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A pilot study of meditation as a stress reliever for dental hygiene students during times of heightened stress

Sarah Henderson

A Pilot Study of Meditation as a Stress Reliever for Dental Hygiene Students During Times of Heightened Stress

A Thesis

Presented in Partial Fulfillment of the Requirements for the

Degree of Masters of Science

in

Dental Hygiene

in the

College of Graduate Studies

Eastern Washington University

by

Sarah Henderson

Spring 2021

Major Professor: Ann O'Kelley Wetmore

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KATRINA TAYLOR, PHD, GRADUATE STUDY COMMITTEE

Human Subjects Approvals

Good evening Sarah,
Your IRB application has been approved. Congratulations! Below is your acceptance letter; attached is your signed IRB Application.

TO: Sarah Henderson, Dental Hygiene
FROM: Heidi Hillman, Vice-Chair – EWU IRB Human Subjects
DATE: February 16, 2021
SUBJECT: Final Approval of HS-5989: Meditation as a stress reliever for dental hygiene students in a post COVID19 world.

Human subjects protocol HS-5989 entitled "Meditation as a stress reliever for dental hygiene students in a post COVID19 world" has been approved as an exemption from federal regulations under 45 CFR Part 46.104(d)(1-8).

A signed and approved copy of your application is attached.

Student research qualifying for an exempt review is valid for a period **one year**. **The timeframe for your study approval is Feb 16, 2021 to Feb 15, 2022.** If after initial approval, the research protocol requires minor changes, the Office of Grant and Research Development should be notified of those changes. Any major departure from the original proposal must be reviewed through a Change of Protocol application submitted to the IRB before the protocol may be altered. Please refer to HS-5989 on future correspondence as appropriate as we file everything under this number.

Cc: HS-5989 file

Heidi Hillman PhD., BCBA-D
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Principal Investigator (PI): Sarah Henderson, RDH, BSDH	*If PI is a student, an RPI is required.* Responsible Project Investigator (RPI) *(faculty/staff sponsor)*: Ann O'Kelley Wetmore
Student Investigators, does the RPI have permission to renew the study in their own name after you have left the university? Yes ☒ No ☐	
Department: Dental Hygiene Phone number: (307) 250-3295 E-mail: shenderson3@eagles.ewu.edu	Department: Dental Hygiene Phone number: (713) 408-1321 E-mail: awetmore@ewu.edu
Project Title: **Meditation as a Stress Reliever for Dental Hygiene Students in a Post COVID-19 World**	
For students only: Is this research being done to meet a course, thesis or other academic requirement? ☒ Yes ☐ No If yes, please specify: Thesis If not, why is it being done? May 2021	

Anticipated start date:	Anticipated end date:	Requested Length of approval						
		Quarter ☐ or Semester ☒	Fall ☐	Winter ☐	Spring ☐	Summer ☐	1 year ☒	5 year (Faculty/Staff Only) ☐
02/01/2021	2/1/2022							

Funding: ☒ Non-funded ☐ Internal funding ☐ External funding

Funding agency (if applicable):
Grant or Contract Number:

Check the type of exemption applicable to the project using the "Exemption Decision Aid:"

☐ 1. ☐ 2i. ☐ 2ii. ☐ 2iii. ☐ 3i. ☐ 3ii. ☒ 3iii. ☐ 4i. ☐ 4ii. ☐ 4iii. ☐ 4iv. ☐ 5. ☐ 6. ☐ 7. ☐ 8.

Rationale for exemption. Why should this project be exempt?

This research involves a benign behavioral intervention, guided meditation. Meditation is brief in duration (30 minutes), harmless (student may turn off the guided meditation video at any time), painless, and not physically invasive, not likely to have significant adverse lasting impact on the subjects, and the investigator has no reason to think the subjects will find the interventions offensive or embarrassing.

Participants will be asked to provide their email addresses that will be associated with an identification number. This will be used to determine student's eligibility for weekly incentives and to be considered for the focus group that will take place at the conclusion of the study. The focus group will be recorded via Zoom, but all responses will be transcribed to protect the identities of the participants.

Please state the purpose and methodology of the research:

Purpose:
It has been well established that college students face a number of stressors that make life more challenging. Healthcare students face even more stressors including, board examination, learning clinical skills, working with live patients and of course the amount of knowledge that they must consume and retain. This stress has only been compounded by the COVID-19 Pandemic. Dental hygiene students are preparing to enter into a healthcare field that puts them at high risk for COVID-19 transmission, and face the changing recommendations of the CDC, as well as the uncertainty of their educational and professional careers.

This research is intended to provide dental hygiene students with a healthy coping mechanism for management of stress and measure its' effectiveness for these students. The hope is that these students will find some benefit from this stress management tool and improve both their educational, personal and professional lives.

Methodology:
This proposed study will be a mixed method experimental design. Dental hygiene students who volunteer to participate will be enrolled and take a pre-test to determine their stress level. This pre-test utilizes an adaptation of the Student Stress Rating Scale and the Perceived Stress Scale. Similarly, the post-test utilizes the same stress scales. Both the pre- and post-test will be administered via SurveyMonkey and will be sent to student through their school email account.
Each student will be asked to provide their email address and will be provided with an identification number. These email addresses and identification numbers will be kept confidential and stored on the Principal Investigator (PI)'s password protected computer.
The PI will explain the study protocol that includes receiving guided meditation media from the PI via email. After completion of the meditation each week, the student will be asked to record their completion by answering a question related to the weekly meditation YouTube via SurveyMonkey using their identification number.

After participation in the four weeks of meditation, the students' level of stress will be re-evaluated utilizing the same adapted SSRS and PSS. These surveys will provide comparative data to determine the effectiveness of this intervention. In order to strengthen the quantitative data, the PI will conduct Zoom focus groups to further establish the impact of this intervention.

Describe the procedures: what specifically will subjects do? If data are anonymous, describe the data gathering procedure for insuring anonymity.

Step one. EWU and SC Dental Hygiene Students will be invited to participate in a study evaluating the effects of meditation on their stress levels. The PI will present a short 10-15-minute presentation in the Clinic IV course via Zoom for EWU students and the same will be done for SC students. Student email addresses will be obtained by request from program directors and students will receive an email invite to participate in the study

Step two. Students will be sent a pre-test via SurveyMonkey within the week. Participation in online pre-test and acknowledgement of informed consent will allow the student to be assigned an identification number to each participant that will be associated with their email address. A reminder email will be sent right before the study intervention begins. The study will commence the following week.

Step three. The PI will send an email containing a YouTube video of a guided meditation each week (see Appendix G) over the four-week study to each participant. Each week, the participants will fill out a post intervention survey including their given identification number and indicate if they enjoyed the meditation. These students will then be entered into a drawing for a $10.00 Starbucks gift card. These identification numbers will be entered into Microsoft Excel by the PI and a randomization function will be used to choose a winner.

Step 4. At the end of the four-week study, participants will be sent a final email (see Appendix H), containing a link to the post-test on SurveyMonkey and indicate if they would be willing to participate in a focus group. Three students from each program will be selected to participate in a focus group to be conducted via Zoom. Students who participate in the full study (completing all four weeks) will be entered into a drawing for a hand carved Sterling Silver Cuff, generously donated by Tom Balding Bits and Spurs™. Microsoft Excel will be used to randomly choose a winner using a randomization function.

Step 5. Focus Group questions will be developed based on pre and post-test data analysis as well as post-test qualitative item responses.

Step 6. Send Zoom invites to selected students and complete focus group interactions.

Attach all proposed recruitment materials (scripts, texts, emails, flyers and/or social media posts), surveys, questionnaires, cover letters, information sheets, consent forms, etc.

I certify that the information provided above is accurate and the project will be conducted in accordance with applicable Federal, State and university regulations:

PI Signature:
(unnecessary signature lines can be deleted)

Recommendations and Action:	**Date**	**Approve/Disapprove**
RPI Signature *(Needed only if PI is a student):* ann o'kelley wetmore		☒ A D ☐

IRB Rep. or Dept. Chair: ☒ A D ☐
(Needed if PI is a student OR for faculty PI if required by department)

IRB Signature: ☒ A D ☐

Heidi Hillman (Vice-Chair, IRB). February 16, 2021

☐ Subject to the following conditions:

Approved from 2/16/2021 to 2/15/2022

Abstract

Purpose: Dental hygiene students face an exorbitant amount of stress during their educational pursuits. This has only been compounded by the added stress of the COVID-19 pandemic. Students may benefit from the practice of meditation in managing their stress levels during these trying times. This study analyzes the effectiveness of meditation as a stress reliever for dental hygiene students as they navigate their education during the pandemic and the effects it may have on perception of stress, academic achievement, and physical health.

Methods: Students participated in a four-week meditation study, consisting of a 30-minute guided meditation completed once weekly. Prior to participation, students completed a pre-test measuring their stress levels, the effects of stress on their physical well-being, and their academic achievement. After four-weeks of meditation, students completed a post-test identical to their pre-test, which provided quantitative data. A focus group was completed and qualitative data was gathered regarding the meditation's effect on stress. Both qualitative and quantitative data were assessed and analyzed.

Results: Fifteen students ($n = 15$) completed the full study. While this study did not supply statistically significant evidence that meditation effects the well-being or academic achievement of students, it did suggest meditation decreased the amount of perceived stress students experienced ($p < .01$).

Conclusion: Meditation is a useful and effective tool for decreasing perceived stress experienced by dental hygiene students.

Acknowledgements

I would like to express my sincere gratitude to my advisor, Professor Ann O'Kelley Wetmore, for her unfailing support of my personal and professional growth. Her patience, perseverance, enthusiasm, and knowledge have been integral to my educational success. Besides my advisor, I would like to thank the rest of my thesis committee, Cheri Barton and Katie Taylor, for their encouragement, insight, and thought-provoking correspondence. I would also like to thank my fellow students who encouraged and sometimes outright forced me to continue with my education when I thought I could not go on. Love and gratitude to my dear friend, Tom Balding for his generous donation of a hand carved sterling silver cuff to be used as an incentive for study participation and for his untiring faith in my ability to complete my degree. And finally, I would like to thank my family and friends for their unwavering support during the pursuit of my educational goals and for putting up with me through the highs and lows that come with higher education.

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Introduction/Literature Review

Introduction to the Research Question

The collegiate experience can be one of the most stimulating and rewarding experiences of a young person's life. It can also be one of the most stressful (Peate, 2017). The Encyclopedia & Dictionary of Medicine, Nursing and Allied Health defines stress as: "the sum of the biological reactions to any adverse stimulus, physical, mental, or emotional, internal or external, that tends to disrupt the homeostasis of an organism. Should these reactions be inappropriate they may lead to disease states"(Miller et al., 1997, p. 1539). These disease states include depression, anxiety, and suicide ideation/thoughts of suicide as well as physical ailments including suppression of the immune system (Alsulami et al., 2018; Halgin & Whitbourne, 2005; Vermeesch et al., 2017).

Healthcare students face many unique stressors during their professional education and dental hygiene students do not differ from other healthcare students (Bramlett, 2014; Gordon et al., 2016; Harris et al., 2017; Jacob et al., 2012). The added healthcare crisis, coronavirus disease 2019 (COVID-19), has increased the stress experienced by healthcare professionals, educational institutes, and students (CDC, 2020b; Landrum, 2020; Olya, 2020).

Meditation is a method to mitigate stress, as it helps to decrease anxiety and lessen depression caused by the stress response (Chawla, 2017; Huberty et al., 2019; Lacaille et al., 2018; Sharma, 2015; Zeidan et al., 2014). This method, when applied to healthcare students, has demonstrated a decrease in perceived stress (Braun et al., 2019;

Chawla, 2017; Huberty et al., 2019) and, therefore, may be effective in stress mitigation in dental hygiene students.

Statement of Problem

Due to the rigor of the healthcare curriculum, many healthcare students experience heightened amounts of stress. According to Macauley et al. (2018), from the years 2000 to 2014 there was an 89% increase in students presenting with anxiety disorders. This stress adversely effects students' mental and physical health and results in a decline in academic performance (Macauley et al., 2018, p. 176). This is further supported by the work of Bramlett (2014), who surveyed dental hygiene students (N = 39) and found when stressors increased, there was a decrease in academic performance and grade point average (GPA). This decrease in academic performance and increase in stress may negatively impact the student's ability to complete their educational pursuits and impacts their academic performance (Bramlett, 2014; Lin & Huang, 2014). Dental hygiene students experience many stressors including: "learning environment, fear of failure, heavy workload, difficulty in dealing with patients, performing non-reversible procedures in a confined space, difficulty in dealing with transitions in curricula and difficult relationships with academic staff" (Gordon et al., 2016, p. 20). Additionally, current students not only face these existing stressors, but the additional stress of completing a dental hygiene program during a pandemic. For dental hygiene students, the pandemic has resulted in a delay in both written and clinical board examinations, delays in graduation, limited funding due to financial aid running out with extra course time added, loss of part time jobs, uncertainty of the future, and lack of emotional support due to social distancing and isolation (Landrum, 2020). While coping with these additional

stressors, dental hygiene students must complete required clinical learning experiences for their chosen profession that puts them at high risk for contraction of COVID-19. Adding these stressors to the established stress of completing a health care professional program, it is clear dental hygiene students face an exorbitant amount of stress. Given the above, one may infer dental hygiene students would benefit from a positive way of coping with stress. Meditation may be one answer for an effective and constructive method of dealing with this stress.

Research Questions

This study assessed the efficacy of weekly meditation on the stress level of undergraduate dental hygiene students. The following research questions guided this research:

1. Does meditation affect students' perceived stress levels?
2. Does meditation influence students' perception of academic achievement and well-being?

Overview of Research

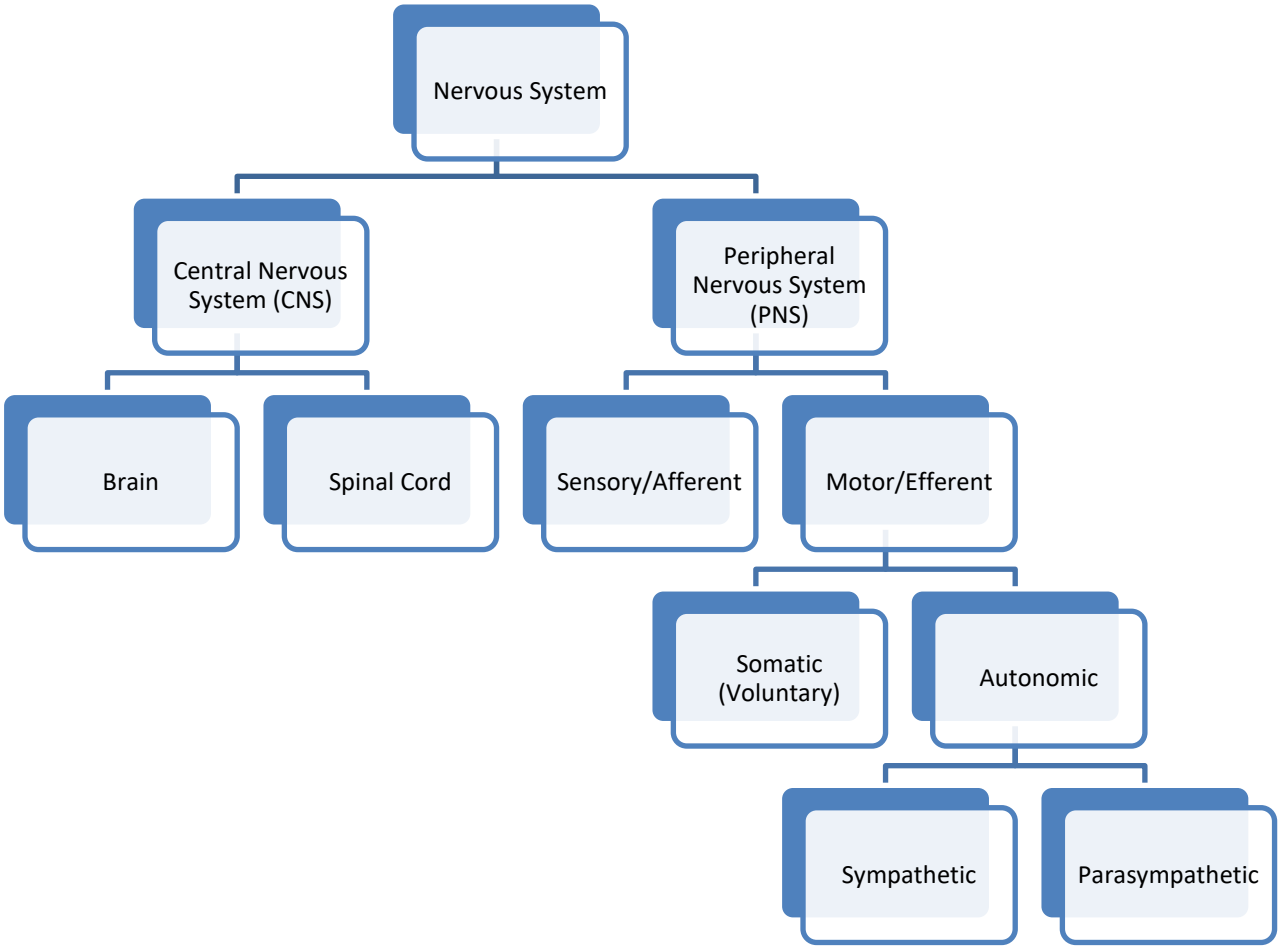
Stress

To understand the stress response, the nervous system must be examined. "The nervous system is made up of the brain, spinal cord, nerves, and sensory receptors. It is controls sensory perceptions, mental activities, and well as stimulate muscle movement and the secretion of glands"(Seeley et al., 2006, p. 373). The nervous system includes two parts, the central nervous system (CNS) and the peripheral nervous system (PNS). The CNS is comprised of the brain and spinal cord. The PNS is comprised of sensory receptors, nerves, ganglia, and networks of axons. The PNS is divided into two

subcategories: afferent/sensory and efferent/motor. The efferent division of the PNS is then divided into two classes: the somatic and autonomic nervous systems. The autonomic nervous system is further divided into two parts: the sympathetic nervous system and the parasympathetic nervous system (Seeley et al., 2006). See Figure 1.

Figure 1

Divisions of the Nervous System



The stress response is attributed to the increased reactivity of the sympathetic nervous system (Halgin & Whitbourne, 2005). The sympathetic division of the nervous system decreases activity of the organs not essential for maintenance of physical activities and directs blood and nutrients to structures active during physical exertion. This is commonly referred to as the "fight or flight response". This response is commonly characterized by increased heart rate, increased blood pressure, dilation of airway or increased respiration rate, increase in body temperature, dilation of pupils, increase in perspiration, and the slowing of digestion (Seeley et al., 2006). Evolutionary scientists have theorized the stress response is linked to survival (Segerstrom & Miller, 2004). In the case of a predator/prey situation, the reactions of the body to this stress may prepare the person to be more alert and more ready to survive the threat, whether by running away or facing the predator. Predator and prey may seem to be an extreme example of the stress response. However, the changes the body undergoes during this process are identical to the process of any stressful situation.

Effects of Stress. According to a meta-analysis published in 2004 by the Psychological Bulletin; "Over the past 30 years, over 300 studies have been done on stress and immunity in humans and together they have shown that psychological challenges are capable of modifying various features of the immune response" (Segerstrom & Miller, 2004, p. 601). The immune response is defined as "the reaction to and interaction with substances interpreted by the body as not-self, the result being humoral and cellular immunity" (Miller et al., 1997, p. 807). Cellular immunity is mediated by T-cells and null cells, while humoral immunity is mediated by antibodies in serum /blood and lymph (Seeley et al., 2006).

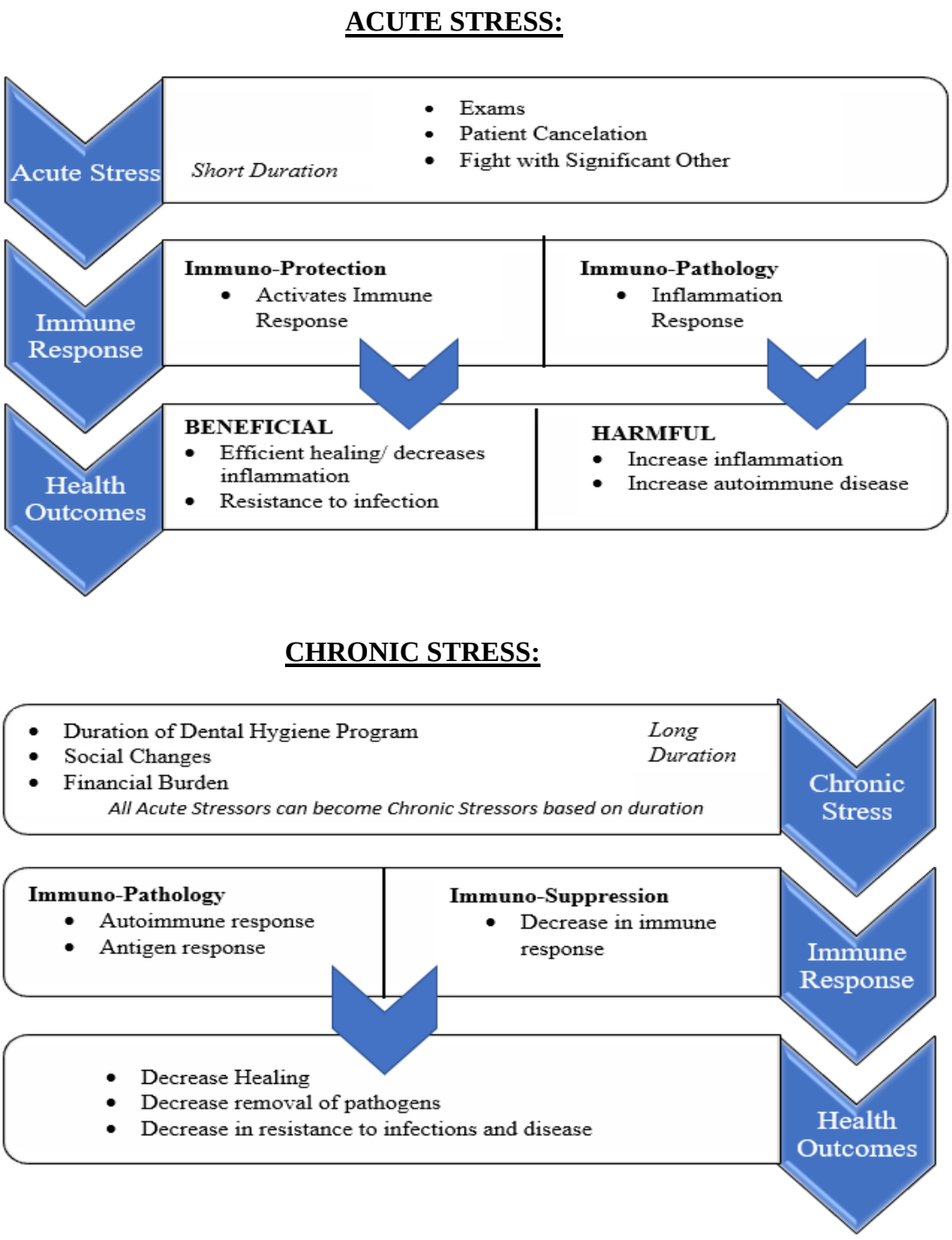
The immune system is made up of many parts including cells, proteins, organs, and tissues that work in consort to protect the human body from attacks by disease or trauma (Morey et al., 2015). Stress is found to "slow wound healing, diminish the strength of the immune response to vaccines, enhance susceptibility to infectious agents and reactivate latent viruses…. [Stress] can also substantially augment the production of proinflammatory cytokines" (Kiecolt-Glaser, 2009, p. 367).

Many studies have attempted to elucidate the link between stress and the immune system. Psychoneuroimmunology is the study of the connections between stress, the nervous system, and the immune system. Segerstrom and Miller found

> "Acute stressors (lasting minutes) were associated with potentially adaptive upregulation of some of the parameters of natural immunity and downregulation of some functions of specific immunity. Brief naturalistic stressors (such as exams) tended to suppress cellular immunity while preserving humoral immunity. Chronic Stressors were associated with suppression of both cellular and humoral measures" (Segerstrom & Miller, 2004, p. 608). See Figure 2.

Figure 2

Examples of Immune Response to Stress for Dental Hygiene Students



Studies provide evidence supporting the concept relating the stress response and immune suppression (Kiecolt-Glaser, 2009; Morey et al., 2015; Sergerstrom & Miller, 2004). The stress a dental hygiene student experiences may start as a naturalistic stressor, but due to the duration of their education, it may then take on the characteristics of a chronic stressor. These stressors are detrimental to the health of the student. As noted, the stress response may manifest as physical ailments including the suppression of the immune system. These stress induced disease states can also lead to depression, anxiety, and thoughts of suicide (Halgin & Whitbourne, 2005; Mcgregor et al., 2008).

Stress and Depression. As stated above, stress can lead to depression. Depression is an illness with a legacy of over 2000 years (Seeley et al., 2006). The American Psychiatric Association defines depression as a common and serious medical condition that "negatively affects how you feel, the way your think and how you act" (Torres, 2020, "What is Depression" section). Depression causes feelings of unhappiness and/or a loss of interest in activities once enjoyed. It can lead to a variety of emotional and physical problems and decrease the ability to function in social, occupational, and other significant situations. The Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-V) is used in the diagnosis and classification of mental disorders. Each disorder in the DSM-V has a diagnostic classification, a set of diagnostic criteria that must be present for a specified amount of time, and a description of the disorder (American Psychiatric Association, 2020a).

The DSM-V gives the following criteria for the diagnosis of depression:

1. Depressed mood most of the day, nearly every day.

2. Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day.
3. Significant weight loss when not dieting or weight gain, or decrease or increase in appetite nearly every day.
4. A slowing down of thought and a reduction of physical movement (observable by others, not merely subjective feelings of restlessness or being slowed down).
5. Fatigue or loss of energy nearly every day.
6. Feelings of worthlessness or excessive or inappropriate guilt nearly every day.
7. Diminished ability to think or concentrate, or indecisiveness, nearly every day.
8. Recurrent thoughts of death, recurrent suicidal ideation without a specific plan, or a suicide attempt, or a specific plan for committing suicide.

A diagnosis of depression requires the patient present with at least five of these symptoms during a 2-week period and must include depressed mood and/or loss of interest or pleasure (American Psychiatric Association, 2013, "Depression" section).

Stress and Anxiety. The relationship between stress and anxiety is well documented and many use these terms interchangeably. However, stress is usually characterized by a specific external cause, while anxiety does not require a specific cause (American Psychological Association, 2020b). An article in The Encyclopedia of Psychology defines anxiety as “an emotion characterized by feelings of tension, worried thoughts and physical changes like increased blood pressure” (Kazdin, 2000, "Anxiety"

section). Recurring disturbing thoughts or worries are common for those with anxiety. The DSM-V sites the following as diagnostic criteria for anxiety:

1. Restlessness, feeling keyed up or on edge.
2. Being easily fatigued.
3. Difficulty concentrating or mind going blank.
4. Irritability.
5. Muscle tension.
6. Sleep disturbance (difficulty falling or staying asleep, or restless, unsatisfying sleep).

These symptoms must also cause clinically significant distress or impairment in social, occupational, or other important areas of functioning. Three (or more) of the listed symptoms must be present with at least some symptoms having been present for the majority of six continuous months (American Psychiatric Association, 2013, "Anxiety" section).

Stress and Suicide. While suicide may be viewed as an extreme consequence of stress, it is more common than society likes to admit. According to a 2018 Centers for Disease Prevention (CDC) Report, suicide was the 10th leading cause of death overall in the United States, claiming over 48,000 people yearly (CDC, 2018). The National Alliance on Mental Illness states “suicide is the second leading cause of death among people age 10-43 in the US;” they also found “41% of students felt so depressed that it was difficult for them to function and 62% felt overwhelming anxiety” (MacPhee & Ponte, 2019, "Suicide" section). The American Psychiatric Association states “suicide is the act of killing yourself, most often as a result of depression or other

mental illness" (American Psychiatric Association, 2020b, "Suicide" section). As previously discussed, depression is a result of stress. According to Medical News Today, "Suicide ideation can occur when a person feels that they are no longer able to cope with an overwhelming situation" (Brazier & Litner, 2020, "Causes" section). However, with constant vigilance and intervention, suicide can be prevented. According to the American Association of Suicidology, the signs of suicide include:

- Threatening to hurt or kill him or herself, or talking of wanting to hurt or kill him/herself; and or,
- Looking for ways to kill him/herself by seeking access to firearms, available pills, or other means; and/or,
- Talking or writing about death, dying or suicide, when these actions are out of the ordinary.
- Increased substance (alcohol or drug) use
- No reason for living; no sense of purpose in life
- Anxiety, agitation, unable to sleep or sleeping all of the time
- Feeling trapped – like there's no way out
- Hopelessness
- Withdrawal from friends, family and society
- Rage, uncontrolled anger, seeking revenge
- Acting reckless or engaging in risky activities, seemingly without thinking
- Dramatic mood changes
- Giving away prized possessions or seeking long-term care for pets (American Association of Suicidology, 2001)

In some states, healthcare professionals are required to receive some kind of education in suicide prevention (Platzman-Weinstock, 2018). However, that is not the case nationally. At this time, there is no national standard for health care professionals nor mental health professionals to be trained in how to prevent or treat suicidal individuals (Dastagir, 2020). Suicide may be one of the most extreme forms of expression of stress, but not all stress results in suicide.

Stress During COVID-19 Pandemic. During the Spring of 2020, the American Psychological Association (APA) decided to convert their annual stress poll into a monthly poll to better evaluate the stress levels of Americans during the pandemic. This online poll was conducted over the course of a month and included adults living in the US (*N*=3013). These participants were asked to rate their current level of stress based on a 10-point scale, where 1 was "little to no stress' and 10 was "a great deal of stress". The average American's stress level was rated at 5.9 when related to the COVID-19 Pandemic. The previous year's Annual Stress in America survey reported average stress levels of 4.9. The results of this poll revealed Americans are experiencing significantly more stress than in previous years (American Psychological Association, 2020a). As noted earlier, stress is known to cause problems with the immune response. Suppression of the immune system is especially concerning as the world lives through the COVID-19 pandemic. According to the CDC, stress puts people at risk for contracting COVID-19.

Stress during an infectious disease outbreak can cause the following:

- Fear and worry about your own health and the health of your loved ones, your financial situation or job, or loss of support services you rely on
- Changes in sleep or eating patterns

- Difficulty sleeping or concentrating
- Worsening of chronic health problems
- Worsening of mental health conditions
- Increased use of tobacco, and/or alcohol and other substances

(CDC, 2020b)

The increased use of tobacco and alcohol are especially concerning during the COVID-19 Pandemic as the virus causes respiratory distress. The experience of stress can negatively influence immune function, specifically heart and respiratory disease (Halgin & Whitbourne, 2005), leading to poor and potentially fatal outcomes for the health of the patient experiencing COVID-19.

How to Measure Stress. There are many ways to measure stress. The most common measurement is the Social Readjustment Rating Scale (SRRS). This assessment examines "life stress in terms of life changing units" (Halgin & Whitbourne, 2005). However, this scale is not appropriate for measuring stress changes in a relatively short amount of time. An effective scale to measure stress changes over time is the classic stress assessment tool, the Perceived Stress Scale (PSS). This scale was developed in 1983, and is the most popular choice for understanding how stress affects personal feelings and thoughts over the course of a month. The PSS originally consisted of 14 items, but was later changed to include only 10 items. These 10 items (see Appendix A) are scored by adding up the numeric answer given. However, the scores from items 4, 5, 7, and 8 are reversed in value before being added. This results in scores ranging from 0 to 40. Scores are analyzed using Table 1.

Table 1

PSS Scoring

SCORE	STRESS LEVEL
0-13	Low Stress
14-26	Moderate Stress
27-40	High Stress

Higher PSS Scores are related to failure to quit smoking and failure among diabetics to control blood sugar. It is also linked to greater vulnerability to stressful life-events-elicited depressive symptoms and more colds (Cohen et al., 1983).

A 2012 study suggests healthcare students across the globe, experience high levels of perceived stress. Stress levels were analyzed using the PSS. This study of healthcare students (N = 312), including physical therapy (n = 154), communication disorder (n = 92), and nutritional science (n = 66) found the average perceived stress was similar for all three programs based upon PSS scores with the majority of students scoring in moderate to high stress (Jacob et al., 2012).

A 2018 study examined the effects of stress on medical school students (N = 290) and found a noticeable increase of stress hormones such as adrenocorticotropic hormone and cortisol in first-and-second year Saudi medical students during an academically stressful situation. This is supported by other studies that examined immunological dysregulation in a similar group of students (Alsulami et al., 2018).

A 2017 systematic review entitled, “Interventions to Reduce Perceived Stress Among Graduate Students: A Systematic Review With Implications for Evidence-Based

Research," found similarities in the stressors for graduate students in "nursing, midwifery, pharmacy, podiatry, medical, social work, counseling, clinical psychology, athletic training, audiology, dental, dental hygiene, dietetics, medical technology, occupational therapy, physical therapy, physician assistant, radiologic technology, respiratory therapy, speech-language pathology, and chiropractic" (Vermeesch et al., 2017, "Definitions" section). The stressors for these graduate students included: finances, time management, role responsibilities, relationships, competing obligations, academic demands, and clinical practicum requiring interaction with patients.

When discussing the measurement of stress in students, the Student's Stress Rating Scale (SSRS) must be examined (see Appendix B). The SSRS is made up of 35 statements rated according to the frequency that the student experiences a particular stressor. The frequency is rated on the basis of 1) *everyday*, 2) *once in 2/3 days*, 3) *once in a week*, 4) *2 times monthly*, 5) *once in a month*, 6) *rarely* and 7) *never*. Each statement is related to five stress factors; these stresses are: Physiological, Emotional, Social, Examination, and Behavioral (Balamurugan & Kumaran, 2008). The response *everyday* receives a score of 6, while a response of *never* receive a score of 0. Scores may range from 0 to 210. A lower score indicates little stress while a high score indicates greater stress.

Mitigators/Coping with Stress. Coping is defined as:

> "the process of contending with life difficulties in an effort to overcome or work through them…Conscious or unconscious strategies or mechanisms that a person uses to cope with stress or anxiety including turning to a comforting person for love and support, self-discipline, acting out or working off tension, talking, and

expressing feelings by crying or laughing and also unconscious defensive mechanisms such as avoidance and rationalization" (Miller et al., 1997, p. 377).

Coping mechanisms can be positive and negative. Some students turn to negative coping strategies; these include alcohol use and other self-destructive activities. A mental health study of medical, dental and veterinary students (N = 2133) found 40% of the students engaged in hazardous drinking behaviors, 16% reported they had suicidal thoughts, and 7% reported they had harmed themselves. The students completing this study noted they did not seek help because they were fearful of documentation (50%). Of note, 70% of these students reported lower than average sense of well-being (Knipe et al., 2018). As people advance in age and maturity, they develop the ability to use more functional coping skills. "Older adults use more problem focused coping and other strategies that allow them to channel their negative feelings into productive activities" (Halgin & Whitbourne, 2005, p. 207). These coping strategies may play an important role in the health of the person experiencing stress. One of the most common ways Americans cope with stress and anxiety is to use pharmacologic agents or medications.

Medication. There are many pharmacotherapeutic agents utilized in the management of stress and anxiety. One of the most commonly prescribed medications for anxiety or stress is benzodiazepines (BZDs). These include but are not limited to: Xanax, Librax, Librium, Klonopin, Ativan, and Halcion (Food Drug Administration [FDA], 2020). Benzodiazepines are favored because they are lipid soluble and have a rapid onset. However, the potential for abuse and addiction to these substances is high (Guina & Merrill, 2018). The deaths of many celebrities have been attributed to the use of BZDs, including Heath Ledger, Amy Winehouse, Michael Jackson, and Elvis Presley (US

Department of Veterans Affairs, 2016). The half-life of BZDs are about 20-50 hours (Haveles, 2007). Other negative side effects include: psychomotor impairment, increased drowsiness, and slowed breathing. The extended half-life and impairment of psychomotor skills would make it difficult for a clinical dental hygiene student to practice without being under the influence of a controlled substance.

Other commonly used pharmacotherapeutic agent are known as Selective Serotonin Reuptake Inhibitors (SSRIs) and Serotonin Norepinephrine Reuptake Inhibitors (SNRIs). Some popular SSRIs and common SNRIs are noted in Table 2 and Table 3. While these are commonly used in the treatment of anxiety caused by stress, they are not without their drawbacks. “Approximately 30-50% of patients experience more mild and transient side effects, most commonly nausea, diarrhea, headaches, insomnia, jitteriness, or restlessness” (Farach et al., 2012, p. 835). These side effects may have a detrimental effect on the clinical practice skills of a dental hygiene student as their manual dexterity is crucial in the successful and safe provision of dental hygiene treatments. For example, if the clinician is constantly nauseated or restless it may have a deleterious effect on their ability to concentrate and provide quality patient care. In 2017, Wible estimated about “75% of medical school students or residents are on antidepressants or stimulants or a combination of the two” (Wible, 2017, para. 4).

Table 2

Common SSRIs

Brand Name	**Generic**
Celexa	citalopram
Lexapro	escitalopram
Prozac,, Sarafem, Symbyax	fluoxetine
Luvox, Luvox CR	fluvoxamine
Paxil, Paxil CR, Pexeva	paroxetine
Zoloft	sertraline
Viibbyrd	vilazadone

Note. (FDA, 2014)

Table 3

Common SNRIs

Brand Name	**Generic**
Pristiq	desvenlafaxine
Cymbalta	duloxetine
Fetzima	levomilnacipran
Effexor XR	venlafaxine

Note. (Mayo Clinic, 2019)

Meditation. According to an article featured on The Encyclopedia Britannica Webpage, meditation is the "private devotion or mental exercise encompassing various

techniques of concentration, contemplation, and abstraction, regarded as conducive to heightened self-awareness, spiritual enlightenment, and physical and mental health" (Merkur, 2020, "Meditation" section). Furthermore, meditation has been practiced throughout history and by nearly all religions. It is estimated meditation is older than recorded history and practiced for about 3,000 years.

Meditation first gained attention in the United States (US) in the 1960s (Logan, 2014). This was largely due to the influence of the British rock band, The Beatles, who practiced West Hindu-oriented forms of meditation. This newly found attention to meditation gained traction in the US beginning in the 1980s. The use of meditation as a psychotherapy was only recently embraced in the 1990s (Merkur, 2020). Meditation is used to "increase calmness and physical relaxation, improving psychological balance, coping with illness, and enhancing overall health and well-being" (National Institutes of Health, 2016, "What is Meditation" section). There are many different varieties of meditation, but most possess four fundamental principles.

1. A quiet location with as few distractions as possible.
2. A specific comfortable posture (sitting, lying down, walking, etc.)
3. A focus of attention (a specifically chosen word, or set of words, an object, or the sensation of breathing).
4. An open attitude (letting distractions come and go naturally without judging them).

   (National Institutes of Health, 2016)

In a 2012 review of 36 meditation trials, it was found 25 of them (70%) reported "better outcomes for symptoms of anxiety in the meditation groups compared to control groups" and The Society for Integrative Oncology(SIO) recommended meditation as "supportive care to reduce stress, anxiety, depression and fatigue in patients" (National Institutes of Health, 2016, para. 14 & 23). In 2015, Radiologic Technology published a study touting the benefits of meditation in radiologic technicians, stating "Radiologic technicians might find that meditation improves their quality of life as well as their level of job satisfaction, allowing them to provide improved quality of care to their patients" (Dunlop, 2015, p. 535). This study is of special interest, as it examines healthcare providers using meditation to alleviate stress. Dunlop quotes a 2006 study of radiology students who rate their stressors during school as follows:

1. Fear of making a mistake
2. Feeling unprepared
3. Feeling intimidated by staff or instructors
4. Having difficult or critically ill patients
5. Experiencing hurtful criticism
6. Having too much supervision
7. Receiving negative responses to requests for help.

While Dunlop's study focuses more on the anatomical and physiologic changes occurring in radiology students when they meditate regularly, the author asserts meditation could be a benefit to healthcare employees and patients (Dunlop, 2015).

Benefits. There are many benefits to meditation. Two of the most seminal examples are evident in the following two studies. In 2002, Tibetan monk, Yoney

Mingyur Rinpoche was studied at the University of Wisconsin-Madison. Brain activity was monitored and measured with an electroencephalogram (EEG) while the monk practiced meditation. This monk had completed over 62,000 hours of meditation at the time of the study. The study was designed to alternate one minute of meditation on compassion followed by a thirty second rest break. This was repeated four times. While this monk completed the study, it was found that when the monk began meditation the EEG would immediately spike with activity. The remarkable part of this study was that the monk entered and exited a meditative state immediately. Ten years after this initial study Rinpoche was examined again. This time the goal was to study the effects of aging on the monk's brain. It was found that the 41-year-old monk's brain showed fewer signs of aging than others (non-meditators) in his age group. The researchers noted Rinpoche's brain exhibited the same aging as someone 10 years younger (Goleman & Davidson, 2017).

In 2012 researchers studied a Buddhist monk, Matthieu Ricard's brain and found the highest level of gamma waves (associated with attention, memory, learning, and happiness) that had been recorded at that time. This earned the monk the title "The Happiest Man." The researchers also studied 21 additional monks; all exhibited high gamma waves both during and after meditation (Taggart, 2012). Less effects of aging on the brain and the increase in gamma waves exhibit some of the benefits of meditation.

An added benefit of meditation is it costs nothing. There is no need for an expensive investment in this intervention and meditation can be completed anywhere at any time. There are even free meditation videos easily located on the internet as well as new apps being developed for download on personal electronic devices. However, some

individuals may prefer a more formal approach to meditation and may opt to participate in formal meditation exercises, such as meditation retreats and formal meditative trainings. These meditative retreats often include spa treatments and are located in exotic locations. An internet search revealed average prices for a meditation retreat in the range of $100-150 per day, while a meditation instructor costs around $960 for six sessions of guided meditation (Lindberg, 2020).

Although there a several benefits to meditation, one limitation is time. Meditation requires an individual to take time and focus during their day to practice this discipline. Some meditation techniques can be utilized quickly, while others can take more time (Sharma, 2015). Buddhist monk Rinpoche meditated an average of eight hours a day (Goleman & Davidson, 2017). However, when completing studies with Buddhist monk, Ricard, it was found just 20 minutes of meditation daily can improve one's mental state (Shontell, 2020). While daily meditation may be ideal, it may be challenging for those with busy schedules, such as college students. A study conducted in 2017 at the University of California, Los Angeles, found medical students who practiced 30 minutes of meditation once a week noticed a decrease in stress and were better able to cope with challenging events (Reyes, 2017). Likewise, a study of pharmacy students (N = 19) found practicing meditation and yoga once weekly, may reduce stress and anxiety in college students (Lemay et al., 2018).

Risks. There are few well documented negative effects of meditation. Most of the existing publications examining the negative effects of meditation all seem to refer to a 2016 study of the unwanted effects of meditation, completed in The United Kingdom. This study found 82% of participants (N = 60) experienced fear, anxiety, or paranoia.

However, this study only sampled meditators who had negative experiences with meditation. These negative effects were divided into eight categories:

1. Cognitive, or related to thinking. This included changes in world view, delusions, irrational or paranormal beliefs, mental stillness, and change in the way people made decisions to do things (executive function).
2. Perceptual, or related to information from the senses. This included hallucinations, visions or illusions, seeing lights and being more sensitive to sensory stimuli such as noise or bright light.
3. Affective, or related to emotions. This included fear, anxiety, panic or paranoia, which were the most commonly reported group of challenging experiences; feeling blissful or very happy; depression or grief; re-experiencing of traumatic memories.
4. Somatic, or related to body. This included feeling bursts of energy, changes to sleep patterns, feelings of pain, and both increased or released pressure or tension.
5. Conative, or relating to motivation. This included changes in motivation, change in effort, loss of enjoyment of things usually found enjoyable and loss of interest in doing things.
6. Sense of self, which included feeling a loss of boundaries between self and the rest of the world, a loss of sense of self.
7. Social, which included difficulties in interacting with people, especially after returning from a meditation retreat or period of intensive practice.

(National Health Service of Great Britain, 2017)

While these negative effects are serious, they are rarely experienced and meditation is still accepted as a safe and acceptable practice.

Master's level graduate students, completing degrees in mental health counseling, school counseling, and marriage and family counseling (N = 33) completed a 2008 qualitative study using Mindfulness Based Stress Reduction, a form of meditation, reported when they first started this practice their bodies initially reacted negatively, but those negative reactions were soon relieved and replaced with positive benefits. One student reported the following:

> "At first when I started the practice, my body ached and my shoulders became even stiffer. I felt uncomfortable and wanted to quit the practice. However, as I kept practicing, I noticed that my shoulders are getting better. My body became more flexible. I did not catch a cold at all in the last winter regardless that I usually get a cold at least a couple of times in winter. I feel that my body is more energized even in the morning. These are many positive physical changes that I am grateful for" (Schure et al., 2008, p. 50).

This was a formal study where students were enrolled in an elective course entitled "Mind/Body Medicine & the Art of Self-Care" and was completed each year for a span of four years. The program was loosely based on Mindfulness-Based Stress Reduction (MBSR). The stress reduction techniques employed by this program included: Hatha Yoga, sitting meditation, qigong, and conscious relaxation techniques. Overall, the study reported counseling students enrolled in this MBSR-based self-care class experienced positive outcomes in their personal and professional lives. The results of this study concur with results of other healthcare professions, such as medicine and nursing, also

benefiting from MBSR (Schure et al., 2008). This may also be applied to dental hygiene students.

Stress and the Dental Hygiene Student

The rigors of the education of healthcare providers can prove to be exceptionally stressful. In 2012, Israeli researchers noted healthcare students often feel more stress due to the evolution of their prospective profession. This includes, "the rate and amount of new knowledge, the changes in healthcare needs and services, and the increased range of responsibilities" (Jacob et al., 2012, p. 401). These factors also effect dental hygiene students. Add to these existing stressors the COVID-19 pandemic and the amount of change and adaptation that has been made in their education, it is understandable that stress levels may increase for dental hygiene students. Dental hygiene students face numerous examinations, criticism about academic and clinical work, as well as the responsibility of providing adequate care for their patients; and the stresses do not stop there - the students must also prepare for both written and clinical board examinations. Researchers concluded the top stressors for dental hygiene students include: "Examinations and grades, workload, patient care, and graduation requirements" (Harris et al., 2017, p. 101). This was determined by a survey of dental hygiene students (N = 72) in 2015 at The University of Portsmouth Dental Academy. The survey used five accepted methods of measurement, including the Dental Environment Stress Questionnaire, Depression Anxiety Stress Scales, Scales of Psychological Well-Being, Valuing Questionnaire, and The Adult Hope Scale. The afore mentioned studies provide supporting evidence of the common stressors experienced by dental hygiene and healthcare students.

The transition from face-to-face courses to online courses can be stressful and at least one college had to decrease class size to accommodate the new standard operating procedures in compliance with the CDC guidelines (Landrum, 2020). It also appears some colleges are attempting to shorten their semesters in an attempt to decrease the risk and rate of COVID-19 infections (Anesi, 2020; Penberthy, 2020). This shortened timeline only adds to the list of stressors for dental hygiene students and it is evident these students could benefit from some kind of intervention due to the stress they are experiencing during their education. According to a recent article on April 29, 2020, published by MSN.com, dental hygienists have the number one most dangerous job for contracting COVID-19 (Olya, 2020). This is due to the close proximity to the oral cavity and the aerosols produced during routine dental hygiene care. This is in addition to the shortages in Personal Protective Equipment (PPE) (CDC, 2020a). This is further supported by the Occupational Safety and Health Administration (OSHA) as they classify "Healthcare workers performing aerosol-generating procedures" at "very high risk" (The Occupational Safety and Health Administration (OSHA), 2020). This increased occupational health risk can add to the stress levels of dental hygiene students. In an effort to decrease the stress, the American Dental Hygienists' Association (ADHA) is advocating for dental hygienists to be included with other healthcare providers for the initial supply of the new vaccine (ADHA, 2020).

A 2001 study published in the Journal of the American Dental Association found while dental students are often given some education on stress management, dental hygiene educational curriculum often does not include stress management. This study recommends dental and other healthcare programs include stress management education

into their curriculum in an effort to decrease the health risks of stress and increase job satisfaction (Alexander, 2001).

Meditation and Stress

One intervention for the multifactorial stresses dental hygiene students face is meditation. “Reducing stress levels of healthcare providers might increase efficiency, reduce burnout, and improve overall quality of life for healthcare workers” (Dunlop, 2015, p. 535). This intervention requires little former or formal knowledge, can be completed quickly, privately, and at no expense to these students. For these reasons, meditation may be an effective way to help dental hygiene students cope with their stress.

According to Psychology Today, MBSR is derived from Buddhist meditative practices. This therapy was popularized by Jon-Kabat-Zinn in 1979 to treat individuals experiencing stress, anxiety, depression, and chronic pain (Baum, 2010). Education for Health, a peer-reviewed global consortium of health professions schools journal, reported a study completed with graduate level healthcare students (N = 33) who were experiencing significant stressors during their professional training. This study examined the impact of MBSR when applied to these students. These students were from graduate healthcare programs at Samuel Merritt University in Oakland, California, and represented five separate healthcare programs including: podiatric medicine, physician assistant, physical therapy, occupational therapy, and graduate level nursing. The students selected for this study met inclusion criteria including demographics, fulltime student status, and current grade point average. Some students were excluded from the study due to the use of psychiatric medications. The selected students (N = 13) completed psychometrically sound tests for anxiety, empathy and burnout. These students then completed a formal

mindfulness-based stress reduction program consisting of eight and a half hours of classes, an eight-hour silent day-long retreat, and daily 35-minute formal practices for 11 weeks. After the program, students completed three questionnaires, including the Burns Anxiety Test, Jefferson Scale of Physician Empathy, and the Maslach Burnout Inventory Questionnaires which are further explained in Table 4. The results of this study revealed that MBSR can mitigate stress and reduce anxiety in healthcare students while increasing empathy, but does not prevent burnout (Barbosa et al., 2013).

Table 4

Barbosa Study Results

Burns Anxiety Test- *Compared experimental and control group:* **Surveyed at 8 weeks** ($P < 0.001$) **Surveyed at 11 weeks** ($P < 0.01$) 85% of students experienced diminished anxiety at both 8 and 11 weeks	33-item list of statements on a Likert scale Total scores divided into 6 categories 1. Minimal to no anxiety 2. Borderline anxiety 3. Mild anxiety 4. Moderate anxiety 5. Severe anxiety 6. Extreme anxiety or panic
Jefferson Scale of Physician Empathy *Compared experimental and control group:* **Surveyed at 8 weeks** ($P < 0.0096$) **Surveyed at 11 weeks** demonstrated a decrease in empathy when compared to the 8 week survey	20-item list of statements on a Likert scale Each item is individually weighed
Maslach Burnout Inventory *Compared experimental and control group:* No statistical differences were observed	16-item list of statements on a Likert scale Total score divided in to three categories 1. Exhaustion 2. Cynicism 3. Professional efficacy

Similarly, a study completed in 2019 among dental and dental hygiene students ($N = 132$) determined the effect of yoga on mindfulness, depressive symptoms, burn out, and perceived stress (Braun et al., 2019). Yoga combines the mental stimulation of

meditation with physical movement. Most yoga practices include a set meditation time at the end of each session. “Yoga is more than just a workout—it’s actually a combination of four components: postures, breathing practices, deep relaxation, and meditation” (Harvard Medical School, 2016, para. 2). The previously discussed 2019 study found yoga was a successful, feasible and acceptable intervention for dental and dental hygiene students. This begs the question: was it the physical movement or the meditation practice that helped relieve stress? There is a surprising lack of research on meditation and its’ effectiveness as a stress reliever for dental hygiene students.

Summary

The stresses dental hygiene students experience during their educational journey are numerous, as delineated in this review. Stress has significant negative health effects, both physically and mentally. These stresses have been magnified with the advent of the COVID-19 Pandemic. Students now face their educational stress with the addition of stresses involving the accelerated program goals, risk of disease transmission, and the uncertainty of their futures. Dental hygiene students may benefit from the practice of meditation in reducing stress levels and giving them a positive coping mechanism that can be used, not only during their education, but also during their prospective careers.

Methodology

Research Method or Design

This study was a mixed method experimental design. Dental hygiene students who volunteered to participate were enrolled and took a pre-test (see Appendix C) to determine their stress levels. This pre-test utilized an adaptation of the SSRS and the PSS as previously discussed. Similarly, the post-test utilized the same stress scales (see Appendix D). Both the pre- and post-test were administered via SurveyMonkey and were sent to students through their school email account. Each student was asked to provide their email address and was provided with an identification number.

The Principal Investigator (PI) explained the study protocol that included receiving guided meditation media from the PI via email. After completion of the meditation each week, the students were asked to record their completion by answering a question related to the weekly meditation YouTube Video via SurveyMonkey using their identification number. After participation in the four weeks of meditation, the students' level of stress was re-evaluated utilizing the same adapted SSRS and PSS. These surveys provided comparative data to determine the effectiveness of this intervention. In order to strengthen the quantitative data, the PI conducted a focus group to further establish the impact of this intervention.

A control group was considered for this study. However, due to the challenges presented by COVID-19 and the constantly changing recommendations that effect dental hygiene education, a control group was not be feasible for this study. The pre-test served as a baseline to establishing a foundation for stress levels.

Procedures

The PI utilized both survey methods in the form of PSS and SRSS as well as a limited focus group to answer research questions. The study required the recruitment of dental hygiene students in their final year of study, pre-test of stress level, completing of weekly meditation intervention over the course of four weeks, post-test of stress level, and, for some, completion of a focus group. All quantitative data was gathered using SurveyMonkey and analyzed using a paired *t*-test and Wilcoxon Sign Rank Test. Qualitative data was gleaned from responses elicited during the focus group and thematical analysis was be used to analyze said data. This study was completed online utilizing email, YouTube, SurveyMonkey, and Zoom.

Human Subjects Protection/Informed Consent

The PI is a graduate student at Eastern Washington University (EWU) and this study was approved by EWU Institutional Review Board (IRB). This research study was conducted in two separate locations, in two separate states, with enrolled students from EWU and Sheridan College (SC) in Sheridan, Wyoming. The PI submitted to SC IRB to approve the EWU IRB as the supervising IRB for this Exempt Category 3 status, and informed consent.

Consent was obtained prior to participation. Minimal risk was involved and participation was voluntary. Participants were allowed to withdraw from the study at any time. All information and responses were kept confidential and saved on the PI's password protected computer. No identifiers were mentioned in the reporting of the results and only the PI knew the answers the students provided.

Participants completed the pre-test (see Appendix C) before completing weekly meditations. By completing the online pre-test and indicating their receipt of the informed consent document, students indicated their consent to participate in the study. When the 4-week study was completed, students completed a similar online post-test (see Appendix D). A finite number ($N = 3$) of completing study participants were selected to participate in a focus group via Zoom.

Sample source, plan, sample size, description of setting.

A convenience sampling of volunteers was recruited from dental hygiene students enrolled in SC's Dental Hygiene Program and EWU Dental Hygiene Program. Inclusion criteria were:

1. Undergraduate Dental Hygiene Students in their final year of study at EWU and SC
2. Ability to use email and online devices

The PI is an alum of SC and a graduate student at EWU with easy accessibility to enroll EWU dental hygiene students. SC was unable to approve EWU as the supervising IRB for the study and the PI was not allowed to contact the students on campus or request their email addresses. Students from SC were recruited via Facebook and referrals from other students. The population of this study included dental hygiene students at SC and EWU.

This stress intervention was implemented weekly for the duration of the 4-week study. All participants were entered into a weekly drawing for a $10 Starbucks Gift Card via a link in the weekly SurveyMonkey. Students who completed all four weeks of the study and indicated their willingness to participate in the Zoom focus group were entered

into a drawing for a hand carved sterling silver bracelet donated by Tom Balding Bits and Spurs™. See Figure 3. Additionally, students were encouraged to include participation in research on their professional resumes.

Figure 3

Hand Carved Sterling Silver Cuff

The PI hoped for a sample of 53 volunteers based on the class sizes of 24 from SC and 37 from EWU and to achieve a statistical significance with a 95% confidence level and a 5% margin of error. Statistical significance was determined by the equation in Figure 4. However, this was not accomplished and a sample of twenty-two (N = 22) students were recruited for the study.

Figure 4

Determining Sample Size

$$\text{Sample size} = \frac{\frac{z^2 \times p\,(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p\,(1-p)}{e^2 N}\right)}$$

Note. This figure was taken from https://www.surveymonkey.com/mp/sample-size-calculator/ and utilized to determine the sample size for this study.

Research was completed online through digital communications (e-mail, SurveyMonkey, and Zoom technology) due to the additional risk of COVID-19 transmission.

Variables

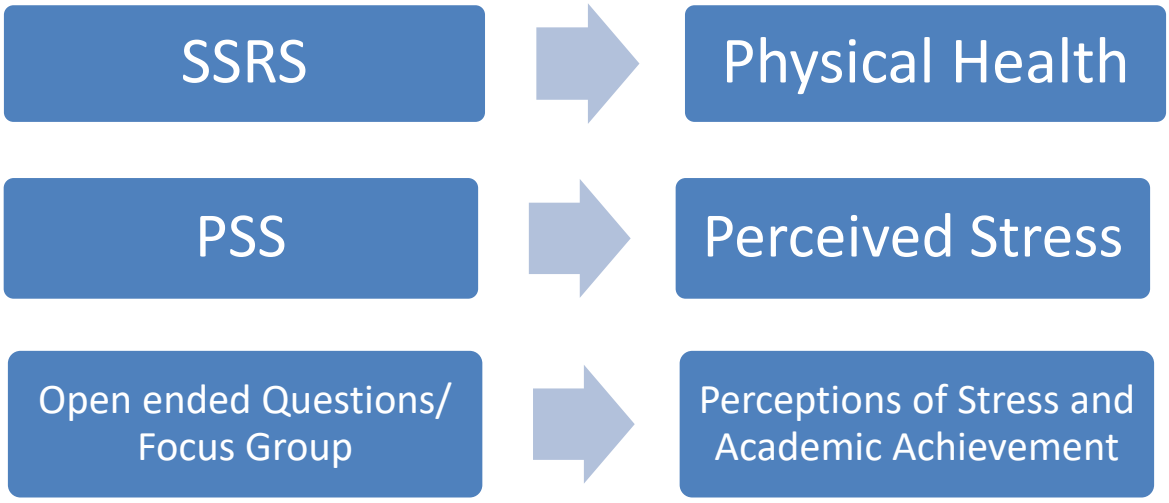
The independent variable for the study was the meditation intervention. The dependent variable was the students' perceptions.

Instruments

A pre- and post-intervention test was administered to the study participants via a SurveyMonkey link sent to the participant's student email. The pre- and post-tests were designed to evaluate the levels of stress that the participants are currently experiencing. The pre-test included demographic questions. The pre- and post-tests were based on the aforementioned SSRS and PSS and were adapted by the PI to satisfy the design of the study. Quantitative data was collected using these pre-test and post-test surveys (see Appendix C and D) to evaluate levels of stress before and after the study. Adapted questions from SSRS were used to evaluate physical health effects, while PSS was used to evaluate perceived stress. Qualitative data regarding perceptions of stress and perceptions of academic achievement were gathered from open-ended questions. Additional qualitative data was further analyzed using responses from a PI facilitated post study focus group. See Figure 5.

Figure 5

Evaluation Instruments



Equipment

Due to the ongoing uncertainty of collegiate educational logistics, the study was completed digitally via email, SurveyMonkey, and Zoom. Students were sent, via their student email, a recruitment video explaining the purpose of the study. Participants required access to a digital device with an internet connection either a laptop, tablet, or phone. Internet connection was required as the students received their correspondence as well as their meditation videos via email and YouTube (see Appendix E).

Steps to Implementation

Step one. Upon IRB approval from EWU, EWU and SC Dental Hygiene students were invited to participate in a study evaluating the effects of meditation on their stress levels. The PI recorded a short seven-minute presentation (see Appendix E) via YouTube and it was played in the Clinic IV course for EWU students. Because of difficulties obtaining approval from SC, a SC student was contacted via Facebook and the student contacted her classmates with the recorded video. This was completed in accordance with

IRB standards. Students were not contacted by the PI through SC until they had agreed to participate and provided their contact information. EWU student email addresses were obtained by request from their program director. Students were then sent enrollment information (see Appendix F).

Step two. Students were sent a pre-test via SurveyMonkey on February 22, 2021. Participation in online pre-test and acknowledgement of informed consent allowed the student to be assigned an identification number to each participant that was associated with their email address. A reminder email was sent right before the study intervention began. The study commenced the following week.

Step three. The PI sent an email containing a YouTube video of a guided meditation, weekly (see Appendix G) over the four-week study, to each participant. Each week, the participants filled out a post intervention survey including their given identification number and indicated if they enjoyed the meditation and their stress levels before and after completing the meditation. These students were entered into a drawing for a $10.00 Starbucks gift card. These identification numbers were entered into Microsoft Excel by the PI and a randomization function was used to choose a winner. Winners were announced each Sunday via email and an electronic gift card was sent to the student's email address.

Step 4. At the end of the four-week study, participants were sent a final email containing a link to the post-test on SurveyMonkey and indicated their willingness to participate in a focus group. Three students were selected to participate in a focus group conducted via Zoom. Students who participated in the full study (completing all four weeks) were entered into a drawing for a hand carved Sterling Silver Cuff, generously

donated by Tom Balding Bits and Spurs™. Microsoft Excel was used to randomly choose a winner using a randomization function. The winner was announced via email and contact information was requested from the winner so that the cuff could be sent to the student.

Step 5. After consultation with a statistician, Focus Group questions were developed based on pre and post-test data analysis as well as post-test qualitative item responses.

Step 6. Zoom invites were sent to selected students and the focus group was completed on Sunday March 28, 2021.

Step 7. Transcription of the focus group and study results were gathered and exported from SurveyMonkey and were emailed to Peak Strategies, LLC for statistical analysis.

Summary

The 2021 graduating dental hygiene students at EWU and SC were a suitable population to use for this research. These students were all preparing for graduation, board exams, and facing the uncertainty of their futures due to COVID-19. This study was designed to determine if a meditation intervention was effective as a stress reliever for dental hygiene students by utilizing pre and post-tests scores, and evaluation of a focus group.

Results

Description of Sample

Dental hygiene students at EWU and SC were recruited to participate in this research evaluating meditation as a stress reliever for dental hygiene students in a post COVID-19 world. A convenience sample of dental hygiene students (N = 22) in their final year of study participated in the pre-test for this study. Of the 22 students who participated, five were enrolled at SC and 17 were enrolled at EWU. A total of seven participants were removed from statistical analysis due to failure to complete the study. This provided a simple completion rate of 68.2% (n = 15). The sample size is similar to Barbosa's study that utilized meditation as a stress reliever in a 2013 study of healthcare students (N = 13). The majority of the students were between the ages of 18-25 (93%) and indicated their race as white/Caucasian (80%), while 13.3% indicated they were Hispanic or Latino and 6.7 % indicated they were of "other race". The majority of the respondents indicated their education level as having earned an associate's degree (66.7%), while the remaining students had completed high school or equivalent education. See Table 5.

Table 5

Demographic Characteristics of Participants who Completed Both Pre-test and Post-test

Demographic Characteristic	*n*	%
Age		
18-25	14	93.3%
26-35	0	0%
36-46	1	6.67%
Race		
White/Caucasian	12	80%
Hispanic/Latino	2	13.3%
Other	1	6.7%
Education		
High School/Equivalent	5	33.3%
Associates Degree	10	66.7%
Sex		
Female	15	100%
Male	0	0%

Students identified the sources of their major stressors both before and after completing the study. See Figure 6. These results suggest that stress related to academics may have been increasing over the four-week period of the meditation study. Students also indicated whether they identified as high achievers before and after completing the study. See Figure 7.

Figure 6

Major Stressors Before and After Study Completion

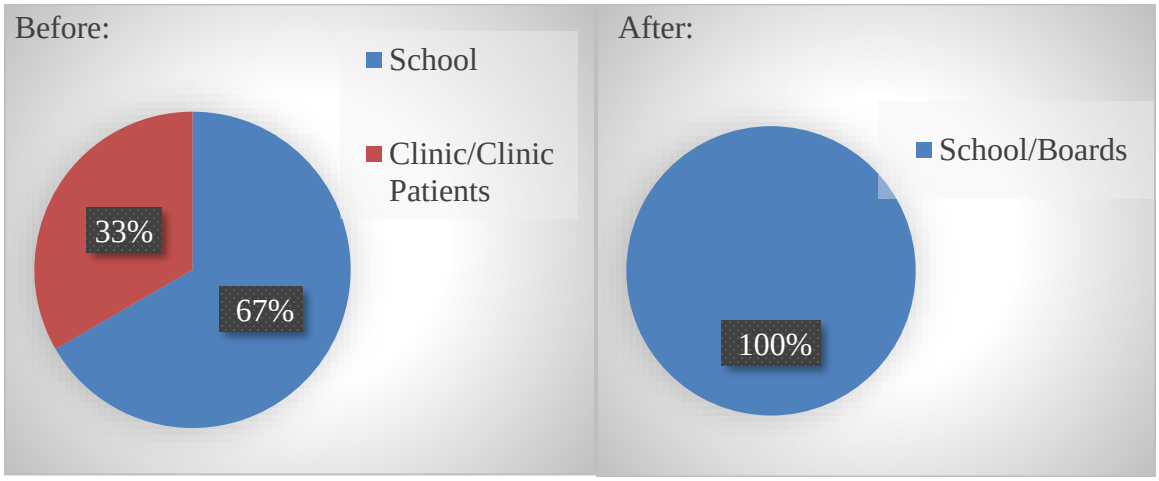
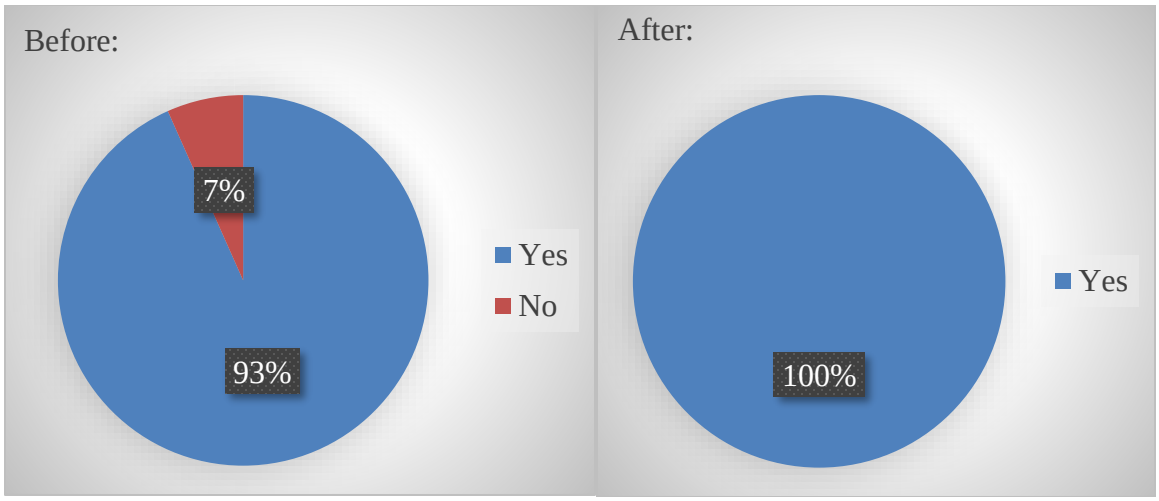


Figure 7

Students Identifying as High Achievers: Before and After Study Completion.



Statistical Analysis

Meditation's Effect on Students' Perceived Stress Levels

Participants rated their currently level of stress on a 10-point Likert-like rating scale. Participants reported a significant decrease in overall stress from before the

beginning of the study and after four weeks of meditation, $t(14) = 2.2$, $p = .01$. The PSS was also used to determine the participants stress levels, $t(14) = 3.4$, $p < .01$. See Table 6.

Meditation's Effect on Student's Perceptions of Academic Achievement and Well-being

Academic Achievement. When asked if participants considered themselves high-achievers, all but one participant reported "yes" in the pre-test, and all reported "yes" in the post-test. When asked the extent current stress levels impacted academic achievement, there was no significant differences between student's perceptions of how stress impacted their academic achievement before and after four weeks of meditation, $t(14) = 2.1$, $p > .05$. See Table 6.

Well-being. Two-thirds of participants in the pre-test ($n = 10$) reported that stress impacts their physical well-being, choosing a 6 or higher on the 10-point Likert-like scale. This number increased slightly at the post-test, with 11 participants choosing above the mid-point on the same scale. There were no significant differences between student's perceptions of how stress impacted their physical well-being before and after four weeks of meditation, $t(14) = 2.1$, $p > .05$. See Table 6. Similarly, a series of Wilcoxon Signed Rank Tests were run on the Adapted Student Stress Rating Scale, and no significant differences were found on physiological stress between pre-test and post-test on either the composite score or the individual items, $p > .05$. A Wilcoxon Signed Rank Test was used instead of a Student's Paired t-test to account for the non-metric data gathered from the Student Stress Rating Scale.

Table 6

Pre-test and Post-test Statistical Analysis

	Pre-test Mean Score	Post-test Mean Score	Pre-test Standard Deviation	Post-test Standard Deviation	*p*-value
Perceived Stress					
10-Point Likert-like Scale	8.0	6.8	1.0	1.1	.01*
PSS	2.4	1.9	0.5	0.4	.002*
Academic Achievement					
10-Point Likert-like Scale	6.0	6.8	1.1	1.1	0.6
Well-being					
10-Point Likert-like scale	7.4	6.9	1.1	1.1	0.2

Note. Statistical significance set at *p < 0.05.

Focus Group

Thematical analysis was utilized in the analysis of data gathered through the focus group. These questions related to the research questions and revolved around stress levels, academic achievement, and physical well-being. See Table 7.

Table 7

Thematic Analysis: Student Comments Regarding Meditation Study

Stress Levels	Academic Achievement	Physical Well-being
"Participating in this made me more aware that I need to prioritize my meditation and do it more regularly."	"I would take 30 minutes and do the meditation and it would allow me to refocus and I could lower my stress levels and get my mind ready to study."	"I had a stroke last January. I think meditation would have helped me before then. They don't know what brought on my stroke. This is my third stroke. I know my stroke in January was related to stress in school."
"I think that [meditation] helped bring down a lot of anxiety."	"I thought it really helped me to focus on what I was doing and give my mind a break before I started studying."	"[after the study] I am not putting stress on myself. I am taking criticism better and am just more ok with

		things that are happening around me."
"It [meditation] would allow me to lower my stress levels."	"I feel like it [meditation] helped with not stressing out about exams."	"When I feel really stressed, I lose my appetite… meditation helped me feel more at ease and I was able to feed myself a proper meal and that helped me to focus more."
"I know that my stress would have been worse had I not been meditating."	"I feel like, after meditating, I was able to focus on the topic that I was supposed to be focusing on."	"I feel like I was definitely able to sleep way better!"
"It made my mindset a lot more positive."	"It[meditation] gave me more energy to tackle my assignments and everything."	"I felt like I was definitely more aware of myself and didn't let things get to me."
"[meditation] helped my stress levels."	"If I had meditated through all of the program, I am guessing that my academic performance would have improved."	"Doing these meditations would sometimes make me sleepy so it would help my mind quiet down for a second."

The three focus group participants were unanimous in their belief that meditating for four weeks had positively improved their responses to stress. These benefits were not limited to academics but were reported to carry over to all aspects of day-to-day life including improvements in coping with criticism, focus and energy, and self-care such as eating and sleeping. Meditation was repeatedly, spontaneously mentioned as a form of self-care, with one participant saying it "…really just helped me to focus and take time for me." Participants indicated meditation prevented them from feeling overwhelmed by

their academic requirements, improved their ability to focus, and all participants believed they would continue to meditate.

When asked about improvements to the study design, all participants agreed more frequent, shorter duration meditation would be beneficial. There were suggestions to increase the variety in the meditation materials. One participant reported having gone and found an additional video on a day where stress had been particularly high.

Discussion

Summary of Major Findings

The results of this study provided evidence that dental hygiene students are under a great amount of stress and their stress mainly stems from school related activities. Two-thirds of students reported school as their main stressor and the remaining third indicated "clinic" and/or "clinical patients" were their main stressor. After the four-week study, students indicated their perceived stress levels had decreased. While this study did not supply statistically significant evidence that meditation effects the well-being or academic achievement of students, it did suggest meditation decreased the amount of perceived stress students experience ($p < .01$).

Discussion

Healthcare students face many unique stressors during their professional education and dental hygiene students do not differ from other healthcare students (Bramlett, 2014; Gordon et al., 2016; Harris et al., 2017; Jacob et al., 2012). This study demonstrated meditation is an effective means of stress management and helps to decrease students' perceived stress levels. However, this study was unable to identify statistically significant effects of meditation on students' perceptions of academic achievement and well-being.

Meditation's effect on students' perceived stress levels

Students perceived stress levels improved after four weeks of meditation. All participants ($N = 15$) indicated they were under a great deal of stress. In 2017, Harris found the top stressors for dental hygiene students included "Examinations and grades,

workload, patient care, and graduation requirements" (Harris et al., 2017, p.101). This supports the findings of this study where during their pre-test two-thirds of participants (*n* = 10) identified school as their main source of stress, while the remaining third (*n* = 5) identified "clinic" or "clinical patients" as their main source of stress. In the post test all participants identified "school" or "boards" or both as their main source of stress. The focus group reported they felt their stress was greater over the four-week period due to end of the year stresses including board exams, mock board exams, deadlines for clinical requirements, etc. This suggests the stress related to academics may have been increasing over the four-week meditation study. This stress may have been unique to the second-year students who were preparing for board exams and graduation. First year students may have identified other stressors. However, for the purposes of this study, second year students were selected because of common stressors, i.e., board exams and graduation requirements.

Before the meditation study, participants reported significantly higher levels of stress than after the meditation study. This was evident on both the PSS and the self-reported 10-point rating scale. These results reflect the 2018 study by Lemay who found that students who participated in meditation and yoga once weekly showed a reduction in stress and anxiety (Lemay et al.,2018).

In 2001, the Journal of American Dental Association recommended dental and other healthcare programs include stress management education into their curriculum in an effort to decrease the health risks of stress and increase job satisfaction (Alexander, 2001). This study's results suggest meditation be implemented into dental hygiene curriculum as a coping mechanism to help to achieve the decrease in stress and increase

in job satisfaction. It is interesting to note Alexander's 20-year-old recommendation was implemented into a few dental school curricula. However, in 2016 Tufts Dental School in Boston, Massachusetts, implemented a mandatory three-week, mind-body wellness program for all first-year dental students and offer a weekly meditation experience (Ducharme, 2016). Tufts is not the only dental school to implement meditation, the University of the Pacific Dental School provide their students with a meditation room (University of the Pacific, 2018). Unfortunately, these institutions are not the norm. Barriers to implementing meditation may be full curricula that includes clinical and laboratory times, lack of instructors educated on stress management, and lack of funding. Implementation of meditation practices could be introduced to the students in their first year as a coping mechanism for the stress they will encounter in the coming years of their education. The availability of free guided meditation videos online is abundant and easily accessed for use. However, the time involved in screening the videos may be prohibitive. This could be solved by utilizing a course of prescreened meditation videos and perhaps involving the educational institution and requesting funding for use of meditation and stress relieving apps that are available. This could also be achieved by involving other educational departments and utilizing interdepartmental collaboration to achieve stress reduction for all students. Massage therapy, sports medicine, and psychology students may be influential in educating other students in stress reduction practices.

Meditation's effect on student's perceptions of academic achievement and well-being

Although anticipated, no statistically significant changes in students' perceptions of academic achievement and well-being in relation to meditation were reported. When asked if participants considered themselves high-achievers, all but one participant (*n* =

14) reported “yes” in the pre-test, and all reported “yes” in the post-test. It would have been interesting to see if more students who did not perceive themselves as high achievers before the study, would perceive themselves to be more high achieving at the end of the study as this one student did. However, it may be difficult to persuade students who are not high achievers to participate in a noncompulsory study. When asked the extent current stress levels impacted academic achievement, there was no significant differences between student's perceptions of how stress impacted their academic achievement before and after four weeks of meditation. This may have been due to the brief duration of the study. Physiological changes and changes in academic performance may take longer than four weeks to become evident.

Two-thirds of participants in the pre-test (n = 10) reported that stress impacts their physical well-being. This number increased slightly at the post-test, with 11 participants choosing above the mid-point on the same scale. However, there were no significant differences between student's perceptions of how stress impacted their academic achievement before and after four weeks of meditation. A series of Wilcoxon Signed Rank Tests were run on the Adapted SSRS, and no significant differences were found on physiological stress between pre-test and post-test on either the composite score or the individual items. These findings were inconclusive in proving or disproving that meditation had an effect on students’ perceptions of academic achievement and well-being. Participants in the focus group also stated they were under a great deal of stress due to end of the year deadlines and board examinations while completing the study. This may have been a flaw in the study methodology. Licensed Professional Counselor, Deanne Wyssman suggested there may have been more of a distinct change if the study

had continued for an extended period of time as changes in physical well-being and academic achievement may take longer to become evident (personal communication, 2021). Student participants in the focus group suggested that the meditations be completed more frequently and have a shorter duration of time. For example, a 10-minute meditation video completed 3 times weekly. This could be achieved by utilizing a scheduled email program to send emails at a weekly interval. Thus, relieving responsibilities of faculty and staff to send a weekly email.

Framework for implementation of meditation. As noted, 20 years ago, by Alexander, 2001, stress reducing mechanisms are needed in dental and allied dental education. This study's results provide data for a framework for programs who are looking to address stress reduction There are many actions that both the educational institution and the department can take to alleviate student stress, the following table provides some examples. See Table 8. Some steps that programs could take to successfully implement meditation are shown in Figure 8.

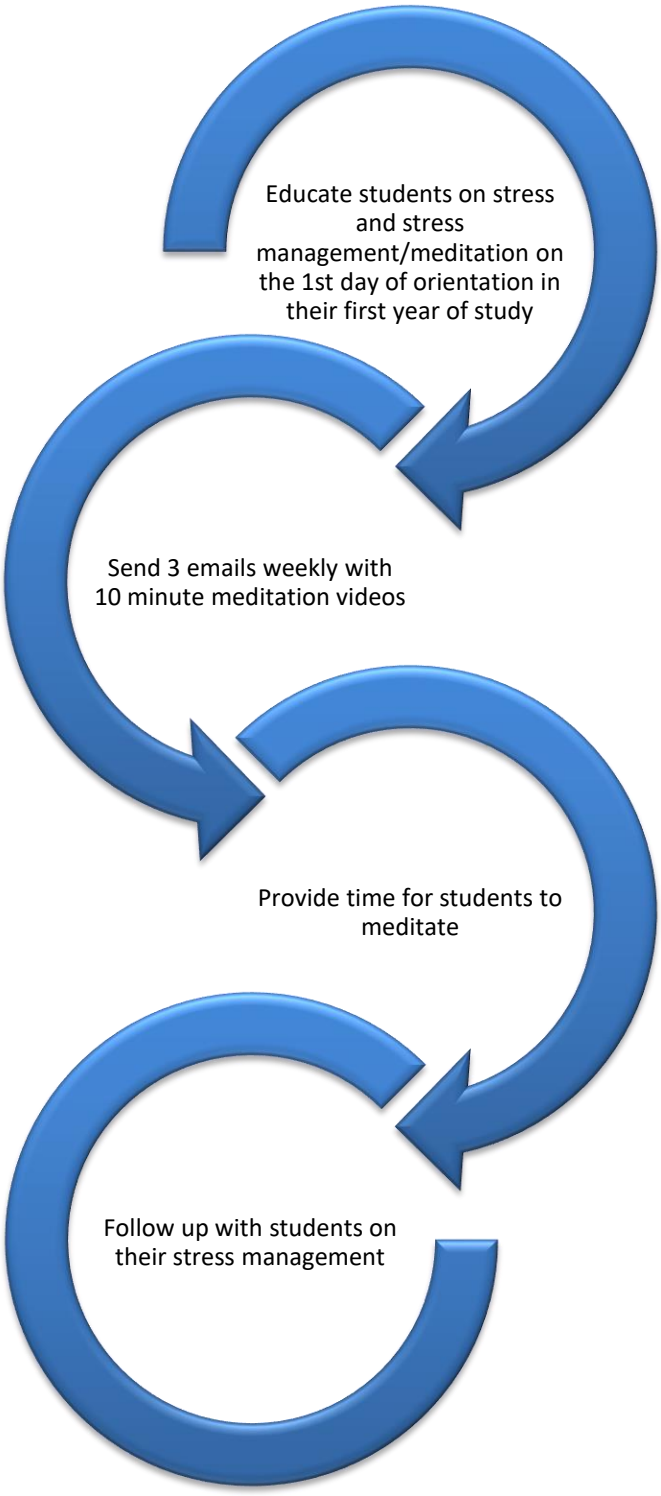
Table 8

Institutional and Program Actions for Alleviating Student Stress

Institution	Program
Make stress management a priority	Educate students on stress and stress management
Increase funding for student stress management	Provide time for students to learn meditation and other methods of stress management
Provide training for faculty and staff in stress management	Collaborate with other departments who might be able to contribute to student stress management (i.e., massage therapy, sports medicine, psychology, etc.)
Provide a meditation room or area dedicated to stress reduction	Check in with students on stress and stress management
Provide the student body with access to meditation apps	Provide 10-minute meditations or times of quiet each day for students to concentrate on releasing stress

Figure 8

Steps for Implementing Meditation into an Educational Program



Limitations

The main limitations to this study were access to students, sample size, study time frame, and lack of a control group.

Access to Students

Access to students at SC was difficult and was completed through social media due to SC's lack of IRB or willingness to accept EWU as the supervising IRB. This was completed in accordance with IRB guidelines. The lack of face-to-face contact when recruiting for the study may have made the study appear impersonal and the results inconsequential. Contact with students may be better achieved by recruiting through social media or in person. Although for the purposes of this study, online communication was preferred due to COVID-19 protocols.

Sample Size

The PI assumed students would participate in an intervention to minimize stress without fully realizing the students were already under a great deal of stress and considered study participation to be another task, especially during their final semester of study when they are preparing for national and regional board examinations. This may have contributed to the small sample size.

Study Time Frame

The largest constraint to this study was the timeline. EWU's IRB took longer than anticipated to approve this study due to COVID-19 and thus the timeline was moved later in the semester, which overlapped with EWU's Spring Break. Another consideration is that while there was a statistically insignificant change in perceptions of well-being and academic achievement in relation to meditation during the four-week study, a longer time

frame may have brought more changes over time and increased the statistical significance. Additionally, the study was implemented in the final semester of the students' education when stress is increasing due to national boards and clinical boards as well as the added stress of graduation. If the study was extended throughout the entirety of the education of dental hygiene students, instructors may be able to identify specific times of heightened stress for the students and help to mitigate them.

Lack of Control Group

Due to EWU's IRB 's slow response and approval, it was decided that a control group was not feasible for the study if it was to be completed in the time allowed. Students also seemed reluctant to participate in the study and recruitment for a control group would have decreased the number of students available for the experimental group. This would have greatly affected the statistical integrity of the study. However, a control group would provide a benchmark to allow comparison between those receiving stress relieving meditations and those that do not. This would elicit more accurate results and provide more comparative data.

Recommendations/Suggestions for Future Research

In addressing the aforementioned limitations, increasing the sample size, extending the timeline, and ensuring reliable access to student participants would add strength to future studies. By including the entire dental hygiene education in the timeframe, instructors may be able to identify specific times of stress that may be relieved with meditation. Additionally, participants suggested shorter meditations with more frequency throughout the week. A formal introduction to meditation may be beneficial to increase student awareness of stress and the benefits of stress management.

Furthermore, students who were dropped from the study might be examined to see if their stress levels were higher or lower than those that completed the study. This may give information explaining why they did not finish the study. Due to the small sample size, it is not appropriate to complete this analysis at this time, but in future research it may be of interest to complete this analysis.

Future research recommendations include:

1. Larger sample size.
2. Longer time frame (perhaps an entire semester, a year, or even throughout the entire educational experience).
3. Inclusion of a control group.
4. Better introduction to stress and meditation.
5. Shorter meditations performed more often: 10-minute meditations 3-4 times weekly.
6. Additional analysis into students who did not complete the study.

Furthermore, although the PI offered incentives throughout the study, participation may have been more robust if the study was implemented as a part of the required curriculum.

Conclusions

Dental hygiene students experience higher than normal amounts of stress due to the rigors of their program and the addition of stressors associated with COVID-19 may have contributed to increased stress levels. The levels of stress students reported were cause for concern. This study provides evidence that meditation decreases the level of perceived stress these students experience. Although study results did not provide statistically significant evidence that meditation effected the students' perceptions of academic achievement and well-being, the participants experienced a significant decrease in stress level after completing their weekly meditations. These findings infer that the practice of meditation is beneficial to dental hygiene students experiencing stress.

Meditation may be implemented into dental hygiene curriculum as a coping mechanism to decrease stress and may help to increase future job satisfaction. Focus group participants agreed that they believe they would take this skill and implement it into their future lives as a means of stress relief. Increasing relaxation and decreasing stress is something that can be utilized by all humans, not just dental hygiene students during times of stress, even during the stress of a pandemic.

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Appendix A
Perceived Stress Scale

0-Never 1-Almost Never 2-Sometimes 3-Fairly Often 4-Very Often

1	In the last month, how often have you been upset because of something that happened unexpectedly?	0 1 2 3 4
2	In the last month, how often have you felt that you were unable to control the important things in your life?	0 1 2 3 4
3	In the last month, how often have you felt nervous and "stressed"?	0 1 2 3 4
4	In the last month, how often have you felt confident about your ability to handle your personal problems?	0 1 2 3 4
5	In the last month, how often have you felt that things were going your way?	0 1 2 3 4
6	In the last month, how often have you found that you could not cope with all the things that you had to do?	0 1 2 3 4
7	In the last month, how often have you been able to control irritations in your life?	0 1 2 3 4
8	In the last month, how often have you felt that you were on top of things?	0 1 2 3 4
9	In the last month, how often have you been angered because of things that were outside of your control?	0 1 2 3 4
10	In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0 1 2 3 4

Appendix B

Students' Stress Rating Scale

	CODE	**Statement**	**Daily**	**2-3x week**	**1x week**	**2x month**	**1x month**	**Rarely**	**Never**
1	V	I get angry							
2	V	I do **not** get enough sleep							
3	III	I get irritated							
4	III	I do **not** share my failures with others							
5	I	I complain about the past							
6	II	I rush through the day							
7	III	I feel lonely							
8	I	I experience constipation							
9	I	I get jealous of others							
10	I	I get ill(cold, flu, etc)							
11	I	I suffer from headaches							
12	I	I take a long time to recover from illness							
13	I	I suffer from diarrhea							
14	I	I find it difficult to sleep							
15	II	I have trouble concentrating on my studies							
16	V	I eat fast							
17	II	I worry about my future							
18	III	I **cannot** find time to have fun or enjoy myself							

19	III	I cry or feel like crying							
20	IV	I feel restless when I have to take a surprise quiz or test							
21	V	I talk fast							
22	IV	I get nervous when I forget points that I already know							
23	IV	I get depressed after taking an examination							
24	IV	My heartrate increases during examinations							
25	II	I feel tired even though I had enough sleep							
26	IV	I do not maintain my body weight							
27	II	I feel stiffness or pain in my neck							
28	II	I have difficulty remembering things							
29	IV	I become tense with delays or interruptions							
30	III	I enjoy games only when I win							
31	III	No one understands me							
32	II	My parents reprimand me							
33	I	My teachers reprimand me							
34	I	I find myself thinking of consequences of failing an examination							
35	I	I fail to see the humor in							

		situations where others find things funny							

Code I Physiologic Stress
Code II Emotional Stress
Code III Social Stress
Code IV Examination Stress
Code V Behavioral Stress

Kumaran, D., & Balamurugan, M. (2008). Development and Validation of Student's Stress Rating Scale(SSRS). *Eric.ed.gov, 7*(1), 35-42. Retrieved from https://files.eric.ed.gov/fulltext/ED501881.pdf

Appendix C

Pre-Intervention Survey

Demographic Survey

Age	☐ 18-25 ☐ 26-35 ☐ 36-45 ☐ 46-55 ☐ 56 and over
Race (you may choose more than one)	☐ American Indian or Alaskan Native ☐ Black or African American ☐ White ☐ Asian ☐ Pacific Islander ☐ Other Race
Highest level of education completed	☐ Less than high school diploma ☐ High school diploma or equivalent degree ☐ Associates degree ☐ Bachelor's degree ☐ Master's degree ☐ Doctoral degree ☐ Post-doctoral degree
Do you currently practice any of the following?	☐ Meditation ☐ Yoga ☐ Therapy ☐ Journaling ☐ Routine physical exercise
Do you currently take any medications for stress related conditions? (i.e. depression, anxiety, etc.)	☐ Yes ☐ No

Adapted from The Student Stress Rating Scale

	Statement	Daily	2-3x weekly	1x weekly	2x monthly	1x monthly	Rarely	Never
1	I experience constipation							
2	I get jealous of others							
3	I get ill(cold, flu, etc)							
4	I suffer from headaches							
5	I take a long time to recover from illness							
6	I suffer from diarrhea							
7	I find it difficult to sleep							
8	My teachers reprimand me							
9	I find myself thinking of consequences of failing an examination							
10	I fail to see the humor in situations where others find things funny							

Perceived Stress Scale

0-Never 1-Almost Never 2-Sometimes 3-Fairly Often 4-Very Often

1	In the last month, how often have you been upset because of something that happened unexpectedly?	0 1 2 3 4
2	In the last month, how often have you felt that you were unable to control the important things in your life?	0 1 2 3 4
3	In the last month, how often have you felt nervous and "stressed"?	0 1 2 3 4
4	In the last month, how often have you felt confident about your ability to handle your personal problems?	0 1 2 3 4
5	In the last month, how often have you felt that things were going your way?	0 1 2 3 4
6	In the last month, how often have you found that you could not cope with all the things that you had to do?	0 1 2 3 4
7	In the last month, how often have you been able to control irritations in your life?	0 1 2 3 4
8	In the last month, how often have you felt that you were on top of things?	0 1 2 3 4

9	In the last month, how often have you been angered because of things that were outside of your control?	0 1 2 3 4
10	In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0 1 2 3 4

Please rate your overall level of stress on a scale of 1-10 (1-no stress, 10-maximum stress).	1--2--3--4--5--6--7--8--9--10
What is your main source of stress?	
Do you see yourself as a high achiever?	
How much does your current stress level impact your academic achievement? 1-Not at all 10- A great deal	1--2--3--4--5--6--7--8--9--10
How much does your current stress level effect your physical well-being? 1- Not at all 10- A great deal	1--2--3--4--5--6--7--8--9--10

Adapted from Development and Validation of Student's Stress Rating Scale(SSRS)

Kumaran, D., & Balamurugan, M. (2008). Development and Validation of Student's Stress Rating Scale(SSRS). *Eric.ed.gov, 7*(1), 35-42. Retrieved from https://files.eric.ed.gov/fulltext/ED501881.pdf

Appendix D

Post Intervention Survey

Adapted from The Student Stress Rating Scale

	Statement	**Daily**	**2-3x weekly**	**1x weekly**	**2x monthly**	**1x monthly**	**Rarely**	**Never**
1	I experience constipation							
2	I get jealous of others							
3	I get ill(cold, flu, etc)							
4	I suffer from headaches							
5	I take a long time to recover from illness							
6	I suffer from diarrhea							
7	I find it difficult to sleep							
8	My teachers reprimand me							
9	I find myself thinking of consequences of failing an examination							
10	I fail to see the humor in situations where others find things funny							

Perceived Stress Scale

0-Never 1-Almost Never 2-Sometimes 3-Fairly Often 4-Very Often

1	In the last month, how often have you been upset because of something that happened unexpectedly?	0 1 2 3 4
2	In the last month, how often have you felt that you were unable to control the important things in your life?	0 1 2 3 4
3	In the last month, how often have you felt nervous and “stressed”?	0 1 2 3 4
4	In the last month, how often have you felt confident about your ability to handle your personal problems?	0 1 2 3 4

5	In the last month, how often have you felt that things were going your way?	0 1 2 3 4
6	In the last month, how often have you found that you could not cope with all the things that you had to do?	0 1 2 3 4
7	In the last month, how often have you been able to control irritations in your life?	0 1 2 3 4
8	In the last month, how often have you felt that you were on top of things?	0 1 2 3 4
9	In the last month, how often have you been angered because of things that were outside of your control?	0 1 2 3 4
10	In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0 1 2 3 4

Please rate your overall level of stress on a scale of 1-10 (1-no stress, 10-maximum stress).	1--2--3--4--5--6--7--8--9--10
What is your main source of stress?	
Do you see yourself as a high achiever?	
How much does your current stress level impact your academic achievement? 1- Not at all 10- A great deal	1--2--3--4--5--6--7--8--9--10
How much does your current stress level effect your physical well-being? 1- Not at all 10- A great deal	1--2--3--4--5--6--7--8--9--10

Adapted from Development and Validation of Student's Stress Rating Scale(SSRS)

Kumaran, D., & Balamurugan, M. (2008). Development and Validation of Student's Stress Rating Scale(SSRS). *Eric.ed.gov, 7*(1), 35-42. Retrieved from https://files.eric.ed.gov/fulltext/ED501881.pdf

Appendix E

PPT Script for Student Recruitment/YouTube Video
https://youtu.be/zfJ9F3CfTN8


I WANT YOU
Enroll in my research Study
1 week
1 30-minute meditation a week sent directly to your email address
Pre and Post Tests
Focus Group


STARBUCKS COFFEE


shenderson3@eagles.ewu.edu

Appendix F

Cover Letter and Pre-test Consent Form

Dental Hygiene Students,

My name is Sarah Henderson and I am currently pursuing a Master of Science in Dental Hygiene degree at Eastern Washington University. For my thesis, I am conducting research on the effectiveness of meditation as a stress reliever for dental hygiene students during the current COVID-19 Pandemic.

The research that you will be participating in consists of a survey completed before the study, a 30-minute guided meditation completed weekly for a duration of four (4) weeks, and a survey completed after the four-week study. Students will then be given the opportunity to participate in a one (1) hour focus group via Zoom. The data from the study will not be linked to you in any way.

You are under no obligation to participate in the study and your consent or non-consent to participate will not impact your academic grade in any way. Please know that your participation in this study is completely voluntary and that your responses will be reported anonymous. Also, you may skip any questions that you are not comfortable answering and you may opt out of the study at any time. This study is less than minimal risk.

Before beginning the study, please take the pre-study questionnaire and mark "yes" for consent for participation in the study.

https://www.surveymonkey.com/r/SBFV56L

Responses are needed by: March 1st, 2021

As an incentive to participate, participants will be entered into a drawing for a $10 Starbucks card at the end of each week. At the end of the 4-week study those who have participated fully and indicate their willingness to participate in the focus group will be entered into a drawing for a one-of-a-kind, hand carved sterling silver cuff. Additionally, you may include participation in the research study on your professional resume.

If you have any questions or concerns about this survey please contact myself or my thesis advisor, Ann O'Kelly Wetmore, RDH, BSDH, MSDH at 509.828.1321, awetmore@ewu.edu; or the department chair at EWU Lisa Bilich, RDH, MSEd at 509.828.1295,
lbilich@ewu.edu.

If you have any concerns about your rights as a participant in this research or any complaints you wish to make, you may contact Charlene Alspach, Executive Director, Grant and Research Development, Eastern Washington University (509) 359-2517 or calspach@ewu.edu.

Thank you,

Sarah Henderson, RDH, BSDH
Email: shenderson3@eagles.ewu.edu
Cell phone: 307-250-3295

Appendix G

Weekly YouTube Meditation Emails

WEEK 1
*sent on 3/1/2021

Study Participant,

Thank you so much for giving of your time to help further this research. I am excited to share this stress reduction skill with all of you.

Please use the following link to access your week 1 meditation video and week 1 survey. Please complete this meditation and survey by midnight on March 5, 2021 . If the link does not work, you may need to copy and paste the URL into your web browser. *Please do not complete this meditation while driving.

Week 1 Meditation Video: https://youtu.be/6vO1wPAmiMQ
Week 1 Participation Survey: https://www.surveymonkey.com/r/2LVDDSR

Please feel free to contact me should you have problems with the video or any questions.

Sarah Henderson, RDH, BSDH
shenderson3@eagles.ewu.edu

WEEK 2
*sent on 3/8/2021

Study Participant,

I hope you are all having a great week! 🙂

Please use the following link to access your week 2 meditation video and week 2 survey. Please complete this meditation and survey by midnight on March 12, 2021. If the link does not work, you may need to copy and paste the URL into your web browser. *Please do not complete this meditation while driving.

Week 2 Meditation Video: https://youtu.be/-pvpljwAqtY
Week 2 Participation Survey: https://www.surveymonkey.com/r/2VLTKRF

Please feel free to contact me should you have problems with the video or any questions.

Sarah Henderson, RDH, BSDH
shenderson3@eagles.ewu.edu

WEEK 3

*sent on 3/15/2021

Study Participant,

We have made it to Week 3! I hope you are all finding these meditations helpful and are able to reduce some stress.

Please use the following link to access your week 3 meditation video and week 3 survey. Please complete this meditation and survey by midnight on March 20, 2021. If the link does not work, you may need to copy and paste the URL into your web browser. *Please do not complete this meditation while driving.

Week 3 Meditation Video: https://youtu.be/i7xGF8F28zo
Week 3 Participation Survey: https://www.surveymonkey.com/r/2V9PZ2Z

Please feel free to contact me should you have problems with the video or any questions.

Sarah Henderson, RDH, BSDH

shenderson3@eagles.ewu.edu

WEEK 4

Study Participant,

FINAL WEEK! Thank you so much for giving of your time to help further this research. Please use the following link to access your final meditation video and final post-test. Please complete this meditation by midnight March 26th. If the link does not work, you may need to copy and paste the URL into your web browser. *Please do not complete this meditation while driving.

Final Meditation Video: https://youtu.be/LZobPMxxoLU
Final Post Test: https://www.surveymonkey.com/r/SPKHSGB

Please feel free to contact me should you have problems with the video.

This will conclude the Meditation study. I appreciate you giving of your time.

The 1-hour Zoom focus group will be completed Sunday March 28th at 3pm MST (2pm PST). Those selected will be sent a Zoom Invite by Midnight March 27th.

I will be sending out the winner of the final $10.00 Starbucks Card on March 28th after the focus group concludes.

The drawing for the Sterling Silver Cuff will be completed on April 1st. I will contact the winner via email and request mailing information.

Sarah Henderson, RDH, BSDH
shenderson3@eagles.ewu.edu

Curriculum Vita

SARAH HENDERSON, RDH, BSDH, MSDH(c)

1126 N. Gould St.
Sheridan, WY
82801
Telephone: 307-250-3295
e-mail: *shendersonrdh@gmail.com*

EDUCATION:

Graduate Education:

Anticipated 2021 — Master of Science, Dental Hygiene
Eastern Washington University

Undergraduate Education:

2012 — Bachelor of Science, Dental Hygiene
University of Wyoming

2010 — Associate of Applied Science, Dental Hygiene
Sheridan College

2006 — Associate of Science, Psychology
Sheridan College

LICENSES:

2014-Present — Colorado State Licensure**,** Registered Dental Hygienist
Inactive

2010-Present — Wyoming State Licensure**,** Registered Dental Hygienist
Active

CERTIFICATIONS:

Current	Expanded functions in local anesthetic, and nitrous oxide sedation Colorado Board of Dental Examiners State of Colorado
Current	Expanded functions in local anesthetic, nitrous oxide sedation and laser therapy Wyoming Board of Dental Examiners State of Wyoming
Current	CPR/ AED Certification American Heart Association

PROFESSIONAL APPOINTMENTS:

2018-2019	Immediate Past President Wyoming Dental Hygienists' Association
2017-2018	President Wyoming Dental Hygienists' Association
2018	Alternate Delegate, ADHA House of Delegates Wyoming Dental Hygienists' Association
2016-2017	President Elect Wyoming Dental Hygienists' Association
2011-2017	Board Member Sheridan College Advisory Board

TEACHING EXPERIENCE:

2020	Teaching Practicum Sheridan College Dental Hygiene Program
2018	Guest Lecturer *Student to Hygienist/ SADHA to ADHA* Sheridan College Dental Hygiene Program
2013-Present	Substitute Clinical Faculty Sheridan College Dental Hygiene Program

2015-Present Professional Tutor
Sheridan College

2006-2008 Assistant Coach
Sheridan College Speech and Debate Program

WORK EXPERIENCE -PRIVATE PRACTICE:

May 2011-Present Clinical Registered Dental Hygienist
Whitney Plaza Dental
Dr. Kevin McCurry

March 2011-April 2011 Clinical Registered Dental Hygienist
Wind River Dental Care
Dr. Michael Shane

Sept. 2010-March 2011 Clinical Registered Dental Hygienist
Dr. Sackett's Office
Dr. Dale Sackett

2002-2008 Dental Assistant/Receptionist
Greybull Dental Clinic
Dr. Bruce Wiley

OTHER WORK EXPERIENCE:

2008-2010 Data entry operator/Billing Assistant/
Administrative Assistant to Facility Director
Cloud Peak Counseling Center

2006-2008 Assistant College Speech and Debate Coach
Sheridan College

PROFESSIONAL ASSOCIATIONS:

2011-Present International Association of Physiologic
Aesthetics

2010-Present	American Dental Hygienists' Association
2010-Present	Wyoming Dental Hygienists' Association

COMMUNITY SERVICE:

2020-Present	COVID-19 Rapid Response Team, Sheridan Memorial Hospital
2011-Present	VOA Dental Assistance for women
2011-2017	Sheridan College Advisory Board member
2014	Habitat for Humanity Theatre Fundraiser
2011	Give Kids A Smile Program
2011	Free Extraction Clinic
2008-2010	Sheridan Free Clinic Dental Screenings

HONORS AND AWARDS:

2009	Sheridan College Dental Hygiene Team Player Award
2007	Irene Ryan Theatre Nomination
2006	Champion- US Air Force Academy Speech and Debate Tournament
2005	Finalist- Kennedy Center American College Theatre Festival
2005	Irene Ryan Theatre Nomination
2004	National Championship- Speech and Debate
2004	Speech and Debate Tournament Awards University of Wyoming Poetry Interpretation: 5TH Prose Interpretation: 4TH Duet Interpterion: 2ND Casper College Duet Interpretation: 2nd Poetry Interpretation: 2ND

Colorado College
Duet Interpretation : 2nd
Poetry Interpretation: 6TH
Prose Interpretation: 2nd
Northwest College
Duet Interpretation: 4th
Duet Interpretation: 2nd
Poetry Interpretation: 1st

2003 Speech and Debate Tournament Awards
University of Wyoming Speech and Debate Tournament
Dramatic Interpretation: 4th Place
Casper College Speech and Debate Tournament
Dramatic Interpretation: 1st Place
Program Oral Interpretation: 2nd Place
Colorado College Tournament
Poetry Interpretation: 6th place
Top Junior Poetry Interpretation
Northwest College Tournament
Drama: 2nd Place
Laramie County Community College Tournament
Program Oral Interpretation: 1st Place
Duet Interpretation: 5th Place