Reducing Stress Among COVID-19 Healthcare Workers

The Effect of a Combined Nature-Based and Smartphone Mindfulness Intervention on Stress Among Frontline COVID-19 Healthcare Workers

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**RESEARCH PROPOSAL**

**Study Rationale**

Healthcare workers caring for patients with COVID-19 experience significant stress and trauma exposure with increased risk for psycho-social-spiritual distress. Social distancing has further limited services available to address mental health needs. Feasible and effective interventions are needed to reduce stress and increase wellbeing and resilience in this population. This randomized controlled trial aims to investigate the feasibility and efficacy of a combined nature and mindfulness intervention by sequencing a nature program followed by an audio-based mindfulness intervention on primary outcomes of stress, as well as secondary outcomes of sleep, burnout, posttraumatic stress, anxiety, depression, mindfulness, self-efficacy, and psycho-social-spiritual healing. To our knowledge no such augmentation has been previously studied.

**Background**

The COVID-19 pandemic has imposed a tremendous amount of psychosocial distress on the healthcare workforce. Working under high levels of stress can increase the risk for developing a myriad of mental health symptoms. A large recent cross-sectional study in the U.S. with data from 657 clinicians at New York-Presbyterian/ Columbia University and other collaborators assessing nurses and advanced practice providers, confirms a significantly high prevalence of psychological symptoms such as acute stress, anxiety, depression, sleep disturbances, and feelings of loneliness. Another study conducted in China had shown similar symptoms in frontline healthcare workers experiencing elevated levels of distress, anxiety, and depression. The nature of the work can be traumatic, as it may involve witnessing the death of patients and colleagues, and the imminent fear of exposing self and family to a fatal virus. In addition, they are at increased risk for developing trauma-related disorders, a trajectory consistent with some providers who worked during the previous viral outbreaks. Moreover, the unprecedented demands of caring for patients can compromise sleep quality and lead to insomnia. Not only is insomnia highly comorbid with mental health conditions, but multiple longitudinal studies indicate that sleep disturbances contribute to the prediction of new-onset posttraumatic stress, anxiety, and depressive disorders, with meta-analytic findings reporting that sleep disturbance yields a three-fold increased risk of anxiety.
and depression.\textsuperscript{15} Chronic stress and inadequate sleep may culminate in burnout, which is characterized by emotional exhaustion, depersonalization, and a sense of low personal accomplishment.\textsuperscript{16} Burnout is consistent with decreased resilience, poor psychological recovery, which can exacerbate distress.\textsuperscript{17}

Social distancing can limit availability of mental health services that could meet the needs of frontline healthcare workers. Innovative interventions that are feasible and effective are needed to reduce stress and increase resilience in this population. Studies have shown that complementary and ancillary programs can increase resilience and wellbeing. Among ancillary services many involve outdoor activities,\textsuperscript{18} nature adventures,\textsuperscript{19,20} and spending time in nature.\textsuperscript{21,22} Nature exposure can enhance well-being with the potential to reduce adverse effects of stressors.\textsuperscript{21} Research on First Descents’ programs, which primarily include nature-based activities, demonstrated that young adult cancer survivors who participated in the program had decreased stress, fewer symptoms of depression and alienation, and improved self-efficacy.\textsuperscript{23,24} However, individuals who participated in the program a second time were not better off psychologically than those who participated only once. Writers argued that individuals signed up for a second time because the benefits of the first program could have faded.\textsuperscript{25} This suggests that the benefits derived from this type of outdoor programs can be short-lived and may require additional therapeutic components to strengthen and prolong their efficacy.\textsuperscript{25}

Mindfulness interventions are evidence-based and are a strong candidate to combine with nature programs for added benefit. Mindfulness is defined as “paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment”.\textsuperscript{26} Meta-analyses have shown that mindfulness-based interventions reduce stress and burnout,\textsuperscript{27} improve sleep quality,\textsuperscript{28} alleviate anxiety and depression,\textsuperscript{29,30} and improve and increase resilience.\textsuperscript{31} Audio-based mindfulness applications have gained popularity and many studies support their effectiveness.\textsuperscript{32,33} Since social distancing has rendered face-to-face mindfulness-based interventions infeasible, audio-based mindfulness applications may be a viable alternative. Indeed, the portability of these applications reduce the burden of accessing mindfulness-based interventions. These mindfulness applications have demonstrated durable positive effects on wellbeing. For instance, a randomized controlled trial found that experimental participants ($n=191$) compared to controls ($n=186$), endorsed large decreases in psychiatric symptoms and moderate improvements in psychological, social, and quality of life measures after using an audio-based smartphone mindfulness application for five weeks, and these gains were maintained for at least three months.\textsuperscript{34} Another study using a relatively brief mobile mindfulness application for 10 minutes a day for 10 days\textsuperscript{35} reported significant improvements in depressive symptoms and mindfulness in the experimental group. Other studies have also supported the effectiveness of brief mindfulness applications.\textsuperscript{36}
Purpose of the Proposed Study

Stress-related symptoms in COVID-19 healthcare workers is an important public health issue that requires attention. A previous study conducted in our lab has shown that a brief mindfulness intervention decreases stress in healthcare providers.97 Another study from our lab confirms the positive impact of nature on stress reduction.38 We also found that adding a mindfulness component to the initial nature experience instructions, enhanced and enriched participants’ positive experiences and contributed to a present moment orientation and increased relaxation.

In the present study we propose to combine a nature program with an audio-based mindfulness intervention. Our goal is to investigate the feasibility and effectiveness of the combined sequenced interventions to decrease stress in COVID-19 healthcare workers. In addition, we will investigate whether there is a decrease in sleep disturbance, burnout, posttraumatic stress, anxiety, depression, as well as improvements in resilience assessed by increased mindfulness, self-efficacy, and psycho-social-spiritual healing. Ninety COVID-19 healthcare workers will be randomized into one of three groups: Nature+Mindfulness (n=30), Nature only (n=30), and a waitlist control (n=30). We hypothesize that the Nature+Mindfulness group will have greater reductions in stress than the other two groups. In addition, the Nature+Mindfulness group will have greater reductions in sleep disturbance, burnout, posttraumatic stress, anxiety, depression, as well as greater improvements in resilience assessed by increased mindfulness, self-efficacy, and psycho-social-spiritual healing compared with the other two groups. Moreover, we hypothesize that at 10-week follow-up the Nature+Mindfulness group will demonstrate a greater maintenance of positive gains compared with the Nature only group.
Specific Aims
Primary Aim:

1.) To investigate the feasibility and effectiveness of a Nature+Mindfulness stress reduction program.

   Hypothesis 1: The Nature+Mindfulness group will have greater reductions in stress indicated by decreased Perceived Stress Scale (PSS) compared to the Nature only and waitlist control groups.  
   Hypothesis 2: The Nature only group will have greater reduction in stress as indicated by decreased PSS compared to the waitlist control group.  
   Hypothesis 3: Assessment of response rate, attendance rate, participant feedback and adverse events will demonstrate that Nature+Mindfulness intervention is feasible.

Secondary Aims:

2.) To investigate the effect of Nature+Mindfulness intervention on sleep, burnout, posttraumatic stress, anxiety, depression, as well as mindfulness, self-efficacy, and psycho-social-spiritual healing.

   Hypothesis 1: The Nature+Mindfulness group will have greater reduction in sleep disturbance, burnout, posttraumatic stress, anxiety, depression, as well as greater improvements in resilience assessed by increased mindfulness, self-efficacy, and psycho-social-spiritual healing compared with the other two groups.  
   Hypothesis 2: The Nature only group will have greater reduction in sleep disturbance, burnout, posttraumatic stress, anxiety, depression, as well as greater improvements in resilience assessed by increased mindfulness, self-efficacy, and psycho-social-spiritual healing compared to the waitlist control group.

3.) To investigate intervention gains at 10-week follow-up in the Nature+Mindfulness and Nature only groups.

   Hypothesis 1: The Nature+Mindfulness group will better retain stress reduction and other positive gains compared to the Nature only group.
Research Strategy

Study Population and Procedures
The study will recruit 90 (male and female age 18 and up) active COVID-19 healthcare workers through First Descents organization.

Study Design
Ninety COVID-19 healthcare workers will be randomized into one of three groups: Nature+Mindfulness (n=30), Nature only (n=30), and a waitlist control (n=30). The randomization scheme will be based on block sizes of six, with 2:2:2 random assignments into each group. De-identified data will be collected from eligible participants who will directly enter their information and responses into a database management system. The Nature+Mindfulness group will undergo both the nature program and mindfulness intervention. The Nature only group will participate only in the nature program. The waitlist control group will participate in the nature program at a later date after study completion. Figure 1 depicts the study design, groups, and study intervals.

Experimental Plan and Interventions

Nature Program
Nature programs are found to be therapeutic, reduce stress, increase relaxation, and improve well-being. First Descents has provided nature adventure programs to young adults with cancer and other serious illness with positive results. A nature program for COVID-19 frontline healthcare workers has been offered by First Descents since August 2020. The program is three days long and includes rock climbing, hiking, and yoga in a nature-rich environment.

Mindfulness Intervention
Mindfulness is established as an effective stress-reduction intervention. Our mindfulness intervention will include an audio-based intervention to be used for 10 days after the nature program is completed (See Research Methods, Figure 1). Audio-based mindfulness applications have gained popularity and there is significant literature that supports their effectiveness. Various smartphone applications have been studied for their impact on medical personnel with positive results. There are also reports that indicate their positive impact on mood, stress, mindfulness, and well-being even with short duration of practice. Audio-based mindfulness applications provide a safe, and portable alternative to regular group-based, face-to-face interventions that are typically 30 hours in length.

Measures
Outcomes will be assessed with validated measures and take approximately 35-40 minutes to complete. These will be completed up to four times per participant.
References


MISSION

First Descents provides life-changing outdoor adventure programs for young adults impacted by cancer and other serious health conditions.
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RESEARCH PROPOSAL
National Institutes of Health
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— MISSION —
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