

Effect of Aromatherapy on Perceived Mental Health Parameters for Academic Department Workers Working From Home During the COVID-19 Pandemic: A Pilot Study

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Abstract

Background: Before the COVID-19 pandemic began, medical staff and academic department workers reported increasing levels of stress and burnout because of strain on the health care system. The COVID-19 pandemic exacerbated this strain and introduced several novel stressors, which included transitioning to remote work. Safe and scalable strategies are needed to help health care workers cope with these stressors. Aromatherapy may help address this need.

Objectives: To assess the effect of 2 aromatherapy interventions (essential oil blends termed STILL and FOCUS) on perceived mental/psychological health parameters for academic department workers working from home during the COVID-19 pandemic.

Methods: Participants were advised to use STILL for 5 days (Monday through Friday). After a 2-day washout period (Saturday and Sunday), participants were instructed to use FOCUS for 5 days (Monday through Friday). Participants completed a visual analog scale survey evaluating restlessness, fatigue, anxiety, stress, happiness, energy, relaxation, calmness, and well-being before and after each of the 2 intervention periods.

Results: Twenty academic department remote workers participated in the study. Mental/psychological health surveys were completed by 6 participants before and after using STILL and by 10 before and after using FOCUS. Five participants answered all survey questions before and after both interventions. Although mean (SD) perceived stress scores improved after both the STILL (4.3 [2.3] vs 1.8 [1.7], $P = .03$) and FOCUS (2.9 [2.3] vs 1.5 [1.4], $P = .02$) interventions, this improvement was not statistically significant after Bonferroni correction (adjusted $\alpha = .006$). Most participants (73.3%) reported that participating in the study was worthwhile, and 81.3% indicated that they would recommend aromatherapy to others.

Conclusions: The STILL and FOCUS aromatherapy interventions did not significantly improve mental/psychological health parameters for remote academic department workers, although perceived stress was marginally improved and participants reported a perceived benefit from using aromatherapy.

Keywords

allied health personnel, anxiety, aromatherapy, COVID-19, occupational stress, professional burnout

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Introduction

As the COVID-19 pandemic has progressed, medical staff and affiliated health care workers have encountered many physical and psychological stressors.^{1,2} Although much attention has been paid to frontline health care workers with a high risk of exposure to COVID-19, academic department workers who do not work in clinical areas have also been considerably affected by the overall strain on the health care system.^{1,2} Medical secretaries, health care administrators, and medical staffing assignment coordinators had to quickly shift from working in the office to working from home. Previously published findings by Evanoff et al¹ suggest that the pandemic has had negative effects on the mental health and well-being of both clinical and nonclinical employees. Therefore, elucidating ways to address the ongoing challenges of working from home related to productivity, work-life balance, and overall well-being is important. Offering wellness activities and other types of assistance with health challenges that employees may be facing also may be beneficial.^{3,4}

In this postpandemic era of short staffing, limited resources, and an ever-increasing rate of exhaustion, stress, anxiety, and burnout reported by health care professionals, providing workers with easy-to-use self-care practices is imperative.⁵ Aromatherapy is a type of complementary and integrative medicine that uses isolated volatile oils from plants that emit pleasant aromas and are inhaled. This treatment has been reported to be beneficial for the management of many different symptoms, such as pain, nausea, vomiting, anxiety, depression, stress, insomnia, and end-of-life symptoms.⁶⁻¹³ Aromatherapy is a personal, easy-to-use, low-cost, and effective complementary approach to promote relaxation, grounding, and calm, while concomitantly reducing stress.¹⁴ When essential oils are inhaled, they affect the limbic system, by promoting relaxation and a sense of well-being.¹⁵ Huang and Capdevila¹⁶ reported that using aromatherapy in the workplace improved quality of life and work performance for university administrative staff. In a systematic review of 16 randomized controlled clinical trials examining the anxiolytic effects of aromatherapy, an overall positive effect was reported for patients with anxiety.¹⁷ However, the quality of the design of the reviewed studies (i.e., small sample sizes, uneven distribution of participant sex, and differences in treatment duration) precluded a definitive conclusion. Another systematic review concluded that evidence did not sufficiently support the hypothesis that aromatherapy is effective for reducing stress levels in healthy adults.¹⁸

The goal of our pilot study was to evaluate whether aromatherapy has a positive effect on various perceived

mental/psychological health parameters (restlessness, fatigue, anxiety, stress, happiness, energy, relaxation, calmness, and well-being) for medical personnel working from home during the COVID-19 pandemic. We conducted this initial pilot study to ascertain the difficulties that we may encounter when performing a larger research study in a virtual setting and to collect information that we will use to design a larger future study in a similar setting.

Methods

This study was approved by the Mayo Clinic Institutional Review Board. Participants were sent an informed consent statement via email. By replying to the email, participants provided informed consent to participate in the study. All relevant data supporting the findings of this study are reported within the article.

Study Design

Mayo Clinic support staff (medical secretaries, administrative assistants, and medical staffing assignment coordinators) in the Division of General Internal Medicine who were working from home were invited to participate in the study via an email sent on May 10, 2021. A reminder email was sent on May 21, 2021. When the participant responded to the email invitation, a demographic survey, which included the participant's mailing address, was sent via our Research Electronic Data Capture (REDCap) tool. Aromatherapy interventions were then mailed to the participant via US mail to this address. The aromatherapy interventions consisted of 2 different essential oil blends: STILL, which contains a blend of sweet orange, ylang, lavender, and bergamot; and FOCUS, which contains a blend of rosemary, clary sage, cinnamon, eucalyptus, and peppermint. Both commercially available interventions were formulated as an inhaler and were donated from Soothing Scents, Inc ([Supplemental Figure](#)).

Participants were advised to use the STILL blend for 5 days (Monday through Friday). After a 2-day washout period (Saturday and Sunday), participants were instructed to use FOCUS for 5 days (Monday through Friday). To self-administer the aromatherapy interventions, participants were directed (per manufacturer instructions) to open the inhaler by twisting the cap and wave it under the nose while inhaling and exhaling. Participants were instructed to self-administer the aromatherapy intervention for 1 to 2 minutes as often as they desired but at least 2 times per day.

Measurements and Outcomes

Surveys were administered via REDCap before and after each of the 2 intervention periods. The surveys collected demographic data, and a visual analog scale was used to quantify the following 9 parameters of perceived mental/psychological health: restlessness, fatigue, anxiety, stress, happiness, energy, relaxation, calmness, and well-being. Restlessness, fatigue, anxiety, and stress were measured on a scale from zero through 10, with zero being the best (i.e., low to none) and 10 the worst (i.e., high). Happiness, energy, relaxation, calmness, and well-being were measured on a scale from 1 through 10, with 1 being the best (i.e., high) and 10 being the worst (i.e., low to none). Participants also completed a survey at the end of the study period to determine whether they thought participating in the study or using aromatherapy was worthwhile and to provide feedback about their experience. All survey data were collected with and stored in REDCap. The primary outcome measured in this pilot study was change in perceived mental/psychological health parameters.

Statistical Analyses

Demographic data for all participants were summarized as median (range) for continuous variables and as frequency (%) for categorical variables. Mean (SD) scores for each of the 9 mental/psychological health parameters were recorded before and after each intervention for those who completed surveys both before and after at least one of the interventions (STILL, $n = 6$; FOCUS, $n = 10$). We analyzed the data for these participants and performed a subgroup analysis for the 5 participants who completed all questions in all surveys. Scores before and after each intervention were compared with a Wilcoxon signed rank test. The preintervention-to-postintervention change in scores was summarized as median (range). For our analysis of all participants who completed surveys both before and after at least one intervention, scores for all survey components were compared between the STILL and FOCUS interventions with a Kruskal-Wallis test. For our analysis of the participants who completed all questions in all surveys, a paired comparison between interventions was performed with a Wilcoxon signed rank test. To account for multiple comparisons, a Bonferroni correction was applied to all findings. With a Bonferroni-adjusted α of .006, differences with $P < .006$ were considered statistically significant. Statistical analyses were performed with SAS software, v9.4 (SAS Institute Inc).

Results

Participant Demographics

A total of 41 academic department remote workers were sent email invitations to participate in the study. After the reminder email was sent, 20 employees agreed to participate and were

enrolled in the study. One participant did not answer the demographic questions in the survey and was therefore excluded from analysis. Participant demographics are summarized in the [Supplemental Table](#). All participants were women, and the majority (63%) were medical secretaries. The median (range) age was 52 (22-62) years. Four participants (21%) reported that they had some experience with aromatherapy.

Survey Completion and Aromatherapy Use

For the STILL intervention, 13 participants completed surveys both before and after the intervention, but only 6 completed all visual analog scale survey questions about perceived mental/psychological health ([Table 1](#)). For the FOCUS intervention, 17 participants completed surveys before and after the intervention, and 10 completed all survey questions about their perceived mental/psychological health. The average frequency of aromatherapy use per participant was 11.8 times during the 5 days of the STILL intervention and 11.0 times during the 5 days of the FOCUS intervention.

Perceived Mental Health Survey Scores

STILL. None of the 9 measured outcome parameters of perceived mental/psychological health (stress, restlessness, fatigue, anxiety, happiness, energy, relaxation, calmness, and well-being) significantly changed after the STILL intervention (all $P > .006$). Of these measures, mean (SD) perceived stress scores had the greatest improvement after the STILL intervention (4.3 [2.3] before vs 1.8 [1.7] after, $P = .03$) ([Table 1](#)), although this improvement was not considered statistically significant after Bonferroni correction.

FOCUS. None of the 9 measured outcome parameters of perceived mental/psychological health significantly changed after the FOCUS intervention (all $P > .006$). Similar to the STILL intervention, the greatest improvement was for mean (SD) perceived stress scores (2.9 [2.3] before vs 1.5 [1.4] after, $P = .02$) ([Table 1](#)), although this improvement was not considered statistically significant after Bonferroni correction.

STILL vs FOCUS. We next determined whether the preintervention-to-postintervention change in scores differed between the FOCUS and STILL interventions ([Table 2](#)). Although the median (range) change in stress score was greater for the STILL intervention ($-3.0 [-3.0$ to $1.0]$) than for the FOCUS intervention ($-1.5 [-4.0$ to $4.0]$), this difference was not statistically significant ($P = .06$).

Subanalysis of Participants Who Completed All Survey Questions

When we performed a subanalysis of only the participants who completed all questions in all surveys ($n = 5$), we

Table 1. Mean (SD) Preintervention and Postintervention Mental/Psychological Health Parameter Scores for All Participants.

Parameter	STILL Intervention (n = 13) ^a			FOCUS Intervention (n = 17) ^a		
	Preintervention (n = 6)	Postintervention (n = 6)	P ^b	Preintervention (n = 10)	Postintervention (n = 10)	P ^b
Restlessness	3.0 (2.8)	1.8 (1.8)	.50	2.5 (2.0)	1.9 (2.0)	.53
Fatigue	4.3 (2.1)	3.5 (1.8)	.53	3.3 (2.3)	2.5 (1.7)	.31
Anxiety	2.5 (3.3)	1.8 (1.7)	.50	2.4 (2.1)	1.4 (1.3)	.05
Stress	4.3 (2.3)	1.8 (1.7)	.03	2.9 (2.3)	1.5 (1.4)	.02
Happiness	4.3 (1.6)	3.3 (1.8)	.25	3.1 (1.7)	3.4 (2.4)	.81
Energy	4.8 (1.8)	3.8 (1.2)	.50	3.5 (1.7)	3.4 (1.7)	>.99
Relaxation	5.0 (1.1)	3.2 (0.8)	.06	3.6 (1.8)	3.0 (2.0)	.22
Calmness	4.5 (1.5)	3.3 (1.0)	.38	3.6 (1.7)	3.0 (2.0)	.25
Well-being	3.8 (2.0)	3.0 (1.3)	.53	3.1 (1.5)	3.3 (2.1)	.53

^aOf the 30 total surveys completed before and after the interventions, 16 had responses for all 9 mental/psychological health parameter questions (10 for FOCUS and 6 for STILL).

^bP values determined with Wilcoxon signed rank tests; Bonferroni-adjusted $\alpha = .006$.

Table 2. Change in Mental/Psychological Health Parameter Scores After Aromatherapy Interventions.^a

Parameter	STILL Intervention (n = 6) ^b	FOCUS Intervention (n = 10) ^b	P ^c
Restlessness	0.0 (−5.0 to 1.0)	0.0 (−5.0 to 3.0)	.86
Fatigue	−1.5 (−3.0 to 3.0)	−0.5 (−4.0 to 3.0)	.87
Anxiety	0.0 (−3.0 to 1.0)	−1.0 (−3.0 to 1.0)	.51
Stress	−3.0 (−3.0 to −1.0)	−1.5 (−4.0 to 0.0)	.06
Happiness	−0.5 (−4.0 to 0.0)	0.0 (−1.0 to 4.0)	.22
Energy	−0.5 (−4.0 to 1.0)	0.0 (−2.0 to 2.0)	.54
Relaxation	−1.5 (−4.0 to 0.0)	−1.0 (−2.0 to 2.0)	.13
Calmness	−0.5 (−4.0 to 1.0)	−0.5 (−2.0 to 2.0)	.74
Well-being	−1.0 (−4.0 to 1.0)	0.0 (−1.0 to 2.0)	.24

^aMedian (range) difference in scores calculated by subtracting preintervention survey scores from postintervention survey scores.

^bOf the 30 total surveys completed before and after the interventions, 16 had responses for all 9 mental/psychological health parameter questions (10 for FOCUS and 6 for STILL).

^cP values determined with Kruskal-Wallis tests; Bonferroni-adjusted $\alpha = .006$.

observed no significant differences in perceived mental/psychological health parameter scores before and after either the STILL or FOCUS intervention (all $P > .006$) (Table 3). Likewise, the preintervention-to-postintervention change in scores did not differ between the STILL and FOCUS interventions for this subgroup (all $P > .006$) (Table 4).

Participant Evaluation of Aromatherapy

A total of 16 participants completed the final *Was It Worth It* survey (Table 5). Most participants (73%) reported that participating in this research study was worthwhile. Although most participants (88%) indicated that their quality of life stayed the same after completing the study, the same percentage of participants also indicated that they would participate in the study again, and 81% reported that they would recommend using aromatherapy to others.

Discussion

The results of this pilot study showed a marginal benefit of aromatherapy for perceived stress levels for academic department workers who experienced a sudden unexpected change from an office work environment to a home office setting early during the COVID-19 pandemic. However, none of the 9 measured mental health parameters (restlessness, fatigue, anxiety, stress, happiness, energy, relaxation, calmness, and well-being) had statistically significant improvements after either aromatherapy intervention. Nevertheless, significant improvement of perceived stress levels was previously reported by nurses using aromatherapy (inhalation of 3% marjoram essential oil) while caring for patients with COVID-19 in the intensive care unit.¹⁹ In a systematic review of 76 studies and a total of 6539 patients in a *clinical setting* from 2000 through 2021, more than 70% of the studies reported a positive effect on perceived stress/anxiety levels for aromatherapy intervention groups. Salivary cortisol level was measured in 5 of the studies, of which 4 reported a reduction in cortisol levels and 1 reported

Table 3. Mean (SD) Preintervention and Postintervention Mental/Psychological Health Parameter Scores for Participants Who Completed All Questions in All Surveys.

Parameter	STILL Intervention (n = 5)			FOCUS Intervention (n = 5)		
	Preintervention	Postintervention	P ^a	Preintervention	Postintervention	P ^a
Restlessness	3.6 (2.7)	2.2 (1.8)	.50	2.6 (2.0)	1.8 (1.5)	.50
Fatigue	4.4 (2.3)	4.0 (1.4)	.88	4.2 (2.2)	2.4 (1.1)	.13
Anxiety	3.0 (3.5)	2.0 (1.9)	.50	3.0 (2.5)	1.6 (1.5)	.13
Stress	4.4 (2.5)	2.0 (1.9)	.06	3.4 (3.1)	2.0 (1.4)	.25
Happiness	3.0 (1.7)	4.8 (2.1)	.25	3.2 (1.6)	3.8 (0.8)	>.99
Energy	4.8 (2.1)	3.6 (1.1)	.50	3.8 (0.8)	3.4 (1.1)	.75
Relaxation	5.0 (1.2)	3.0 (0.7)	.13	3.0 (0.7)	2.8 (1.6)	>.99
Calmness	4.4 (1.7)	3.2 (1.1)	.50	3.2 (0.5)	2.8 (1.6)	.75
Well-being	3.6 (2.2)	2.8 (1.3)	.75	3.0 (1.2)	3.0 (1.9)	>.99

^aP values determined with Wilcoxon signed rank tests; Bonferroni-adjusted $\alpha = .006$.

Table 4. Change in Mental/Psychological Health Parameter Scores After Aromatherapy Interventions for Participants Who Completed All Questions in All Surveys.^a

Parameter	STILL Intervention (n = 5)	FOCUS Intervention (n = 5)	P ^b
Restlessness	0.0 (−5.0 to 1.0)	0.0 (−3.0 to 0.0)	>.99
Fatigue	−1.0 (−3.0 to 3.0)	−2.0 (−4.0 to 0.0)	.25
Anxiety	0.0 (−3.0 to 1.0)	−1.0 (−3.0 to 0.0)	.75
Stress	−3.0 (−3.0 to −1.0)	−1.0 (−4.0 to 0.0)	.25
Happiness	−1.0 (−4.0 to 0.0)	0.0 (−1.0 to 2.0)	.50
Energy	−1.0 (−4.0 to 1.0)	−1.0 (−2.0 to 2.0)	.94
Relaxation	−2.0 (−4.0 to 0.0)	−1.0 (−1.0 to 2.0)	.25
Calmness	0.0 (−4.0 to 1.0)	−1.0 (−2.0 to 2.0)	>.99
Well-being	−1.0 (−4.0 to 1.0)	0.0 (−1.0 to 2.0)	>.99

^aMedian (range) difference in scores calculated by subtracting preintervention survey scores from postintervention survey scores.

^bP values determined with Wilcoxon signed rank tests; Bonferroni-adjusted $\alpha = .006$.

no significant change. The authors of the systematic review concluded that the development of standard protocols for research in this area is clearly needed.²⁰

Another systematic review of aromatherapy for perceived stress reduction in healthy adults, including 5 randomized clinical trials, also concluded that evidence supporting the efficacy of aroma inhalation for perceived stress is limited and that additional studies are needed.¹⁸ Four of the 5 randomized clinical trials compared the effect of aroma inhalation on perceived stress with that of a no treatment control group and reported a favorable effect of aroma inhalation on perceived stress management. In 3 of the trials, the effect of aroma inhalation on saliva or serum cortisol levels was also measured but did not significantly differ between the treatment and control groups.

Unexpectedly, the baseline perceived mental/psychological health of our participants was high, with a mean score of approximately 3 for all 9 parameters together. This may reflect positive effects of supportive programs that were initiated by institutional leadership during the pandemic. The high baseline perceived mental/psychological health of

our participants may have limited our ability to detect significant changes in the parameters other than perceived stress.

Several factors should be considered when evaluating our results. Our pilot study faced several unique challenges. All participants in our study were working from home, which was a novel work setting for most of the participants. This shift in work environment introduced new distractions and previously unencountered job-related challenges. This contributed to difficulties adhering to the intervention schedule and made it more difficult to keep participants on schedule with our outcome measures. We also encountered numerous issues during the pivot from conventional research methods to those adapted for a virtual-based protocol.

Many important lessons were learned from this pilot study and the unexpected transition from the office to home because of the COVID-19 pandemic. First, both investigators and institutional review board members learned how to quickly shift from in-person meetings for important study steps (e.g., recruitment and informed consent) to virtual meetings. Even as meetings are increasingly returning to in-person settings for most clinical trials, maintaining the infrastructure to pivot

Table 5. Was It Worth It Survey Results.

Survey Question	No. (%) (n = 16)
1. Was it worthwhile for you to participate in this research study?	(n = 15)
Yes	11 (73)
No	2 (13)
Unsure	2 (13)
2. If you had to do it over, would you participate in this research study again?	
Yes	14 (88)
No	2 (13)
3. Would you recommend using aromatherapy to others?	
Yes	13 (82)
No	1 (6)
Unsure	2 (13)
4. Overall, did your quality of life change by participating in this research study?	
It improved	2 (13)
It stayed the same	14 (88)
5. Overall, how was your experience of participating in this research study?	
Better than I expected	4 (25)
The same as I expected	11 (69)
Worse than I expected	1 (6)
6. Would you like to talk to someone about your concerns?	
Yes	0 (0)
No	16 (100)

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to virtual activities will help future studies to be less affected by unexpected changes in work location. Second, the increased anxiety documented among clinical and nonclinical health care workers during the COVID-19 pandemic^{2,21,22} indicates that a comprehensive approach to early and urgent interventions is needed to mitigate threats to employee well-being during future stress-inducing events.

Aromatherapy is an intervention that can be easily implemented and can serve as an early attempt by leadership to acknowledge the impending mental/psychological health effects of potentially negative events. Other interventions known to be helpful for depression and anxiety disorders, such as mind-body approaches (e.g., meditation, yoga, and tai chi),²³ may also be implemented in parallel, or in addition, to aromatherapy but may require additional guidance.

We further learned that people who have higher baseline resiliency appear to be able to maintain a higher quality of life and have lower stress levels than do those with lower resiliency when encountering major life stressors. Before an inevitable future stress-inducing event occurs and the predictable mental/psychological health issues follow, emphasizing enhanced resiliency and offering options for self-care resources may be a preventive strategy to considerably reduce human distress and health consequences.²⁴

Study participants reported that the intervention was worthwhile, despite the lack of a significant effect on most of the perceived mental/psychological health parameters. We will, therefore, replicate the study with a larger number of participants and study design improvements based on our

experience conducting this pilot study. Such improvements will include randomization, close monitoring of the frequency of aromatherapy use, and specific use of standardized assessments (e.g., General Anxiety Disorder-7, Connor-Davidson Resilience Scale, and Mindful Attention Awareness Scale). No standard surveys for the evaluation of aromatherapy are currently available. With advancements in telemedicine and an increase in hybrid work schedules for many academic department workers, a larger, more precise study would improve our understanding of the role of aromatherapy for improving the mental/psychological health of allied health workers. In addition, replicating the current study now will be timely because many of the staff positions in the pilot study have transitioned to permanent at-home status. Because this population of academic department personnel will have had their work environment stabilized for at least 1 year, some of the impediments to the original study will also no longer be present. In addition, we have observed that at-home positions have not only unique advantages but also several novel stressors, as well. Thus, evaluating a low-risk, low-cost, and readily accessible intervention such as aromatherapy is needed for both staff whose work is performed predominantly at home and those working in a traditional office environment.

Strengths and Limitations

This pilot study performed during the COVID-19 pandemic is a proof of concept that research studies can be conducted

successfully from the home office and without personal interactions. Our findings suggest that aromatherapy can be perceived as a helpful self-care intervention for academic department personnel working remotely. Despite these strengths, this pilot study was designed simply to evaluate initial interest and potential outcomes of using aromatherapy and, therefore, has several limitations. We did not collect information regarding participant sense of smell/loss of smell, which was later determined to be an important component of the COVID-19 disease course. Our study also did not include a control group, and the aromatherapy interventions were used only for a short time period. The number of participants was too small to derive to any substantial conclusions. A larger well-designed and well-powered study is required to fully understand the role of aromatherapy for alleviating perceived stress and improving other perceived mental/psychological health parameters for academic department workers who work from home.

Conclusions

Our findings showed no statistically significant improvement of perceived mental/psychological health parameters (restlessness, fatigue, anxiety, stress, happiness, energy, relaxation, calmness, and well-being) with STILL and FOCUS aromatherapy interventions among academic department workers working from home during the COVID 19 pandemic. However, aromatherapy has been shown to be helpful by many other studies that were not disrupted by the COVID-19 pandemic.^{12,13,25} A new work structure away from the clinical environment is now in place, but this work structure is associated with its own novel stressors. Because of these stressors and the potential needs that may arise from future pandemics or other stress-inducing events, we encourage further research of aromatherapy as a low-cost, safe intervention to potentially mitigate perceived mental health concerns for employees.

Appendix

Abbreviation

REDCap Research Electronic Data Capture.

Author's note

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Supplemental Material

Supplemental material for this article is available online.

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