

Online Mindfulness May Target Psychological Distress and Mental Health during COVID-19

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Abstract

Background: The COVID-19 pandemic has dramatically affected mental health, creating an urgent need for convenient and safe interventions to improve well-being. Online mindfulness interventions show promise for improving depression, anxiety, and general well-being.

Objective: To assess: 1) the impact of online mindfulness on psychological distress, 2) altruistic efforts, and 3) the quantity, quality, and availability of online mindfulness resources during the COVID-19 pandemic.

Methods: 233 participants (203 U.S.; 20 international; 10 unknown) participated in this prospective, single-arm, non-randomized clinical trial of a single online mindfulness meditation session with pre- and post-surveys.

Main Outcome Measures: (a) Mindfulness session helpfulness, online platform effectiveness, and immediate pre- to post-session changes in momentary stress, anxiety, and COVID-19 concern; (b) qualitative themes representing how people are helping others during the pandemic; (c) absolute changes in quantity of mindfulness-oriented web content and free online mindfulness resource availability from May to August 2020.

Results: Most participants felt the online mindfulness session was helpful and the electronic platform effective for practicing mindfulness (89%, 95% CI: [82 to 93%]), with decreased momentary anxiety (76%; 95% CI: [69 to 83%]), stress (80%; [72 to 86%]), and COVID-19 concern (55%; [46 to 63%]), ($p < 0.001$ for each measure). Participants reported helping others in a variety of ways during the pandemic, including following public health guidelines, conducting acts of service and connection, and helping oneself in hopes of helping others. "Mindfulness + COVID" search results increased by 52% from May to August 2020. Most (73%) Academic Consortium for Integrative Medicine and Health member websites offer free online mindfulness resources.

Conclusions: Virtual mindfulness is an increasingly accessible intervention available world-wide that may reduce psychological distress during this isolating public health crisis. Kindness and altruism are being demonstrated during the pandemic. The consolidated online mindfulness resources provided may help guide clinicians and patients.

Keywords

mindfulness, COVID-19, mental health, migraine, pandemic, stress, coronavirus, meditation, lovingkindness, service, psychological distress

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Introduction

The COVID-19 pandemic and subsequent social isolation has exerted alarmingly negative effects on mental health with stress, anxiety, and depression¹ in the general public^{2,3} and in healthcare workers.⁴⁻⁶ This negative

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impact has exacerbated pre-existing depressive symptoms⁷ and stress-susceptible medical conditions (e.g., migraine).^{8,9} Daily surveys conducted March 10th to March 16th 2020 showed each additional day was significantly associated with an 11% increase in psychological distress.⁷ As of March 23, 2020, 53 countries had active statewide or national stay-at-home orders to reduce the virus' spread,¹⁰ necessitating remotely accessible interventions to address the pandemic's psychological harms.

Mindfulness targets stress and anxiety¹¹ by cultivating moment-to-moment awareness with open, non-reactive, non-judgmental attention.¹² Online mindfulness interventions have shown promise for improving depression, anxiety, and general well-being, with guided interventions exerting stronger effects than self-directed practice.¹³ Online mindfulness programs may also reduce burnout in healthcare workers,¹⁴ are accessible from home, and may provide unique benefits in a socially-distanced world transformed by COVID-19.

Times of crisis can promote prosocial behavior and a sense of community;¹⁵ helping others can benefit both the helped and the helper by providing meaning, improving mental health, and mitigating the negative effects of stress.^{16,17} This study was inspired by "Mindfulness for Milan," a program in which an Italian physician (LG) led free daily mindfulness sessions as part of a larger public health response designed to educate the public and manage stress and anxiety during the lockdown period.¹⁵

This prospective, single-arm, non-randomized clinical trial aimed to 1) examine the helpfulness and platform effectiveness of a single virtual mindfulness session for reducing momentary stress, anxiety, and concern about COVID-19 in patients with migraine, healthcare workers, and the public; 2) identify modalities of service to others during COVID-19; and 3) evaluate the quantity, quality, and availability of online mindfulness resources across time during the pandemic.

Methods

Participants and Recruitment

Study information and materials were distributed via web link from March 23rd to August 4th 2020 to recruit patients with migraine, healthcare providers, and the general public. There were no exclusions for participation, and all interested were eligible. Recruitment methods varied based on target populations. Migraine patients were recruited a) regionally through EMR batch messaging and direct notification at patient visits; b) nationally through notification of headache providers; c) internationally through Migraine World Summit. Healthcare providers and their patients were recruited nationwide through physician social media

groups, listservs, and institutional emails. The principal investigator also contacted headache providers directly (see Acknowledgements). Recruitment of the general public, including healthcare providers, occurred through the institution's employee wellness program, local church communications, Clinicaltrials.gov, social media (e.g. Facebook, Twitter), ResearchMatch.org,¹⁸ and Clara Health.

Study Design and Interventions

Participants used a single web link to access the consent form and watch a 15-minute guided video mindfulness session embedded between pre- and post-REDCap surveys (surveys available in Online Supplemental Material). A physician and mindfulness instructor, wearing a white coat, introduced herself and described the session, its intentions, and its inspirations as an opportunity for her to be of service during the pandemic, inspired by a similarly designed Italian virtual mindfulness program. She provided an overview of mindfulness and led participants in a guided mindfulness session by providing calm guidance on bringing attention to the present moment, to the breath, and on "being." Participants were encouraged to gently release thoughts, feelings, and sensations while repeatedly returning attention to the breath. Bells signaled the guided mindfulness session's initiation and conclusion. The study was approved by the institution's Institutional Review Board and registered at clinicaltrials.gov NCT04319445. All participants provided informed consent prior to study participation.

Primary outcomes included Likert scale ratings of session helpfulness and platform effectiveness. Secondary outcomes included: changes in momentary anxiety level, stress level, and COVID-19 concern; value of and satisfaction with the session; and percent interested in future sessions and willingness for family/friend recommendations. Participants were queried on how they were helping others during the pandemic (free text responses) by responding to the statement, "We are hopeful this session was helpful for you. We are also hopeful we may have inspired you to think of ways that YOU may be helpful during this pandemic. Have you thought of any ideas of what YOU can do to help OR are you actively helping others during this pandemic? If so, please describe."

To assess online mindfulness resource availability, Google search engine was used to search "mindfulness + COVID" on May 19, 2020 and August 23, 2020. Study team members further evaluated Academic Consortium for Integrative Medicine & Health (ACIMH) member webpages by searching "MBSR" (Mindfulness-Based Stress Reduction, a standardized curriculum of 8 weekly classes¹²) and

“mindfulness” within each page. To develop a consolidated list of excellent online mindfulness resources that address COVID-19, the top options from both the Google and ACIMH searches were selected, and then finalized to a list of 10 excellent resources based on source reputation, content quality, quantity, and format.

Statistical Analyses

All statistical analyses were performed using R Statistical Software.¹⁹ Response variables were measured on a 5-item Likert scale (e.g., none at all, a little, somewhat, quite a bit, very much). We analyzed each Likert Scale response using a cumulative logit mixed model with time (pre vs. post) as a main effect and random intercepts by participant. The proportional odds assumption was checked via the Brant Test.²⁰ Baseline characteristics and additional responses were analyzed using descriptive statistics. In an exploratory analysis, potential differential changes in anxiety, stress, and concern in healthcare providers and patients with migraine were assessed through inclusion of an interaction effect with time in separate models. Only data from participants who completed surveys immediately before and after the session were included in quantitative analyses ($n = 144$, given assessments included momentary stress/anxiety/concern). Reasons for delayed

post-survey completion were captured in 24 participants (with resulting quantitative data exclusion) and included: continued meditation ($n = 5$), technical difficulties ($n = 13$), unawareness of post-survey ($n = 3$), distractions ($n = 3$). Data are reported with a 95% confidence interval (CI) and a significance level of $p < 0.05$. A constructivist grounded theory approach was used to assess all post-survey qualitative data ($n = 168$, e.g., 144 plus 24) regarding how individuals have been offering acts of kindness during the COVID-19 pandemic. All survey responses were reviewed to create a master codebook, which was reviewed individually by two coders (REW and PME) until no new codes emerged. Related codes were then combined, and themes were developed and organized into categories. An iterative process ensued until all coders agreed on emerged themes and categories. To ensure authenticity and rigor, an audit trail was kept for result validity.

Results

Participant Characteristics

233 participants (203 from across 116 US zip codes; 20 international; 10 unknown, (Figure 1) completed pre-surveys; of those 144 (60%) also completed post-

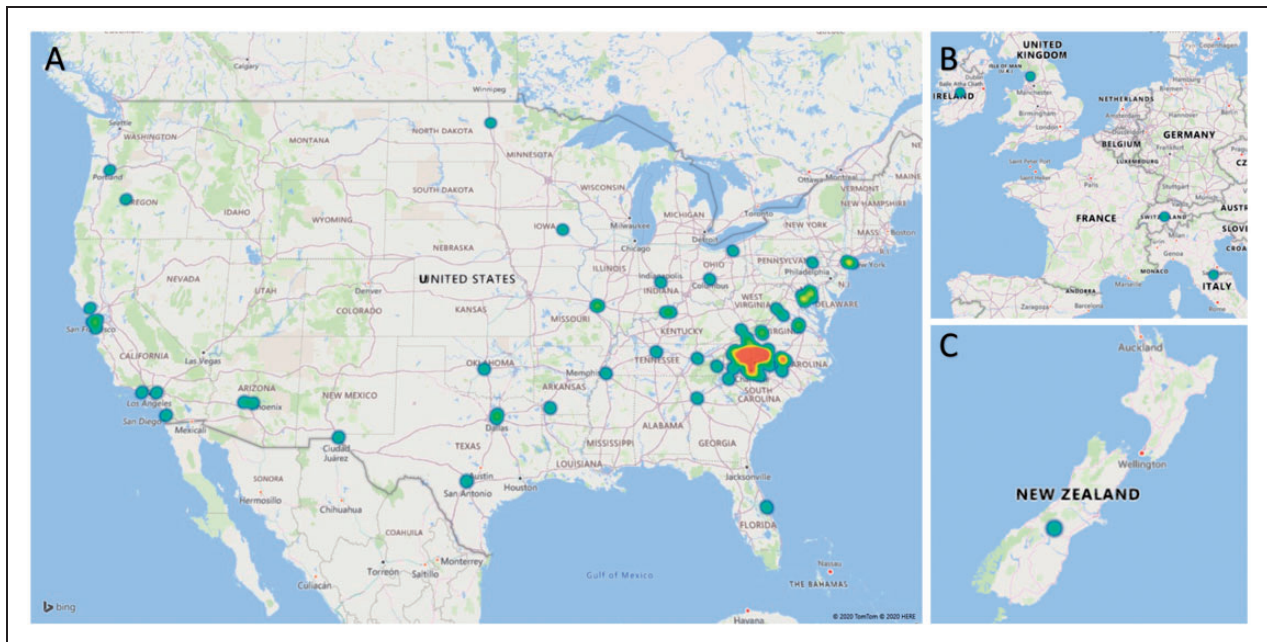


Figure 1. International Heat Maps of Participants.

Number of Surveys Completed

Least Most
Least Most

Heat Map represents the international geographic distribution of participants who were recruited for participation in this study ($n = 233$) from the United States and Canada (A); Europe (B); and New Zealand (C). The study was based out of North Carolina; high density in this area is reflective of high recruitment in this area.

surveys immediately after the session. Most participated within the first week (53%) or first month (83%) of recruitment. 94% watched the video; 6% only listened. Most participants were female (85%), employed full-time (45%) or retired (21%), with a bachelor's or graduate degree (70%), and an average age of 48.6 (SD=15.6). Participants were 84% white, 7% Asian, 5% Black, 2% American Indian or Alaska Native, and 2% other/unknown. Nearly half (45%) reported a history of migraine, with 5.17 (SD=8.7) average headaches/month; one-quarter (24%) were healthcare providers. Most (63%) had never practiced mindfulness.

Primary Outcomes

Most participants felt the session was helpful (89%, 95% CI: [82 to 93%]) and perceived the electronic platform effective for practicing mindfulness (89% [82 to 93%]).

Secondary Outcomes

After practicing mindfulness, participants had significantly decreased odds (e.g., reduction of at least 1 level in the 5 point Likert scale) of momentary anxiety, momentary stress, and momentary COVID-19 concern (p < 0.001 for each measure). Specifically, 76% (95% CI: [69 to 83%]) demonstrated decreased anxiety; 80% [72 to 86%], decreased stress; 55% [46 to 63%] decreased COVID-19 concern (Figure 2). Most participants felt the session was valuable (87% [80 to 92%]), met or exceeded expectations (94% [88 to 97%]), and were satisfied with

the experience (92% [86 to 95%]). Many participants: were interested in learning more about mindfulness (yes 65%, maybe 24%), would participate again (yes 69%, maybe 22%), and would recommend to friends/family (yes 74%, maybe 21%). Participants reported wanting additional sessions weekly (48%), daily (36%), or monthly (17%).

Exploratory Analyses

Patients with migraine and healthcare providers had similar improvements in stress, anxiety, and concern (no statistically significant difference identified between groups).

Qualitative Data

39% of participants who completed the post-surveys immediately (n = 144) or after a delay (n = 24) provided free-text responses of being helpful during the pandemic. Qualitative analysis revealed three meta-themes (Table 1): (1) *Promoting public health*; (2) *Acts of Service and Connection*; and (3) *Self Care*. Four themes emerged under *Promoting public health*, including (1) staying home; (2) social distancing; (3) washing hands; (4) disseminating information on COVID-19. Five themes emerged under *Acts of Service and Connection*: (1) helping those in need; (2) maintaining connections with others; (3) through prayer; (4) making masks; (5) sharing practices of mindfulness and yoga. Three themes emerged under *Self Care*: (1)

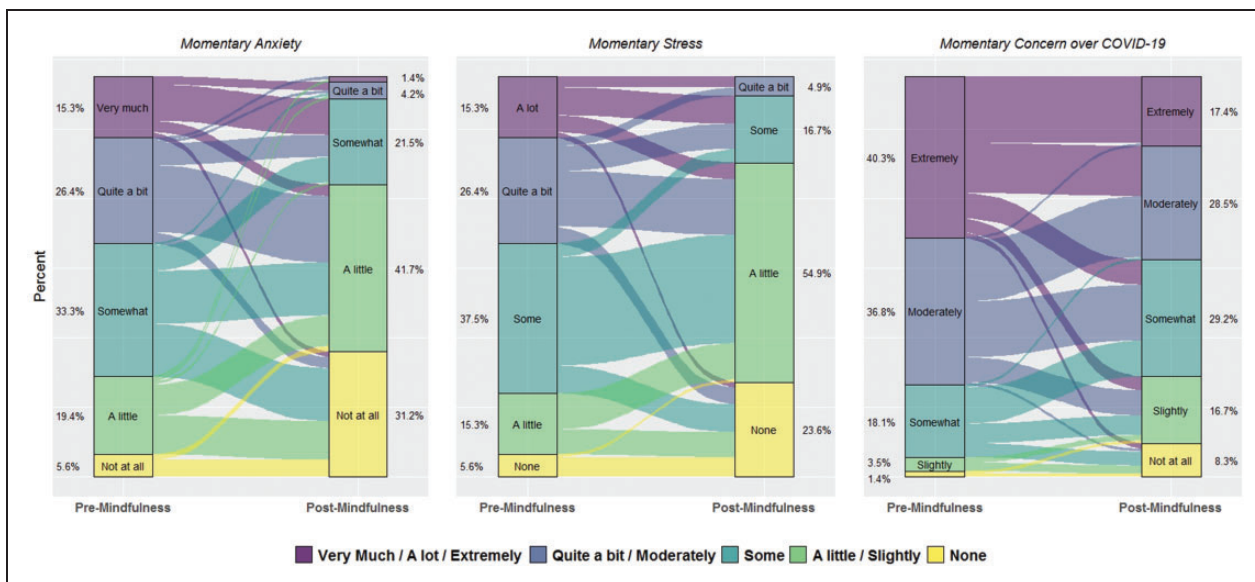


Figure 2. Momentary anxiety, stress, and concern over COVID-19 significantly decreased after a single mindfulness session (p < 0.001 for each measure), reflecting answers to these questions asked before and after the mindfulness session, respectively: At this moment, how anxious do you feel? At this moment, how much stress do you feel? At this moment, how concerned are you about the coronavirus pandemic? No participants had “A lot” of stress post-mindfulness.

Table 1. Acts of Compassion and Kindness During COVID-19.

Meta-Theme	Theme	Representative Quotations
PROMOTING PUBLIC HEALTH	Staying Home	<ul style="list-style-type: none"> • “I have been doing my part by staying home and not going out unless it’s absolutely necessary. I think that’s the best thing I can do right now so as to limit my interactions with others”
	Social Distancing	<ul style="list-style-type: none"> • “. . . Just to do my part. . . stay at home as much as I can” • “I am practicing social distancing in order to do my part and help!” • “We are social distancing which we believe is the best for our community”
	Washing Hands Disseminate Information on COVID-19	<ul style="list-style-type: none"> • “. . . Keep hands wash and sanitized” • “. . . Share posts on Facebook regarding proven methods for maintaining mental health in age of social distancing” • “Share my experience of being sick with COVID with others who may need to understand it better” • “. . . Reminding family remotely of the importance of staying home” ^a<u>Friends/Family</u>
ACTS OF SERVICE AND CONNECTION	Helping Those in Need	<ul style="list-style-type: none"> • “I’ve been helping family and friends who can’t or shouldn’t be getting out get groceries and supplies that they need” • “Well for me it’s getting my garden ready for planting my seedling to produce organic food to share with family and friends. . .” ^a<u>Neighbors</u> • “Yes, have offered to purchase groceries for neighbors” • “I am creating family seed packs for my neighbors and encouraging them to grow non-GMO, heirloom vegetables in their yards” ^a<u>Elderly</u> • “. . . I am helping walk my elderly neighbor’s dog with my room-mates” • “. . . Making sure elderly neighbors have everything they need” • “[We have] groups to go food shopping for the elderly” ^a<u>Vulnerable and Disabled</u> • “I have been helping people who can’t get out. . .” • “Taking care of my disabled son during this time” • “[I] help donate to my local shelter” ^a<u>Patients</u> • “I am caring for patients in the ER as a physician” ^a<u>Student and Teachers</u> • “. . . I am putting great time and energy into my lesson plans for my students, making them thorough enough for parents to execute and still enjoyable and engaging for students” • “Using our extra money from reduction in daycare tuition to pay the teachers directly. . .” • “. . . I video meet with teachers in rural areas of Nicaragua and Peru to help with brainstorming ideas and to listen to their concerns” ^b<u>Friends/Family</u>
	Maintaining Connections with Others	<ul style="list-style-type: none"> • “Listen to friends and family process their emotions. . .” • “Providing a knowledgeable and understanding listening ear for those who are anxious. Simply being available and remaining calm” • “. . . Checking in on friends and family via video calls” ^b<u>Those Living Alone</u> • “. . . What I am doing is contacting old friends, family, anyone I know is living alone in the hopes of connecting with them” • “Checking in on my single friends” ^b<u>Spiritual Community</u> • “I have stayed in touch with members of a Sunday school class I teach and have continued to do that electronically. My wife has stayed in close communication with neighbors” • “I send encouraging notes to church members and family”

(continued)

Table 1. Continued.

Meta-Theme	Theme	Representative Quotations
		^b Patients
	Prayer	<ul style="list-style-type: none"> • “I am calling and sending cards to former older patients and leaving flowers at their door” • “I am [praying] for our nation, its leaders and our healthcare providers. . .” • “I can pray and send positivity forward”
	Making Masks	<ul style="list-style-type: none"> • “I am helping make face masks for hospital and nursing home employees” • “I can make masks for family. . .” • “I craft a lot so I have been sewing masks for my team members during this time so they can be safe when they have to go out during this time”
	Sharing Practices of Mindfulness and Yoga	<ul style="list-style-type: none"> • “I would like to help my entire department with tools for mindfulness. There seems to be a lot of tension and stress. Shifts seem better when the people in charge are calm but also not dismissive. I wish more people in control and power would admit to needing/benefitting or open to this practice” • “Because I teach restorative yoga, this pandemic inspired me to put out a Yoga Nidra recording on the InsightTimer app. I plan to teach yoga classes and guided meditation through online platforms” • “. . . I’ve run some short yoga classes on zoom for my national migraine association during the pandemic. . .” • “I’d like to tell others about this mindfulness experience- just the relaxation, the moment of breathing really helped my anxiety so much which in turned helped my headache”
SELF-CARE	Minimizing Personal Exposure Risk	<ul style="list-style-type: none"> • “. . . I am staying in as I am in a high risk category, over 60 and have preexisting health conditions” • “I am immune compromised but have walked and waved at neighbors” • “I want to, but am immune compromised so walking only. I am hanging out stuffed animals in trees daily for the amusement of others walking by our home”
	Self-renewing Activities and Self-compassionate Attitudes	<ul style="list-style-type: none"> • “To take a few moments each day to learn not to worry so much about this pandemic. Going for short walk. To be outside even if it’s just sitting in the yard at home enjoying sounds of nature” • “Trying to be patient with myself knowing that I can only do so much”
	Staying Positive and Calm	<ul style="list-style-type: none"> • “Thinking positive thoughts” • “Keeping positive” • “. . . We generally try to convey a sense of calm and optimism that we will get through this”

^aGroups being helped by participants.

^bGroups being communicated with by participants.

minimizing personal exposure risk; (2) self-renewing activities and self-compassionate attitudes; (3) staying positive and calm.

Notably, there was a sense of commonality during this time of crisis among the responses, with many describing the importance of a positive attitude and self-compassion. Several participants recognized the public health service of staying home or social distancing to decrease exposure risk. Others felt the best way to help others was sharing COVID-19 facts

via social media or directly with friends/family. Participants described direct acts of service and acknowledged the value of maintaining social connections virtually or via phone. Interestingly, this data revealed participants reaching out specifically to vulnerable populations (elderly, disabled, and those living alone). Many participants also referenced reconnecting with neighbors. Even those limiting personal exposure found ways to help others, such as through humor.

Table 2. Online Mindfulness and MBSR Offerings Available From Members of the Academic Consortium of Integrative Medicine and Health.^a

Institution	State	Link	Description of Offerings	Mindfulness Classes and/ or MBSR ^b
University of Alberta	Alberta, CANADA	Tips For Relaxation and Mindfulness Exercises	Guided audio relaxation and mindfulness exercises files for patients with chronic pain	
Canadian Institute of Natural and Integrative Medicine	Alberta, CANADA	Breathing Room App	Evidence-based app called "Breathing Room" aimed at college-aged young adults to assist with anxiety and mild depression, uses mindfulness and other mind-body therapies	
McMaster University	Ontario, CANADA	Mindfulness in Modern Society Mindfulness & Relaxation Offerings	Mindfulness in Modern Society: 6-week online course, and links to other institutional offerings	
University of Arizona Andrew Weil Center for Integrative Medicine	AZ	Integrative Approaches to COVID-19	Links to various courses and links for meditation and wellness using mind-body techniques	
University of Arkansas for Medical Sciences	AR	Resources and Mindfulness Programs	Guided video meditations including mindfulness and yoga; online MBSR classes	✓
Cedars-Sinai	CA	Online MBSR Classes	PDF with brief instructions on incorporating mindfulness into daily life	
Sutter Health Institute for Health and Healing	CA	Yoga and Mindfulness for Cancer Survivors and Neurology Patients	Yoga and mindfulness classes for cancer survivors and neurology patients	✓
UC-Irvine Susan Samueli Integrative Health Institute	CA	Mindfulness Classes	Live online mindfulness and MBSR classes	✓
UCLA Health Integrative Medicine Collaborative	CA	Mindfulness for Clinicians 2021 Training in Mindfulness Facilitation	Both live online and pre-recorded online mindfulness classes, Mindfulness Facilitator Training Webinars, interviews, and COVID-specific guided meditations	✓
UC San Diego School of Medicine Center for Integrative Medicine	CA	COVID-19 Mindfulness Resources	Guided audio and video meditations, online mindfulness and MBSR courses, mindful poetry, 1-on-1 consultations to determine best fit for group mindfulness courses	✓
UCSF Osher Center for Integrative Medicine	CA	Public Meditation and Mindfulness Classes	Online classes in meditation and yoga	✓
Uconn Health Programs in Complementary and Integrative Medicine	CT	Mindfulness Meditation	Brief list of links to audio guided meditations	
Yale School of Medicine Yale Stress Center	CT	Mindfulness Courses	Audio guided meditations and live online MBSR	✓

(continued)

Table 2. Continued.

Institution	State	Link	Description of Offerings	Mindfulness Classes and/ or MBSR ^b
GW School of Medicine & Health Sciences Integrative Medicine Program	DC	Mindfulness Online	Weekly mindfulness sessions online with COVID-19 Q&A	✓
Georgetown University Program in Complementary & Alternative Medicine	DC	Resources on Meditation and Mindfulness	Links to public mindfulness resources via Georgetown HR department	
US Department of Veterans Affairs	DC	Mindfulness Resources	General information and guided audio meditations, videos, and podcasts	
University of Florida Health Integrative Medicine	FL	Meditation Exercises	Guided mindfulness videos	
University of Miami Health System - Osher Center for Integrative Medicine	FL	Mind Body Offerings Online	MBSR live online classes	✓
NorthShore Integrative Medicine Program	IL	Integrative Medicine Resources	Blogs, podcasts, and website links	
University of Kentucky Integrative Medicine & Health	KY	Wellness Videos for Stress Management, Including Mindfulness, Yoga, and Relaxation	Guided mindfulness and breathing exercise videos	
Johns Hopkins Medicine	MD	Integrative Medicine Resources	Resources and links to Integrative Medicine websites	
Boston Medical Center Integrative Medicine	MA	Patient Mindfulness Resources	Links to patient handouts and links to BMC and publicly available guided meditations	
Osher Center for Integrative Medicine at Harvard Medical School and Brigham and Women's Hospital	MA	Guided Meditation Videos Mindful Stress Management for COVID Mindfulness, Yoga, and Integrative Medicine Resources for Coping with COVID-19 Mind Body Classes Mind Body Classes Center For Mindfulness	Videos, audio guided exercises, links to additional resources, and mind body class offerings	✓
University of Massachusetts	MA	Center For Mindfulness	Weekly online meditation sessions, live online MBSR and MBCT classes, and mindfulness blog	✓
Beaumont Center For Mindfulness	MI	Center For Mindfulness	Links to online audio guided meditation recordings	
University of Minnesota	MIN	What Is Mindfulness? Mindfulness Programs	Mindfulness information, interviews, guided meditations, mindfulness community classes and MBSR courses	✓
University of Nevada	NV	Calendar with Mindfulness Meditation Online	Online mindful meditation sessions for faculty and staff	✓
Hackensack Meridian Health	NJ	Mindfulness Activities	Breathing videos and interviews	

(continued)

Table 2. Continued.

Institution	State	Link	Description of Offerings	Mindfulness Classes and/ or MBSR ^b
Albert Einstein College of Medicine	NY	Guided Audio and Video Meditations and Yoga Calm for Self Care and Stress Reduction	Video and audio mindfulness and yoga sessions for students	
Icahn School of Medicine at Mount Sinai	NY	Mind-Body Workshops	Virtual classes, resources, and dial-in meditation exercises	✓
Memorial Sloan Kettering Cancer Center	NY	Guided Meditation and Relaxation	Online workshops for meditation, tai chi, yoga, and barre	✓
NYU Langone Health	NY	"Mindfulness on Call" Mindfulness and Stress Management"	Guided meditation sessions, online relaxation videos/ recordings, resources, and relaxation hotline for recorded exercises	
Weill Cornell Medicine	NY	Integrative Medicine Programs and Training	Video and audio guided mindfulness meditation exercises	
Duke University Integrative Medicine	NC	Mindfulness Programs	Resources, online mindfulness, yoga, and MBSR classes, training for medical professionals	✓
UNC Integrative Medicine	NC	Mindful Wake Class Schedule	Online mindfulness courses and webinars	✓
Wake Forest University Office of the Chaplain	NC	Koru Mindfulness	Online weekly drop-in meditation groups	✓
Case Western Reserve University	OH	Mindfulness for Effective Leadership Remote Sessions	Mindfulness courses and remote session recordings	✓
Cleveland Clinic Integrative & Lifestyle Medicine	OH	Online Wellness Calendar	Online wellness and self-care lectures and classes	✓
Ohio State Integrative Medicine	OH	Integrative Medicine Resources	Resources, links, online mind body classes, audio and video guided mindfulness and breathing exercises	✓
University Hospitals	OH	Resources for Mindfulness	Resources (suggested books, websites, apps, podcasts, and audio guided meditation)	
University of Cincinnati College of Medicine	OH	Mindfulness Resources	Mindfulness and MBSR classes, audio guided recordings	✓
OHSU	OR	Mindfulness Offerings	MBSR and mindfulness classes, video and audio recordings, weekly drop-in workshops	✓
University of Pennsylvania	PA	Wellness Resources	Online mindfulness resources, exercises, and recordings	
Marcus Institute of Integrative Health at Thomas Jefferson University	PA	Mindfulness Programs and Resources	Online mindfulness and MBSR classes, professional training, audio and video mindfulness guided practices	✓
University of Pittsburgh Medical Center	PA	Stress Management	Mindfulness, breathing, and meditation exercises and information	
Osher Center for Integrative Medicine at Vanderbilt	TN	Integrative Medicine Resources	Online Mind Body and MBSR classes and resources	✓
Texas Tech University	TX	Mental Health Resources	Online resources listed (apps, links, videos, etc.)	
University of Texas Medical Branch	TX	Mindfulness Apps and Downloads	List of mindfulness apps and online audio guided meditations	

(continued)

Table 2. Continued.

Institution	State	Link	Description of Offerings	Mindfulness Classes and/or MBSR ^b
University of Utah	UT	Mindfulness Resources	Guided audio meditations, resources, and mindfulness classes	✓
University of Vermont	VT	Integrative Health Offerings and Resources	Online guided audio meditation	✓
INOVA	VA	Practice Mindfulness and Relaxation	Written guided techniques and guided relaxation video exercises	✓
Mindfulness Northwest	WA	Mindfulness Training, Classes, and Professional Development	Mindfulness and MBSR classes, professional development, audio guided meditations and readings, and resources	✓
University of Washington	WA	Mindfulness Exercises	Videos and links to audio guided meditation exercises	✓
Aurora Health Care	WI	Weekly Resilience Courses	Weekly online courses in Resilience – Feldenkrais Awareness Through Movement	✓
University of Wisconsin-Madison Integrative Health Program	WI	Patient Resources Mindfulness Courses	Links to sites, book recommendations and audio resources for patients, and courses for adults and youth	✓

MBSR: Mindfulness-based Stress Reduction (standardized curriculum with 8 weekly classes).

^aFull listing of all members of the Academic Consortium for Integrative Medicine and Health available at: <https://imconsortium.org/members/member-listing/>

^bOnline mindfulness offerings and links provided as available at time of searches (Fall 2020); some may change or additional resources become available.

Resource Review

“Mindfulness + COVID” Google search yielded 63,500,000 results on May 19, 2020 and 96,400,000 results on August 23, 2020, representing a 52% increase. Most (55 of 75, 73%) ACIMH member websites across 26 US states and 3 Canadian locations offer extensive online mindfulness resources, guided recordings, and links, with 31 programs offering instructor-led online mindfulness classes or MBSR courses (Table 2). A consolidated list of excellent online mindfulness resources to directly help patients and providers during COVID-19 is provided (Table 3).

Discussion

Our study demonstrates that a single online mindfulness session is helpful and provides immediate decreases in momentary stress, anxiety, and COVID-related concern, with similar effects seen in migraine patients, healthcare workers, and the general public. The online platform provided breadth and flexibility for recruitment and access, and participants found it effective for practicing mindfulness. Most participants in our study were mindfulness-naïve, demonstrating increased interest in mindfulness and the value of online access. Participants endorsed multiple, multimodal efforts to help others during the pandemic through adherence to public health recommendations, direct service to others, and self-care.

Throughout the height of stay-at-home orders, online mindfulness resource availability dramatically increased. Both the Google and ACIMH member website searches demonstrated the broad variety and depth of online mindfulness offerings and resources across the United States. Many programs have converted previously in-person mindfulness and/or MBSR classes to online options. Mindfulness apps, web-based programs, and mindfulness instructors expanded offerings or eliminated fees to mitigate the pandemic’s negative psychological effects. For example, Jon Kabat-Zinn (the founder of MBSR) live-streamed meditation sessions with dialogue and inquiry with international participation weekdays from March 30th to June 26th, 2020; these 65 videos are still available to the public on the Wisdom 2.0 YouTube channel.

Online mindfulness interventions may improve psychological health at a time of uncertainty, chaos, and distress. These interventions offer momentary improvements in state function (e.g., reducing pandemic-induced elevations in state anxiety²¹) while potentially creating new frameworks for processing stress,¹³ enhancing resilience,²² and increasing self-compassion and concern for others.²³ Mindfulness may increase happiness and well-being in healthcare workers by cultivating self-

Table 3. Selected Online Mindfulness Resources for COVID-19.^{a,b}

Institution or Entity	Link	Description of Offerings	Online MBSR
Academic Consortium for Integrative Medicine and Health	Well-Being Resources	<ul style="list-style-type: none"> • Online guided meditations • Articles & Educational Tools for Professional Well-being during COVID-19 	
Massachusetts Medical Society	Mindfulness Resources for Providers during COVID-19	<ul style="list-style-type: none"> • Mindfulness Apps • Guided audio and video meditations for providers during COVID-19 (e.g., gratitude, compassion, appreciation, lovingkindness, hand-washing, etc). 	
UCLA Health Integrative Medicine Collaborative	COVID-19 Mindfulness Resources Mindfulness Classes 2021 Training in Mindfulness Facilitation	<ul style="list-style-type: none"> • Webinars, interviews, and COVID-specific guided meditations • Introduction to mindfulness classes • Mindfulness Facilitator Training 	✓
Palouse Mindfulness (Moscow, ID, USA)	COVID-19 Mindfulness Resources	<ul style="list-style-type: none"> • List of live and recorded mindfulness sessions • Links to other mindfulness resources 	✓
Massachusetts General Hospital Department of Psychiatry (Boston, MA, USA)	Mindfulness & Other Tools	<ul style="list-style-type: none"> • List of resources for mental health, healthy habits, mindfulness, positive emotions, yoga & movement • COVID specific resource links (e.g., the Awake Network, Ten Percent Happier, etc.) 	
Centre for Mindfulness Studies (Toronto, ON, CA)	COVID-19 Pandemic: Mental Health Toolkit for Challenging Times	<ul style="list-style-type: none"> • Articles and Support Tools from faculty • Live and recorded mindfulness sessions 	✓
Free Mindfulness Project (UK)	Free Mindfulness Resources as a Response to COVID-19	<ul style="list-style-type: none"> • Links to free online mindfulness resources from various sources in the US and UK 	
University of Wisconsin Center for Healthy Minds (Madison, WI, USA)	Access our COVID-19 Well-Being Toolkit and Resources	<ul style="list-style-type: none"> • Live and recorded guided mindfulness sessions • Available in English & Spanish • Articles, interviews and tips from Healthy Minds faculty 	
Mind and Life Institute (Charlottesville, VA)	COVID-19 Resources for Resilience and Connection	<ul style="list-style-type: none"> • Podcasts on the science of mindfulness • Links to live and recorded meditations 	
University of Arizona Andrew Weil Center for Integrative Medicine	<u>Integrative Approaches to COVID-19</u>	<ul style="list-style-type: none"> • Links to various courses, meditations and wellness offerings with mind-body techniques 	

^aMany websites include summary lists with additional links to additional websites that also include excellent information; the ones presented were chosen based on source reputation, content quality, quantity, and format.

^bOnline mindfulness offerings and links provided as available at time of searches (Fall 2020); some may change or additional resources become available.

compassion²⁴ and reducing burnout, which can improve the quality and safety of healthcare delivery in a time of increased burden on healthcare systems.¹⁴

The magnitude and effects of pandemic-induced stress may be different across groups or roles. For example, parents, teachers, and healthcare workers have been

required to exert new levels of flexibility. A history of depressive symptoms may increase the risk for mental distress during the pandemic,⁷ and those at greatest risk of COVID-related morbidity may be more isolated and/or fearful.⁷ Those with stress-susceptible medical conditions may have disease exacerbations in response

to COVID-related stress, seen with the increased frequency of migraine during the pandemic by some,⁹ but not all.²⁵ Interventions that target psychological distress may thus provide differential responses based on need.

Since this program was created as an act of service, participants were asked to share their ideas and acts of service. A sense of unity in the universal experiences of COVID-19 emerged. The pandemic seemed to create an enhanced sense of needing to help others, especially those in greatest need. Neighborly affection was represented, suggesting that stay-at-home orders may have provided an opportunity to reconnect with those in close home proximity who are often overlooked in the frenzied pace of typical life. Due to social distancing measures, people are actively and meaningfully finding ways to engage with those of importance. Participants described providing a “listening ear” and sending letters, modalities often forgotten in our technologically-savvy and text-friendly world. Several participants specifically commented on generating new ideas for serving others during the mindfulness session itself. The act of practicing mindfulness, therefore, may increase the innate desire to help through loving-kindness, which cultivates both self-compassion and concern for others’ suffering.²³ While the pandemic has created great sadness, loss, and distress, our results demonstrate the potential positives emerging from such a devastating experience. Further research is needed to evaluate the pandemic’s effects on post-traumatic growth (the positive psychological change experienced following a challenging life circumstance).^{26,27}

The international inspiration for this study demonstrates 1) how one person’s act of service can inspire others; 2) the value of communication during a crisis; 3) the beauty of international collegiality and friendship; and that 4) mindfulness is a cross-cultural approach with international interest and availability. Servant leadership is a powerful way to inspire others to serve.²⁸ The participants’ acts of service described in this study may also serve as a source for future inspiration for others as well.

Important strengths of this study include the timing of this study, initiated at the height of early pandemic response, and capturing the impact of a mindfulness session at a time of great anxiety and distress. The exclusively online format allowed for international recruitment, delivery, and participation, increasing access and availability. This study uniquely examined the effects of an online mindfulness intervention in the context of pandemic lockdown. Capturing participants’ altruism highlights the positivity of humankind. The online mindfulness tables may provide unique tools to guide those who are interested in mindfulness but feel overwhelmed by the volume of available resources (Tables 2 and 3).

This study has several important limitations. Using a single, participant-specific REDCap link to embed the mindfulness session between pre- and post-surveys resulted in several challenges for immediate post-survey completion (e.g., technological difficulties, continued meditation practice, distractions), creating potential post-survey response bias. Surveys assessed state anxiety and stress and did not evaluate clinical depression and anxiety. Observed improvements may only reflect results for meditation-naïve participants and/or those with interest in mindfulness meditation. The dramatic impact on psychological distress may be attributed to the timing of the study, as 83% participated within a month of study onset at the potential height of pandemic-induced stress. Further investigation is needed to understand the reasons behind lack of participant diversity: recruitment methods vs. lack of interest or access. While online programs improve accessibility, lack of internet or low technological proficiency may create disparities for some populations. Interestingly, 21% of participants were retired, suggesting that age did not preclude online accessibility, which may reflect forced technology use on all ages by the pandemic. Study side effects were not assessed, though harm is infrequent with guided mindfulness interventions.²⁹ The themes that emerged for ways of helping others may be specific to those practicing mindfulness (e.g., sharing mindfulness with others) and the recruitment strategies utilized (e.g., spiritual communities). Though participants reported helping behaviors during COVID-19, mindfulness’ effects on the desire to help others were not assessed. While “COVID-19 concern” was assessed in an attempt to examine potentially damaging anxiety associated with COVID, a certain amount of concern may be important and needed to prompt appropriate and responsible pandemic responses, such as mask-wearing. Table 2 highlights mindfulness resources from the ACIMH member websites; additional non-ACIMH mindfulness programs, websites, and resources exist. Both Tables 2 and 3 were created to serve as resources for patients and providers but changes, updates, and/or additional resources may become available since the time of the original online searches (Fall 2020).

This study included one brief mindfulness session. Future research should assess the longitudinal impact of regular online guided mindfulness practice. Future studies would be strengthened with longer study time and more than one session. As loneliness is an important component of pandemic-induced psychological harm,³⁰ studies that assess the impact of online mindfulness interventions on feelings of loneliness and isolation may help improve targeted approaches to pandemic-related distress. Comparisons between guided vs. self-led mindfulness could help guide recommendations.

In summary, our study suggests that online mindfulness interventions are feasible, increasingly available, and serve a novel and crucial function in the setting of social distancing to improve pandemic-related psychological effects. Participants world-wide are demonstrating altruistic behaviors with acts of compassion and kindness during the pandemic, finding meaningful ways to connect with others in ways rarely done in the pre-pandemic world. The opportunity to help others during the pandemic highlights the unique capacity of the human spirit to find positivity amidst devastatingly negative circumstances.

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Supplemental Material

Supplemental material for this article is available online.

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