

Public Health Employees' Perceived Stress during the COVID-19 Pandemic and Their Levels of  
Physical Activity

by

Mayra Alejandra Mendoza

Master of Public Health, California Baptist University, 2022

Thesis Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Master of Public Health

California Baptist University

2022

© 2022  
Mayra Alejandra Mendoza

The College of Health Science  
California Baptist University  
Riverside, California

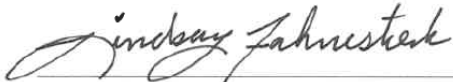
This is to certify that the Master's Thesis of  
Mayra Alejandra Mendoza  
has met the thesis requirements  
for the degree of  
Master of Public Health

Approved by:



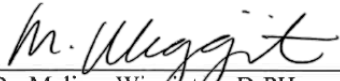
---

Dr. Sangmin Kim, Ed. D  
Professor  
Committee Chair



---

Dr. Lindsay Fahnestock, DrPH  
Associate Professor  
Committee Member



---

Dr. Melissa Wigginton, DrPH  
Professor  
Committee Member



## Abstract

The COVID-19 pandemic exacerbated the stress levels of public health employees in local and state public health departments. This study aimed to evaluate whether the perceived stress levels differed between the stages of readiness for change for physical activity and stress management techniques among public health workers. Secondly, this study assessed whether stress levels differed depending on their role in the department and race/ethnicity. The study sample included 101 public health employees from local public health departments in Southern California. Participants completed a survey that included the Perceived Stress Scale (PSS), demographic questions, and other questions about their engagement in physical activity and stress reduction activities. There was no significant difference among the stages of readiness for change for physical activity. The results showed a significant difference in the perceived stress scores between the stages of readiness for change for stress management techniques. Participants in the maintenance stage of readiness for stress management techniques showed significantly lower mean PSS-10 scores ( $M = 18.46, sd = 4.11$ ) than in the other stages of readiness. Mean perceived stress scores were significantly different between entry-level employees ( $M = 20.80, sd = 4.65$ ) and managers/directors ( $M = 18.00, sd = 3.25$ ). Finally, perceived stress scores were significantly higher among employees who identified as Black, Indigenous, or Person of Color (BIPOC) ( $M = 21.46, sd = 4.37$ ) compared to White/Caucasian employees ( $M = 18.97, sd = 4.01$ ). This thesis provides recommendations for implementing holistic multi-dimensional interventions for public health employees to improve their well-being.

*Keywords: public health employees, perceived stress, race/ethnicity stages of change, physical activity*

## Acknowledgments

I want to thank my family for always being my support and the reason for everything I do. Má, y Pá, todo lo que hago, siempre lo haré por ustedes y para ustedes. Gracias por su amor y apoyo incondicional. To my sisters, Maria and Vicky, and my brothers, Raul and Martin, thank you for always being there to celebrate all my accomplishments with me, no matter how small.

To my nieces Layla, Selena, and Alicia, I love you girls so much, and I hope you are as proud of your auntie as I will always be of you. Thank you for being my motivation to keep going, so I can be someone you look up to.

To my best friend and favorite person, Reginald, thank you for being the voice of reason during the last couple of minutes of the most challenging WOD of my life so far. Thank you for constantly reminding me to finish the race, no matter the pace. Your support and encouragement were pivotal in my completing this marathon. Thank you for believing in me enough for both of us. I would not have been writing this without your love and support.

I also thank my committee – Dr. Sangmin Kim, Dr. Fahnestock, and Dr. Wigginton. Thank you for your patience, kindness, and support throughout this process.

I want to thank everyone who never let me give up. Everyone who encouraged me to keep going, to keep pushing, to keep fighting – I am thankful for you all.

Only 4% of Latinas in the U.S. have received a Master's degree. I want to acknowledge all the Latinas working on increasing this number and paving the way for other little brown girls to do the same. Échale ganas. Tú puedes.

A veces llore, a veces dude, pero nunca me raje. Sí, se pudo.

## Table of Contents

List of Tables .....	ii
Introduction .....	3
Overview of the Literature .....	3
COVID-19 and Stress .....	3
Stress among Public Health Employees .....	4
Race/Ethnicity and Stress .....	5
Role in the Department .....	6
Physical Activity as a Protective Factor for Stress .....	7
Stress Reduction Techniques as Protective Factors for Stress .....	8
The Transtheoretical Model (TTM) .....	9
Gaps in the Literature .....	11
Purpose of the Study .....	11
Research Questions .....	11
Hypotheses .....	11
Methodology .....	13
Design and Procedures .....	13
Participants .....	13
Independent Variable and Dependent Variable .....	14
Measures .....	14
Stress .....	14
Stage of Readiness—Physical Activity .....	15
Data Analysis .....	15
Results .....	17
Part I. Descriptive Statistics .....	17
Demographic Information .....	17
Stages of Change Distribution .....	17
Part II. Major Findings .....	18
Research Hypothesis 1 .....	18
Research Hypothesis 2 .....	19
Research Hypothesis 3 .....	19
Research Hypothesis 4 .....	19
Summary of Major Findings .....	21
Public Health Implications .....	23
Study Limitations and Future Recommendations .....	25
Conclusion .....	26
References .....	28
Appendix A: Tables .....	37
Appendix B: Informed Consent Form .....	39
Appendix C: Survey Questionnaire .....	40

## **List of Tables**

Table 1. Mean Perceived Stress Scores Based on Demographics .....	37
Table 2. Stage of Change Categorization for Physical Activity and Mindfulness Engagement Questions .....	38



## **Introduction**

### **Overview of the Literature**

#### ***COVID-19 and Stress***

The World Health Organization declared COVID-19 a global pandemic on March 11, 2020 (Centers for Disease Control and Prevention [CDC], 2021). The coronavirus disease impacted not only those directly infected with the virus but also those conducting the COVID-19 emergency response who ensured that the health and safety of the public were at the forefront of all decisions about protocols and mandates (de Beaumont Foundation, 2022). Public health workers' required hours and workload increased with the constant surge in cases, hospitalizations, and deaths. These new and increased responsibilities caused and exacerbated stress levels, burnout, and mental health issues in the public health workforce (Ward et al., 2021). Additionally, the backlash and threats many public health and frontline workers faced from the public for over two years led to post-traumatic stress disorder (PTSD) (Dye et al., 2020). The COVID-19 pandemic was instrumental in throwing a spotlight on the public health system, but it also played a pivotal role in increasing the stress of public health employees.

While some stress is essential, long-term or chronic stress can cause serious health concerns. According to the National Institute of Health (NIH, 2020), continued strain on the body from stress can cause cardiovascular disease, high blood pressure, and diabetes. Additionally, chronic stress can lead to mental health disorders, such as anxiety and depression (NIH, 2020). PTSD is an anxiety disorder that develops after a traumatic event and is characterized by intrusive thoughts about the incident with recurring distress (National Institute of Mental Health [NIMH], 2022). The American Psychological Association (APA, 2022) conducts annual surveys on the population's stress and its sources. In 2020, respondents' stress

levels were significantly impacted and exacerbated by the COVID-19 pandemic, with nearly 80% of respondents stating that the COVID-19 pandemic was a significant source of stress (APA, 2022).

### ***Stress among Public Health Employees***

The 2021 Public Health Workforce Interests and Needs Survey (PH WINS) was a national representative survey conducted by the de Beaumont Foundation and the Association of State and Territorial Health Officials (ASTHO). It inquired about the experiences of local and state public health workers during the COVID-19 pandemic, specifically about their emotional and mental well-being. The findings of the PH WINS showed that over half of the public health workforce who completed the survey were experiencing at least one symptom of PTSD (de Beaumont Foundation, 2022). A quarter of participants experienced three or more symptoms. Additionally, one in five individuals reported that their mental health was "fair" or "poor" (p. 26). Several public health employees, especially those in leadership and decision-making positions, were bullied, harassed, and threatened by individuals who opposed the safety protocols and measures created by public health departments. Various public health employees decided to leave their positions for fear of retaliation, work overload, burnout, and the inevitable increase in stress (p. 17). Most public health employees who participated in the study observed an increase in perceived stress, regardless of gender, race/ethnicity, and supervisory role in their department.

Before the height of the COVID-19 pandemic, public health employees and other healthcare professionals were already concerned about mental and emotional resilience. The pandemic increased concerns about stress, anxiety, depression, and burnout (Ammerman & Elliot, 2021). Burnout describes the effect of extreme stress and unattainable expectations of professionals who serve the public (National Institute of Health, 2020). Burnout is caused by

high expectations, extra commitments not previously in the job description, and other work-related stressors (CDC, 2021). Nearly three in four public health employees played a role in the COVID response, which was a high-stakes and high-stress national and global situation (de Beaumont Foundation, 2022). As more public health employees supported ongoing disease control efforts during the pandemic, the support from other teams declined significantly (de Beaumont Foundation, 2022). About 39% of the individuals who contemplated leaving public health altogether stated that the pandemic made them more likely to leave (National Association of County and City Health Officials [NACCHO], 2022).

While the public was encouraged or even mandated to stay at home as much as possible, public health employees were investigating outbreaks, contact tracing, case investigating, working in vaccine clinics, and assisting in other tasks to support the COVID-19 response (Melvin et al., 2020). Public health employees were pulled from their permanent programs to help in the national emergency (CDC, 2021). In California, public health employees learned new roles for which they had not been trained and navigated ever-changing protocols and procedures set forth by the California Department of Public Health (CDPH). Some employees took on multiple roles due to high turnover rates and staffing shortages, as some public health workers resigned due to fatigue and stress (de Beaumont Foundation, 2022). Many public health employees also feared they would be infected with the virus and take it home to their families (Ammerman & Elliot, 2021). Often, their fears were not unfounded, which caused them to leave in pursuit of safer jobs (de Beaumont Foundation, 2022).

### ***Race/Ethnicity and Stress***

The COVID-19 pandemic shed light on the racial disparities and inequities experienced by Black, Indigenous, and People of Color (BIPOC). Disproportionate stress levels related to the

COVID-19 pandemic were seen among communities of color due to the higher number of cases, disproportionately higher death rates, and increased racism during the pandemic (Miu & Moore, 2021). Just one month into the pandemic, there was a rise in anti-Asian hate crimes and police brutality (Miu & Moore, 2021). Black/African Americans experienced a "dual pandemic," witnessing the lack of action after police shootings led to the murders of Breonna Taylor, Ahmaud Arbery, and George Floyd (Lipscomb & Ashley, 2020).

The APA (2020) stress survey reported that most adults (59%) claimed police violence toward minorities was a significant source of stress. Among people of color who responded to the APA survey, over 44% stated that discrimination was a substantial source of stress, and over two-thirds of adults claimed the political climate was a stressor. BIPOC-identifying public health professionals were not immune to the consequences of racism and discrimination experienced by the general BIPOC public during the pandemic. The confluence of racism and other COVID-19-related stressors experienced by the rest of the public health field led to significant stress and anxiety in BIPOC public health employees (APA, 2020).

### ***Role in the Department***

Although public health employees remained committed to their job and communities, more than half reported symptoms of PTSD and poor mental health (de Beaumont Foundation, 2022). A survey conducted by the NACCHO revealed that over 57% of respondents had been targets of harassment (Ward et al., 2021). As the face of public health, executives, such as the Public Health Officer and Public Health Director, received the most threats and backlash from community members who disagreed with protocols regarding social distancing, masking, and vaccinations (de Beaumont Foundation, 2022). Ward et al. (2021) reported that 222 public health officials resigned from their positions between March 2020 and January 2022, the height of the

pandemic. Reasons public health officials reported for leaving included the belief that their expertise was constantly undermined. They also received direct threats and harassment from the public (Ward et al., 2021).

Employees in entry-level roles were on the frontline and worked as contact tracers and in vaccine clinics. In these roles, they experienced harassment from individuals in the public who opposed the protocols and prevention recommendations in place (de Beaumont Foundation, 2022). Over half of entry-level employees and leaders who remained in their roles despite the backlash reported symptoms of mental health conditions, and 37% reported symptoms of PTSD (Ward et al., 2021). According to Ward et al. (2021), the high turnover of the public health workforce during the pandemic can be attributed to significant rates of PTSD and burnout caused by harassment and backlash from the public.

### ***Physical Activity as a Protective Factor for Stress***

It is critical to understand the protective factors that can mitigate anxiety and stress symptoms. One protective factor is adequate engagement in physical activity. The health benefits of physical activity are vast. Physical activity's immediate benefits include reduced anxiety symptoms, decreased depressive episodes, and improved sleep (U.S. Department of Health and Human Services [USDHHS], 2018). Regular exercise builds resilience to stress, reducing stress and depressive episodes (Silverman & Deuster, 2014). The USDHHS (2018) recommends adults engage in 150 minutes of physical activity per week as it lowers the risk of developing chronic health conditions, such as diabetes, obesity, some cancers, and cardiovascular diseases. Studies showed that adolescents and adults who reported high levels of inactivity also reported adverse effects of anxiety, stress, and depression (Costa et al., 2020). Thus, regular physical activity protects against many preventable health concerns and disabilities.

Various studies, such as the one conducted by Gillan and colleagues (2013), demonstrated that individuals who participate in moderate to vigorous physical activity also report less perceived stress and more utilization of coping strategies in their daily lives. Evidence showed that individuals who engage in moderate to vigorous exercise, as recommended by the *Physical Activity Guidelines for Americans*, also have improved coping styles to stress and report improved mental health status (Gillan et al., 2013; Rajoo et al., 2019). Other studies found that physical activity can serve as a buffer against the effects of stress, such as depression and anxiety (Uebelacker et al., 2013). Ultimately, individuals meeting the national recommendations for physical activity tend to experience the protective effects of exercise against stress.

### ***Stress Reduction Techniques as Protective Factors for Stress***

An evidence-based activity for preventing stress, depression, burnout, and fatigue includes mindfulness meditation (Ammerman & Elliot, 2021; Davidson & McEwen, 2012). According to the APA (2012), mindfulness is an awareness of one's thoughts, feelings, and surroundings. Mindfulness meditation can provide the necessary tactics to focus on positive aspects and not be reactive in stressful situations (Davidson & McEwen, 2012). Engagement in stress-reducing activities, such as mindfulness meditation, increases resilience and the ability to cope with stressful occurrences that can lead to burnout and fatigue (Bränström et al., 2010). Individuals who practice mindfulness show reduced emotional reactivity to life stressors (Ortner et al., 2007). Studies on interventions designed to promote mindfulness suggested that these qualities can be practiced and improved with time (Davidson & McEwen, 2012). A study by Schnaider-Levi and colleagues (2017) indicated that the inquiry-based stress reduction (IBSR) mediation technique effectively reduces depression and anxiety. Furthermore, mindfulness meditation reduces stress and anxiety and promotes healing, wellness, and better coping

strategies (Schreiner & Malcolm, 2008; Redstone, 2017). Mindfulness meditation practices as a stress-reducing technique can improve mental and emotional well-being when incorporated into regular routines.

### ***The Transtheoretical Model (TTM)***

According to the transtheoretical model (TTM), also known as the stages of change model, individuals go through five stages as they adopt and maintain a new behavior (Prochaska & DiClemente, 1992). Behavior change does not occur automatically but through transitioning among the different stages of pre-contemplation, contemplation, preparation, action, and maintenance (Prochaska & DiClemente, 1992). Using physical activity as an example, individuals in the pre-contemplation stage are not yet physically active and are not yet thinking about being active. They either do not believe that a behavior needs to be changed or are not ready to change (Hayden, 2014). To move towards contemplation, these individuals must be informed of the benefits of engaging in physical activity and the risks of being sedentary. Those in the contemplation stage recognize a problem with their behavior. Although they are not yet active, they think of becoming physically active. People in the preparation stage are getting ready to act, have decided to make a change, and are planning to engage in the new behavior change. Individuals in the action stage are physically active, reaching the recommended levels of physical activity. These individuals move from the action to the maintenance stage after engaging in the behavior for six or more months. Finally, individuals in the maintenance stage have met the recommendations for physical activity for six months or more. The stages of change are a valuable tool to measure individuals' readiness for change.

Physical activity is associated with less perceived stress. Researchers, Marin-Farrona and colleagues (2020) analyzed the relationship between the transtheoretical model stages of change,

Perceived Stress Scale (PSS) scores, and physiological stress among office workers. The results indicated decreased physiological stress levels in stage 5 of the TTM or the maintenance stage. According to Lutz and colleagues (2010), many individuals may cope with stressful experiences by engaging in more physical activity, while others choose to manage by avoiding it. The study by Lutz and colleagues (2010) indicated that the stages of change for exercise moderated the stress-exercise relationship in the study population (p. 565). Participants in the maintenance stage showed a positive relationship between exercise intensity and frequency when experiencing stressful situations (Lutz et al., 2010). In contrast, participants in the other stages showed either no or negative relationships. This finding suggested that individuals in the maintenance stage tend to increase exercise frequency and intensity to cope with stress.

Engagement in physical activity for longer durations is imperative to promote stress reduction. Thus, individuals in the maintenance stage of readiness would show reduced stress in future measurements of stress levels compared to individuals in the other stages who might react to stressful situations by avoiding exercise (Lutz et al., 2010). In a similar study, Horiuchi and colleagues (2010) examined the relationship between the stages of change for stress reduction techniques, the ability to cope with stressful situations, and participants' stress levels. The results indicated that participants in the maintenance stage more frequently reported that they were able to cope with stressful situations compared to the other stages (Horiuchi et al., 2010, p. 296). Additionally, the study revealed that participants in the maintenance stage showed lower perceived stress levels than those in the other stages (p. 296). These findings further validated the correlation between TTM and stress management behaviors.



## **Gaps in the Literature**

The literature indicated that the COVID-19 pandemic increased stress levels among the public health workforce that provided services and supported the public during this time. Public health workers experienced high levels of burnout, anxiety, and PTSD symptoms (CDC, 2021). Although various studies have evaluated the impact of COVID-19 on stress levels, there are evident gaps in the research. While there are studies that focused on the effect of physical activity and mindfulness meditation on stress, there is minimal research on whether the impact of COVID-19 on stress levels decreased between the stages of readiness for change for physical activity and other stress management techniques, such as mindfulness meditation.

## **Purpose of the Study**

This study aimed to evaluate whether stress levels differed between the stages of readiness for change for physical activity and stress management techniques among public health workers in Southern California. Secondly, this study evaluated whether stress levels differed depending on workers' supervisory roles in their department and race/ethnicity.

## **Research Questions**

The research questions for this study were:

1. Do stress levels differ between stages of readiness for change for physical activity?
2. Do stress levels differ between stages of readiness for change for stress management techniques?
3. Do stress levels differ between supervisory roles in the organization?
4. Do stress levels differ between race/ethnicity?

## **Hypotheses**

The following were the hypotheses outlined for this study:

H1: Perceived stress levels differ between the stages of readiness for change for physical activity.

H2: Perceived stress levels differ between the stages of readiness for change stress management techniques.

H3: Perceived stress levels differ between supervisory roles in the organization.

H4: Perceived stress levels differ between race/ethnicity,

## **Methodology**

### **Design and Procedures**

This study used a cross-sectional design to examine differences in public health employees' perceived stress during the COVID-19 pandemic. The Institutional Review Board (IRB) approved the study before data collection began. Participants filled out a survey that took about 15 minutes to complete and included questions from the Perceived Stress Scale (PSS-10), demographic questions, and other health-related questions. The PSS-10 is a ten-item questionnaire used to measure individuals' stress levels (Cohen et al., 1983). It measures the extent to which someone has perceived their life as unpredictable or uncontrollable (Cohen et al., 1983). The stages of change questions asked participants if they were currently engaging in physical activity or other stress-managing techniques, such as mindfulness meditation. Demographic data collected included age, gender, race/ethnicity, income, the highest level of education obtained, and supervisory status/role in the department. This study was voluntary, so participants were informed that they could stop the survey at any point and did not have to answer any questions with which they felt uncomfortable. The survey was built into Qualtrics, and the data collected from the platform were inputted into a password-protected Statistical Analysis Software Package (SPSS) file and analyzed.

### **Participants**

Public health employees in local public health departments were recruited through an email sent by branch chiefs with a link to a Qualtrics survey and an email description sent by the researcher stating the purpose of the study and the logistics. This study recruited participants from departments that assisted with the COVID-19 response between March 2020 to March 2022. Participants in this study included a sample of 101 public health employees from local

public health departments. The sample consisted of 80 females, 20 males, and one non-binary individual. A required sample size of 101 participants was calculated a priori using G\*Power software and was determined to be adequate for a one-way analysis of variance (ANOVA) (Faul et al., 2007). The factors used to calculate the sample size included an effect size  $f$  of 40%.

### **Independent Variable and Dependent Variable**

In this study, the dependent variable was the perceived stress levels of the participants, which was determined using the ten-item Perceived Stress Scale questionnaire. The independent variables included the stage of readiness for physical activity: pre-contemplation, contemplation, preparation, action, and maintenance. The second independent variable was the stage of readiness for stress management activities: pre-contemplation, contemplation, preparation, action, and maintenance. The final two independent variables were supervisory roles in the organization and race/ethnicity.

### **Measures**

#### ***Stress***

This study utilized the PSS to measure individual stress levels. The PSS-10 is a ten-item questionnaire that determines how different situations affect an individual's feelings and perceived stress level (Cohen et al., 1983). The scale asks questions regarding an individual's thoughts and feelings during the last month, such as "In the last month, how often have you felt that you were unable to control the important things in your life?" and "In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?" A stress score is determined by participants' perception of how stressful their life is. The PSS-10 score is determined by reversing the scores for questions 4, 5, 7, and 8 before summing up the

scores for each item. PSS-10 scores can range from 0 to 40. Higher scores are associated with higher levels of perceived stress.

### ***Stage of Readiness—Physical Activity***

The stage of readiness for physical activity was measured by asking participants if they "exercised 150 minutes of moderate-intensity physical activity each week." Participants who chose "yes, I have been for more than six months" as their answer were in the maintenance stage because they had been engaging in the behavior for six months or more. Those who chose "yes, I have been, but for LESS than six months" as their answer were in the action stage or when a person has begun the new behavior but has been engaging in it for six months or less.

Additionally, those who chose "no, but I intend to in the next 30 days" as their response were in the preparation stage because they have decided to engage in the new behavior; they just have not started. Participants who chose "no, but I intend to in the next six months" were in the contemplation stage because they were thinking of starting the new behavior but had not begun preparing to exercise. Finally, those who chose "no, and I do NOT intend to in the next six months" were in the pre-contemplation stage because these individuals had not thought about starting a new behavior. The same answer responses were utilized to determine the stages of readiness for stress management techniques.

### **Data Analysis**

Data analysis was conducted using SPSS software. A one-way ANOVA was conducted to analyze the collected data for the research questions. The one-way ANOVA was used to examine if there was a relationship between mean PSS-10 scores and the stages of readiness for change for physical activity. A one-way ANOVA was also used to examine if there was a relationship between mean PSS-10 scores and the stages of readiness for change for stress

management techniques, such as mindfulness meditation. A one-way ANOVA was also used to compare the mean PSS-10 scores of the different supervisory roles in the department, including entry-level/non-supervisory, team lead/supervisor, and manager/director. Finally, a one-way ANOVA examined whether there were differences in mean PSS-10 scores between employees who identified as Black, Indigenous, or Person of Color and employees who identified as White/Caucasian.

## Results

### Part I. Descriptive Statistics

#### *Demographic Information*

Of the 101 participants, 79.20% ( $n = 80$ ) were women, and 19.80% ( $n = 20$ ) were men. One participant identified as non-binary (0.99%). Table 1 displays the demographic characteristics of the study participants. The mean PSS-10 scores remained consistent between males ( $M = 20.60$ ,  $sd = 4.10$ ) and females ( $M = 20.26$ ,  $sd = 4.29$ ). Most participants were entry-level/non-supervisor employees ( $n = 49$ , 48.5%). Team leads or supervisors accounted for 38.6% ( $n = 39$ ) of the sample, while managers or directors accounted for 11.9% ( $n = 12$ ) of the sample. The mean PSS-10 scores for entry-level, team lead/supervisor, and manager/director roles were 20.80, 20.33, and 18.00, respectively. About 34% of participants identified as White/Caucasian, while 57% identified as BIPOC. Of the BIPOC category, 9.9% ( $n = 10$ ) were Asian or Pacific Islander, 12.87% ( $n = 13$ ) were Black/African American, 37.62% ( $n = 38$ ) were Hispanic/Latino, and 0.99% ( $n = 1$ ) were American Indian/Native Alaskan. About 4.95% ( $n = 5$ ) of the population identified as "Other." The mean PSS-10 score for employees who identified as BIPOC was 21.46 ( $sd = 4.37$ ), while White/Caucasian employees' mean PSS-10 score was 18.97 ( $sd = 4.01$ ).

#### *Stages of Change Distribution*

**Physical Activity.** Of the 101 participants in this study, 31.68% ( $n = 32$ ) were in the maintenance stage with a mean PSS-10 score of 19.22 ( $sd = 4.30$ ). About 14.85% ( $n = 15$ ) of participants were in the action stage and had a mean PSS-10 score of 20.13 ( $sd = 2.72$ ). Next, 20.79% ( $n = 21$ ) were in the preparation stage with a mean PSS-10 score of 21.14 ( $sd = 4.25$ ), while 26.73% ( $n = 27$ ) were in the contemplation stage and had a mean PSS-10 score of 21.22

( $sd = 4.68$ ). Finally, 5.94% ( $n = 6$ ) of participants were in the pre-contemplation stage of readiness for physical activity with a mean PSS-10 score of 20.67 ( $sd = 4.76$ ).

**Stress Reduction Techniques.** Of the participants, 25.74% ( $n = 26$ ) were in the maintenance stage of readiness for stress reduction activities and had a mean PSS-10 score of 18.46 ( $sd = 4.11$ ). Approximately 16.83% ( $n = 17$ ) were in the action stage of readiness with a mean PSS-10 score of 20.76 ( $sd = 4.18$ ). About 18.81% ( $n = 19$ ) of participants were in the preparation stage of readiness and had a mean PSS-10 score of 22.63 ( $sd = 4.13$ ). Approximately 17.82% ( $n = 18$ ) were in the contemplation stage and had a mean PSS-10 score of 20.94 ( $sd = 4.08$ ). Finally, 20.79% ( $n = 21$ ) of participants were in the pre-contemplation stage and had a mean PSS-10 score of 19.90 ( $sd = 3.87$ ).

## **Part II. Major Findings**

### ***Research Hypothesis 1***

A one-way ANOVA was computed to test the hypothesis that perceived stress differs between the stages of readiness for change for physical activity. The results showed that there was no significant difference between the stages of readiness for change ( $F(4,96) = 1.06, p > 0.5$ ). The participants' perceived stress scores did not differ significantly depending on the stages of readiness for change for physical activity. Participants in the pre-contemplation stage of readiness had a mean PSS-10 score of 20.67 ( $sd = 4.76$ ), while participants in the contemplation stage of readiness had a mean PSS-10 score of 21.22 ( $sd = 4.68$ ). Additionally, individuals in the preparation stage of readiness for change for physical activity had a mean PSS-10 score of 21.14 ( $sd = 4.25$ ). Participants in the action and maintenance stages had mean PSS-10 scores of 20.13 ( $sd = 2.72$ ) and 19.22 ( $sd = 4.30$ ), respectively.



### ***Research Hypothesis 2***

A one-way ANOVA was utilized to examine if perceived stress scores differed between the stages of readiness for change for stress-reducing activities, including mindfulness meditation. The respondents' utilization of stress-reducing techniques was also classified into the five stages of readiness for change: pre-contemplation, contemplation, preparation, action, and maintenance. A significant difference was found among the stages of readiness for change for stress-reducing activities ( $F(4,96) = 3.09, p < 0.05$ ). A Tukey post hoc test was executed to determine the nature of the differences between the stages of readiness for change. The test showed that participants in the maintenance stage ( $M = 18.46, sd = 4.11$ ) showed significantly lower mean PSS-10 scores than the other stages.

### ***Research Hypothesis 3***

An ANOVA was conducted to compare the mean differences between supervisory statuses' perceived stress scores. The results showed a significant difference among the supervisory statuses ( $F(3,97) = 3.36, p < 0.5$ ). Individuals who self-identified as being in an entry-level/non-supervisory role in the department had a mean PSS-10 score of 20.80 ( $sd = 4.65$ ). In contrast, those who identified as team leads/supervisors had a mean PSS-10 score of 20.33 ( $sd = 3.53$ ). Participants identified as managers/directors in the department had a mean PSS-10 score of 18.00 ( $sd = 3.25$ ). Perceived stress scores decreased as the level of supervisory status increased.

### ***Research Hypothesis 4***

An ANOVA compared the mean perceived stress scores of employees identifying as BIPOC and White/Caucasian. BIPOC employees included participants who identified as Asian or Pacific Islander, Black or African American, Hispanic or Latinx, and American Indian/Native

American. The results found a significant difference between the means of the two groups ( $F(1,99) = 3.77, p < .05$ ). The mean PSS-10 scores of participants who identified as White/Caucasian was significantly lower ( $M = 18.97, sd = 4.01$ ) than that of BIPOC-identifying employees ( $M = 21.46, sd = 4.37$ ). This finding suggests that BIPOC public health employees experience considerably more stress than White/Caucasian public health employees.

## Discussion

### Summary of Major Findings

The mean PSS-10 scores in this study ranged from 18.00 to 23.20. Overall, public health employees' perceived stress scores in this study were higher than the national average, which range from a PSS-10 score of 11.00 to a score of 18.00 (Cohen & Janicki-Deverts, 2012). A possible explanation is that the study sample was from a local public health department that continues to play a role in the COVID-19 response among other responsibilities. This study utilized the stages of change model to examine whether there was a difference in perceived stress depending on the stage of readiness for change for physical activity. The first research question examined if there was a statistically significant difference in perceived stress scores among the stages of readiness for change for physical activity. The findings indicated no significant difference between the five stages of readiness for change for physical activity. These findings are inconsistent with publications reporting that regular physical activity is beneficial for reducing stress levels (Gillan et al., 2013; Rajoo et al., 2019; Strehli et al., 2022; Uebelacker et al., 2013). Notably, the mean stress scores for participants in the maintenance stage of readiness for physical activity were among the lowest of all the stages of readiness. This finding is consistent with the literature that states that physical activity over months reduces stress and anxiety (USDHHS, 2022).

The second research question in this study utilized the stages of change model to examine whether there was a difference in perceived stress depending on the stage of readiness for change for stress-reducing activities. There was a statistically significant difference in perceived stress scores among the stages of readiness for change for stress-reducing activities. The study results emphasized the importance of engaging in stress-reduction activities, such as mindfulness meditation. Participants in the maintenance stage of readiness for change for stress reduction

activities had the lowest perceived stress scores. These results are consistent with the research findings reporting stress-reducing activities as protective factors against stress, burnout, depression, and anxiety (Ortner et al., 2007). Individuals who utilize mindfulness meditation in their routines to reduce stress tend to perceive less stress than those who do not (Bränström et al., 2010; Ortner et al., 2007; Redstone, 2015; Schreiner & Malcolm, 2008). Physical and stress-reduction activities are protective factors that can reduce employees' likelihood of leaving their roles due to increased stress and burnout.

The third research question examined if there was a difference in perceived stress scores based on supervisory roles in the department. A one-way ANOVA was performed and demonstrated statistically significant differences. The study findings indicated that individuals in entry-level/non-supervisory roles experience significantly more stress than team leads/supervisors and managers/directors. This finding does not fully align with the PH WINS results showing no significant differences in experienced stress between employee statuses (de Beaumont Foundation, 2022). The difference in perceived stress found in this study can be attributed to public health employees being the boots on the ground and connecting with the public during the COVID-19 pandemic. Supervisors, managers, and directors tend to delegate tasks to individuals in entry-level positions. During the pandemic, those in power-holding positions created protocols and updated mandates (de Beaumont Foundation, 2022). The public health workers who received and dealt with complaints answered calls and worked directly with the public, such as contact tracers, and those working in vaccination clinics, primarily entry-level positions. Unsurprisingly, individuals in entry-level roles experienced more stress during the pandemic because their workload increased substantially. This increase in workload was coupled with backlash from the public and concerns about becoming or getting others sick (de Beaumont

Foundation, 2022). Respondents to a similar survey reported experiencing traumatic stressors since March 2020, which included feeling overwhelmed by the workload, receiving job-related threats, and contracting COVID-19 with the fear of infecting others (Bryant-Genevier et al., 2021). With the public health system facing immense pressure during the pandemic, work-life balance and public health employees' well-being were not prioritized.

The fourth research question examined if there was a statistically significant difference in perceived stress scores between employees who identified as BIPOC and White/Caucasian employees. A one-way ANOVA was conducted and revealed a statistically significant difference. This study finding highlights that public health employees who identified as BIPOC experienced significantly higher stress than White/Caucasian public health employees. This finding was consistent with the literature, which indicated the BIPOC faced significant challenges during the pandemic, witnessed health inequities, and faced overt discrimination (Miu & Moore, 2021). There was an increase in racial hate crimes and racism against people of color, especially Asian Americans and Black/African Americans, during the pandemic (Gover et al., 2020; Miu & Moore, 2021). Public health employees were not immune to these stressors during the pandemic. The COVID-19 pandemic brought to light the inequities and disparities that BIPOC communities have faced for generations. It also brought attention to addressing mental health disorders caused by increased stress in employees and communities of color (Loeb et al., 2020).

### **Public Health Implications**

Over half of the sample who participated in this survey did not engage in any form of exercise. This finding is alarming because the sample was taken from local public health departments that promoted healthy activities to reduce morbidity and mortality. Various studies

have shown that employees who regularly engage in physical activity and other stress management techniques utilize coping strategies more and, thus, have reduced perceived stress on the job and their daily lives (Ammerman et al., 2021; Bränström et al., 2010; Gillan et al., 2013; Leufke et al., 2013; Rajoo et al., 2019; & Schnaider-Levi et al., 2020). As these factors appear to be directly interrelated, worksites conducting health-promoting programs for their employees would benefit from a multi-dimensional approach focusing on promoting physical activity and stress management techniques, such as mindfulness meditation.

Public health employees must receive more support to improve retention, especially during times of crisis when a robust workforce is required to respond effectively to emergencies and reduce the health disparities exacerbated by these emergencies. Public health leadership must prioritize the health and well-being of all public health employees by introducing interventions that promote regular physical activity and mindfulness meditation. Previous research showed that mindfulness-based interventions and physical activity components are instrumental in reducing individuals' perceived stress (Diaz-Silveira et al., 2020). An example of a comprehensive, multi-dimensional intervention is the Arkansas Healthy Employee Lifestyle Program (AHELP), which the Arkansas State Health Department implemented (health.arkansas.gov, 2017). The intervention utilized a points system where participants received points if they engaged in physical activity and other healthy behaviors. The accrued points could be used towards days of leave (healthy.arkansas.gov, 2017). The results of this intervention included an increased intake of fruits and vegetables and increased participation in physical activity among participants. Additionally, 91% of participants reported they were either "somewhat effective" or "very effective" in coping with workplace stress (healthy.arkansas.gov, 2017).

It has been widely demonstrated that physical activity significantly reduces job burnout, stress, and depression, while mindfulness meditation interventions increase resilience and mental well-being. Diaz-Silveira and colleagues (2020) found a significant decrease in perceived stress after participants engaged in a holistic intervention that included physical activity and mindfulness meditation for six months. Similarly, de Bruin and colleagues (2020) found that combining physical activity with mindfulness meditation significantly improved stress, depression, and anxiety among the participants in the Mindful2Work intervention. Thus, implementing mindfulness meditation and physical activity components among public health employees can substantially reduce their perceived stress and increase their overall well-being.

### **Study Limitations and Future Recommendations**

One study limitation is that the Perceived Stress Scale is temporal in nature; scores are based on the participants' perceived stress when taking the survey and can change at different times (Cohen et al., 1983). Additionally, depending on other factors, two individuals experiencing the same stressors may perceive them as less or more stressful. However, the PSS-10 remains a valid and reliable measure of perceived stress in different populations and has been effectively employed in many studies to measure perceived stress (Sun et al., 2018). A second limitation was the use of a cross-sectional study. Cross-sectional studies are observational and analyze data from a population at one point, taking a “snapshot” of health conditions at a single moment (Crosby et al., 2015, p. 87). Cross-sectional studies cannot infer cause and effect. Also, results may be affected by selection bias due to the accessibility of the targeted population (Crosby et al., 2015, p. 93). Despite these limitations, cross-sectional studies in health promotion research can be useful in finding significant correlations between health-related behaviors and health outcomes (Crosby et al., 2015, p. 93).

A third study limitation was response bias, which is seen when respondents do not answer honestly or accurately (Crosby et al., 2015, p. 270). Response bias can take several forms, such as the need for social desirability, which is seen when respondents answer questions the way they believe will be favorable to the researcher (Crosby et al., 2015). The participants will then respond in a way that plays to or against the hypotheses. The participants in this study were public health employees, which might have led them to answer the survey questions of how an individual who knows the implications of certain health behaviors would respond. One way to control for response bias in future studies is to ensure participants understand that an honest answer will be the best answer for the study.

## **Conclusion**

During the COVID-19 pandemic, public health employees experienced increased stress, burnout, PTSD, anxiety, and depression. Various reports and federal organizations have endorsed the importance of engaging in physical activity and stress-reducing activities to reduce the consequences of burnout and stress (CDC, 2021). Despite the extensive evidence on the efficacy of available protective factors, over half of the study population did not meet the recommendations for physical activity for Americans and was not engaging in stress reduction activities. This study did not find a significant difference in the mean perceived stress scores between the stages of readiness for change for physical activity. This study found a significant difference in mean perceived stress scores between the stages of readiness for change for stress-reducing activities. This study also indicated a significant difference in perceived stress scores among the supervisory roles. Finally, the results highlighted a significant difference in perceived stress scores between BIPOC public health employees and White/Caucasian public health employees. Based on these findings, public health departments should prioritize increased



support and holistic, multi-component health promotion interventions to improve the well-being of all employees.

## References

- Almaghrabi, R. H., Alfaradi, H., Hebshi, W. A., & Albaadani, M. M. (2020). Healthcare workers experience in dealing with coronavirus (COVID-19) pandemic. *Saudi Medical Journal*, 41(6), 657–660. <https://doi.org/10.15537/smj.2020.6.25101>
- American Psychological Association. (n.d). *APA Dictionary of Psychology*. American Psychological Association. Retrieved October 10, 2022, from <https://dictionary.apa.org/mindfulness>
- American Psychological Association. (n.d.). Stress in America™ 2020: A National Mental Health Crisis. American Psychological Association. Retrieved November 14, 2022, from <https://www.apa.org/news/press/releases/stress/2020/report-october>
- Ammerman, C. E., & Elliott, E. Q. C. Q. (2021). Effective stress reduction techniques for anxiety, depression, and burnout. *Tennessee Nurse*, 84(1), 8+.  
<https://link.gale.com/apps/doc/A681131609/AONE?u=anon~a6af471d&sid=googleScholar&xid=222f9627>
- Almaghrabi, R. H., Alfaradi, H., Hebshi, W. A., & Albaadani, M. M. (2020). Healthcare workers experience in dealing with coronavirus (COVID-19) pandemic. *Saudi Medical Journal*, 41(6), 657–660. <https://doi.org/10.15537/smj.2020.6.25101>
- Bränström, R., Kvillemo, P., Brandberg, Y., & Moskowitz, J. T. (2010). Self-report mindfulness as a mediator of psychological well-being in a stress reduction intervention for cancer patients—a randomized study. *Annals of Behavioral Medicine*, 39(2), 151–161.  
<https://doi.org/10.1007/s12160-010-9168-6>

Bryant-Genevier, J., Rao, C. Y., Lopes-Cardozo, B., Kone, A., Rose, C., Thomas, I., Orquiola, D., Lynfield, R., Shah, D., Freeman, L., Becker, S., Williams, A., Gould, D. W., Tiesman, H., Lloyd, G., Hill, L., & Byrkit, R. (2021). Symptoms of depression, anxiety, post-traumatic stress disorder, and suicidal ideation among state, tribal, local, and territorial public health workers during the COVID-19 pandemic — United States, March–April 2021. *MMWR. Morbidity and Mortality Weekly Report*, 70(48), 1680–1685.  
<https://doi.org/10.15585/mmwr.mm7048a6>

Centers for Disease Control and Prevention. (2021, December 2). *Support for Public Health Workers and health professionals*. Centers for Disease Control and Prevention. Retrieved October 10, 2022, from [https://www.cdc.gov/mentalhealth/stress-coping/healthcare-workers-first-responders/index.html?CDC\\_AA\\_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fhcp%2Fmental-health-healthcare.html](https://www.cdc.gov/mentalhealth/stress-coping/healthcare-workers-first-responders/index.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fhcp%2Fmental-health-healthcare.html)

Centers for Disease Control and Prevention. (2022, July 14). *Why should people be active?* Centers for Disease Control and Prevention. Retrieved October 10, 2022, from <https://www.cdc.gov/physicalactivity/activepeoplehealthnation/why-should-people-be-active.html>

Centers for Disease Control and Prevention. (2022, June 2). *How much physical activity do adults need?* Centers for Disease Control and Prevention. Retrieved October 10, 2022, from <https://www.cdc.gov/physicalactivity/basics/adults/index.htm>

Cohen, S., & Janicki-Deverts, D. (2012). Who's stressed? distributions of psychological stress in the United States in probability samples from 1983, 2006, and 2009. *Journal of Applied Social Psychology*, 42(6), 1320–1334. <https://doi.org/10.1111/j.1559-1816.2012.00900.x>

- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24, 385-396.
- Coronado, F., Beck, A. J., Shah, G., Young, J. L., Sellers, K., & Leider, J. P. (2019). Understanding the dynamics of diversity in the Public Health Workforce. *Journal of Public Health Management and Practice*, 26(4), 389–392.  
<https://doi.org/10.1097/phh.0000000000001075>
- Costa, M. P., Schmidt, A., Vitorino, P. V., & Corrêa, K. de. (2021). Physical inactivity and symptoms of depression, anxiety, and stress in adolescent students. *Acta Paulista De Enfermagem*, 34. <https://doi.org/10.37689/acta-ape/2021ao03364>
- Crosby, R. A., DiClemente, R. J., & Salazar, L. F. (2015). Observational Research Designs. in *Research methods in health promotion* (2nd ed., pp. 87–94). essay, Wiley.
- de Bruin, E. I., Formsma, A. R., Frijstein, G., & Bögels, S. M. (2016). Mindful2Work: Effects of combined physical exercise, yoga, and mindfulness meditations for stress relieve in employees. A proof of concept study. *Mindfulness*, 8(1), 204–217.  
<https://doi.org/10.1007/s12671-016-0593-x>
- Davidson, R. J., & McEwen, B. S. (2012). Social influences on neuroplasticity: Stress and interventions to promote well-being. *Nature Neuroscience*, 15(5), 689–695.  
<https://doi.org/10.1038/nn.3093>
- Department of Health and Human Services. (2018). *Physical activity guidelines for Americans 2nd edition ... - health*. Physical Activity Guidelines for Americans, 2nd edition. Retrieved October 10, 2022, from [https://health.gov/sites/default/files/2019-09/Physical\\_Activity\\_Guidelines\\_2nd\\_edition\\_Presentation.pdf](https://health.gov/sites/default/files/2019-09/Physical_Activity_Guidelines_2nd_edition_Presentation.pdf)

- Díaz-Silveira, C., Alcover, C.-M., Burgos, F., Marcos, A., & Santed, M. A. (2020). Mindfulness versus physical exercise: Effects of two recovery strategies on mental health, stress and immunoglobulin a during lunch breaks. A randomized controlled trial. *International Journal of Environmental Research and Public Health*, 17(8), 2839. <https://doi.org/10.3390/ijerph17082839>
- Dye T. D., Alcantara, L., Siddiqi, S., Barbosa., Sharma, S., Pank, T., & Pressman, E. Risk of COVID-19-related bullying, harassment, and stigma among healthcare workers: an analytical cross-sectional global study. *BMJ Open* 2020;10: e046620. doi:10.1136/bmjopen-2020-046620
- Depression: What is burnout?* National Library of Medicine. (2020, June 18). Retrieved October 10, 2022, from <https://www.ncbi.nlm.nih.gov/books/NBK279286/>
- Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G\*Power 3: A flexible statistical power analysis for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39, 175-191.
- Gillan, W., Naquin, M., Zannis, M., Bowers, A., Brewer, J., & Russell, S. (2013). Correlations among Stress, Physical Activity, and Nutrition: School Employee Health Behavior. *School Employee Health Behavior*, 8(1), 55–60.
- Gover, A. R., Harper, S. B., & Langton, L. (2020). Anti-Asian hate crime during the COVID-19 pandemic: Exploring the reproduction of inequality. *American Journal of Criminal Justice*, 45(4), 647–667. <https://doi.org/10.1007/s12103-020-09545-1>

- Hare Bork, R., Robins, M., Schaffer, K., Leider, J. P., & Castrucci, B. C. (2022). Workplace perceptions and experiences related to covid-19 response efforts among public health workers — public health workforce interests and needs survey, United States, September 2021–January 2022. *MMWR. Morbidity and Mortality Weekly Report*, 71(29), 920–924. <https://doi.org/10.15585/mmwr.mm7129a3>
- Hayden, J. (2014). *Health Behavior Theory* (2nd ed). Jones & Bartlett Learning.
- Healthy People 2030 Framework. Healthy People 2030 Framework - Healthy People 2030.* (n.d.). Retrieved November 13, 2022, from <https://health.gov/healthypeople/about/healthy-people-2030-framework>
- Home: Nami: National Alliance on Mental Illness.* NAMI. (n.d). Retrieved October 10, 2022, from <https://www.nami.org/home>
- Horiuchi, S., Tsuda, A., Kim, E., Hong, K.-S., Park, Y.-S., & Kim, U. (2010). Relationships between stage of change for stress management behavior and perceived stress and coping. *Japanese Psychological Research*, 52(4), 291–297. <https://doi.org/10.1111/j.1468-5884.2010.00444.x>
- Jackson, C. S., & Gracia, J. N. (2014). Addressing health and healthcare disparities: The role of a diverse workforce and the social determinants of health. *Public Health Reports*, 129(1\_suppl2), 57–61. <https://doi.org/10.1177/00333549141291s211>
- Leufke, R., Zilcha-Mano, S., Feld, A., & Lev-ari, S. (2013). Effects of "the work" meditation on psychopathologic symptoms: A pilot study. *Alternative and Complementary Therapies*, 19(3), 147–152. <https://doi.org/10.1089/act.2013.19303>

- Lipscomb, A. E., & Ashley, W. (2020). Surviving being black and a clinician during a dual pandemic: personal and professional challenges in a disease and racial crisis. *Smith College Studies in Social Work*, 90(4), 221–236.  
<https://doi.org/10.1080/00377317.2020.1834489>
- Loeb, T. B., Ebor, M. T., Smith, A. M., Chin, D., Novacek, D. M., Hampton-Anderson, J. N., Norwood-Scott, E., Hamilton, A. B., Brown, A. F., & Wyatt, G. E. (2021). How mental health professionals can address disparities in the context of the COVID-19 pandemic. *Traumatology*, 27(1), 60–69. <https://doi.org/10.1037/trm0000292>
- Lutz, R. S., Stults-Kolehmainen, M. A., & Bartholomew, J. B. (2010). Exercise caution when stressed: Stages of change and the stress–exercise participation relationship. *Psychology of Sport and Exercise*, 11(6), 560–567. <https://doi.org/10.1016/j.psychsport.2010.06.005>
- Melvin, S. C., Wiggins, C., Burse, N., Thompson, E., & Monger, M. (2020). The role of Public Health in COVID-19 emergency response efforts from a Rural Health Perspective. *Preventing Chronic Disease*, 17. <https://doi.org/10.5888/pcd17.200256>
- Miu, A. S., & Moore, J. R. (2021). Behind the masks: Experiences of mental health practitioners of color during the COVID-19 pandemic. *Academic Psychiatry*, 45(5), 539–544.  
<https://doi.org/10.1007/s40596-021-01427-w>
- Moore, C. (2022, September 12). *What is mindfulness? definition + benefits (incl... psychology)*. PositivePsychology.com. Retrieved October 10, 2022, from <https://positivepsychology.com/what-is-mindfulness/>
- Ortner, C. N., Kilner, S. J., & Zelazo, P. D. (2007). Mindfulness meditation and reduced emotional interference on a cognitive task. *Motivation and Emotion*, 31(4), 271–283.  
<https://doi.org/10.1007/s11031-007-9076-7>

- Ph wins 2021: Rising stress and burnout in public health*. de Beaumont Foundation. (2022, August 9). Retrieved October 10, 2022, from <https://debeaumont.org/phwins/2021-findings/stress-and-burnout/>
- Prochaska, J. O., & DiClemente, C. C. (1992). The transtheoretical approach. In J. C. Norcross & M. R. Goldfried (Eds.), *Handbook of psychotherapy integration* (pp. 300–334). Basic Books.
- Rajoo, Y., Wong, J., Cooper, G., Raj, I. S., Castle, D. J., Chong, A. H., Green, J., & Kennedy, G. A. (2019). The relationship between physical activity levels and symptoms of depression, anxiety, and stress in individuals with alopecia areata. *BMC Psychology*, 7(1). <https://doi.org/10.1186/s40359-019-0324-x>
- Redstone, L. (2015). Mindfulness meditation and aromatherapy to reduce stress and anxiety. *Archives of Psychiatric Nursing*, 29(3), 192–193. <https://doi.org/10.1016/j.apnu.2015.03.001>
- Schnaider-Levi, L., Ganz, A., Zafrani, K., Goldman, Z., Mitnik, I., Rolnik, B., & Lev-Ari, S. (2020). The effect of inquiry-based stress reduction on teacher burnout: A controlled trial. *Brain Sciences*, 10(7), 468. <https://doi.org/10.3390/brainsci10070468>
- Schreiner, I., & Malcolm, J. (2008). The Benefits of Mindfulness Meditation: Changes in Emotional States of Depression, Anxiety, and Stress. *Behaviour Change*, 25(3), 156-168. [doi:10.1375/bech.25.3.156](https://doi.org/10.1375/bech.25.3.156)
- Silverman, M. N., & Deuster, P. A. (2014). Biological mechanisms underlying the role of physical fitness in health and resilience. *Interface Focus*, 4(5), 20140040. <https://doi.org/10.1098/rsfs.2014.0040>



- Stone, K. W., Kintziger, K. W., Jagger, M. A., & Horney, J. A. (2021). Public Health Workforce Burnout in the COVID-19 response in the U.S. *International Journal of Environmental Research and Public Health*, 18(8), 4369. <https://doi.org/10.3390/ijerph18084369>
- Strehli, I., Ziegenfuss, D. H., Block, M. E., Burns, R. D., Bai, Y., & Brusseau, T. A. (2022). “I felt grounded and clear-headed”: Qualitative exploration of a mind-body physical activity intervention on stress among college students during COVID-19. *INQUIRY: The Journal of Health Care Organization, Provision, and Financing*, 59, 004695802211263. <https://doi.org/10.1177/00469580221126307>
- Sun, Y., Gao, L., Kan, Y., & Shi, B.-X. (2018). The perceived stress scale-10 (PSS-10) is reliable and has construct validity in Chinese patients with systemic lupus erythematosus. *Lupus*, 28(2), 149–155. <https://doi.org/10.1177/0961203318815595>
- Tanner, M. K., Fallon, I. P., Baratta, M. V., & Greenwood, B. N. (2019). Voluntary exercise enables stress resistance in females. *Behavioural Brain Research*, 369, 111923. <https://doi.org/10.1016/j.bbr.2019.111923>
- Uebelacker, L. A., Eaton, C. B., Weisberg, R., Sands, M., Williams, C., Calhoun, D., Manson, J. A. E., Denburg, N. L., & Taylor, T. (2013). Social support and physical activity as moderators of life stress in predicting baseline depression and change in depression over time in the women's Health initiative. *Social Psychiatry and Psychiatric Epidemiology*, 48(12), 1971–1982. <https://doi.org/10.1007/s00127-013-0693-z>
- Ward, J. A., Stone, E. M., Mui, P., & Resnick, B. (2022). Pandemic-related workplace violence and its impact on public health officials, March 2020–January 2021. *American Journal of Public Health*, 112(5), 736–746. <https://doi.org/10.2105/ajph.2021.306649>

World Health Organization. (n.d.). *Coronavirus disease (covid-19)*. World Health Organization.

Retrieved October 10, 2022, from <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>

## Appendix A: Tables

**Table 1**

*Mean Perceived Stress Scores Based on Demographics*

Variable	f (%)	Mean Perceived Stress Score
<b><i>Gender</i></b>		
Male	20 (19.80%)	20.60
Female	80 (79.20%)	20.26
Non-binary	1 (0.99%)	-
<b><i>Race/ethnicity</i></b>		
White/Caucasian	34 (33.66%)	18.97
Asian or Pacific Islander	10 (9.90%)	19.00
Black/African American	13 (12.87%)	20.69
Hispanic/Latino	38 (37.62%)	21.39
American Indian/Native Alaskan	1 (0.99%)	-
Other	5 (4.95%)	23.20
BIPOC	67 (66.34%)	21.46
<b><i>Supervisory status</i></b>		
Entry-level (non-supervisor)	49 (48.50%)	20.80
Team Lead/Supervisor	39 (38.60%)	20.33
Manager/Director	12 (11.90%)	18.00
Executive	0 (0%)	-

**Table 2***Stage of Change Categorization for Physical Activity and Mindfulness Engagement Questions*

<b>Answer response</b>	<b>Stage of readiness</b>
Yes, I have been for more than six months.	Maintenance
Yes, I have been, but for LESS than six months.	Action
No, but I intend to in the next 30 days.	Preparation
No, but I intend to in the next six months.	Contemplation
No, and I do NOT intend to in the next six months.	Precontemplation

## **Appendix B: Informed Consent Form**

I agree to participate in the research study conducted by Mayra Mendoza, a graduate student in the Department of Public Health Sciences at California Baptist University (CBU). I understand that the study is designed to look at information regarding the COVID-19 impact on stress levels among the public health workforces.

The survey will take about 10-15 minutes to complete and will ask questions about my stress levels and other general health topics. I understand that I do not have to put my name on the survey and that my answers provided in the survey will be confidential. Only the researcher will have access to the information provided in the study. I understand that my participation in the study is voluntary, and I can decline to answer any of the questions and/or withdraw completely from the study at any time. There is no penalty or punishment for the decision to participate or not.

I understand that if in any way I start to feel uncomfortable with the questions that are being asked of me, I have the right to not answer any questions and/or withdraw from the study. In addition, the researcher has given me the number of the San Bernardino County 24/7 Access & Referral Helpline: 1-888-743-1478 and 909-386-8256 and the Riverside University Health System-Behavioral Health HELPLine number (951) 686-4357 if, for any reason, I feel affected by the study.

I understand that the research study has been approved by the CBU Institutional Review Board (IRB) which looks at the risks that can be associated with involving human participants. I can contact the CBU IRB at (951) 552-8626 or IRB@calbaptist.edu if I have any questions regarding participants in research studies.

I understand that the study being led is to further the research within the public health department employees and to inform individuals in supervisory roles about the importance of managing stress. The findings will provide recommendations for incorporating stress management mechanisms within the development of the workforce to reduce burnout. If I have any additional questions or concerns about the study after it is conducted, I can contact Mayra Mendoza at (951) 538-3562 or MayraAlejandra.Mendoza@calbaptist.edu

I voluntarily agree to participate in the study. By clicking the blue button below, I give my consent to take this survey.

If you would like to be entered into a raffle for a chance to win a gift card, please include an email address below. This email address will not be shared with anyone or used for any other reason other than to enter it in the raffle.

## Appendix C: Survey Questionnaire

### Demographic Questions

1. What is your gender?
  - 1) Male
  - 2) Female
  - 3) Non-binary/ third gender
  - 4) Prefer not to say
  
2. What is your age? \_\_\_\_\_(Enter in number)
  
3. What is your race/ethnicity?
  - 1) White/Caucasian
  - 2) Asian or Pacific Islander
  - 3) Black/African American
  - 4) Hispanic/Latino
  - 5) American Indian/Native American
  - 6) Other \_\_\_\_\_
  
4. What is your household's estimated yearly income?
  - 1) Less than \$10,000
  - 2) \$10,000 to \$14,999
  - 3) \$15,000 to \$24,999
  - 4) \$25,000 to \$34,999
  - 5) \$35,000 to \$49,999
  - 6) \$50,000 to \$74,999
  - 7) \$75,000 to \$99,999
  - 8) \$100,000 to \$149,999
  - 9) \$150,000 to \$199,999
  - 10) \$200,000 or more

5. What is the highest level of education you have?
  - 1) High School Diploma or GED
  - 2) Associates Degree (2-year degree)
  - 3) Some College
  - 4) Bachelor's Degree (4-year degree)
  - 5) Graduate Degree (Masters, Ph.D, JD, MD, etc)
  
6. What is your supervisory status?
  - 1) Non-supervisor (ex: Health Education Assistant)
  - 2) Team lead or Supervisor (ex: Program Coordinator)
  - 3) Manager
  - 4) Executive

**Section 1: General Health Questions**

1. Do you eat at least 1½ to 2 cups per day of fruit and 2 to 3 cups per day of vegetables a day?
  - 1) Yes, I have been for more than 6 months.
  - 2) Yes, I have been, but for LESS than 6 months.
  - 3) No, but I intend to in the next 30 days.
  - 4) No, but I intend to in the next 6 months.
  - 5) No, and I do NOT intend to in the next 6 months.
  
2. Do you exercise 150 minutes of moderate-intensity physical activity each week?
  - 1) Yes, I have been for more than six months.
  - 2) Yes, I have been, but for LESS than 6 months.
  - 3) No, but I intend to in the next 30 days.
  - 4) No, but I intend to in the next 6 months.
  - 5) No, and I do NOT intend to in the next six months.
  
3. Do you practice stress reduction activities (e.g., meditation) in your daily life?
  - 1) Yes, I have been for more than 6 months.
  - 2) Yes, I have been, but for LESS than 6 months.
  - 3) No, but I intend to in the next 30 days.
  - 4) No, but I intend to in the next 6 months.
  - 5) No, and I do NOT intend to in the next 6 months.

**Section 2. Perceived Stress Scale (Cohen et al., 1983)**

Instructions: Please use the scale below to answer the questions.

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

### Section 3. Sources of Stress

Instructions: Please use the scale below to answer the questions.

How often have you experienced the following work-related stressors over the last three months?

- | <b>1-Never</b> | <b>2-Almost never</b> | <b>3-Sometimes</b> | <b>4-Fairly often</b> | <b>5-Very often</b> |
|----------------|-----------------------|--------------------|-----------------------|---------------------|
| _____          | _____                 | _____              | _____                 | _____               |
| _____          | _____                 | _____              | _____                 | _____               |
| _____          | _____                 | _____              | _____                 | _____               |
| _____          | _____                 | _____              | _____                 | _____               |
| _____          | _____                 | _____              | _____                 | _____               |
| _____          | _____                 | _____              | _____                 | _____               |
| _____          | _____                 | _____              | _____                 | _____               |
| _____          | _____                 | _____              | _____                 | _____               |
| _____          | _____                 | _____              | _____                 | _____               |
| _____          | _____                 | _____              | _____                 | _____               |