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Integrating Stress Relief Strategies into DPT Curriculum: A Quasi-Experimental Design

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Abstract

Objective: Doctor of Physical Therapy (DPT) students report higher levels of stress and anxiety compared to age matched peers. Increased stress can negatively impact not only students' physical conditions but also academic performance. The purpose of this study was to determine the effectiveness of integrating stress relief strategies for DPT students to help them reduce stress during schooling.

Methods: The research design was a quasi-experimental study. Participants (n= 39) were current DPT students. Weekly Interventions of 5-10-minute-deep breathing, mindfulness, or progressive muscle relaxation were performed over 13 sessions. Data points of weeks 0,7, and 13 were used to collect outcome measure scores on the Depression Anxiety Stress Scale 21(DASS-21), and the Perceived Stress Scale-10 (PSS-10), while the Stress Numeric Scale (SNS) was collected weekly. Estimations of differences between means and 95% confidence intervals were used to analyze data using a PEDro template. Effect size was measured using Cohen's d.

Results: Estimations of differences between means between beginning and end point results are as follows: DASS21-Anxiety: 2.29 (CI: 2.03, 2.55; d: 0.88). DASS21-Stress: 0.51 (CI: 0.35, 0.67; d: 3.86). DASS21-Depression: 1.93 (CI: 1.60, 2.26; d: -0.34). PSS-10: 1.41(CI: -1.29, 4.11; d: 0.23). SNS: 1.65 (CI:0.79, 2.51; d: 0.87).

Conclusion: This study showed significant changes from beginning to final on outcome measures in all three categories of the DASS-21 and in the SNS. Results support that integration of the stress relief strategies of deep breathing, mindfulness and progressive muscle relaxation into curriculum may help reduce symptoms of depression, stress, and anxiety in DPT students.

Impact Statement: To assist DPT students with being successful in their schooling and future careers it is vital to address high stress and anxiety levels that they may present with. Teaching stress relief strategies and integrating them into coursework may be a way to aid this problem.

Keywords: Stress; Deep breathing; Mindfulness; Progressive muscle relaxation; DPT students

Abbreviations: DPT: Doctor of Physical Therapy; NIH: National Institutes of Health; PMR: Progressive Muscle Relaxation; DASS-21: Depression Anxiety Stress Scale 21; PSS-10: Perceived Stress Scale-10; SNS: Stress Numeric Scale; SD: Standard Deviations; CI: Confidence Interval

Introduction

Doctor of Physical Therapy (DPT) students report higher levels of stress and anxiety compared to their age matched peers [1]. Previous studies have shown that graduate students report increased stress levels compared to undergraduate students and up to 65% of graduate students report stress levels that are above average [2,3]. Increased stress can negatively impact not only students' physical conditions but also their academic performance [4]. This may potentially have long term consequences that carry over into their careers and lead to decreased quality of care and burnout [5,6]. Since 2020, COVID-19 has caused increased stress among students and the general population [7,8]. Students with high levels of acute stress since the pandemic are more likely to stop pursuing a career in healthcare [8].

With the knowledge of increased stress, anxiety, and depression among college students there is still a lack of information on how DPT programs address stress within their respective curriculum. According to the National Institutes of Health (NIH), long term stress, or chronic stress, can lead to serious health problems

including disrupted sleep, muscle tension, metabolic dysfunction, immune abnormalities, and inflammation [9]. Some diseases such as cardiovascular disease, diabetes, cancer, autoimmune diseases, depression, and anxiety orders can be linked to chronic stress. Deep breathing, muscle relaxation and mindfulness are strategies recommended by the NIH "Press Reset on Stress" campaign to help manage stress in the public.

Deep breathing, mindfulness, and muscle relaxation have been used to manage stress in older and younger adult populations [7,8,10-12]. Deep breathing has been used as a stress management strategy in nursing and engineering students to reduce stress prior to tests and throughout schooling [13,14]. One-time uses of progressive muscle relaxation (PMR) were shown to be effective in a collegiate student population for reducing stress, depression, and anxiety [15,16]. The use of mindfulness practice may help college students better adapt to stress [17]. Press reset on stress strategies can potentially be used by DPT programs to help DPT students manage their stress and be successful. However, there is lack of evidence on the use of these strategies to assist DPT students to manage stress and anxiety during their schooling. The purpose of this study is to determine the effectiveness of integrating stress relief strategies of deep breathing, muscle relaxation and mindfulness into curriculum for DPT students to help reduce stress and anxiety.

Methods

Study Design

This study is a quasi-experimental design. The study was exempt from the ########## State University Internal Review Board and was registered through Clinical Trials with ID NCT05697419. The study ran from January 13th, 2023, through April 24th, 2023 at ########## State University.

Recruitment

Students in the DPT program were recruited for the study by email, recruitment fliers that were posted within the department, and by a current DPT graduate assistant. Faculty members were not involved in the recruiting process to avoid coercing participation. Students who chose to participate signed an informed consent that was turned into the primary investigator. An initial meeting was held with participants to fill out intake paperwork, which included: a survey that asked demographic information and participant knowledge of deep breathing, muscle relaxation, and mindfulness, demographic information, the Depression Anxiety Stress Scale 21(DASS-21), the Perceived Stress Scale-10 (PSS-10), and a Stress Numeric Scale (SNS), (Attached in appendix). This study included any students enrolled in the DPT program at ###, who were over the age of 18, and were able to follow instructions to perform deep breathing, muscle relaxation, and mindfulness strategies. This study excluded students who were not enrolled in the DPT program at ###, were not eighteen, or could not perform the intervention strategies. Potential risks to this intervention that participants were informed of were negative feelings by recalling previous experience when completing the questionaries.

Study Interventions

Reset Stress sessions were administered prior to the start of a weekly Monday class by the primary investigator. The focus of the sessions was a combination of mindfulness, deep breathing, and muscle relaxation that were displayed through YouTube videos (see appendix). The sessions lasted approximately 5-10 minutes. Sessions were performed in a classroom in a group setting. There was a total of 13 sessions administered throughout the 2023 Spring semester at ########## State University.

Outcome Measures

Participants filled out a Stress Numeric Scale immediately after each weekly intervention session via SLIDO polling. Participants completed paper forms of the DASS-21 and PSS-10 at the beginning (prior to start of interventions), midpoint check-in during week 6 and at the end of the project. An additional survey at the end of the project was administered via Microsoft Forms to inquire if it was helpful to learn stress management strategies and how frequently they used the techniques outside of class sessions. All paper questionnaires did not have names or identifying information on them. The SLIDO poll data and Microsoft Forms data were kept anonymous. The DASS-21, PSS-10, and SNS were the outcome measures used for this study. They were administered at the beginning of the study prior to intervention, at midpoint during week six, and at completion of the study (final). The DASS-21 is a short form of the DASS-42. It has 21 questions that are categorized as being related to either stress, anxiety, or depression. The DASS-21 has been shown to be valid, reliable, and easy to administer when used with medical students [18]. The PSS-10 is a ten-question stress rating scale that indicates the person's perceived stress levels over a month period. It has acceptable psychometric properties when used with a healthy student population [19]. The SNS is a Likert scale that runs from 1-10. The participants were shown a picture of the scale each time they rated their stress level. The numbers 1-3 were labeled in yellow as low stress4-6 were labeled in orange as moderate stress, and 7-10 were labeled red as high stress.

Statistical Analysis

Descriptive statistics were performed on all outcome measures utilized in the study (DASS21, PSS10, and SNS). These statistics include reporting of frequency of responses, mean scores, standard deviations (SD), median values, and a 95% confidence interval (CI). Participant characteristics were analyzed using descriptive statistics related to frequency of responses and mean values. Outcomes were reported as means (lower 95% confidence limit, upper 95% confidence limit) using a PEDro template or mean (SD) unless otherwise noted. The CIs were calculated using an Excel-based CI calculator which was recommended by the International Society of Physiotherapy Journal Editors [20]. Statistical analyses were conducted using estimations of differences between means with a 95% confidence

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interval were used to analyze outcome measure data. Cohen's d was used to measure effect size. No null hypothesis statistical tests were conducted based on recommendations from the International Society of Physiotherapy Journal Editors [20].

Results

Participant Characteristics

A total of 42 participants in the second year of DPT program were recruited. A total of 39 participants completed the study (Figure 1). Of the sample, 74.4% of participants were female. The mean age of participants was 23.9 (SD 1.2) years old. When asked in the initial survey if they knew what the NIH strategies to reset stress were, 97.4% reported knowledge of what deep breathing exercises were, 69.2% knew about mindfulness, and 69.2% were familiar with progressive muscle relaxation. Participants listed exercise or working out (40.5%) as the most common form of stress relief outside of the NIH strategies (Table 1).

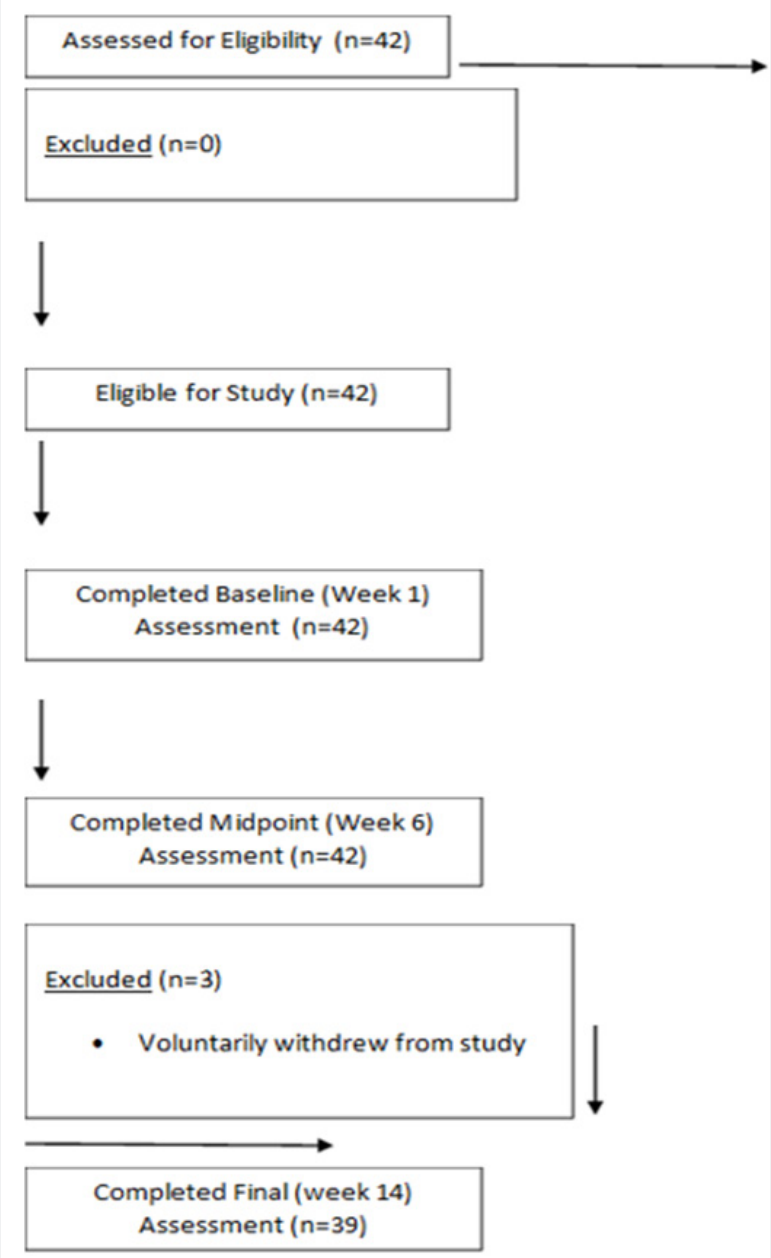

Figure 1: Recruitment participation for each of the completed assessments.

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Table 1: Participant Characteristics.

Demographic Characteristic	n	%
Sex		
Male	10	25.6
Female	29	74.4
Knowledge of NIH Stress Strategies		
Deep Breathing	38	97.4
Mindfulness	27	69.2
Progressive Muscle Relaxation	27	69.2
Current Techniques for Stress Relief		
Using Ice	2	4.0
Exercise	17	41.5
Family and Friends	3	7.3
Religious Practices	3	7.3
Music	3	7.3
Going Outside	1	2.4
Guided Imagery/Meditation	6	14.6
Laying in the Dark	2	4.9
Video Games/Board Games	1	2.4
Reading	1	2.4
Self-Care	1	2.4
Sleep	1	2.4
Age M, SD [95% CI]	23.9, 1.2 [23.5, 24.2]	
M; Mean, SD; Standard Deviation, 95% CI; 95% Confidence Interval, n; Number of Responses.		
[a]Reported as whether the participant had knowledge of the stress strategy.		

Outcome Measure Results

The means and confidence intervals for the weekly SNS were calculated (Figure 2). Estimations of differences between means between beginning and end point results are as follows: DASS21-Anxiety:2.29 (CI: 2.03, 2.55; d: 0.88). DASS21-Stress:0.51 (CI: 0.35, 0.67; d: 3.86). DASS21-Depression: 1.93 (CI: 1.60, 2.26; d: -0.34). PSS-10:1.41(CI: -1.29, 4.11; d:0.23). SNS:1.65 (CI:0.79, 2.51; d: 0.87). The estimations of differences between means between beginning and final data points for the DASS-21 categories of stress, anxiety and depression, the PSS-10 and the SNS with a 95% confidence interval as well as the effect size (Cohen's d) are displayed in (Figure 3) and (Table 2). The confidence interval did not cross zero for any of the DASS-21 categories or on the SNS, indicating significant changes. The confidence interval did cross zero on the PSS-10, which does not indicate significant change on that measure.

Table 2: Estimation of Differences Between Means Baseline to Final.

Variable	Difference Between Means	Confidence Interval (95%)	Cohen's d
DASS-21-Anxiety	2.29	2.03, 2.55	0.88
DASS-21-Stress	0.51	0.35, 0.67	3.86
DASS-21-Depression	1.93	1.60, 2.26	-0.34
PSS-10	1.41	-1.29, 4.11	0.23
Stress Numeric Scale	1.65	.79, 2.51	0.87

Notes: N=39.

Discussion

To our knowledge this was the first study to look at the use of these stress relief strategies integrated into DPT curriculum. This study showed significant changes from initial to final in all three categories of the DASS-21 and in the SNS but not in the PSS-10 scores. When using the estimation of difference between means, significant changes are indicated by the confidence interval not crossing zero. This implies that integration of the NIH press reset on stress strategies of deep breathing, mindfulness and progressive muscle relaxation into curriculum may help reduce

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symptoms of depression, stress, and anxiety in DPT students. The stress relief strategies of deep breathing, mindfulness and progressive muscle relaxation have been shown to be effective in reducing stress in student populations [13,14,17].

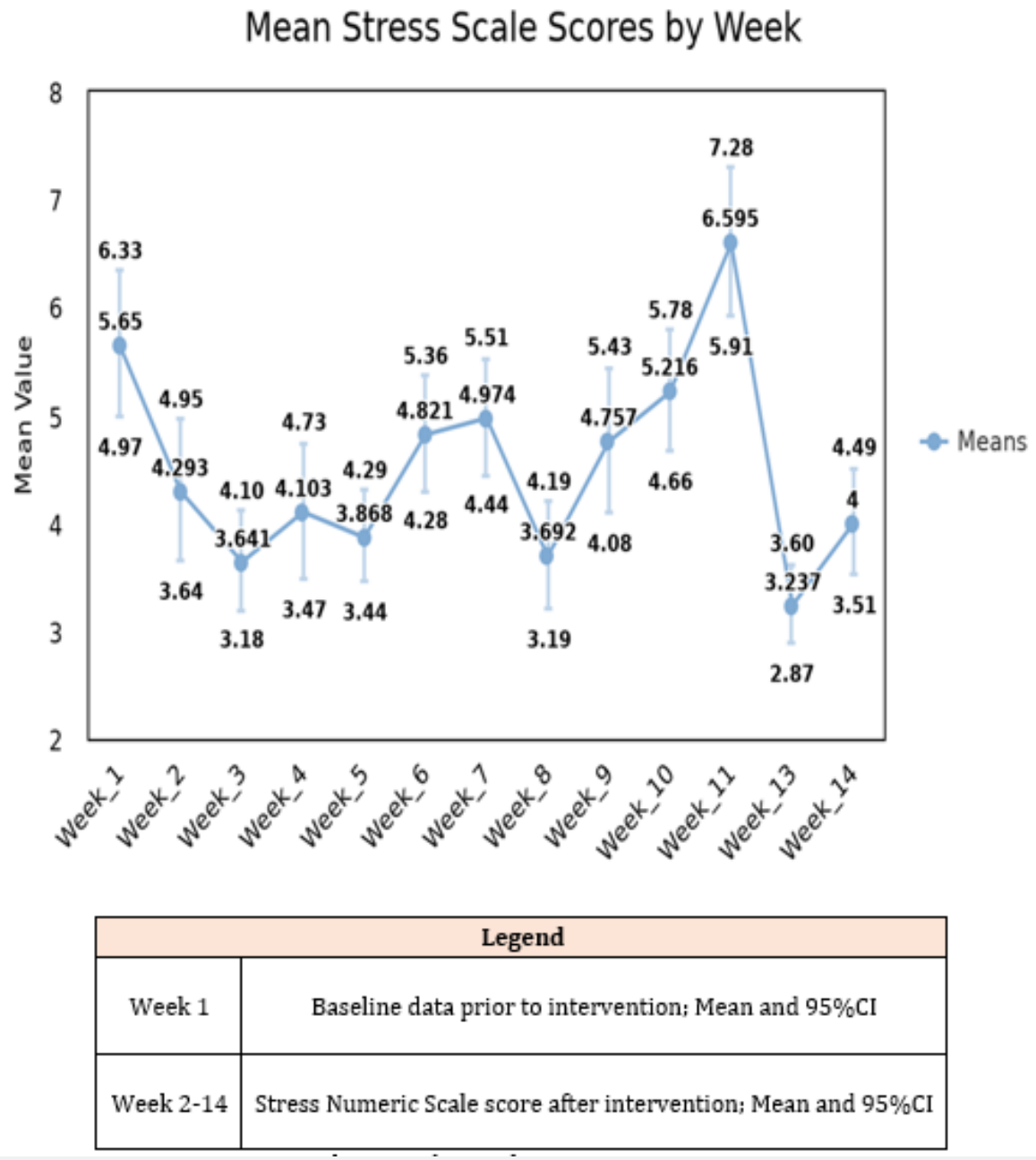

Figure 2: Mean Stress Numeric Scale Scores by Week.

It has been stated that DPT students experience higher levels of stress [1]. Bogardus et al. found that DPT students have statistically higher levels of depression, anxiety, and stress based on the DASS, and suggest addressing mental health within DPT programs. No studies have been found to date that attempted to integrate stress relief strategies into DPT curriculum. A study by Joshi et al. examined the use of deep breathing exercises in curriculum for engineering students. It found that the use of deep breathing exercises reduced blood pressure, which in turn can reduce stress levels, and suggests using deep breathing within curriculum of engineering students to reduce blood pressure and stress levels.

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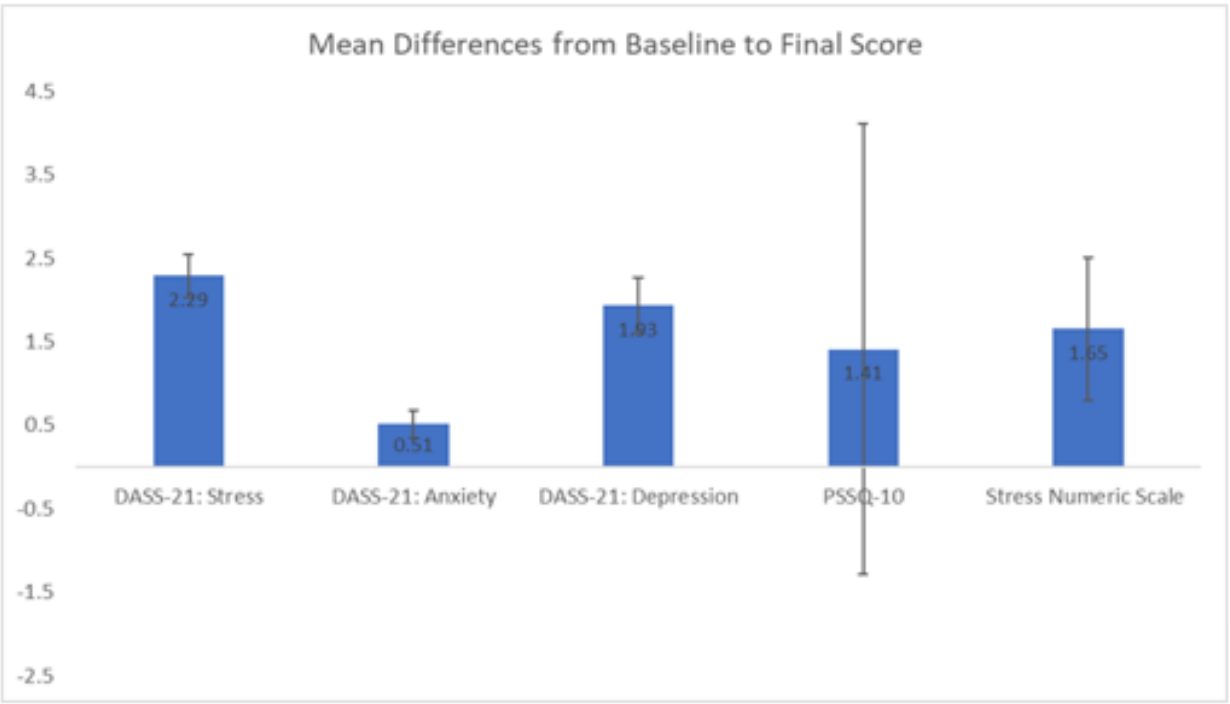

Legend	
Bar	Indicates mean difference from baseline to final
Error Bar	Indicates 95% confidence interval

Figure 3: Estimation of Differences Between Means (Baseline to Final).

Our study incorporates the same idea of utilizing deep breathing into curriculum, in addition to other stress management strategies, but instead of tracking blood pressure, we looked directly at perceived stress and anxiety levels with the DASS-21, PSS-10, and the SNS. Mindfulness practice has been shown to reduce the physiological markers of stress [8]. A study by Moeller et al. surveyed college students and found that the use of mindfulness was related to lower levels of perceived stress on the PSS-10. This varied from our study which was looking to see if introducing and using mindfulness practices in class would reduce stress on the PSS-10 over the time of the study. Progressive muscle relaxation (PMR) has also been shown to be an effective method of perceived stress reduction in college students [15,16].

The immediate effects of PMR were tested in undergraduate physiotherapy students and found to be significant at reducing stress, anxiety and depression based on DASS-42 scores [16]. Our study utilized similar outcome measures of the PSS-10 and DASS -21 (short version of the DASS-42) to examine the effect of utilizing PMR, mindfulness, and deep breathing over the course of the semester instead of just looking at immediate effects. This study is not without limitations. By looking at the participants as a whole cohort there was no control group, so it is unknown if the changes seen are effects of the intervention or other factors. Second, a larger sample size of only students that report moderate to extremely severe symptoms could offer more information.

Since many of the participants reported normal/low to moderate stress, anxiety, and depression at initial baseline there was less room for changes when looking at the participants as one cohort as opposed to each individual student. Future studies should look at more severe symptoms as part of a more focused group analysis [21,22]. Third, looking at DPT students from various universities, instead of a single University could provide additional information on the impact of using the stress relief strategies in curriculum. There were inconsistencies with regular participation among students for various reasons throughout the timeline of the project. Lastly, the primary investigator delivered the intervention and administered the outcome measures which may have created a potential bias to occur.

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Students who report stress, anxiety, or depression during their schooling may benefit from having built in time for stress management in the curriculum instead of asking them to do the strategies on their own. Students who are already feeling stressed and overwhelmed may not prioritize making time for performing stress management strategies, but if they were offered time to do these strategies within a class it would make it easier for them to commit to performing them. Significant changes in the DASS-21 and SNS suggest that implementing stress relief strategies into DPT curriculum can help students manage stress throughout their schooling which in turn can carry into their professional careers. We advocate for the integration of utilizing deep breathing, mindfulness, and progressive muscle relaxation into DPT curriculum to aid students who are feeling stress, anxiety, or depression.

Appendix

1. (Attach the appendix).

YouTube Videos Used	Stress Relief Exercise
https://www.youtube.com/watch?v=e-8E9m1TiVU	Deep Breathing and diaphragmatic breathing instruction
https://www.youtube.com/watch?v=5f-5N6YFjvVc	Deep Breathing
https://www.youtube.com/watch?v=6BFwqDiOMMc	Deep breathing and mindfulness
https://www.youtube.com/watch?v=DbDoBzGY3vo	Mindfulness
https://www.youtube.com/watch?v=D4SNVjSeBHU	PMR
https://www.youtube.com/watch?v=XtGYSIk_F80	PMR
https://www.youtube.com/watch?v=TXNECaIJPDI	Deep Breathing
https://www.youtube.com/watch?v=9yj8mBfHlMk	Mindfulness
https://www.youtube.com/watch?v=utGa6rqzs3g&t=67s	PMR
https://www.youtube.com/watch?v=5qM-NBgBTSo	Mindfulness
https://www.youtube.com/watch?v=9yj8mBfHlMk&t=39s	Deep Breathing
https://www.youtube.com/watch?v=-lUJ3nl7N35Q	Mindfulness
https://www.youtube.com/watch?v=D4SNVjSeBHU	PMR

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