FOCUSED QUESTION
Will participating in a sensory-enhanced hatha yoga program have any effects on symptoms of combat stress (anxiety and sensory processing) in deployed military personnel compared to the anxiety and sensory processing of stateside civilians?


CLINICAL BOTTOM LINE:
Occupational therapists are skilled at creating interventions that aim to reduce hyper-arousal and improve self-regulation skills for clients experiencing symptoms of stress and anxiety. This study showed that using a sensory-based hatha yoga program as a modality for intervention for veterans experiencing combat stress had potential to effectively address symptoms of combat stress before they developed into full-blown posttraumatic stress disorder (PTSD), reduce anxiety, improve self-regulation skills, and improve occupational performance. A sensory-based yoga program uses different sensory strategies, such as proprioceptive input, slow rhythmic movements, and deep-touch pressure, to promote a calming effect for participants. Occupational therapists should consider this alternative treatment intervention when working with military personnel who are experiencing combat stress. Using this intervention can help reduce stress or anxiety and prevent occupational dysfunction.

RESEARCH OBJECTIVE(S)
List study objectives. There are five objectives for this study:

1. For each of the four quadrants of the Adolescent/Adult Sensory Profile (AASP), assess whether there was a difference between the treatment and the control group in the mean amount of normalization from pretest to posttest.

2. Assess each of the two state-trait scales of the State Trait Anxiety Inventory (STAI) to analyze if the mean changes from pretest to posttest in the treatment group. If there is a change, it could indicate a significantly greater decrease in anxiety than the mean change from pretest to posttest in the control group.

3. With consideration of the AASP’s four quadrants, evaluate whether the mean for the deployed military personnel is less than the mean for the established norm for sensory seeking and greater than the mean for the established norms for sensory sensitivity, sensory avoidance, and low registration.
4. For each of the STAI’s two scales, analyze whether the mean for the deployed military personnel is higher than the established population norm.

5. For deployed military personnel, with consideration of the STAI’s two scales and the AASP’s four quadrants, evaluate whether sensory sensitivity, sensory avoidance, low registration, state anxiety, and trait anxiety have a positive correlation with one another, and evaluate whether sensory seeking is negatively correlated with these other five measures.

DESIGN TYPE AND LEVEL OF EVIDENCE:

The design of this study is a Level I randomized controlled trial in which the participants were randomly selected to participate in either the control or intervention group. This type of study enables the researcher to assess whether the intervention itself, as opposed to other factors, caused the observed outcomes.

Limitations (appropriateness of study design):
Was the study design type appropriate for the knowledge level about this topic? Circle yes or no, and if no, explain.

YES/NO  The study design type was appropriate for the knowledge level about this topic. However, there were several limitations in this study. First, there was a lack of information about the length of deployment and combat exposure, including ongoing exposure, during the course of the study. This information could have affected symptomatology and outcomes. Another limitation was the study’s duration. Because the study lasted only 3 weeks, it prevented the researchers from gathering information about the sequence and timing of symptom onset and treatment sustainability. Lastly, the skewed randomization of all high-sensory sensitivity participants to the control group affected the study results. Researchers relied on their subjective reports, which would have been bolstered by the addition of objective physiological measures.

SAMPLE SELECTION
How were subjects selected to participate? Please describe.

Participants were recruited by flyers and e-mail. Eighty participants first gathered, but only 70 enrolled in the program. Thirty-five participants were in the control group and the other 35 participants received the treatment.

Inclusion Criteria
To be included in this study, participants were required to be military personnel deployed to Forward Operating Base Warrior, Kirkuk, Iraq.

Exclusion Criteria
Any active duty military personnel deployed to Forward Operating Base Warrior who would not be able to complete or participate fully in the study because of redeployment or operational requirements, any active-duty military personnel who took yoga during the month before the onset of the study, all pregnant women, and all civilians were excluded from the study.
SAMPLE CHARACTERISTICS

N = 50

% Dropouts | 12.5%
---|---
#/ (%) Male | 48 (69%)
#/ (%) Female | 22 (31%)
Ethnicity | NR
Disease/disability diagnosis | PTSD

Check appropriate group:

<table>
<thead>
<tr>
<th>Group</th>
<th>20–50/study group</th>
<th>51–100/study group</th>
<th>101–149/study group</th>
<th>150–200/study group</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20/study group</td>
<td>✓</td>
<td></td>
<td></td>
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</tbody>
</table>

INTERVENTION(S) AND CONTROL GROUPS

Add groups if necessary

Group 1

<table>
<thead>
<tr>
<th>Brief Description</th>
<th>The control group consisted of 35 participants who participants did not participate in any yoga classes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting</td>
<td>This group was expected to continue in engaging in military physical training activities.</td>
</tr>
<tr>
<td>Who Delivered?</td>
<td>NR</td>
</tr>
<tr>
<td>Frequency?</td>
<td>NR</td>
</tr>
<tr>
<td>Duration?</td>
<td>Participants were to continue their normal physical training activities during the 3-week trial period.</td>
</tr>
</tbody>
</table>

Group 2

<table>
<thead>
<tr>
<th>Brief Description</th>
<th>The intervention group consisted of 35 participants who participated in sensory-enhanced hatha yoga classes for 3 weeks. This highly structured, sensory integrative, and sensorimotor yoga program was designed to provide a therapeutic threshold of enhanced proprioceptive input, deep touch pressure, slow rhythmical movement, selected pranayama techniques, and a series of asanas. These strategies were chosen to balance the nervous system and produce a more relaxed steady state.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting</td>
<td>This program was based on a yoga program developed by Lucy Cimini in 2005 that aimed to reduce veterans’ symptoms of combat stress or PTSD. The program also followed the Yoga Warrior Lesson Plan, which was a protocol designed to delineate yoga principles. Readings from yoga masters were selected to contribute a sense of peace and calm, and positive affirmations were paired with particular asanas to address the nervous system from a top-down approach. Zen meditation music was played to decrease auditory challenges, such as electrical generators, air conditioners, helicopters, and machine-gun fire.</td>
</tr>
<tr>
<td>Setting</td>
<td>The classes were held in a gym that was constructed of rubber mat flooring, aluminum beams, and plastic fabric walls. Zen meditation music was played during each session.</td>
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<td>----------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Who Delivered?</td>
<td>A certified yoga instructor taught the yoga classes.</td>
</tr>
<tr>
<td>Frequency?</td>
<td>During the 3-week time period, participants were required to participate in a minimum of two sessions per week and a minimum of nine sessions for the entire program.</td>
</tr>
<tr>
<td>Duration?</td>
<td>Each class was 75 minutes long.</td>
</tr>
</tbody>
</table>

**Intervention Biases:** *Circle yes or no and explain, if needed.*

- **Contamination**
  - YES/NO

- **Co-intervention**
  - YES/NO

- **Timing**
  - YES/NO

- **Site**
  - YES/NO

- **Use of different therapists to provide intervention**
  - YES/NO A certified yoga instructor assisted in data collection.

**MEASURES AND OUTCOMES**

Complete for each relevant measure when answering the evidence-based question:

Name of measure, what outcome was measured, whether the measure is reliable and valid (as reported in article – yes/no/NR [not reported]), and how frequently the measure was used.

Several assessment tools were used to measure the outcomes of the study. They are as follows:

- **AASP**
  - Composed of 60 questions sorted into four quadrants: sensory sensitivity, sensory avoidance, low registration, and sensory seeking
  - Researchers were looking to see whether the mean amount of normalization from pretest to posttest in the treatment group was significantly greater than that in the control group. (Normalization consists of scores moving toward the standardized norms on the AASP.)
  - This tool has satisfactory reliability and validity.
  - Coefficients $\alpha$ for each pattern ranged from .66 to .82 in the pilot study and from .64 to .78 in the standardization study.

- **STAI**
  - Consists of two self-report scales for measuring state and trait anxiety.
  - Includes 40 Likert scales.
  - Construct validity and high internal consistency have been established for the scales.
• Coefficients $\alpha$ for the State Anxiety scale is .92 and is .90 for the Trait Anxiety scale.

Quality of Life Survey
• Composed of 18 questions geared to explore occupational performance, hyperarousal, mood, interpersonal relations, and cognitive functioning issues.
• Reliability and validity tests have not been conducted on this tool.

Measurement Biases
Were the evaluators blind to treatment status? *Circle yes or no, and if no, explain.*

**YES/NO** Yes, evaluators were blind to treatment status.

Recall or memory bias. *Circle yes or no, and if yes, explain.*

**YES/NO** No.

Others (list and explain):

NR

RESULTS
List results of outcomes relevant to answering the focused question
Include statistical significance where appropriate ($p < 0.05$)
Include effect size if reported

- In terms of seeing whether there was an effect on participating in a sensory-enhanced yoga hatha program to help increase normalization of sensory processing, the AASP data did not yield evidence to support that hypothesis.
- In terms of reducing anxiety through the use of a sensory-enhanced yoga hatha program, the data yielded evidence that showed the yoga program did aid in significantly reducing both state and trait anxiety. With $p < .001$, the control group experienced a mean increase of 1.38 in state anxiety and the treatment group experienced a mean decrease of 8.23. For trait anxiety, the control experienced a mean increase of 1.21 and the treatment group experienced a mean decrease of 6.86.
- When using the Quality of Life Survey, the researchers found that the treatment participants showed a significant improvement over the control participants on 16 of 18 variables of the Quality of Life Survey. There was a 0.05 significance level.
- There were several variables from the Quality of Life Survey that reached a .01 significance level. The following variables showed improvement in the experimental group compared to the control group:
  - Having trouble sleeping: $p = .002$
  - Feeling down in the dumps: $p = .002$
  - Having outbursts of anger: $p = .003$
  - Always on guard or watching my back: $p = .003$
  - Experiencing feelings of loneliness: $p = .004$
  - Experiencing intrusive thoughts or images: $p = .005$
  - Having bouts of sadness or crying: $p = .007$
- The treatment group reported the following:
54% of participants reported sleeping improvements.
37% of participants commented that they felt more calm and relaxed.
26% commented on other physical benefits.
11% reported a reduction in frustration and anger or had better anger management.

Was this study adequately powered (large enough to show a difference)? Circle yes or no, and if no, explain.

YES/NO The researchers used a power analysis to determine the appropriate sample size. The researchers found that using a sample size of 80 participants allowed for 85% power, which in turn was used to detect the difference between the control and intervention group. With this power and the sample size, it allowed for there to be the possibility of having a 25% attrition rate. Initially, the researchers sought out 80 participants; however, they ended with 70. The standard deviation was 0.77.

Were appropriate analytic methods used? Circle yes or no, and if no, explain.

YES/NO Yes, because the researchers used t-tests. T-tests demonstrate that there was a change from pretest to posttest.

Were statistics appropriately reported (in written or table format)? Circle yes or no, and if no, explain.

YES/NO Results were written out in the study and were included in table format.

CONCLUSIONS
State the authors’ conclusions that are applicable to answering the evidence-based question.

The researchers found that participation in the sensory-enhanced hatha yoga program proved to be effective in reducing both state and trait anxiety in deployed military personnel. The research did not prove that participating in the sensory-enhanced hatha yoga program improved sensory processing in deployed military personnel. Lastly, the research showed that yoga had a positive effect on quality of life for the participants. Yoga can be incorporated into the therapeutic process as a preparatory method or as a purposeful activity, which can carry over once the person has left treatment.

This work is based on the evidence-based literature review completed by Stephanie McAllister, OTS, and Rochelle Mendonca, PhD, OTR/L, Faculty Advisor, University of the Sciences.


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