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The Effects of a Single Session of Online Yoga for Anxiety and Mood States: A Pilot Study

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***PURPOSE**: The purpose of this study was to examine the effects that a single session of online yoga has on anxiety. The secondary purpose was to compare the anxiolytic effects of this study to the effect size reported for the effects of single session in-person yoga.* ***METHODS**: Eligible participants were randomly assigned to a 30-minute, prerecorded Zoom session of either yoga practice or yoga information. Prior to and following completion of the recording, participants completed an online survey assessing anxiety and mood. An effect size (SMD) was calculated and compared to the effect size reported in a meta-analysis.* ***RESULTS**: Statistically significant group X time interactions were found for anxiety outcomes (intensity, frequency, total) ($p<.026$) and for POMS tension, fatigue, depression, esteem-related, vigor, and total mood disturbance scores, $p<.041$. Yoga participants reported a greater reduction in total anxiety and total mood disturbance scores compared to information participants. The SMD anxiety scores in this study was .54 (95% CI, .051-1.03), which is comparable to the effect size previously reported which was .55 (95% CI, .29-.79).* ***CONCLUSION**: A single session of online yoga was found to reduce anxiety. When compared to in person yoga, online yoga appears to have similar anxiolytic effects.*

***Keywords**: Online exercise, anxiety, yoga, mood*

Introduction

The novel coronavirus 2019 (COVID – 19) pandemic brought immense alterations on daily life, causing drastic limitations and restrictions on daily tasks, inhibiting normal social activities and interactions. Individuals' mental health has also been impacted by the pandemic. A nationwide psychological survey on the general Chinese population, found that 53.8% of the participants reported the COVID-19 outbreak as moderate or severely psychologically impactful.[1] Additionally 28.8% of respondents reported moderate to severe anxiety symptoms.[1] When compared to pre-pandemic anxiety levels, there has been an increase in individuals reporting symptoms of anxiety during the pandemic, 17.3% to 20.1%.[2] Data from a nationally representative sample in the US revealed that the percentage of individuals screening positive for anxiety increased from 8.2% in 2019 to as high as 30.0% in 2020.[3] Anxiety symptoms have been shown to impact social activities, work, and home life.[4]

The impact of COVID-19 has potentially left many individuals without proper psychological treatment. Possible anxiety-related circumstances, such as fear of crowds or fear of infection, and limited psychological services may also contribute towards individuals

being unable to receive treatment. Common treatments for anxiety include pharmaceutical medication and cognitive behavioral therapy.[5] Pharmaceutical medication such as selective serotonin reuptake inhibitors (SSRIs) and serotonin/ norepinephrine reuptake inhibitors (SNRIs) have been shown to significantly improve anxiety and anxiety-related disorders.[5] Face-to-face cognitive behavioral therapy has also been found as an effective treatment for anxiety.[5] Although significantly effective in treating anxiety, such treatment options can be expensive and/or require a physician's prescription that individuals may have been unable to obtain due to COVID-19 restrictions or unable to afford due to loss of job and benefits resulting from the pandemic. Alternative treatments for anxiety that are safe, effective, and accessible are needed.

Participation in a single session of physical activity has been shown to decrease anxiety[6] and increase overall mood[7] whilst being cost effective for many individuals.[7] One study found that during COVID, self-reported physical activity was associated with improving mood states, with anxiety relief being a top motivator for physical activity.[8] However, Marashi et al. reported barriers to physical activity during COVID were lack of equipment and access to gym facilities.[8] Pre-COVID common barriers to physical activity among young adults were found to be: Facilities do not have inconvenient schedules for me, Costs too much money, Place too far away, and Too few places.[9] These studies highlight the need to address barriers concerning access to physical activity. One type of physical activity that has been shown to result in improvement in anxiety symptoms is yoga.[10] Unlike aerobic or resistance training exercises that can require gym equipment or adequate space, yoga participation can occur within the home with little equipment. One meta-analysis summarizing the effects of a single session of yoga on anxiety found that a single session of yoga resulted in a small to moderate but significant reduction in anxiety.[10] Larger reductions in anxiety were found for yoga sessions rated over 10 (light intensity) on Borg's 6-20 RPE scale, for participants that had previous yoga experience, and when anxiety was assessed 0-10 minutes after the yoga session.[10] Due to pandemic constraints, opportunities to participate in yoga through Internet based platforms, has created a space where individuals are able to continue to participate in physical activity classes from their own home. A meta-analysis found that online Hatha yoga interventions were a feasible, "lower cost, and non-invasive intervention" option for management of an array of disorders and symptoms that yielded promising attendance and practice rates.[11] This suggests that providing online yoga interventions could reduce barriers to seeking alternative treatment options for conditions such as anxiety. One form of yoga, hatha yoga, may be particularly beneficial for reducing anxiety as hatha yoga focuses on slow and deliberate movement as well as the constructs of relaxation and mindfulness. The aims of the present study were 1) to examine the effects of a single session of online hatha yoga session on anxiety and mood state in college-aged individuals, and 2) to compare the results found in the current study to results reported in a recent meta-analysis[10] that summarized the effects of a single session of in-person yoga on anxiety.

Methods

Participants

The participants (n = 29) were recruited via email, campus flyers around the Temple University and Philadelphia area, and word of mouth. Recruitment of participants lasted from October 2021 to March 2022. Inclusion criteria included participants being between the ages of 18 to 30 years old, having no contraindications to exercise, and having a score of at least a total score of 60 on the Anxiety Symptoms Questionnaire (ASQ). All participants provided

informed consent before participating in this study. The Temple University Institutional Review Board approved the study (record number: 28743).

Participant Screening

Potential participants were screened through a Qualtrics screening survey that assessed physical health status, participation in physical activity, and anxiety symptoms. Physical health status was evaluated utilizing the Physical Activity Readiness Questionnaire (PAR-Q+)[12]. Participation in physical activity was assessed using the Paffenbarger Physical Activity Questionnaire.[13] Anxiety symptoms were assessed using the Anxiety Symptom Questionnaire (ASQ).[14] Participants were not required to be diagnosed with an anxiety disorder in order to be included in this study.

Measures

Anxiety

Anxiety was assessed utilizing the Anxiety Symptoms Questionnaire (ASQ).[14] This is a 17-item questionnaire that measures the frequency and intensity of anxiety symptoms on a 0 (None) – 10 (Extreme) scale. An example of a statement included "Please select number below that best describes your experiences regarding the Intensity (A) and Frequency (B) of this symptom: Nervousness." The ASQ assesses a range of symptoms central to anxiety that includes nervousness, worrying, irritability, trouble relaxing, insomnia, lack of energy, difficulty concentrating, somatic symptoms and impairment in functioning due to anxiety. The ASQ total score is calculated by summing the 17 frequency and 17 intensity scores together. The subtotal ranges for both frequency and intensity are 0 to 170 and total ASQ scores ranges from 0 to 340. A minimum score of 60 was required to be included in this study based on findings from a previous study using the ASQ in college-aged individuals.[14] The ASQ takes approximately 2 - 3 minutes to complete. The ASQ was found to have a test-retest reliability of 0.77 in a sample of college students.[14] Additionally, the ASQ in a sample of college students was found to have an overall Cronbach's α of 0.96 for total scores and Cronbach's α of 0.93 for both the intensity and frequency subscales.[14]

Mood States

Mood states were assessed using the short-form version of the Profile for Mood States (POMS).[15] This version is a 37-item inventory of six subscales: tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment. Eligible participants rated the overarching question "How are you feeling right now?" for each stated mood descriptor (e.g., Tense). Responses were provided on a 5-point scale with a range of 0 (not at all) and 4 (extremely). Scores are calculated through the summing of 5 subscales (tension-anxiety, depression-dejection, anger-hostility, fatigue-inertia, and confusion-bewilderment) and subtracting the subscale scores of vigor-activity and esteem-related affect. The POMS-SF takes approximately 5 -7 minutes to complete. The Profile of Mood States Short Form has been found to have a test-retest reliability ranging from .76 to .95.[16]

Rate of Perceived Exertion

Rate of Perceived Exertion was assessed utilizing Borg's 6-20 Rating of Perceived Exertion scale.[17] This was a 1-item inventory with a category scale that ranged from 6 (no exertion at all) to 20 (maximal exertion). Rating of perceived exertion was assessed during the post-condition questionnaire.

Eligible participants were then randomized into two groups: yoga practice or yoga information. This study was completed entirely online, with no required in-person meeting. All data were gathered using Qualtrics.

Yoga Intervention

Hatha yoga was chosen as the form of yoga as it focuses on slow and deliberate movement as well as the constructs of relaxation and mindfulness. The yoga practice recording included a Hatha yoga sequence of tabletop, cat/cow, hip circles on knees, mountain pose, standing stretches, sun salutation, tree, and star pose. Variations for certain poses were also offered to provide participants with alternative options to ensure they were able to complete the sequence safely. The yoga practice session was conducted at low intensity to minimize risk of injury.

Yoga Information

The yoga information recording included background information about Hatha yoga, the relationship between yoga and psychological health, and information about mindfulness. There was no physical activity involved with the yoga information group.

Zoom recordings were used for both conditions, with each recording lasting approximately 30 minutes, and taught by the same licensed yoga instructor. Participants in both conditions were asked to complete a pre-condition questionnaire via Qualtrics that assessed amount of sleep during the prior night, caffeine consumption prior to completion of session, expectations of session, anxiety symptoms, and mood states. Participants then watched their respective Zoom recording. Once the recording was completed, participants then completed the post-condition questionnaire via Qualtrics which assessed rate of perceived exertion, anxiety symptoms, and mood states.

Statistical Analysis

Data was analyzed using version 28.0 of the IBM Statistical Package for the Social Sciences (SPSS) software (IBM Armonk, NY). The primary hypothesis that anxiety would be reduced significantly for the yoga participants and unchanged for the yoga information participants was tested using a two-way ANOVA (two groups X two time points) using $p<.05$ as the criterion for statistical significance. Data were checked for normality and outliers. One participant from the yoga information group was identified as an outlier on most POMS outcomes (depression, fatigue, total mood disturbance) and was removed from all POMS analyses. Previous yoga experience and baseline anxiety scores (intensity, frequency, and total) were tested individually as covariates. These covariates did not significantly influence the results. The results below are from the analyses with no covariates included.

The secondary hypothesis that a single session of online yoga would reduce anxiety to the same degree as a single session of in person yoga was tested by calculating the effect size for anxiety total scores (SMD) with 95% CI. The

SMD in this study was then compared with the effect size reported in Yin et al.[10]

Results

A total of 29 participants completed all study procedures (n=14 yoga practice; n= 15 yoga information). Participant characteristics are presented in Table 1. Descriptive statistics for the Anxiety Symptom Questionnaire (ASQ) outcomes (intensity, frequency, and total) are presented in Table 2. Descriptive statistics for the POMS are presented in Table 3.

Table 1.
Participant Characteristics

Measure		Yoga Practice N = 14 (%)	Yoga Information N = 15 (%)
Gender	Female	13 (93%)	10 (67%)
	Male	1 (7%)	5 (33%)
Age-years	Mean (SD)	21.28 (1.94)	20.33 (1.63)
Race/ Ethnicity	White or Caucasian	9 (64%)	10 (67%)
	Black or African American	2 (14%)	2 (13%)
	Asian	2 (14%)	2 (13%)
	Latin	0	1 (7%)
	Jamaican	1 (8%)	0
Yoga Participation	Regularly participate	4 (29%)	6 (40%)
	Had participated	7 (50%)	6 (40%)
	Never participated	3 (21%)	3 (20%)

Data presented are number and rounded %; Gender, Race/Ethnicity, and Age were write in options.

Table 2.
Anxiety Symptom Questionnaire Descriptives

Group	Measure		Mean	95%CI
Yoga Practice (N = 14)	Intensity	Pre	59.29 (14.69)	50.80, 67.77
		Post	46.43 (15.64)	37.40, 55.46
	Frequency	Pre	54.64 (20.32)	42.91, 66.37
		Post	45.79 (17.49)	35.69, 55.88
	Total	Pre	113.93 (30.32)	96.42, 131.43
		Post	92.21 (29.74)	75.04, 109.39
Yoga Information (N = 15)	Intensity	Pre	46.13 (17.65)	36.36, 55.91
		Post	49.80 (18.29)	39.67, 59.93
	Frequency	Pre	48.00 (18.22)	37.91, 58.09
		Post	48.40(18.36)	38.23, 58.57
	Total	Pre	94.13 (34.39)	75.09, 113.18
		Post	98.20 (34.83)	78.91, 117.49

Table 3.
Profile of Mood States Descriptives

Group	Measure		Mean (SD)	95%CI
Yoga Practice (N = 14)	Tension	Pre	7.43 (3.32)	5.51, 9.35
		Post	2.00 (1.66)	1.04, 2.96
	Anger	Pre	1.21 (1.25)	0.49, 1.94
		Post	0.21 (0.58)	-0.12, 0.55
	Fatigue	Pre	7.29 (2.92)	5.60, 8.97
		Post	2.57 (1.56)	1.67, 3.47
	Depression	Pre	3.21 (2.29)	1.89, 4.54
		Post	1.00 (2.08)	-0.20, 2.20
	Esteem-related Affect	Pre	6.29 (2.84)	4.65, 7.93
		Post	8.57 (2.21)	7.30, 9.85
	Vigor	Pre	4.21 (1.89)	3.12, 5.30
		Post	7.21 (2.39)	5.83, 8.60
	Confusion	Pre	3.57 (1.87)	2.49, 4.65
		Post	1.29 (1.07)	0.67, 1.90
	Total	Pre	12.21 (9.30)	6.84, 17.58
		Post	-8.71 (7.05)	-12.79, -4.64
Yoga Information (N= 15)	Tension	Pre	7.33 (3.16)	5.59, 9.08
		Post	5.73 (4.04)	3.49, 7.97
	Anger	Pre	1.53 (1.46)	0.73, 2.34
		Post	0.93 (1.49)	0.11, 2.76
	Fatigue	Pre	7.40 (3.36)	5.54, 9.26
		Post	6.00 (3.42)	4.10, 7.90
	Depression	Pre	3.47 (2.26)	2.21, 4.72
		Post	2.87 (2.83)	1.30, 4.43
	Esteem-related Affect	Pre	5.80 (2.57)	4.38, 7.22
		Post	5.40 (3.29)	3.58, 7.22
	Vigor	Pre	4.07 (3.52)	2.12, 6.01
		Post	4.80 (3.41)	2.91, 6.69
	Confusion	Pre	3.60 (3.02)	1.93, 5.27
		Post	2.20 (2.46)	0.84, 3.56
	Total	Pre	13.47 (12.27)	6.67, 20.26
		Post	7.53 (15.84)	-1.24, 16.30

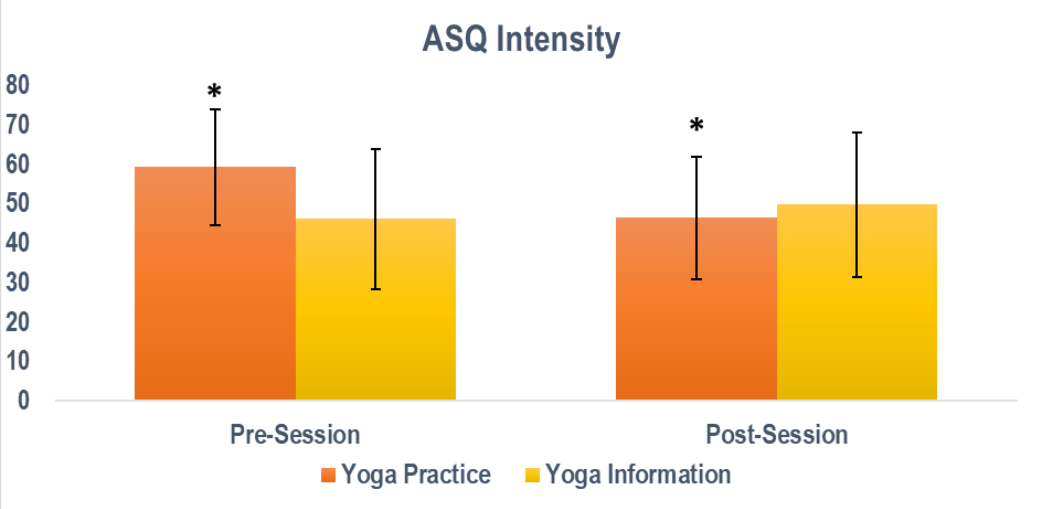
Anxiety Symptom Questionnaire

As shown in Figure 1, the condition by time interaction for ASQ intensity scores was significant, $F(1, 27)=15.362$, $p<.001$. The condition by time interaction for ASQ frequency scores was significant, $F(1, 27)=6.736$, $p=.015$. As shown in Figure 2, the condition by time interaction for ASQ total scores was significant, $F(1, 27)=12.225$, $p=.002$.

Profile of Mood States

The condition by time interactions for POMS tension, fatigue, depression, esteem-related, vigor, and total mood disturbance scores were significant, $p<.041$. The condition by time interactions for POMS anger and confusion scores were not significant, $p>.242$.

Figure 1.
Anxiety Symptom Questionnaire Intensity Scores Before and After either the Yoga Practice Session or Yoga Information Session



* Indicates a significant (p<.05) reduction pre to post for Intensity ASQ scores for the yoga practice group.

Figure 2.
Anxiety Symptom Questionnaire Total Scores Before and After either the Yoga Practice Session or Yoga Information Session

* Indicates a significant (p<.05) reduction pre to post for Total ASQ scores for the yoga practice group

Secondary Analysis

For the secondary purpose, effect sizes (SMD) with 95% CI were calculated and compared with the effect size reported in Yin et al.[10] The SMD for Total Anxiety scores in this study was .54 (95% CI, .051-1.03). This is comparable to the effect size previously reported by Yin et al. which was .55 (95% CI, .29-.79).[10]

Discussion

The primary purpose of this study was to examine the effects that a single session of online yoga has on anxiety and mood states. The results revealed that a 30-minute session of light-intensity, online yoga reduced the anxiety intensity scores as well as improved overall mood. There was no significant reduction in anxiety frequency scores after the yoga practice. The POMS score for tension, fatigue, depression, esteem-related, vigor, and total mood disturbance were significantly improved after the yoga practice; however, did not improve after the yoga information session. It appears the single session of online, low-intensity yoga may be an effective form of physical activity to improve anxiety and mood in adults.

The utilization of online yoga for mental health has produced favorable results in improving mental well-being. Online Isha Upa yoga, a form of yoga that focuses on joints, muscles, and energy system, has been shown to significantly reduce stress and positively improve well-being in college students.[18] Additionally, online yoga has been shown to improve symptoms of mood disturbance for individuals with mood disorders.[19] The accessibility and acceptability of online yoga has also seen positive results from both participants and yoga practitioners, with individuals reporting that online yoga provided safety from risks of COVID-19, was cost effective, and provided wider access for yoga participants.[11, 20] The utilization of online yoga can potentially aid towards improving daily mood disturbance thus reducing the severity of several anxiety-related symptoms. Furthermore, online yoga may be a beneficial form of physical activity and mood disturbance control for individuals who are uncomfortable with in-person options. It would be beneficial to extend the findings of this study to future research studies in populations with limited mobility or limited transportation to determine if online yoga is feasible, safe, and effective at improving mood.

The secondary purpose was to compare the effect size reported in the current study to the effect size reported in a recent meta-analysis that investigated single session in-person yoga on anxiety.[10] The effect size found in this study (SMD= 0.54) was of similar magnitude for in-person single session yoga (SMD= .32-.55).[10] This suggests that the anxiolytic effects of a single session of yoga are not mode dependent. Additionally, the effect size found in this study is also comparable to the effect size reported for a single session of exercise for anxiety of 0.16.[6] There may be concerns over the safety of participants through online delivery of yoga[20]; however, participating in low or light intensity a single session of yoga has not been associated with increased risk of injury further suggesting that online, single session yoga may be an effective and accessible way to reduce anxiety. Online treatment forms for anxiety, such as videoconference-based cognitive behavioral therapy, have been shown to improve anxiety to a similar degree when compared to in-person cognitive behavioral therapy.[21] The potential of reducing anxiety from home may offer a more readily accessible form of treatment to a significant portion of the population. However, this does produce a potential barrier of access as some individuals may not access to a device with internet connection or do not have consistent internet availability. The results from the current study and other studies[21] suggest researchers should continue to investigate online treatment options for those with anxiety.

There were limitations to this study. One limitation was that the majority of the participants were white college-aged females thus the results found from this study cannot be generalized towards other populations. Another potential limitation was the use of recordings instead of a live class; a live class would confirm if participants completed their session, however, participants did report their level of perceived exertion for their session and scores were indicative of participants having completed their session.

In summary, the results from this study suggest that a single session of online yoga may be an accessible and effective alternative for individuals to reduce their anxiety. Anxiety continues to affect many individuals with access to treatment continually being a barrier. It would be beneficial for researchers to implement a training study to determine the longer-term effects of online yoga for anxiety symptom reduction. Future studies should also aim to further explore how online yoga may be used to reduce anxiety symptoms in more diverse samples.

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Conflicts of Interest

The authors have no relationships to disclose.

Statement of Contributions

Ms. Soliva contributed to the conception and design of the study, collected the data, was involved in the interpretation of the data analyses, and drafted the manuscript. Dr. Sara Kovacs contributed to the study design and manuscript preparation. Dr. Fritz contributed to the conception and design of the study, supervised data collection and data analyses, and reviewed and revised the manuscript.

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