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| **Student Name: Amy Gwynn** | | | | **Search initially conducted: 9/30/14, Updated: 2/1/15** | | |
| **Question:** “In military personnel with mild traumatic brain injury and post-traumatic stress disorder, does yoga improve sleep quality and increase heart-rate variability?” | | | | | **Searches: PubMed, CINAHL, EMBASE** | |
| **Author/**  **Year** | **Purpose/Design/ Subjects** | **Intervention** | **Outcome Measures** | | **Results** | **Limitations/**  **comments** |
| Cabral, P., et al (2011) | **Design:** Meta-analysis  **Purpose:** To research the efficacy of yoga as treatment for psychiatric disorders (schizophrenia, depression, anxiety, and PTSD).  **Articles:** n= 10 RCT  **Participants:**  N = 343  Yoga: n = 186  Control group: n = 157  Most common intervention used: hatha, iyengar, sudarsha kriya, and mixed versions | Databases used: PubMed/MEDLINE, Cochrane Control Trials Register, Google Scholar, EBSCO  Search terms: yoga for schizophrenia, yoga for depression, yoga for anxiety, yoga for PTSD, yoga therapy, yoga for psychiatric disorders, complementary treatment, and efficacy of yoga therapy  Exclusion criteria: insufficient information, inadequate statistical analysis, yoga was not central component of intervention, subjects were not diagnosed with one of psychiatric disorders of interest, study was not in English, or study did not include a control group | -Beck Depression Inventory  -Hamilton Depression Rating Scale  -self-reported symptoms of depression and trait anxiety  -stress hormone levels | | Yoga therapy is an effective adjunct treatment for several psychiatric disorders (i.e. depression, anxiety, PTSD, and schizophrenia). Yoag may help relieve symptoms that remain after more traditional treatment. | -few well-designed randomized control trials exist on this topic in general  -publication bias may exist |
| Dick, A. M., et al (2014) | **Design:** RCT  **Purpose:** To understand which symptoms of PTSD could be affected by yoga.  **Subejcts:**  n= 38 women who had never practiced yoga regularly with DSM-V full or subthreshold PTSD, 9 veteran, 29 civilian  Drop-outs: in experimental group: n = 6, in control group: n = 6 | Experimental group: 12, 75-min sessions of Kripalu yoga instruction with an emphasis on trauma-sensitive yoga, 9 weekly, and 11 bi-weekly, taught by 200-RYT  Control group: 12 weekly assessment sessions in groups of 5 | -PTSD Checklist-Civilian (PCL-C)  -Emotional Regulation Questionnaire (ERQ)  -Mindful Attention Awareness Scale (MAAS) | | Yoga helped reduce expressive suppression, a component of emotional regulation. Psychological flexibility significantly increased for the control group, and not the yoga group. | Generalizability potentially limited due to: participants with high level of education, partial PTSD diagnoses, low symptom levels, veteran status, and prior yoga experience. There was a small sample size, and a only 10% power, limiting detection of effect size. |
| Kim, S. H., et al (2013) | **Design:** Systematic review  **Purpose:** To evaluate the effectiveness of mind-body interventions on symptoms of PTSD.  **Articles:** 16  6 RCT, 1 randomized non-controlled study, 8 nonrandomized studies, 1 observational non-controlled study  **Participants:**  n= 1065  13/16 studies on adults (n = 813), 1/16 studies on children (n = 31), 2/16 studies on adolescents (n = 221)  average age: 33.92 years  6/16 studies included females only (n = 514), 10/16 included males only ( n = 553) | Databases used:  PubMed/MEDLINE, EBSCO/PsycINFO, Published International Literature on Traumatic Stress Database  Search terms: “mindfulness” OR “mind-body” AND “exercise” OR “yoga” OR “tai chi” OR “qigong” OR “meditation” AND “posttraumatic stress disorder” OR “PTSD”  Selection criteria: English, humans with PTSD, RCTs, comparative and observational studies, studies which looked at whether mind-body interventions change PTSD symptoms  Control groups: relxation, relaxation plus deep breathing and thermal biofeedback, short-term meditation-relaxation to narrative exposure therapy, transcendental meditation to traditional psychotherapy  Experimental groups:  Yoga, meditation, tai chi, qigong, mindfulness-based stress reduction  Interventions were applied anywhere over 1 week to 1 year. | -PTSD Check List (PCL)  -Post-Vietnam Stress Disorder (PVSD) -Harvard Trauma Questionnaire (HTQ)  -Impact of Event Scale  -UCLA PTSD Index for *DSM-IV* (UPID)  -PTSD Reaction Index  -Child PTSD Symptom Scale | | There were conflicting outcomes amongst the RCTs. Three RCTs found statistically significant changes in PTSD symptom reduction based on mantram, meditation-relaxation, and mind-body skills. Two RCTs found found no significant changes in HRV or overall PTSD symptoms. All of the studies which were not RCTs found significant PTSD symptom reduction. | There was high variability in quality, intervention, duration, design, use of control group, age, and gender in the studies utilized making any results challenging to generalize. Recommendations for future studies include: larger sample sizes, more control groups, and outcome measures involving biomarkers. |
| Libby, D. J., et al (2012) | **Design:** unclear  **Purpose:** To understand how yoga is used in specialized VA PTSD treatment programs.  **Subjects:**  n = 125 program coordinators or designated staff at VA PTSD treatment programs | Program directors or designated staff completed a survey regarding use of complementary and alternative medicine modalities in the past year. Items included prevalence, nature, and context of the use of yoga, mindfulness, and meditation other than mindfulness practices | There is large variation in terms of what practices are offered in each VA specialized PTSD program. Cited challenges include: “lack of staff” and “lack of funding.” Further research into understanding benefits of yoga to help establish yoga as a therapy used in this setting would be beneficial. No specifics otherwise on measure utilized. | | 81 mixed format questions, estimated to take 30 min to complete, assessing use of 32 types of CAM within the past year | There may be response bias as only 125/170 programs completed the survey. There may have been a difference in response based on who responded, and what their role in the program is. Respondents weren’t provided with definitions for the CAM interventions. Additionally, the number of veterans who are receiving this kind of therapy in a PTSD setting was not established. |
| Mitchell, K. S., et al (2014) | **Design:** RCT  **Purpose:** To determine if yoga can help reduce symptoms of PTSD in women.  **Subjects:** n = 38  Mean age: 44.37 yo (SD = 12.37)  Mean BMI: 29.33 (SD = 7.38)  who had not taken a yoga class in the past 6 months, nor had substance abuse problems in the past 3 mos, or currently at risk of suicide | Control group: met 1x/wk for 12 wks and only completed questionnaires in groups of 4-5, did not perform yoga  Experimental group: 12, 75-min gentle-moderate level Kripalu-style yoga classes either 1x/wk or 2x/wk until all 12 classes were completed | -PC-PTSD  -PTSD Symptom Scale-Interview (PSS-I)  -Structured Clinical Interview for *DSM-IV* (SCID-I/P)  -The Trauma Life Events Questionnaire (TLEQ)  PTSD Checklist-Civilian (PCL-C)  -Center for Epidemiological Studies-Depression Scale (CES-D)  -State-Trait Anxiety Inventory (STAI) | | Participants in the yoga group had significant decreases in PTSD symptoms, including re-experiencing, and hyperarousal symptoms. Both groups showed clinically significant change on the PCL. No significant differences in symptoms were noted between groups at the end of the study. | -small sample size  -study noncompleters had significantly higher PCL scores than study completers  -only a 1 month follow-up was completed, so long-term effects are not able to be determined |
| Staples, J. K., et al (2013) | **Design:** cohort study  **Purpose:** To evaluate feasibility and effectiveness of a yoga program as an adjunctive therapy for improving PTSD symptoms in veterans with military-related PTSD.  **Subjects:**  n= 12  all veterans  mean age: 62.2 (SD = 2.2)  male: 10  female: 2  military branch: Army = 7, Navy = 4, Marine = 1  Drop outs: 3 in yoga group, no ITT | Control group: None  Experimental group: 1 hour class 2x/wk for 6 wks from the Krishnamacharya Healing and Yoga Foundation, by three different teachers, focusing on self-awareness, postures with breath awareness, and then full body relaxation with guided visualization | -PTSD Checklist (military version = PCL-M)  -Pittsburgh Sleep Quality Index (PSQI)  -State-Trait Anger Expression Inventory-2 (STAXI-2)  -Outcome Questionnaire 45.2 (OQ-45.2) | | Yoga may be an effective adjunctive therapy for improving hyperarousal symptoms of PTSD, potentially including sleep quality. Subjectively, participants rated the classes as being “very” or “extremely” helpful in improving QOL. | -small sample size  -lack of a control group |
| Stoller, C. C., et al (2011) | **Design:** RCT  **Purpose:** To explore the effects of sensory-enhanced hatha yoga on combat stress in military personnel deployed to Iraq.  **Subjects:**  n=70  deployed military personnel in Kirkuk, Iraq  Military: U.S. Army: 20, U.S. Air Force: 50  gender: 22 women, 48 men  mean age: 32 yo SD: 9.09  Drop outs: n=10, all in treatment group | Control group: no training beyond regular military physical exercise regimen  Experimental group: 75 minute sensory-enhanced hatha yoga classes led by PI, offered 7x/wk for 3 wks, participants had to attend at least 2 classes/wk. Elements included: centering, asana, pranayama, meditation, and savasana. Participants also still engaged in their regular military physical exercise regimen. | 1. Adolescent/Adult Sensory Profile (AASP): self-administered standardized sensory processing scoring questionnaire to determine threshold and categorize patients into sensory profiles.  2. Spielberger Trait Anxiety Inventory (STAI): self-administered and standardized state and trait anxiety questionnaire  3. Quality of Life Survey: self-administered tool developed by authors of this study to assess occupational performance, level of arousal, mood, interpersonal relations, and cognitive functioning | | The use of sensory-enhanced hatha yoga on symptoms of combat stress in military personnel is supported as it produces statistically significant reductions in state and trait anxiety when compared to the control group. Participants also experienced better sleep quality, though this was only noted on the subjective quality of life scale. | This study’s small sample size of subjects were all deployed military personnel, all who tested normal on the AASP, making the results difficult to generalize. The study’s intervention was complex making it challenging to elucidate which element was the most effective in reducing state and trait anxiety. Also, the PI was supervising the outcome measures and taught all of the yoga classes. |
| Telles, S., et al (2010) | **Design:** RCT  **Purpose:** To understand the effects of yoga on PTSD symptoms and heart rate variability in Bihar flood survivors in north India.  **Subjects:**  n = 22  all male  yoga group mean age: 31.9 (SD = 9.3)  control group mean age: 30.8 (SD = 5.5) | Control group: participants continued with the routine they already had at their camp  Experimental group: practiced yoga 1 hr/day for 7 days, from 6-7AM, included loosening exercises, physical postures, breathing techniques, and guided relaxation | 10-cm VAS: fear, anxiety, disturbed sleep, sadness  **HRV:** 4 channel digital polygraph EKG  **Respiration:** volumetric pressure transducer fixed around trunk | | No significant changes in HRV or RR. The yoga group showed significant decrease in self-rated sadness on VAS. The control group showed an increase in self-rated anxiety on VAS. | -lack of follow-up  -short length of study  -small sample size |
| Van der Kolk, B. A., et al (2014). | **Design:** RCT, Investigator-blinded  **Purpose:** To determine whether or not yoga helped increase tolerance and decrease PTSD symptoms in women with histories of interpersonal violence who were unresponsive to treatment.  **Subjects:**  n=64  mean age: 42.9 yo SD: 12.0  white race: 78.1%, non-Hispanic: 85.9%  dropouts: n = 4, 1 in treatment group, 3 in control group | **Control group:** 1 hour session of women’s health education class 1x/wk for 10 weeks, participants were allowed to bring food, and have contact with each other outside of the course  **Experimental group:** 1 hour session of trauma-informed yoga class 1x/wk for 10 weeks including breathing postures and meditation by certified yoga teachers with master and doctoral level degrees in Psychology. Participants were not allowed to bring food or have contact with each other outside of the course. | 1. **Clinical Administered PTSD Scale (CAPS):** 45-60 min interview which assesses 20 *DSM-V* PTSD symptoms, onset and duration of symptoms, distress, impact of symptoms on social and occupational functioning, severity, dissociative subtype information 2. **Inventory of Altered Self-Capacities (IASC):**  used to identify issues with affect regulation, and emotional control 3. **Davidson Trauma Scale (DTS):** quick assessment of PTSD symptoms 4. **Beck Depression Inventory II:** quantifies severity of depression | | In women with chronic treatment-resistant PTSD, a 10 week yoga program can significantly reduce PTSD symptoms. | Different instructors were used for each group  -different evaluators were used for assessment  -sampling bias potentially due to presence of comorbidities  -difference in amount of social support provided for each group |

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**Summary/Synthesis:**

A total of 104 studies that met the inclusion and exclusion criteria were identified. This group was narrowed down to 9 studies based on relevance to the clinical question and study quality. This group included 2 systematic reviews (SR), 5 randomized controlled trials (RCTs), and 2 case series. Due to the small amount of research on this topic not all of the studies are SR’s and RCTs, and not all studies look at military or veteran populations. A total of three studies were reviewed for a CAT and discussed due to their superior quality, intervention that was closest to yoga, and use of a military population.

Of the RCTs (average Downs & Black score = 20.8/28), generally the sample sizes are small, attrition is moderate, investigators are generally not blinded to the experiment, and the discussion always includes the need for more research on yoga over a longer period of time with a larger sample size.

These studies consider a variety of types of yoga for a variety of populations who experience PTSD. The SRs used reviewed a small number of articles and looked at studies regarding different mind-body practices for PTSD, and yoga as therapy for major psychiatric disorders— there isn’t currently an SR specifically about yoga and PTSD, probably since it is such a small topic. There also is a lack of studies for individual mind-body approaches, limiting the SR as well.

The effects of yoga on PTSD are still questionable as pointed to by the SR by Kim et al., which found only 3/6 RCTs had significant improvement in PTSD symptoms, and 2/6 found no change in HRV or PTSD symptoms.

**Implications for Future Research:**

The authors recommend future longer-term studies that are randomized and controlled which include larger samples on populations with identified confounding variables and outcome measures involving biomarkers. For example, utilizing outcome measures that rely on more objective, quantitative data such as sleep data or heart rate variability would be helpful to further establish yoga as an intervention for the military population and others as well.

Future systematic reviews focused on one particular intervention for defined populations would help determine which interventions are the most significant and valuable in practice for which patients.

Further research into non-pharmacologic psychobiological mechanisms. through which mind-body intervention work would be helpful to justify using yoga in clinical practice, especially in terms of receiving financial reimbursement.

Additionally, further exploration and establishment of self-identification and self-treatment techniques to modulate affect and arousal changes related to PTSD could help reduce cost of service, positively affect dependence of patients with PTSD on mental health services, and help reduce re-victimization of PTSD (van der Kolk et al., 2014).