participant coped with the difficult sea conditions, whether they felt strong emotions, what they thought while they had these emotions, what helped them cope with anxiety and fear and finally how the group as a team managed the situation. They were also asked in what way their coping today was the same or different than during other previous instances when they had to cope with difficult situations or strong emotions. Participants were empowered, and when possible changes in behavior were acknowledged.

**A Session close to the end of the program**

The goal of the session was to improve responsibility and leadership. The session started with an explanation and a detailing of the skipper's responsibility regarding the boat and crew. This included taking care of the sailing gear (sails, lines, tackles, etc.), being responsible of everything that happens on board from sailing skills up to personal and interpersonal safety. Then the staff leader empowered the group and told them that they could now take responsibility for the boat and the crew, and that they would sail the boat on their own. After setting sails, at a distance of a mile the leader appointed a skipper from amongst the participants, and then left the boat (onto another boat) and watched the crew sail on their own. After half an hour of sailing in various directions, and performing various tasks, the leader went back on board, took command and headed back to the marina. The participants were first debriefed regarding their maneuvers, then participants were encouraged to share the experience of taking full responsibility of the boat. Participants were asked to compare their present experience with their personal lives. Participants were commanded for their efforts and success in sailing the boat independently.

decisions regarding how to cope with sailing-related challenges; (3) to challenge participants incrementally at emotional, cognitive, physical and social levels. Every meeting's content was different and was prepared in advance. Sessions followed the development of the group at the technical sailing level, the individual psychological level and the group level. For example, the team leader might decide that it was time to learn certain maneuvers, that some of the individual members should be encouraged to take leadership and that the group was sufficiently unified to permit and support these individuals. The level of difficulty and the type of maneuvers might then be set to necessitate a lot of responsibility taking, decision making and the team working at high levels of cooperation. These plans were extremely flexible, as they had to take into consideration both technical factors such as wind and weather, the state of mind of the individual members and the state of the group. Furthermore, additional activities were added, such as ‘open-days’ for the participants' families. Each participant also took part in two 3-day activities that included outdoor sleeping, camping, swimming, rowing, walking and social activities.

**2.4. Measures**

The assessments were done during a first appointment before randomization, and after 12 months for both the NAR and WL groups. We asked participants about their age, marital status, income, education and religiosity. We asked about their direct and indirect exposure to combat-related traumatic events, with questions as to whether the individual had ever been in a combat situation (yes/no), whether he had been wounded (yes/no) and whether he knew someone close who had been wounded (yes/no) or who had died (yes/no) during army service. We also asked when the traumatic exposure took place.

To assess motivation for NAR, we asked participants whether they wished (1) to sail, and (2) to learn how to sail. Answers were given on a 5-point scale from 0 (not at all) to 4 (very much). History of treatment was queried by asking the participants whether they were currently in or had undergone psychological or psychiatric, private (yes/no) and/or group (yes/no) treatment. They were also asked to answer on a 1–5 scale whether they were satisfied with the treatment they had received.

**2.4.1. Posttraumatic stress symptomatology (PTS)**

Posttraumatic stress symptomatology (PTS) was measured using a modified 30-item Stanford Acute Stress Reaction Questionnaire (SASRQ) (Cardena et al., 2000). The current scale was used instead of a more conventional one because its high sensitivity due to its 6-point assessment scale, its large number of items permitting the calculation of continuous scores for each of the PTSD clusters and dissociative and functional factors as well as social problems not found in regular PTSD scales. It has a good track record for assessing posttraumatic severity (Silver et al., 2002; Bleich et al., 2003; Gelkopf et al., 2008a). We added to the original scale questions asking whether each of the symptoms had been present for more or less than 1 month (Cronbach's  $\alpha$  0.94). A composite total PTS score was calculated based on the items with a symptomatology that had been present for more than 1 month, for the total number of items, as well as for each PTSD cluster separately.

**2.4.2. Depression**

Depression was measured using the 7-item brief Beck Depression Inventory Fast Screen (BDI-FS) (Beck et al., 1996). The BDI-FS has good psychometric properties, strong agreement with previous versions of the BDI and equal ability to detect clinical change (Poole et al., 2009). The BDI-FS has the practical advantages of faster administration and reduced patient burden. The items are scored 0–3; higher scores indicate increased depression. (Cronbach's  $\alpha$  0.75).

**2.4.3. Sense of control over PTSD symptoms**

Sense of control over PTSD symptoms was assessed using an adapted version of the 7-item Perceived Control over Illness Questionnaire (PCIQ) (Affleck et al., 1987). The questionnaire has two factors: sense of control through self (SCS), and sense of control through the help of others (CHO). The original scale was developed to assess the degree of control that people with rheumatoid arthritis feel they or their health care providers have over their daily symptoms, the future course of the illness, and the medical treatment that they receive. Kravetz et al. (2000) translated this measure's items into Hebrew and reformulated them so such that were applicable to the mental health field. The tool has shown satisfying reliability and validity with mental health population (Kravetz et al., 2000; Hasson-Ohayon et al., 2006a). For the present study, we replaced the description of the symptoms of severe mental illness, in each of the questions, with symptoms of PTSD. Items are scored 1–5 with higher scores indicating less control over the illness. Cronbach's  $\alpha$  for the entire scale 0.77; for SCS 0.72 and for CHO 0.75.

**2.4.4. Quality of life**

Quality of life was measured by three subscales of the Human Service Scale (HSS, Kravetz et al., 1985), namely the fulfillment of emotional, social, and physiological basic needs. The scales assess objective and subjective aspects of quality of life. The scales have shown satisfactory internal reliability and validity (Katz and Kravetz, 1997). Cronbach's  $\alpha$  in the present study for the emotional, social and physiological quality of life scales was respectively 0.84, 0.80 and 0.84.

#### 2.4.5. Functional problems

Functional problems were assessed using seven items assessing functioning in the domains of: parenting, work/study, intimate couple relationships, friendship relationships, coping with problems, sexual activity and drug use (Gelkopf et al., 2012). Each question was presented on a 7-point semantic differential scale. For example, on one end of the scale was the phrase: 'I function well as a parent' and on the other: 'I do not function well as a parent.' All items also had a 'not relevant' box. Two-week test–retest on a 20 CR-PTSD sample was found to be 0.91 on the total mean score (Cronbach's  $\alpha$  0.81).

#### 2.4.6. Hope

Hope was assessed using the 12-item (including four filler items) Hope Scale (HS) (Snyder et al., 1991). Response options ranged from definitely false (1) to definitely true (4). The HS has been used repeatedly in PTSD treatment outcome studies (Berger et al., 2007; Gelkopf et al., 2008b) (Cronbach's  $\alpha$  0.87). Mean scores were used to calculate the total score.

#### 2.5. Statistical analysis

To assess differences between NAR, WL and Dropout (DO; in the dropout group we included the 20 individuals who did not begin the intervention, and the six who left during the first two meetings) we used univariate analyses. To assess whether significant changes could be observed over time a Repeated measures MANOVA was used from first to second assessment (after 1 year) comparing NAR to WL on all outcome measures. A significant interaction of group  $\times$  time  $\times$  type of measure entailed

following up with separate Repeated measures ANOVAs to assess specifically which outcome measure was significant. To try to assess whether the intervention was differentially effective on each of the PTS clusters the previous procedure was repeated for the assessment of the five sub-clusters of PTS. Finally to assess whether the observed change in PTS symptoms was contingent upon changes in control over illness, a Repeated measure MANCOVA was employed with as dependent values all the separate PTS cluster scores and the 'sense of control over illness' change scores (from time 1 to time 2) as a covariant. There were no missing values. Significance was set at  $p < 0.05$ .

### 3. Results

#### 3.1. Comparison of NAR, WL and DO at baseline and description of populations

Demographics, history of treatment and baseline measures are presented in Tables 1 and 2. Using chi square, Fisher exact test analyses and 3 way ANOVAs comparing NAR, WL and DO on all the baseline measures, we found no differences between groups, nor did we find any difference between groups regarding sailing motivation. An additional analyses was performed comparing the DO before the first session ( $n=20$ ) and those after the first session ( $n=6$ ). No significant differences were found on any of the measures between the two DO groups.

**Table 1**

Demographics, history of treatment, exposure and motivation for sailing in the Nature adventure therapy (NAT), waiting list (WL) and drop-out (DO) groups.

	NAT		WL		DO	
	(n 22)		(n 20)		(n 26)	
	N	%	N	%	N	%
Gender						
Male	22	100	20	100	26	100
Country of birth						
Israel	21	95.5	16	80	23	88.5
Outside of Israel	1	4.5	4	20	3	11.5
Marital status						
Single	6	27.3	9	45.0	15	57.5
Married	13	59.1	9	45.0	10	38.5
Divorced	3	13.6	2	10.0	1	3.8
Has children	13	59.1	10	50.0	18	69.2
Income						
Much lower than average	6	27.3	8	40	9	34.6
Lower than average	4	18.2	4	20	6	23.1
Average	6	27.3	4	20	5	19.2
Higher than average	6	27.3	4	20	6	23.0
Education						
Only elementary	0	0	2	10.0	2	7.4
Only secondary	6	27.3	6	30.0	12	44.4
Matriculation certificate	13	59.1	7	35.0	10	37.0
Higher	3	13.6	5	25.0	3	11.1
Religiosity						
Atheist	14	63.6	9	45.0	8	30.8
Traditional	7	31.8	8	40.0	17	65.4
Religious	1	4.5	3	15.0	1	3.8
Age; Range 24–59; Mean (S.D.)	39.1 (12.4)		37.5 (13.6)		34.7 (11.7)	
History of treatment						
Was ever in treatment	21	95.5	16	80.0	26	100
Was ever in private treatment	20	90.9	16	80.0	24	92.3
Was ever in group treatment	6	27.3	6	30.0	7	26.9
Currently in treatment	18	81.8	16	80.0	22	84.6
Satisfaction, Range 1–5; Mean (S.D.)	3.30 (1.5)		3.38 (1.7)		3.24 (1.2)	
Traumatic exposure						
Active duty as a combat soldier	22	100	20	100	26	100
Physically harmed as a soldier	15	68.2	12	60.0	19	73.1
Someone close hurt/died in the army	17	77.3	11	55.0	19	73.1
Motivation						
For sailing; Range 0–4; Mean (S.D.)	1.44 (0.7)		1.18 (0.4)		1.45 (0.5)	
For learning to sail; Range 0–4; Mean (S.D.)	1.41 (0.6)		1.56 (0.6)		1.55 (0.5)	
PTS; Range 0–150; Mean (S.D.)	116.36 (16.8)		111.25 (26.6)		104.69 (28.7)	
BDI-FS; Range 0–21; Mean (S.D.)	15.52 (2.6)		15.08 (4.2)		16.75 (4.6)	

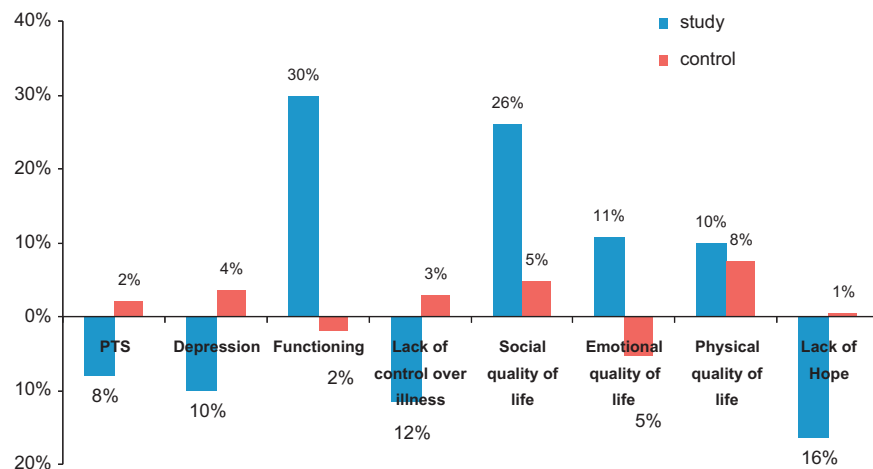
Note. PTS Posttraumatic symptomatology; BDI-FS Beck Depression Inventory Fast Screen.  
No significant differences between groups were observed on any of the measures at baseline.

**Table 2**  
Comparison of NAT ( $n = 22$ ) and WL ( $n = 20$ ) on posttraumatic symptoms, Depression, Perceived Control Over Illness, Social, Emotional and physiological Quality of Life, Functioning and Hope at First and Second Assessments.

	First assessment		Second assessment		Time main effects		Group $\times$ time interaction		
	<i>M</i>	(S.D.)	<i>M</i>	(S.D.)	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	$\eta^2$
PTS (0–150)									
NAT	115.05	(16.0)	105.37	(21.5)	4.68	0.04	4.69	0.04	0.11
WL	111.25	(26.6)	113.60	(19.2)	0.59	0.45			
BDI-FS (0–21)									
NAT	15.52	(2.7)	13.95	(2.9)	5.26	0.03	4.4	0.04	0.11
WL	15.08	(4.2)	15.64	(3.8)	0.56	0.46			
Functioning (1–7)									
NAT	2.8	(1.3)	3.7	(1.2)	25.62	< 0.001	24.4	< 0.001	0.34
WL	3.3	(1.5)	3.3	(1.5)	1.2	0.29			
Lack of control over illness (1–5)									
NAT	2.9	(0.5)	2.6	(0.6)	7.09	0.016	8.2	0.007	0.19
WL	2.9	(0.6)	2.9	(0.5)	1.2	0.28			
SOCQOL (0–5)									
NAT	2.5	(0.9)	3.1	(0.6)	12.32	0.02	5.9	0.01	0.13
WL	2.6	(0.8)	2.8	(0.7)	1.5	0.24			
EMOQOL (0–5)									
NAT	3.0	(0.6)	3.3	(0.5)	5.03	0.03	5.8	0.02	0.13
WL	3.1	(0.6)	2.9	(0.5)	1.4	0.26			
PHYQOL (0–5)									
NAT	3.4	(0.6)	3.7	(0.6)	13.27	0.001	0.3	0.57	0.01
WL	3.2	(0.7)	3.5	(0.7)	0.33	0.57			
Lack of hope (1–4)									
NAT	2.6	(0.5)	2.2	(0.3)	15.43	0.001	12.1	0.001	0.24
WL	2.5	(0.7)	2.5	(0.7)	0.04	0.84			

Note. PTS Posttraumatic symptomatology; BDI-FS Beck Depression Inventory Fast Screen; PCIQ Perceived Control over Illness Questionnaire; SOCQOL Social Quality of Life; EMOQOL Emotional Quality of Life; PHYQOL Physical Quality of Life. All degrees of freedom = 1,41.

$\eta^2 > 0.01$  constitutes a small effect size  $\eta^2 > 0.06$  constitutes a medium effect and  $\eta^2 > 0.13$  a large effect size. No significant differences between groups were observed on any of the measures at baseline.



**Fig. 1.** Percentage change over time between study and control groups.

### 3.2. Assessment of the intervention: repeated measures MANOVA analyses

Repeated measures MANOVA results suggest an overall impact of the intervention on the outcome measures (time  $\times$  type of measure  $\times$  group; Pillai's Trace=0.68;  $F=8.86$ , d.f.=7;  $p < 0.001$ ). As presented in Table 2, separate Repeated measures ANOVAs (time  $\times$  group) show a significant reduction in PTSD symptomatology ( $P < 0.05$ ), depression ( $p < 0.05$ ), an improvement in functioning ( $p < 0.001$ ), an improvement in the sense of control of the symptoms of PTSD ( $p < 0.01$ ) an improvement in social and emotional quality of life ( $p < 0.01$ ) and an improvement in hope ( $p < 0.001$ ) compared to the WL control group. The physiological quality of life factor was not found to change significantly. Fig. 1 shows the percentage change scores between first and second

assessment in the study and control group on all the outcome measures. An additional Repeated MANOVA results suggest an overall impact of the intervention on all the PTS clusters (time  $\times$  group; Pillai's Trace=0.10;  $F=4.44$ , d.f.=1;  $P=0.04$ ) but no interaction with type of measure (time  $\times$  type of measure  $\times$  group; Pillai's trace=0.10;  $F=1.10$ , d.f.=4;  $p=n.s.$ ) suggesting no difference between the different PTS clusters.

### 3.3. Perceived control over illness as covariate in the improvement of PTS: repeated measures MANCOVA analysis

To assess whether PTS change over time was contingent upon a change in the measure of 'control over illness' we set up a Repeated measure MANCOVA with as dependent values all the separate PTS clusters with the variable 'sense of control over the

illness' change score (from time 1 to time 2) as a covariant. Results show that the interaction of time  $\times$  group lost the significance observed in the first group of Repeated measures ANOVAs (Pillai's Trace = 0.60;  $F=2.24$ ;  $p=n.s.$ ) suggesting PTS changes over time in the NAR group to be significantly related to an improved sense of personal control over symptoms. Effect sizes for depression, PTS, social and emotional quality of life were found to be medium; for functioning, control over the illness and hope effect sizes were large.

#### 4. Discussion

The results of this study suggest that a 1 year NAR intervention compared to a WL group has an overall positive impact on individuals suffering from CR PTSD. Medium improvements in PTS, depression, social and emotional quality of life, and large improvements in daily functioning, hope and PCI were found. These changes could also be observed in significant behavioral changes, both as measured by the functioning and quality of life scales, as well as observed during NAR related behaviors and based on informal reports from the crew members as well as from participants and their families.

A central finding of this study was the reduction in PTS symptomatology. In trying to understand which aspect of PTS was improved, we observed a significant reduction on all the PTS factors. These findings suggest that NAR does not specifically improve one group of symptoms but the entire span of symptomatology. Indeed, instead of avoidant behavior, acting reactively or dissociate, when confronting challenging situations, the intervention seems to help individuals cope actively. As suggested in the introduction the intervention seems to work by a variety of mechanism such as anxiety reduction, procuring new coping modes, behavioral activation processes, desensitization and reinforcement through improved functioning. The intervention helps to 'open up' individuals to experiencing life instead of an often seen tendency in PTSD victims to isolate themselves both physically and emotionally. A reduction of 8% in posttraumatic symptomatology, 10% of depression and an improvement of 30% in functioning were observed. In addition, more openness, more daring, more social exchange and better coping with intense emotions were also observed. If, during the first months, we could see hyper vigilant, avoidant and dissociative behaviors (nervousness before getting in the boat, participants sleeping during rough weather, a lack of communication and emotional numbness, finding excuses for not cleaning the boat after sailing), as time passed by, these behaviors became more rare. Many clients also reported less distress, more moments of 'grace' when they were not bothered by memories or feeling numb, as well as seemed to smile and laugh more often as well as participated in all the preparation and post sailing tasks as time went by.

A significant reason for the reduced symptomatology seemed to be a sense of control that the participants developed regarding their symptoms. Although the participants still sometimes reacted very strongly to stimuli (such as an over flying helicopter) with nervousness and anger, the emotional outbursts were mainly short lived, and did not impede their coping with the different challenges. Participants seemed to have gained the ability to verbalize their distress, and reduce the intensity and time span of symptoms. One of the participants said: "I still often lose it, but I know I lose it, and I just breathe deeply, do what I need to do, or tell everybody to let me be, or hide somewhere in my head and it just goes away." Another participant said: "I just learned not to hang on to my anger and to let the storm pass." The increased sense of control and the reduced reactivity to external stimuli could be observed when a boat was caught in the mist and

capsized during one of the sessions. Indeed, if during some of the first sessions, external stimuli could cause several participants to become extremely distressed, in this case, all participants remained calm, set the boat right, helped one another to climb back aboard and found their way back to the shore. All participants were exhilarated by the experience.

A further important factor observed was the solidarity and esprit de corps that developed between the participants. Support extended beyond the sessions to include carpooling, visiting a hospital when one of the participants had an accident and providing help in times of emotional turmoil. The solidarity that developed in the team was probably also due to the fact that the team leader was a former POW. This added to a sense of belonging, an absence of formal hierarchy, and the feeling that they were heard and understood, neither judged, diagnosed nor 'treated.' Indeed, a sense of belonging, as well as the empathy of the leader were found in previous studies as important contributors to psychosocial interventions for person with severe mental illness (Hasson Ohayon et al., 2006b; Roe et al., 2009, 2010). One of the participants said: 'I am sick of being treated: I want to be considered as a human being, not as a patient. Here, I can say what I want, and the truth is, most of the time, I don't want to talk about it (my trauma) at all. It is good to know that I do not need to talk about it, but can if I wanted, because I know that Y. (the team leader) understands me.'

Probably, the most important feature of this intervention is that its effect did not stay limited to the intervention setting, but that a process of generalization could be observed, whereby participants improved both their quality of life and their daily functioning. In point of fact, three individuals started work at regular jobs, four started working as volunteers in Challenges activities with problematic youth and most registered for a skipper course. For all participants, the sea had a calming effect. Even though the dangers at sea are greater than on land, many declared feeling 'safe' at sea. One participant declared that 'it is only after coming here that I feel relaxed and that I can really sleep well.' An improvement in hope and in sense of control and purposefulness was also observed. It seems that the mastery involved in being able to maneuver and control the boat gave participants a great sense of self worth, of control and of having tools to face life. One of the participants told us that 'If I can do this (sail through bad weather), I can certainly get through my latest crisis with my wife.' The sense of control is an important feature while coping with crises and illness (Hasson Ohayon et al., 2006a) enabling one to cope as an active agent instead of in a passive, detached or reactive fashion. A recent study showed that a sense of control over the recovery process of sexual assault survivors was related to lower levels of psychological distress (Walsh and Bruce, 2011). Interventions aimed at improving sense of control might be of special benefit for traumatized individuals who feel a loss of control over their lives. Indeed at least one study has suggested that an activity based psychosocial intervention in comparison to a verbal one helped persons with severe mental illness gain an increased sense of control over their lives (Hasson Ohayon et al., 2006b).

Based upon the suggested potential therapeutic mechanisms at play, adventure sports seem to be a fertile learning ground, where participants learn new coping modes, self regulation, self control and restart a process of positive reinforcement of action and problem solving activities as well as reduce some of the strain and stress in their lives.

To conclude, although most individuals still had important levels of posttraumatic stress symptomatology, depression and functioning problems, the intervention was found to help individuals take control over their lives, reduce the impact of the symptoms, returned them to an albeit low but reasonable level

of functioning and provided for hope for the future and a better quality of life. Although NAR should not be considered a first line intervention for chronic CR PTSD, it might be an important addendum to conventional and well documented interventions such as CBT and PE. It also suggests that for clients suffering from CR PTSD, treatment modules with experiential learning paradigms can be advantageous (Berger and Gelkopf, 2009; Gelkopf and Berger, 2009). Indeed NAR could function as a rich 'training ground' for strengthening and quickening change processes as well as function as a reservoir of readily available attitudes, cognitions and memories to be worked on in therapy.

However, while considering the current study results a few limitations should be taken into account. Although the intervention had a positive impact on the participants, it is important to note that sailing NAR might not be relevant for everyone. First, there might be a selection bias, in that only clients who already felt they had a propensity to enjoy outdoor, or sailing related activities participated in the intervention, and second, many of those who thought they might enjoy sailing, dropped out even before the first session. Many reasons for this can be suggested but in light of the absence of differences between groups at baseline it is probable that seasickness or group participation in physical activity in general would be a barrier for many would be participants, and not trauma related variables. A second limitation lies in the small sample sizes of the groups. Nevertheless the 95% CI for each group was relatively small for all the relevant measures suggesting a good reliability of the estimates. A further limitation of the study was the difficulty in generalizing from an all male CR PTSD group to other PTSD groups. Another important limitation lies in the fact the NAR group was compared to a waiting list group, and that we therefore cannot exclude the possibility that it was being part of a group, taking part in an intervention or demand characteristics such as social desirability in wanting to please the team leader that led to changes, and not per se the components of NAR. By far the most important limitation of this study is our lack of theoretical understanding of the active therapeutic ingredients. Further studies should compare NAR to other interventions, be held upon larger samples and attempt to assess which components of NAR are most potent in effecting clinical changes.

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