Yoga Nidra as a Non-Pharmacological Intervention for Improving Mood

Original Research

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Abstract

Introduction: Yoga Nidra has gained recognition as an effective intervention for stress and anxiety. This study investigated the therapeutic (psychological and physiological) effects of Yoga Nidra, focusing on its impact on mood and engagement.

Methods: Twenty-one participants (N=21, 6 males) underwent a 30-minute Yoga Nidra session while wearing EEG headbands and wristbands to monitor brainwave activity, heart rate variability, and electrodermal activity. Mood changes were assessed using the Profile of Mood States (POMS).

Results: The results revealed that engagement during the practice, characterized by increased alpha and high beta brainwave activity, were associated with positive mood outcomes. Alpha was positively correlated with vigor (p = .016). High beta was negatively related to confusion (p = .009), and fatigue (p = .016). Conversely, sleep stages, indicated by theta and delta activity, correlated with poorer mood outcomes. Theta was positively correlated with confusion *(p = .007)* and fatigue *(p = .009)*. Delta was positively correlated with confusion *(p = .014)* and anxiety *(p = .048)*. Additionally, longer sleep durations during the session were inversely related to alpha wave power and positively related to high beta wave power *(all p's < 0.05)*, highlighting the nuanced interplay between relaxation and engagement.

Conclusions: Combined, these findings suggest that Yoga Nidra's psychological benefits are optimized through active participation rather than transitioning into sleep states since sleep states during the practice associated with negative mood outcomes. The study underscores Yoga Nidra's potential as a non-pharmacological therapeutic intervention for improving short-term mood states.

Key Words: EEG, Mood, Yoga Nidra, Sleep

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Introduction

Yoga Nidra, commonly referred to as "sleep yoga" or iRest, is a guided meditation and relaxation technique rooted in ancient Indian practices. Unlike traditional yoga, which requires physical postures (asanas), Yoga Nidra is a deeply meditative practice, offering a period of deep rest, where the body is at rest while the mind transitions between states of wakefulness and sleep[1,2]. The practice involves guided mental imagery and progressive relaxation of each body part, typically facilitated by a trained instructor's voice[3,4]. The goal of Yoga Nidra is to lead the practitioner into a hypnagogic state (hypnagogia) —an intermediate stage of consciousness characterized by calm awareness and deep relaxation, without falling asleep[1,5].

Yoga Nidra has increasingly gained recognition as an intervention for a variety of conditions, ranging from stress reduction to sleep improvement and mental health support[1,5]. One of the key reasons for its increasing popularity,

particularly in Western settings, is its accessibility—anyone, including those with physical limitations or chronic conditions, can practice Yoga Nidra without the need for physical exertion[1,6]. This non-invasive and cost-effective approach makes Yoga Nidra an appealing alternative or complementary treatment in both clinical and community settings. The framework of Yoga Nidra was developed into iRest, as a form of Yoga Nidra adapted for Western practitioners. This form blended traditional relaxation techniques with principles of Western psychology and neuroscience[1]. iRest has since been endorsed by the U.S. military for use in treating post-traumatic stress disorder (PTSD) and has been incorporated into various military and veteran healthcare programs due to its promising outcomes in reducing anxiety and improving emotion regulation[1,7].

Given the increasing prevalence of stress and anxiety in young adults, there is a need for effective, non-pharmacological interventions that address both the psychological and physiological aspects of stress. Given the success of Yoga Nidra intervention in U.S. military populations, it is possible that this intervention would also be beneficial for young adults. Young adults between the ages of 18 and 24 experience heightened levels of stress and anxiety as they navigate the transition from adolescence to adulthood[8,9]. This developmental stage is marked by uncertainty in areas such as education, employment, relationships, and identity formation, all of which contribute to increased mental health challenges[10,11]. In the United States alone, approximately 40 million adults are affected by anxiety disorders, and it is estimated that 75% of individuals with anxiety experience their first episode by age 22[1]. Given the widespread nature of anxiety and stress in this population, it is critical to explore interventions that not only provide psychological relief but also address underlying physiological stress responses.

From a physiological perspective, Yoga Nidra is believed to activate the parasympathetic nervous system, promoting relaxation and reducing sympathetic nervous system activation, which is responsible for the body's fight-or-flight response[4,12,13]. This process is thought to be mediated by the hypothalamus, which regulates autonomic functions such as heart rate, blood pressure, and stress hormone release[1]. A shift in brain wave patterns can be observed during Yoga Nidra when a participant enters a relaxed, yet aware, state[14]. Prior studies suggest that alpha activity promotes emotional regulation and stress relief, making it critical in interventions targeting mood enhancement. For example, increased alpha activity is associated with deep relaxation[15] and previous work shows that Yoga Nidra increases relaxation via enhanced alpha wave activity [16]. Beta wave activity is linked to increased alertness [17]. Yoga Nidra has also been shown to specifically increase beta wave activity [18]. However, it is also reported that, during Yoga Nidra, there is a shift from beta activity to alpha and theta wave activity[1]. In general, the interplay between EEG frequencies suggests that Yoga Nidra encourages a balance between relaxation and alertness.

Despite its rising popularity, there remains a significant gap in the literature regarding the physiological mechanisms underlying Yoga Nidra's effects, particularly in relation to stress reduction and autonomic nervous system regulation. Most of the existing research focuses on the psychological benefits of Yoga Nidra, such as improvements in mood, stress, and sleep quality, with fewer studies examining its impact on physiological biomarkers such as brain wave coherence and autonomic function[1,14]. Moreover, while there is evidence supporting the use of Yoga Nidra for stress management, the specific mechanisms by which it affects stress-related physiological responses, such as changes in heart rate (HR)[1] and skin conductance, have yet to be fully explored.

The present study aimed to fill this gap by investigating the effects of Yoga Nidra on both psychological stress and physiological markers. We hypothesized that the impact of Yoga Nidra on subsequent mood would be determined by the level of engagement in the intervention. Specifically, greater levels of focus during the yoga Nidra induction, as evidenced by higher levels of alpha or high beta, would associate with improved mood following the induction. We further hypothesized that individuals who experienced deeper levels of sleep during the intervention would have poorer mood following the intervention.

Scientific Methods

This study tested the effect of Yoga Nidra (iRest) on psychological and physiological therapeutic outcomes as part of a larger study.

[1] Acronyms throughout this paper are as follows: Heart Rate (HR), electrodermal activity (EDA), anger–hostility (AH), confusion–bewilderment (CB), depression–dejection (DD), fatigue–inertia (FI), tension–anxiety (TA), vigor–activity (VA), friendliness (F). and Total Mood Disturbance (TMD).

Participants

Participants (*N* = 21, 6 males) mean age = 19.33, *SD* age= 1.06, were fitted with an Enchanted Wave (Enchanted Wace, LLC) EEG headband and an Empatica (Empatica, LLC) E4 wristband at the start of each session. The EEG headband recorded electrical activity from the forehead (Fp1 region), while the Empatica wristband measured various physiological metrics, including heart rate (HR) and electrodermal activity (EDA). The study was conducted according to a protocol that was reviewed and approved through the Nova Southeastern University Institutional Review Board (IRB).

Protocol

The sessions took place in a quiet, dimly lit room where participants were alone during the intervention. A researcher monitored the EEG and Empatica measurements in real-time from an adjacent room. Participants listened to a professional guided Yoga Nidra protocol (iRest Audio) for 30 minutes. At the conclusion of the session, participants completed the Profile of Mood Sates (POMS) to assess psychological outcomes. EEG was recorded during the session using an Enchanted Wave headband (Enchanted Wave, LLC). The system categorized brainwave activity into four primary stages: alpha, high beta, theta, and delta waves. For peripheral Measures an Empatica E4 wristband was used (Empatica, LLC). Heart rate (HR) and electrodermal activity (EDA) were monitored throughout the session using the Empatica E4 wristband. For psychological measures we used the Profile of Mood States (POMS)[19]. The POMS was used to measure mood disturbances across six subscales: anger–hostility, confusion–bewilderment, depression–dejection, fatigue–inertia, tension–anxiety, vigor–activity, and friendliness There is also a composite Total Mood Disturbance (TMD) score.

Statistical Analysis

To test the hypothesis that the benefit of engaging in Yoga Nidra on mood would be altered based on the active engagement in the intervention compared to relaxing to the point of sleeping, a series of correlations were examined. Specifically, the correlations between POMS mood states and EEG band frequencies. Further, to determine if deeper levels of sleep like EEG frequency were related to mood, we examined the correlations between time spent in each sleep stage and POMS mood states.'

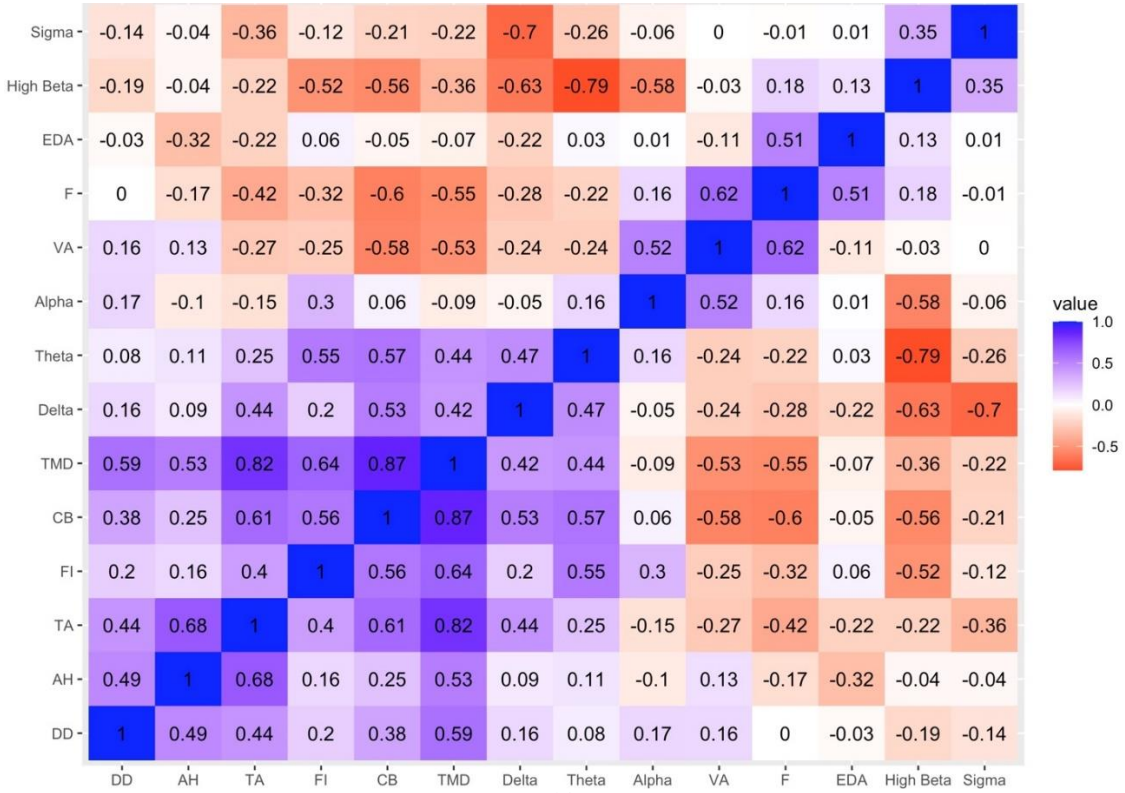
Results

Analyses of Heart Rate did not show any significant relationship between mood or EEG measures. Since the relationships between Heart Rate and either mood or EEG measures were not the focus of the current study and no specific hypotheses related to Heart Rate had been made this data is not presented. Table 1 shows that EDA during the practice correlated with the POMS depression score (p = -0.03).

As seen in Table 1, measures of passive and focused attention, alpha and high beta, were related to better mood following the induction. Specifically, alpha was positively correlated with vigor, $r\,(19) = .52$, $p = .016$, and high beta was negatively related to confusion, $r\,(19) = -.56$, $p = .009$, and fatigue, $r\,(19) = -.52$, $p = .016$. Conversely, theta was positively correlated with confusion, $r\,(19) = .57$, $p = .007$, and fatigue, $r\,(19) = .55$, $p = .009$. Delta was positively correlated with confusion and bewilderment, $r\,(19) = .53$, $p = .014$, and anxiety, $r\,(19) = .44$, $p = .048$.

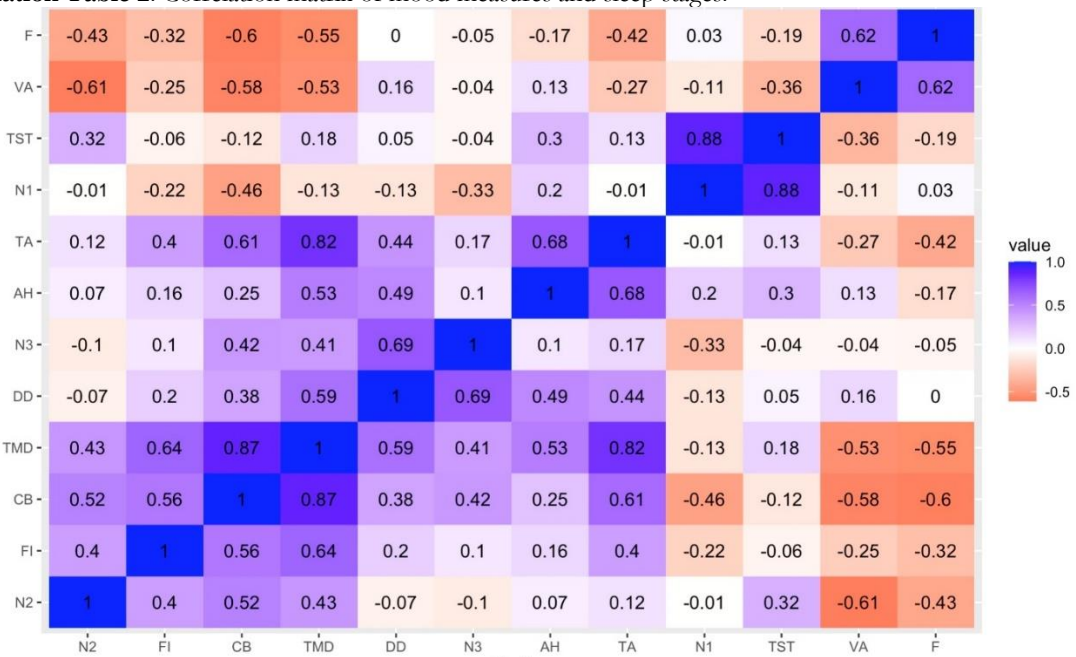
To further examine the relationship between depth of sleep classified by the EEG band as N1, or N2 sleep, plus total sleep time and mood following the Yoga Nidra intervention, we examined correlations between these measures. These correlations can be seen in Table 2. Confusion and bewilderment were negatively correlated with time spent in N1 sleep, $r\,(19) = -.46$, $p = .037$, and positively correlated with the time spent in N2 sleep, $r\,(19) = .52$, $p = .016$. Vigor, Friendliness, and total mood disturbances were negatively related to time spent in N2 sleep, $r\,(19) = -.61$, $p = .003$, $r\,(19) = -.43$, $p = .049$, and $r\,(19) = .43$, $p = .049$, respectively. Of note is that the depression measure was positively correlated with N3 sleep time (indicating deep sleep), $r\,(19) = .69$, $p = .0005$, but not related to the other sleep measure. Interestingly, the total amount of time that individuals were classified as being asleep overall (regardless of stage) was positively related to the amount of high beta wave power, $r\,(19) = .50$, $p = .022$, and negatively related to alpha wave power, $r\,(19) = -.61$, $p = .003$. EDA was positively correlated with friendliness, $r\,(19) = .51$, $p = .019$.

Correlation Table 1. Correlation matrix of mood measures and EEG bands.



Note: Numeric values in the cells represent the Pearson r value. The color represents the strength and direction of the relationship with red values representing negative relationships and purple representing positive relationships. Acronyms are as follows: electrodermal activity (EDA), anger–hostility (AH), confusion–bewilderment (CB), depression–dejection (DD), fatigue–inertia (FI), tension–anxiety (TA), vigor–activity (VA), friendliness (F). and Total Mood Disturbance (TMD).

Correlation Table 2. Correlation matrix of mood measures and sleep stages.



Note: Numeric values in the cells represent the Pearson r value. The color represents the strength and direction of the relationship with red values representing negative relationships and purple representing positive relationships. Acronyms are as follows: anger–

hostility (AH), confusion–bewilderment (CB), depression–dejection (DD), fatigue–inertia (FI), tension–anxiety (TA), vigor–activity (VA), friendliness (F). Total Mood Disturbance (TMD), Total Sleep Time (TST).

Discussion

The present study tested the impact of Yoga Nidra on both psychological and physiological outcomes. The results confirmed our hypothesis that greater mental engagement, as evidenced by alpha and high beta wave activity, correlated with improved mood. Conversely, theta and delta, slower EEG band activity (indicating sleep during the session), were associated with poorer mood outcomes, providing novel insights into the role of mental engagement and alertness on the effects of Yoga Nidra.

Alpha and high beta wave activity, indicative of relaxed attention and cognitive focus,[17], were positively correlated with vigor and negatively correlated with fatigue and confusion. This supports the idea that active engagement during Yoga Nidra optimizes its psychological benefits. These findings align with previous literature suggesting that Yoga Nidra facilitates a hypnagogic state where relaxation coexists with awareness—leading to enhanced mood regulation [1,5].

In contrast, theta and delta wave activity, which signify deeper relaxation or sleeping[20], were associated with increased confusion, and anxiety. Interestingly, time spent in N2 and N3 sleep stages negatively impacted mood. Notable, higher N3 sleep time correlated with higher depression scores. These results suggest that the therapeutic benefits of Yoga Nidra may diminish when participants transition from a meditative state to a sleep state. The EDA findings also support this notion since higher EDA (increased sympathetic arousal) during the session was associated with lower depression scores. This is also consistent with the hypothesized mechanisms where Yoga Nidra activates the parasympathetic nervous system, promoting calmness without the need for inducing sleep [4,21]. Participants who fell asleep during the practice may have been experiencing a greater degree of sleep debt, potentially due to inadequate sleep at night. Their propensity for sleep during the session was correlated with the depression scores. Indeed, the connection between sleep loss and depression is well-documented, with depression being the most prevalent mood-related consequence of insomnia—90% of individuals with insomnia report experiencing depressed mood [22]. Notably, prior research from our lab demonstrates that even a single night of sleep deprivation can significantly increase self-reported depression [23].

The inverse relationship between total sleep time and alpha wave power, coupled with the positive association between total sleep time and high beta wave power, underscores the complexity of the brain's response during Yoga Nidra. In general, these findings suggest that a balance between relaxation and engagement is critical for optimizing the psychological benefits of Yoga Nidra.

The study supports the potential for Yoga Nidra to serve as an accessible and non-pharmacological therapeutic intervention for improving mood and deep rest without sleep. This is particularly needed in populations such as young adults who face heightened mental health challenges or tactical populations who need opportunities of deep rest but might not be able to engage in sleep [8,9]. The findings also reinforce the importance of adapting Yoga Nidra protocols to encourage focused engagement rather than passive relaxation that transitions into sleep. This could involve modifications such as shorter session durations or structured cues to maintain wakeful awareness during the practice.

It is important to note that the study has several limitations that warrant consideration. A notable limitation of this study is the absence of a control group. Future research should include a control condition, such as a passive relaxation group or an active alternative intervention, to better isolate the specific effects of Yoga Nidra on psychological and physiological outcomes. The small sample size and younger age of the participants limits the generalizability of the results. Additionally, the reliance on self-reported mood measures may not capture the full spectrum of psychological changes associated with Yoga Nidra. Future studies should include additional validated physiological or behavioral measures. There was also a potential influence of unmeasured confounding factors (e.g. such as sleep patterns, stress levels, and recent physical activity) on EEG and physiological measures. While these variables were not directly assessed, we implemented standardized protocols to mitigate their impact. Future studies should explore longitudinal designs with larger, more diverse populations and include additional objective measures of psychological and physiological outcomes.

Conclusions

In conclusion, the study demonstrates that Yoga Nidra holds significant promise as a deep rest intervention for improving mood—if participants remain actively engaged during the practice. These findings contribute to the growing

body of evidence supporting Yoga Nidra as a valuable tool for enhancing mental health and well-being. Further research is needed to elucidate the precise underlying mechanisms to optimize the therapeutic application of Yoga Nidra in clinical and community settings. In practical terms, this suggests that mental health professionals, wellness practitioners, and community organizations can integrate guided Yoga Nidra sessions into their programs to support individuals dealing with mood disturbances. Educating participants on the importance of active engagement during Yoga Nidra practice and providing accessible, high-quality resources could enhance its effectiveness. Furthermore, tailoring sessions to specific populations, such as veterans, first responders, or individuals with chronic stress, may maximize its therapeutic benefits.

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Conflict of Interest. Jaime Tartar is a scientific advisor for the Enchanted Wave company. This company produces the EGG bands that were used in the present study. While she holds shares in this company, she has never received payment or compensation in any form from this company.

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