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Effects of an eight-week, online mindfulness program on anxiety and depression in university students during COVID-19: A randomized controlled trial

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ABSTRACT

The COVID-19 pandemic has had adverse mental health effects for many groups in British society, especially young adults and university students. The present study reports secondary outcomes (i.e., symptoms of anxiety and depression) from a randomized waitlist controlled trial, with a one-month post-intervention follow-up, on the effects of a guided, eight-week mindfulness program delivered online during the COVID-19 pandemic among students at the University of Oxford. Longitudinal multilevel models showed greater reductions in anxiety but not depression symptoms for participants in the mindfulness condition relative to participants in the waitlist control condition (time X group B=-0.36, p=.025).

1. Introduction

On March 23rd, 2020, the British government announced a nationwide lockdown in response to the outbreak of the coronavirus (COVID-19) pandemic. Restrictions required people to stay at home, except for essential activities (e.g., buying basic necessities, attending to medical needs); schools and universities transitioned to online teaching; and non-essential shops and businesses were closed. Although easing of restrictions began in early summer the same year, the United Kingdom (UK) went into a second – and later a third – nationwide lockdown in response to rising cases and deaths.

The economic and social fallout of the nationwide lockdowns, along with the real and perceived threat of infection by COVID-19, has had adverse mental health effects for many groups in British society, especially young adults and university students (Daly, Sutin & Robinson, 2020; Niedzwiedz et al., 2021; O'Connor et al., 2021; (Pieh et al., 2021); Savage et al., 2020). For example, nationally representative surveys in the UK have found that young adults showed some of the largest decreases in mental health (Pierce et al., 2020; (Pierce et al., 2021). Another survey with a sample of university students in the UK – weighted to be representative by age, gender and university type – found that two-thirds reported feeling psychologically worse than before the pandemic (Hewitt, 2021). Hence, given the increased prevalence of psychiatric symptoms among university students, there is a need to investigate accessible interventions that can reduce distress.

Mindfulness – a particular way of paying attention, purposefully and nonjudgmentally, to the present moment (Kabat-Zinn, 1994) – is a construct that has emerged as a potential protective factor during the pandemic (Conversano et al., 2020; Matiz et al., 2020; Sun et al., 2021; Zhang et al., 2021; Zheng et al., 2020). Previous research has shown reduced psychological distress among university students in Spain and China following mindfulness-based interventions designed for the pandemic (González-García et al., 2021; Sun et al., 2021). No study, however, has thus far examined the effects of a mindfulness-based intervention on university students in the UK during the pandemic. Using a randomized waitlist control design, we therefore investigated whether an eight-week, online mindfulness program impacted symptoms of anxiety and depression among students at the University of Oxford.

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2. Materials and methods

2.1. Participants and procedure

The data in the present study were collected as part of a preregistered experiment whose primary outcome was affective polarization (Open Science Framework: https://osf.io/px8m2). The outcomes reported here were secondary and not included in the primary preregistration. Students (≥18 years) at the University of Oxford were invited to participate in the study and attend an eight-week mindfulness course for free. Eligible participants completed baseline assessments prior to randomization in January 2021 (T1). Participants were randomized (1:1) using Microsoft Excel's randomization formula to start the mindfulness course immediately (mindfulness condition) or three months later (waitlist control condition). Post-test assessment (T2) was taken after the end of the first mindfulness course and follow-up assessment (T3) was taken one month after T2 (prior to the second mindfulness course). All data were collected using Qualtrics (https://www.qualtrics.com/). The reporting of the present study follows the CONSORT 2010 statement: http://www.consort-statement.org/

2.2. Mindfulness intervention

The eight-week mindfulness program was adapted from the book *Mindfulness: a Practical Guide to Finding Peace in a Frantic World* (Williams & Penman, 2011). The course consisted of eight weekly classes and was delivered online via Zoom (https://zoom.us/). Classes lasted 90 minutes (to allow participants to familiarize themselves with the online format, sessions 1 and 2 were 105 minutes) and involved mindfulness meditation practices, periods of inquiry and reflection, and interactive exercises based on cognitive behavioral therapy. Participants were encouraged to engage with home practice 20-30 minutes per day.

Four courses (15-29 participants in each course) were delivered in parallel by the same mindfulness teacher. If participants were absent from a session, they were invited to attend one of the parallel sessions that week. The mindfulness teacher met Good Practice Guidelines for Teachers of Mindfulness-Based Interventions as defined by the British Association of Mindfulness Based Approaches (British Association of Mindfulness Based Approaches 2020).

2.3. Measures

2.3.1. Demographics

Participants provided their gender, age, citizenship, ethnicity, first language, and degree program.

2.3.2. Anxiety and depression

Participants completed four-item versions of the Patient-Reported Outcome Measurement Information System (PROMIS) anxiety and depression scales (Pilkonis et al., 2011). Items assess symptoms of anxiety (e.g., "My worries overwhelmed me") and depression (e.g., "I felt hopeless") in the past 7 days. Responses were rated on a 1- (Never) to 5-point (Always) scale. A total score for each scale was computed by summing across the four items, with adequate internal consistency for anxiety (α=0.84) and depression (α=0.88).

2.4. Data analysis

Analyses of anxiety and depression variables followed the analytic plan outlined for the primary study outcomes. Specifically, we conducted multilevel models with assessments nested within participants over time. We used maximum likelihood estimation which is robust to data missing at random (Graham, 2009). We examined time X group (mindfulness vs. control) interactions as our test of group effects. Analyses were conducted in R using the 'lme4' package (Bates et al., 2015).

3. Results

Sample demographics for both groups are reported in Supplemental Table 1. One-hundred seventy seven participants (71.8% age 18-24 years; 64.4% female; 68.9% White; 55.9% Undergraduate) completed baseline measures (T1). Of these, 165 (93%) completed measures at post-test (T2) and 162 (92%) completed measures at follow-up (T3; see Supplemental Figure 1 for a study flow diagram). There were no significant differences across conditions on clinical or demographic measures at baseline (*ps* > .050). Groups did not differ in likelihood of completing post-test or follow-up assessments (*ps* > .050).

Descriptive statistics for both groups are shown in Table 1.

Anxiety and depression scores showed acceptable skewness and kurtosis (Curran et al., 1996). On average, anxiety symptoms were moderately elevated (mean=11.19, SD=3.63, T>60) and depression symptoms were mildly elevated (mean=9.95, SD=3.87, T-score>55). A significant time X group interaction was detected for changes in anxiety over time (*B*=-0.36, *t*=-2.25, *p*=.025) with the treatment group showing larger reductions relative to the control group. Between-group Cohen's *d* effect sizes (i.e., within-group change in treatment minus within-group change in control; Becker, 1988) showed a small magnitude difference at post-test (*d*=-0.39) and follow-up (*d*=-0.20). The time X group interaction was not significant for depression (*B*=-0.06, *t*=-0.94, *p*=.347). Correspondingly, the between-group Cohen's *d*s were also smaller at post-test (*d*=-0.26) and follow-up (*d*=-0.06).

4. Discussion

In this randomized controlled trial, we examined whether an eight-week mindfulness program delivered online had an effect on symptoms of anxiety and depression among students at the University of Oxford during the COVID-19 pandemic. Participants randomized to the mindfulness condition showed a significantly greater reduction in anxiety but not depression over time relative to participants randomized to the waitlist control condition.

The finding of reduced anxiety symptoms corresponds with a recent meta-analysis of studies conducted pre-COVID-19 and primarily in person showing that mindfulness-based interventions reduce anxiety symptoms among university students relative to passive controls (Dawson et al., 2020). The current study joins a recent single-arm trial conducted in Spain (González-García et al., 2021) and a randomized controlled trial conducted in China (Sun et al., 2021) showing reduced anxiety associated with online mindfulness training. The lack of between-group effects on depression is consistent with (Sun et al., 2021), raising the possibility that anxiety may be more amenable to mindfulness training during COVID-19 than depression.

The study design has several limitations. First, the sample consisted of a single UK university and those who self-selected into the study, limiting generalizability of the findings. Second, the influence of non-specific factors such as instructor attention and expectancy were not controlled for in our use of a waitlist control. Third, the participants were not asked to report amount of home practice, which has been shown to associated with intervention outcomes (Parsons et al., 2017). Fourth, anxiety and depression scores were assessed using self-reported measures and may therefore have been influenced by social desirability bias. Fifth, the present study reported secondary outcomes and the results should therefore be interpreted with caution.

Despite these limitations, results suggest that an eight-week mindfulness program delivered online may be an effective approach for British universities to promote student mental health during global challenges such as the COVID-19 pandemic.

Data availability statement

The data and R script are available at the Open Science Framework: https://osf.io/rxf87/files.

Table 1
Changes in anxiety and depression symptoms over time.

Group	Time	Outcome	n	Mean	SD	Min	Max	Skew	Kurtosis	d_{within}
Control	Pre	Anxiety	89	11.43	3.42	4	19	-0.21	-0.53	NA
Control	Post	Anxiety	86	11.70	3.72	4	20	-0.05	-0.33	0.08
Control	Follow-up	Anxiety	85	10.87	3.45	4	18	0.08	-0.44	-0.16
Control	Pre	Depression	89	10.17	3.89	4	18	0.13	-0.95	NA
Control	Post	Depression	86	10.23	4.06	4	20	0.17	-0.78	0.02
Control	Follow-up	Depression	85	9.56	4.12	4	20	0.43	-0.65	-0.15
Treatment	Pre	Anxiety	88	10.95	3.84	4	20	0.15	-0.62	NA
Treatment	Post	Anxiety	79	9.81	3.54	4	19	0.21	-0.41	-0.31
Treatment	Follow-up	Anxiety	77	9.57	3.76	4	20	0.35	-0.30	-0.36
Treatment	Pre	Depression	88	9.74	3.85	4	20	0.04	-0.52	NA
Treatment	Post	Depression	79	8.81	3.75	4	18	0.46	-0.66	-0.24
Treatment	Follow-up	Depression	77	8.94	3.83	4	20	0.61	-0.09	-0.21

Note: Anxiety=4-item PROMIS Anxiety; Depression=4-item PROMIS Depression; Follow-up=1-month follow-up; d_{within}=within-group Cohen's d computed as later timepoint minus earlier timepoint for control and treatment groups separately (i.e., pre- to post-d reported on Post row, pre-to follow-up-d reported on Follow-up row).

Author contributions

OS conceptualized, designed and preregistered the study, with input from SG. OS randomized participants. SG analyzed the data with assistance from OS. OB taught the mindfulness courses. OS wrote the manuscript, with comments from OB, SF, and SG. SF provided local supervision. SG supervised the study.

Ethical approval

All procedures performed involving human participants were in accordance with the ethical standards of the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study was approved by the Research Ethics Committee of the Department of Sociology (DREC) at the University of Oxford.

Informed consent

Informed consent was obtained from all individual participants included in the studies.

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Declaration of Competing Interest

The authors declare that there is no conflict of interest.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2021.114222.

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