SCHOOL OF PSYCHOLOGY

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LITERATURE REVIEW: Are facilitated online mindfulness group sessions efficacious in improving psychological outcomes?

EMPIRICAL PAPER: The Impact of Attending Online Mindfulness Drop-In Sessions on Depression, Anxiety, Distress and Wellbeing in the General Population

Submitted by Sonam Nagrani, to the University of Exeter

as a thesis for the degree of Doctor of Clinical Psychology, Aug 2022

Signature: ……

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LITERATURE REVIEW

Are facilitated online mindfulness group interventions efficacious in improving psychological outcomes?

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Abstract

Background: Online mindfulness-based interventions (MBIs) have become increasingly popular in recent years. These have been developed in various formats including self-directed, smart phone app-based, virtual reality based, and delivered as one-to-one sessions or in group settings. Although there are some reviews on online MBIs, none to date have specifically addressed group facilitated online MBIs (GFO-MBIs). Therefore, the purpose of this review is to explore whether GFO-MBIs are efficacious in improving psychological outcomes.

Method: A systematic review was carried out based on the PRISMA-P guidelines. Relevant articles were identified from five databases including EBSCO, PsycInfo, PsycExtra, Medline, and Scopus. Selected articles were screened using the Rayyan platform and shortlisted articles were assessed for quality using the Randomised Control Trial of Psychotherapy Quality Rating Scale (RCT-PQRS).

Results: In total six articles were included in the systematic review based on inclusion criteria and quality ratings. Study interventions included general MBIs, mindfulness-based cognitive therapy (MBCT) and mindfulness-based stress reduction (MBSR). The findings suggest that the evidence is insufficient and inconsistent to confirm the efficacy of GFO-MBIs overall in improving psychological outcomes.

Conclusions: The current review found inconsistent and insufficient evidence to confirm the efficacy of GFO-MBIs overall in improving psychological outcomes. However it was found that the efficacy varied depending on the type of MBI, population and psychological outcomes being measured, suggesting further research is needed to clarify the efficacy of GFO-MBIs in specific subgroups.

Keywords: Online, facilitated, group, mindfulness intervention, psychological outcomes

1.0 Introduction

1.1 Defining Mindfulness

Mindfulness that originates from ancient Eastern philosophy and Buddhism, can be defined as the practice of paying attention, on purpose, non-judgmentally, in the present moment (Kabat-Zinn, 1994). By practising mindfulness, a state of self-awareness can be achieved in which one can better notice and respond to unhelpful cognitions and distressing emotions as they arise, which may prevent mental and physical health problems associated with these processes (Bishop et al., 2004; Waszczuk et al., 2015).

1.2 Mindfulness-Based Interventions

Mindfulness has been operationalised as a healthcare intervention in the form of mindfulness-based interventions (MBIs; Mars & Abbey, 2010), which include Mindfulness-Based Stress Reduction (MBSR; J. Kabat-Zinn, 1982) and Mindfulness-Based Cognitive Therapy (MBCT; Segal et al., 2002; Teasdale et al., 2000). MBIs have been applied to a range of clinical and non-clinical applications and are supported by a growing body of literature (Mars & Abbey, 2010; Spijkerman et al., 2016; Ulrichsen et al., 2016).

1.2.1 MBIs with Healthy Populations

A systematic review (SR) and meta-analysis (MA) of MBSR efficacy on stress reduction in healthy individuals concluded that MBSR reduced stress, ruminative thinking and trait anxiety, and increased empathy, self-compassion and spiritual values (Chiesa & Serretti, 2009). However the majority of included studies had small sample sizes and non-randomisation, which could mean that these findings were not robust. Another MA reported MBSR with healthy individuals had large effects on stress and moderate effects on anxiety, depression, distress, and quality of life (Khoury et al., 2015). However this review included

studies mostly based on relatively young, Caucasian and female participants, thus reducing the generalisability of these findings.

1.2.2 MBIs with Physical Health Conditions

MBIs have also been shown to be effective in improving mental health symptoms and quality of life in people with physical health conditions, including chronic diseases (Bohlmeijer et al., 2010), cancer (Ledesma & Kumano, 2009; Piet et al., 2012), breast cancer (Cramer et al., 2012; Zainal et al., 2013), vascular disease (Abbott et al., 2014) , fibromyalgia (Lauche et al., 2013) and chronic pain (Veehof et al., 2011).

1.2.3 MBIs with Mental Health Disorders

Some reviews have explored the efficacy of MBIs on psychological outcomes in people with mental health disorders. An MA by Klainin-Yobas et al., (2012) reported MBIs as efficacious in reducing depressive symptoms and preventing relapse in adults with mental disorders. This had good generalisability (covered 39 studies from 10 countries), however study designs were mainly single group pretest-posttest which lacks randomisation. A SR and MA by Hedman-Lagerlöf et al. (2018) reported MBIs were more effective than no treatment and treatment-as-usual, but not placebo or active treatments, in improving disorder-specific symptoms in common psychiatric disorders, suggesting some efficacy of MBIs in this population. Strengths of this review were its comprehensive assessment of study quality and disorder-specific analyses. Another SR and MA of MBIs in psychiatric disorders by Goldberg et al. (2018) reported MBIs to be more efficacious in improving mental health symptoms than no treatment, minimal treatment and active controls, and equivalent efficacy to evidence-based treatments, with the most consistent results found for depression and addiction disorders.

1.3 Online MBIs on Psychological Outcomes

There has been growing interest in online MBIs both in practice and research exploring the effects of online MBIs in non-clinical populations e.g., general population, students or employees, and clinical populations e.g., those with physical or mental health conditions.

1.3.1 Online MBIs with Non-Clinical and Mixed Populations

A review and MA by Spijkerman et al. (2016) including 15 RCTs found that online MBIs overall had a moderate effect on stress and small effects on depression, anxiety and wellbeing. Greater effects on stress were observed with guided online MBIs compared to unguided, and effect sizes were positively moderated by the number of sessions. These findings suggest that online MBIs can improve mental health outcomes and effects are enhanced with more sessions and guided interventions. However the heterogeneity in terms of population (somatic and psychological illnesses, students and employees), intervention type (Acceptance and Commitment Therapy; ACT, MBSR and MBCT), and measures, meant that effect sizes varied considerably, making it difficult to generalise findings.

An updated MA by Sommers-Spijkerman et al. (2021) investigating the effectiveness of online MBIs on a broad range of populations, supported earlier findings from Spijkerman et al. (2016). It reported moderate effects on depression and stress, and small effects on anxiety and wellbeing, as well as small follow-up effects on depression and anxiety. It also found guided online MBIs had larger effects on stress, suggesting facilitation of online MBIs helps attendees to experience greater benefits. In support of this, an RCT by Ma et al. (2018) based on the general population also found that online MBIs were more effective when delivered in facilitated groups compared to self-directed formats. However studies by Cavanagh et al. (2018) and Gu et al. (2018) support the effectiveness of self-guided online

MBIs in improving perceived stress, depression and anxiety symptoms, with small to large effect sizes in non-clinical populations (i.e., university staff and students).

1.3.2 Online MBIs with Clinical Populations

Currently in the literature there is a lack of empirical studies and reviews on online MBIs for clinical populations, particularly mental health disorders. However a SR and MA by Sevilla-Llewellyn-Jones et al. (2018) found that online MBIs were effective in improving depression, anxiety and quality of life in those with clinical anxiety disorders, compared to waitlist control, but not compared to treatment as usual or active controls, suggesting weak efficacy in this population. Limitations of this review include its relatively small number of studies (12) and high heterogeneity.

Furthermore a recent SR and MA by Liu et al. (2022) investigated the effectiveness of online MBIs for improving mental health in patients with physical health conditions. The review included nine RCTs and findings suggest that online MBIs (specifically MBSR, MBCT and ACT interventions) were efficacious in improving depression, anxiety and stress, but not wellbeing, in people with physical health conditions. Although this review indicated which studies used guided vs non-guided MBIs and the format of online delivery used, subgroup analyses based on these factors were not reported.

1.4 Rationale & Research Question

Several studies and reviews have explored the effectiveness of MBIs and online MBIs on psychological outcomes, for both non-clinical and clinical populations. In research studies and clinical practice, online MBIs are often delivered either as an individual self-directed or a facilitated/guided group intervention. Despite these types of online MBIs being fundamentally different in nature, this distinction has often been overlooked or not clearly stated in the literature and the effects of each type have not been explored separately in depth.

Furthermore, many face-to-face facilitated group MBIs transitioned to an online format during the recent Covid-19 pandemic, meaning an upsurge in group facilitated online MBIs. However, to date there have been no SRs that specifically explore the efficacy of group facilitated online MBIs on psychological outcomes. Therefore the current SR aims to investigate evidence-based peer-reviewed literature to answer the research question: Are facilitated online mindfulness group interventions efficacious in improving psychological outcomes?

2.0 Method

This SR follows the Preferred Reporting Items for Systematic reviews and Meta Analyses Protocol (PRISMA-P) checklist and guidelines (Page et al., 2021).

2.1 Eligibility Criteria

The current SR entered studies that explored the efficacy of online MBIs on psychological outcomes according to specific inclusion and exclusion criteria. Eligible studies were those with adults from both non-clinical and clinical populations without severe mental health difficulties (see Table 2.1). To be included studies must have involved mindfulness-based interventions that had mindfulness as the main and largest component of the intervention e.g. MBIs, MBSR and MBCT. For the purposes of this SR, this did not include other forms of therapy where mindfulness did not make up the majority of the intervention e.g., ACT and Dialectical Behaviour Therapy (DBT).

Mindfulness interventions must have been delivered online in a facilitated group setting for inclusion. For the purposes of this review, ‘group facilitated online’ is defined as when at least one person i.e., facilitator guides a group of attendees/participants through all or part of the mindfulness intervention via online videoconferencing (most commonly the

mindfulness practice part), such that it is not experienced purely alone in a self-directed format. For inclusion in this SR, different levels of guidance/facilitation were accepted to distinguish this set of studies from those that involved purely self-guided mindfulness interventions.

Furthermore, to be included, studies must have measured psychological outcomes using standardised psychometric measures. For the purposes of this review, 'psychological outcomes' refers to constructs related to mental health and wellbeing for which there are prevalidated outcome measures, such as depression, anxiety, stress and quality of life. The full entry criteria used are set out in Table 2.1 according to PICOS (Population, Interventions, Comparators, Outcomes and Study design) guidance (Liberati et al., 2009; Moher et al., 2009).

Table 2.1

PICOS Criteria

	Inclusion criteria	Exclusion criteria
Population	• Adults ≥ 18 years old • General population and other non-clinical populations e.g. students, employees • Clinical populations (common mental health problems or physical health conditions only) with mild to moderate levels of severity	• Severe mental health presentations/distress levels

Interventions	• Online format • Group setting • Facilitated sessions • Mindfulness as main active component of intervention (e.g. MBIs, MBSR and MBCT)	• Face to face format • Individual format • Unfacilitated sessions (e.g. self-directed or self-help) • Virtual reality-based mindfulness • Smartphone app-based mindfulness • Other forms of therapy where mindfulness is not the main intervention (e.g. ACT, DBT) • Intervention solely physical, meditation, yoga, pharmaceutical or psychoeducational
Comparators	• Single group trial • Comparison between control/waitlist/treatment as usual	• No groups receive mindfulness
Outcomes	• Study uses psychometrically valid and reliable psychological outcomes measures e.g. of depression, anxiety, stress or well-being	• Physical, biochemical or behavioural outcomes only
Study design	• Quantitative methodology • Randomised controlled trial (RCT), controlled trials, single case experimental design, etc. • Prospective or retrospective and longitudinal or cross-sectional design • Feasibility or pilot study only if efficacy outcomes are reported with multivariate analyses	• Studies not available in English • Book chapters, conference proceedings, government reports • Dissertation abstracts • Study protocols • Systematic reviews or meta-analyses • Case studies/Examples

2.2 Search Strategy

To conduct searches for this review, five electronic databases were chosen following initial scoping searches. These were EBSCO, PsycInfo, PsycExtra, Medline, and Scopus. The PsycExtra database was searched to include grey literature in the results. Scoping searches indicated that searching only titles and abstracts prevented numerous irrelevant results that using the full-text search retrieved, therefore this technique was used during the final

searches, which were conducted on these databases via the Ovid and Scopus platforms during October 2021. The literature review question consists of three core constructs, namely, online, mindfulness and efficacious. These constructs were used to develop search terms for the SR that are outlined in Table 2.2 below.

Table 2.2

Search Terms for Systematic Review

Construct	Search terms
Online	"online" "digital*" "internet*" "net*" "web*" "computer*"
Mindfulness	"mindful*" "mindfulness intervention*" "mindfulness treatment*" "mindfulness-based intervention*" "MBI" "mindfulness program*" "mindfulness based therap*" "mindfulness based*" "mindfulness-based stress reduction" "MBSR" "mindfulness-based cognitive therapy" "MBCT"
Effectiveness	"effica*" "effectiv*"

The addition of truncations and asterisks were used to include all possible endings of a root word. Wildcards were used to identify variations in the spelling of a word where required and Medical Subject Heading (MeSH) terms were used in the Medline database. The search strategy was to combine terms within the same construct using the Boolean operator "OR" and combine searches of different constructs using the Boolean operator "AND". All combinations of searches using these search terms were considered.

2.3 Evaluation Strategy

Titles and abstracts of studies retrieved from searches were exported from each database and imported into Endnote with total numbers of studies recorded. Duplicates were removed and study information imported into Rayyan (literature review platform) for title and abstract level screening. Studies were checked against PICOS criteria and marked with 'include' or 'exclude' labels. Studies deemed suitable at this stage had their full-text retrieved and saved to Zotero (Roy Rosenzweig Center for History and New Media, 2006). These studies were screened at full-text level against the PICOS criteria. Several papers were checked jointly by the lead researcher (SN) and primary supervisor (KL) at this stage. Studies that met the exclusion criteria during screening were rejected and the reason noted.

2.4 Quality Rating

Studies that passed the full-text screening stage were assessed for methodological quality using the Randomised Control Trial of Psychotherapy Quality Rating Scale (RCT-PQRS; Kocsis et al., 2010) tool (see Appendix A). This tool was chosen because it is specifically designed to assess the methodological quality of psychotherapeutic intervention studies, which is the main focus of this review. Furthermore, the RCT-PQRS reports good internal consistency, external validity and inter-rater reliability (Kocsis et al., 2010).

In this review, the lead researcher (SN) and primary supervisor (KL) independently assessed the quality of three randomly selected studies from the full-text screening stage and ratings were compared (see Appendix B for each assessor's rating scores of the three papers reviewed). SPSS statistical software (Version 28, IBM Corp) was used to calculate inter-rater reliability using the intra-class correlation coefficient (ICC) method. An ICC value of 0.98 was obtained, which is considered excellent and was based on a mean-rating (k=2), absolute-agreement, two-way mixed effects model (Koo & Li, 2016; Shrout & Fleiss, 1979).

3.0 Results

3.1 Eligible studies

A total of 4538 papers were found using the search terms outlined in Table 2.2 in the specified databases. Duplicates were deleted automatically in Endnote (882 papers) and manually in Rayyan (10 papers). After de-duplication, 3646 records were screened at the title and abstract level on the Rayyan platform. This resulted in 251 papers being selected for full text screening. Two reports could not be retrieved. The remaining 249 papers were assessed for eligibility against the PICOS criteria. This led to 234 papers being excluded due to the reasons noted in the PRISMA flow diagram (Figure 3.1). The main exclusion reasons were interventions being unfacilitated and self-directed (101 studies), and interventions being smartphone app-based (77 studies), which do not meet eligibility criteria for this review.

The remaining 15 full-text papers were assessed for methodological quality using the RCT-PQRS tool (Kocsis et al., 2010). A PQRS total score of 30 and an omnibus rating of moderately good (5 on item 25) was chosen as the minimum level of quality that would be accepted for inclusion in the current review, as this differentiated papers with good methodology from those with average or poor methodology, reduced heterogeneity, and allowed a more focused review of the literature, constituting a stronger test of the research question. Nine papers scored below this and were excluded, leaving six papers for the current review (see Appendix C). Initially all items on the RCT-PQRS tool were used in the scoring and decision-making process, however to ensure validity this process was repeated excluding items that were largely descriptive and/or irrelevant to the SR question (items 1-4, 12, 13). Recalculating study quality in this way resulted in the same six papers scoring the highest and therefore being selected for the current review. Table 3.1 provides a summary of the included studies and Table 3.2 summarises each study's findings.

Figure 3.1

PRISMA Flow Diagram of Study Selection Process

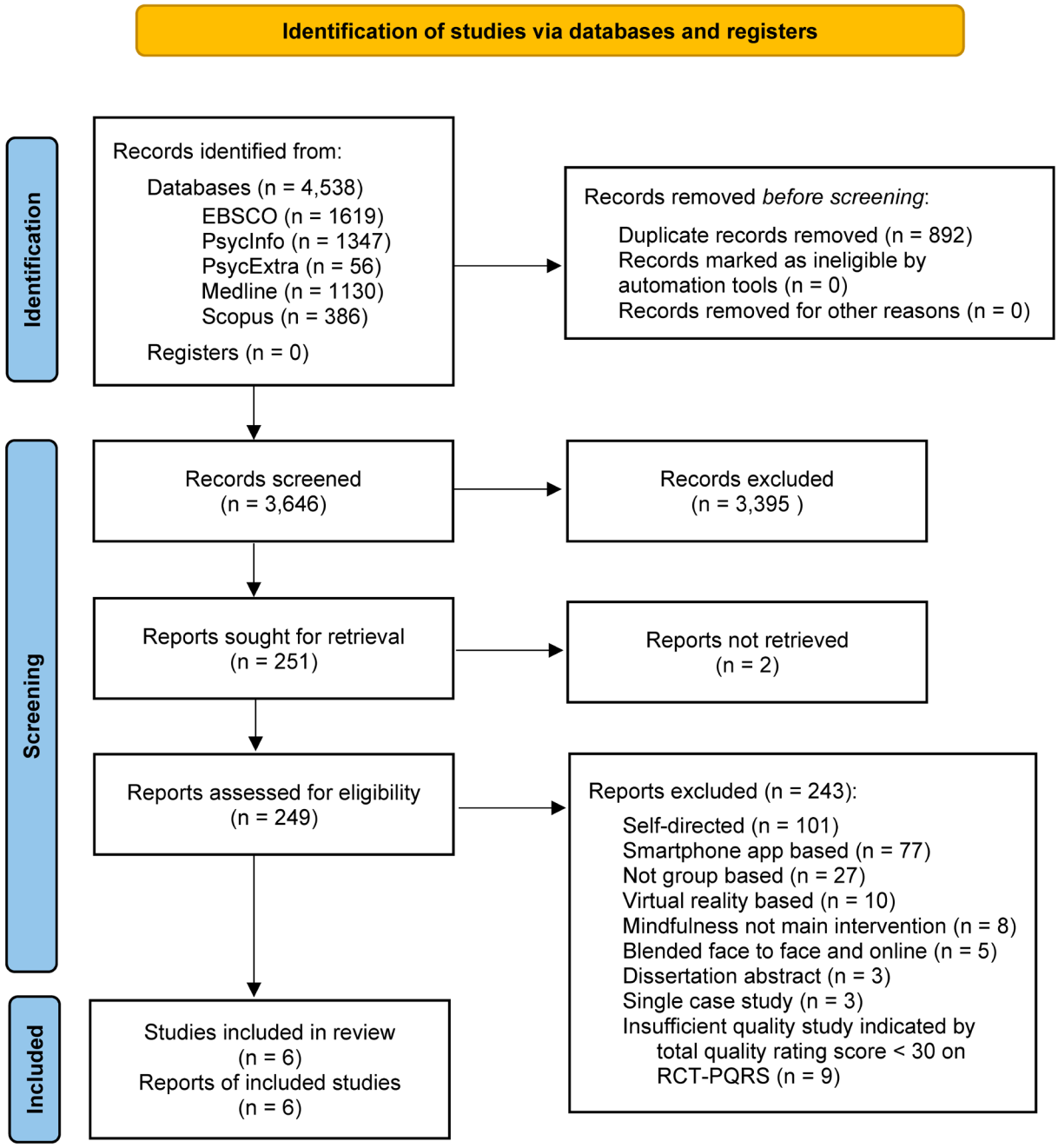

Table 3.1

Characteristics of Included Studies

Study	Author (year)	Country	Mean age (years)	Gender (F : M)	Participants/ Diagnosis	Ix of interest	Ix length	Comparison group/s	Psychological outcomes (measure)	Sample size	Follow-up length	Quality Rating (RCT-PQRS total)
1	Bogosian et al. (2021)	UK	60.87	30 : 30	Parkinson's disease (stabilised on medication)	Adapted MBCT	8 weeks	CG = TAU (received NHS treatment depending on need - typically a mix of clinical input + review from 1° and 2° care services)	Depression (HADS) Anxiety (HADS)	Total = 60 MG = 30 CG = 30	3 months	Moderately good (37)
2	Cavalera et al. (2019)	Italy	42.73	78 : 43	Multiple sclerosis (relapsing – remitting or secondary progressive)	Adapted MBSR	8 weeks	CG = active (8-week online psychoeducational course with videos + home exercises on improving stress, fatigue, sleep, relaxation and social relationships)	Depression (HADS) Anxiety (HADS) QoL (MSQOL-54)	Total = 121 MG = 54 CG = 67	6 months	Moderately good (34)
3	El Morr et al. (2020)	Canada	22.55	125 : 32	Undergraduate students	MBI	8 weeks	CG = WL (received no Ix, only completed outcome measures)	Depression (PHQ-9) Anxiety (BAI) Perceived stress (PSS)	Total = 159 MG = 79 CG = 80	None	Moderately good (34)
4	Thompson et al. (2010)	USA	35.9	43 : 10	Epilepsy with mild-moderate depressive symptoms (CES-D score >13 and <38)	Adapted MBCT (UPLIFT)	8 weeks	CG = TAU (continued any psychotherapy or antidepressant medication they were prescribed)	Depression (BDI) Mental health QoL (BRFSS)	Total = 53 MG = 26 CG = 27	8 weeks	Moderately good (35)

5	Thompson et al. (2015)	USA	41.2	77 : 41	Epilepsy with mild depressive symptoms (CES-D score >8 and <27)	Adapted MBCT (UPLIFT)	8 weeks	CG = TAU (followed usual protocol for depression at their epilepsy clinic e.g. antidepressant medication and/or psychotherapy + received weekly contact by study staff, unless declined)	Depression (mBDI) Mental health QoL (BRFSS)	Total = 118 MG = 62 CG = 56	8 weeks	Very good (44)
6	Wolever et al. (2012)	USA	42.9	183 : 56	Employees with moderate - high perceived stress (PSS score ≥ 16)	MBI	12 weeks	Other Ix = yoga CG = active (given list of resources with discounted fitness programs, employee assistance programs, behavioural health services for depression, chair massage sessions and wellness coaching opportunities)	Depression (CES-D) Perceived stress (PSS)	Total = 239 MG = 96 Yoga = 90 CG = 53	None	Very good (40)

Note. Ix = intervention; RCT-PQRS = Randomised Controlled Trial - Psychotherapy Quality Rating Scale (tool to measure methodological quality of studies); MG = mindfulness (intervention) group; CG = control group; WL = waitlist; TAU = treatment as usual; PE = psychoeducation active control; QoL = quality of life; MBI = Mindfulness-Based Intervention; MBCT = Mindfulness-Based Cognitive Therapy intervention; MBSR = Mindfulness-Based Stress Reduction intervention; UPLIFT = 'Using Practice and Learning to Increase Favourable Thoughts' Project intervention; CES-D = Centre for Epidemiological Studies Depression scale; PSS = Perceived Stress Scale; BSI-18 = Brief Symptom Inventory-18; HADS = Hospital Anxiety and Depression Scale; MSQOL-54 = Multiple Sclerosis Quality of Life-54; PHQ-9 = Patient Health Questionnaire-9; BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; mBDI = modified version of the Beck Depression Inventory; BRFSS = Behavioural Risk Factor Surveillance System.

Table 3.2

Summary of Findings

Study	Author (year)	Data Analysis	ITT	Key Findings	Summary of Significant Results				
					Dep.	Anx.	PS	QoL	FU
1	Bogosian et al. (2021)	Mixed ANOVA with group allocation (MG or CG) as between-subjects factor and time as within-subjects factor.	Yes	Statistically significant main effect of time on depression with medium effect size ($F = 5.49$, $p = .002$, $\eta p^2 = .09$) and anxiety with large effect size ($F = 12.61$, $p < .001$, $\eta p^2 = .18$). However there was not a statistically significant main effect of group or group (MG vs CG) x time (T1, T2) interaction for depression and anxiety. This means that although depression and anxiety improved over time, MG was no more efficacious than TAU CG in improving depression or anxiety, both overall and over time.	No	No	–	–	–
2	Cavalera et al. (2019)	ANCOVA with group (MG or CG) as between-subject factor and baseline values as covariates.	Yes	Depression ($F = 5.56$, $p = .020$, $\eta p^2 = .05$) and anxiety ($F = 3.96$, $p = .049$, $\eta p^2 = .04$) were statistically significantly lower and QoL ($F = 4.68$, $p = .033$, $\eta p^2 = .04$) was statistically significantly higher, in MG compared to active CG at T2, with small effect sizes. This means that MG was more efficacious than active CG at improving depression, anxiety and QoL. However these differences were not maintained at 6-months follow-up (depression: $F = 0.17$, $p = .682$; anxiety: $F = 1.03$, $p = .312$; QoL: $F = 0.02$, $p = .894$).	Yes	Yes	–	Yes	No
3	El Morr et al. (2020)	Independent samples T-tests, generalized estimation equation with multiple imputation and adjustments for covariates.	Yes	Depression ($p < .001$, $d = .69$) and anxiety ($p < .001$, $d = .74$) were statistically significantly lower in MG compared to waitlist CG at T2, with medium effect sizes. There were significant group (MG vs CG) x time (T1 vs T2) interactions for depression ($\beta = –2.13$, $p = .016$) and anxiety ($\beta = –4.89$, $p = .004$). These results mean that MG was more efficacious than waitlist CG at improving depression and anxiety, over time. Perceived stress was not statistically significantly different in MG compared to waitlist CG at T2 ($p = .16$, $d = .23$) and there was not a statistically significant group (MG vs CG) x time (T1 vs T2) interaction ($\beta = 0.66$, $p = .46$). This means that MG was no more efficacious than waitlist CG in improving perceived stress over time.	Yes	Yes	No	–	–

4	Thompson et al. (2010)	Student T-tests, repeated-measures ANCOVAs and cross-sectional ANCOVAs	No	There was a statistically significant group (MG vs CG) x time (T1, T2) interaction for depression ($F = 11.99$, $p = .001$), indicating that MG was more efficacious than TAU CG at improving depression over time. However this difference was no longer statistically significant at 8-weeks follow-up ($F = 1.12$, $p = .297$), indicating that benefits were not maintained at 8 weeks. There was not a statistically significant group (MG vs CG) x time (T1, T2) interaction for mental health QoL ($F = 0.09$, $p = .767$), meaning that MG was no more efficacious than TAU CG in improving mental health QoL over time.	Yes	–	–	No	No
5	Thompson et al. (2015)	Fisher's Exact 2-tailed probability and repeated measures ANCOVAs	Yes	There was a statistically significant group (MG vs CG) x time (T1, T2) interaction for depression ($F = 4.67$, $p = .033$), indicating that MG was more efficacious than TAU CG at improving depression over time. However at 8-week follow-up, there was not a statistically significant difference in depression scores between MG and CG ($t = 0.02$, $p = .988$), indicating that benefits were not maintained at 8 weeks. There was not a statistically significant group (MG vs CG) x time (T1, T2) interaction for mental health QoL ($F = 0.28$, $p = .600$), meaning that MG was no more efficacious than TAU CG in improving mental health QoL over time.	Yes	–	–	No	No
6	Wolever et al. (2012)	Repeated measures ANCOVA	Yes	There was not a statistically significant group (MG, yoga, CG) x time (T1, T2) interaction for depression ($F = 1.34$, p = ns, $\eta^2 = .01$), meaning that MG was no more efficacious than yoga or active CG in improving depression over time. There was a statistically significant group (MG, yoga, CG) x time (T1, T2) interaction for perceived stress ($F = 8.89$, $p < .001$, $\eta^2 = .07$) and post-hoc analyses showed that MG was statistically significantly more efficacious at improving perceived stress than active CG ($F = 21.31$, $p < .001$, $\eta^2 = .13$).	No	–	Yes	–	–

Note. ITT = intention to treat analysis; Dep. = depression outcome; Anx. = anxiety outcome; PS = perceived stress outcome; QoL = quality of life outcome; FU = follow-up; ANOVA = analysis of variance; ANCOVA = analysis of covariance; MG = mindfulness (intervention) group; CG = control group; TAU = treatment as usual; T1 = pre-intervention (baseline) time point; T2 = post-intervention time point; ; ηp^2 = partial eta squared (measure of effect size); η^2 = eta squared (measure of effect size); ns = non-significant (exact figure not specified by study).

3.2 Study Characteristics

The characteristics of the six included studies are presented individually in Table 3.1 and summarised collectively in the sections below.

3.2.1 Study Context

Of the six included studies, one was based in the United Kingdom (study 1), one in Italy (study 2), one in Canada (study 3), and three in America (studies 4, 5 and 6). Three studies were published between 2010 and 2015 (4, 5 and 6) and three studies more recently between 2019 and 2021 (1, 2 and 3).

3.2.2 Participants

The six papers included a total of 750 participants, with 536 females (71.5%) and 212 males (28.3%). Overall 347 participants received a mindfulness intervention, 313 were in a control group, and 90 received a yoga intervention (study 6). Mean ages ranged from 22.6 years to 60.9 years, with mean age across studies 41.0 years. Of the six studies, four recruited participants with physical health conditions (1, 2, 4, 5) and two used non-clinical samples. Study 1 recruited participants with a diagnosis of Parkinson's disease (PD) stabilised on medication. Study 2 recruited participants with multiple sclerosis (MS) of the relapsing–remitting or secondary progressive type. Study 4 recruited participants with a diagnosis of epilepsy with mild to moderate depressive symptoms. Study 5 recruited participants with a diagnosis of epilepsy with mild depressive symptoms. Study 3 recruited undergraduate students and study 6 involved insurance company employees with moderate to high levels of perceived stress.

3.2.3 Intervention

The intervention length was eight weeks for most studies (1, 2, 3, 4, 5) and twelve weeks for one study (6). The mindfulness interventions used were adapted MBSR (2), adapted MBCT (1, 4, 5), and other MBIs (3, 6).

3.2.3.1 Adapted MBSR. MBSR is an mindfulness intervention developed by Kabat-Zinn (1990) to relieve stress, cope with illness and promote health. Study 2 used an adapted MBSR program to improve depression, anxiety and quality of life in people with MS. The intervention was delivered by an expert trainer for eight weekly sessions via Skype and based on the original MBSR protocol adapted for people with MS by adding music meditations and discussions about MS symptom acceptance.

3.2.3.2 Adapted MBCT. MBCT is an intervention developed by Segal et al. (2002) that combines cognitive behavioural therapy (CBT) and mindfulness from the MBSR program developed by Kabat-Zinn (1990). Study 1 used MBCT material adapted for people with PD and reduced the length of sessions and meditation to reduce discomfort and fatigue. Studies 4 and 5 used the Project UPLIFT (Using Practice and Learning to Increase Favourable Thoughts; Thompson et al., 2010), an adapted MBCT program that combines mindfulness and CBT into an intervention for depression in people with epilepsy.

3.2.3.3 Other MBIs. Study 3 delivered an eight-week videoconference mindfulness group to reduce depression, anxiety and stress, 12 mental health modules, and three discussion boards. Study 6 used a 12-week mindfulness intervention with brief practices to improve work-related stress, work-life balance and self-care in employees.

3.2.4 Comparator

All six studies in the current review adopted a control group as comparator. Three studies used a treatment-as-usual (TAU) control group (1, 4, 5), two studies had active control groups (2, 6), and one study used a waitlist control (3). In study 1, the TAU control group continued to receive any NHS treatment for PD and/or their mental health depending on need. In study 4, the TAU control group continued any psychotherapy or antidepressant medication they received. In study 5, the TAU group followed the usual protocol for depression at their epilepsy clinic and received weekly contact by the research staff. In study 2, the active control group received an eight-week online psychoeducational course consisting of videos and home exercises on improving stress, fatigue, sleep and relationships. In study 6, the active control group received a list of resources with discounted fitness programs, behavioural health services for depression, and wellness coaching opportunities. Study 6 also had a comparison intervention group that received 12 weekly sessions of yoga to manage stress. Study 3 used a waitlist control group that received no intervention and only completed outcome measures at the same timepoints as the mindfulness group.

3.2.5 Outcome Measurement

The six studies in this review used standardised self-reported psychometric measures. All six studies collected data at two timepoints: pre-intervention (baseline) and post-intervention, which was after eight weeks for most studies except for study 6 (after 12 weeks). Study 1 carried out an additional data collection at the mid-intervention point (four weeks). Two studies had no follow-up (3, 6), two had eight weeks follow-ups (4, 5), one had three month follow-up (1), and one had a six months follow-up (2).

The psychological outcomes of interest in the included studies were depression, anxiety, perceived stress and quality of life. Three studies included measures of anxiety, of

which two used the Hospital Anxiety and Depression Scale (HADS; 1, 2), and one used the Beck Anxiety Inventory (BAI; 3). Two studies included measures of perceived stress using the PSS (3, 6). Three studies measured quality of life; one using the Multiple Sclerosis Quality of Life-54 (MSQOL-54; 2), and two using the mental health quality of life subscale on the Behavioural Risk Factor Surveillance System (BRFSS; 4, 5). All six studies included a measure of depression of which: two used the HADS (1, 2), one used the Patient Health Questionnaire-9 (PHQ-9; 3), one used the Beck Depression Inventory (BDI; 4), one used a modified BDI (mBDI; 5), and one used CES-D (6). The mBDI used was a modified version of the BDI that measures depression severity and is comprised of the same 21 items in the BDI, however there is the addition of a positive response option (e.g., I feel fairly happy or content) for each item (Dori & Overholser, 2000). These positive responses score 0 on the mBDI, moving the neutral responses that previously scored 0 in the original BDI to scores of 1, such that item responses range from 0 (positive) to 4 (severe). The mBDI has good internal consistency and test–retest reliability, and is significantly better than the BDI in detecting differences in lower levels of depression (Dori & Overholser, 2000), making it more suitable to the population being studied in study 5.

3.2.6 Methodological Quality

All six studies scored a total of at least 34 on the RCT-PQRS methodological quality rating tool (Appendix A). Four studies were rated as moderately good (1, 2, 3, 4) and two studies were rated as very good (5, 6) as in Table 3.1. Other studies that scored below this level on the RCT-PQRS (i.e., an average or poor rating) were excluded. This means that all six studies included in this review had good methodological quality and therefore results obtained from them will be given equal weight towards answering the research question. Each included study's individual scores on the RCT-PQRS items are in Table 3.3. Scores are

displayed by category, where 0, 1 and 2 indicate a criterion was not met, partially met and fully met respectively. Individual items descriptions are included in Appendix A.

Table 3.3

RCT-PQRS Quality Rating Item Scores

Study	1	2	3	4	5	6
Author (year)	Bogosian et al. (2021)	Cavalera et al. (2019)	El Morr et al. (2020)	Thompson et al. (2010)	Thompson et al. (2015)	Wolever et al. (2012)
	Description of subjects					
Item 1	2	2	1	2	2	2
Item 2	1	1	0	1	1	1
Item 3	1	1	1	1	2	2
Item 4	2	2	1	1	2	2
	Definition and delivery of treatment					
Item 5	2	2	2	2	2	2
Item 6	0	0	1	0	2	0
Item 7	2	2	1	0	2	2
Item 8	1	0	2	1	1	0
Item 9	1	0	0	2	1	1
	Outcome measures					
Item 10	2	2	2	2	2	2
Item 11	2	2	2	2	2	2
Item 12	0	0	0	0	0	0
Item 13	0	0	0	2	2	0
Item 14	1	1	0	1	1	0
	Data analysis					
Item 15	2	1	2	0	2	2
Item 16	2	1	2	1	2	2
Item 17	2	2	2	2	2	2
Item 18	2	2	2	1	1	1
Item 19	0	0	0	0	0	1
	Treatment assignment					
Item 20	0	2	2	2	1	2
Item 21	2	2	2	2	2	2
Item 22	2	2	2	2	2	2
	Overall study quality					
Item 23	1	1	0	2	2	2
Item 24	2	1	2	2	2	2
Item 25	5	5	5	5	6	6
Total	37	34	34	36	44	40

3.3 Critical Summary of Findings

The findings of the six included studies are presented individually in Table 3.2 and summarised by type of mindfulness intervention in the sections below. All studies included mindfulness interventions that were online, group-based and facilitated.

3.3.1 Adapted MBSR

There was only one study that utilised adapted MBSR as the mindfulness intervention and this was with a clinical population of people with MS (2). This study (2) reported statistically significant lower depression and anxiety scores and higher quality of life scores at post-intervention in the mindfulness group, compared to the active psycho-educational control group, with small effect sizes. This means that the eight-week online adapted MBCT was more efficacious than the active psycho-education control group at improving depression, anxiety and quality of life in people with MS, however these benefits were not maintained at six-months follow up. Overall, findings suggest adapted MBSR interventions are efficacious in improving depression, anxiety and quality of life in those with MS.

3.3.2 Adapted MBCT

Three studies used adapted MBCT as a mindfulness intervention with clinical populations of people with physical health conditions (1, 4, 5). Study 1 reported a statistically significant main effect of time on depression with medium effect size and anxiety with large effect size, but no statistically significant main effect of group or group x time interaction, for depression or anxiety. These results indicate that although depression and anxiety improved over time, the eight-week online adapted MBCT intervention was no more efficacious than treatment-as-usual, in improving depression or anxiety in people with PD.

Study 4 reported a statistically significant group x time interaction for depression but not for mental health quality of life. At eight-week follow up, the difference in depression

scores between groups was no longer statistically significant. These results indicate that online adapted MBCT was more efficacious than treatment-as-usual at improving depression from pre- to post-intervention but not at 8-weeks follow up, and not for mental health quality of life, in people with epilepsy and mild to moderate depressive symptoms.

Study 5 reported similar results with a statistically significant group x time interaction for depression but not for mental health quality of life. At eight-week follow up, the difference in depression scores between groups was no longer statistically significant. These results indicate that online adapted MBCT was more efficacious than treatment-as-usual at improving depression from pre- to post-intervention but not at 8-weeks follow up, and not for mental health quality of life, in people with epilepsy and mild depressive symptoms.

Overall, these findings suggest that adapted MBCT is more efficacious than treatment-as-usual for depression in epilepsy, but no more efficacious than treatment-as-usual for depression and anxiety in PD and quality of life in epilepsy. Therefore, the efficacy of adapted MBCT on psychological outcomes in those with physical health conditions is unclear given these mixed results.

3.3.3 Other MBIs

Two studies used other types of MBI as the mindfulness intervention and these were with non-clinical populations, including university students (3) and employees with moderate to high levels of perceived stress (6). Study 3 reported statistically significant lower depression and anxiety scores in the mindfulness group compared to the waitlist control group at post-intervention, with medium effect sizes, but no statistically significant differences in perceived stress between the groups. This study also reported statistically significant group x time interactions for depression and anxiety, but not for perceived stress. This means there were significantly greater reductions in depression and anxiety over time in the mindfulness group compared to the waitlist control group, but this difference between

groups was not significant for perceived stress over time. These results indicate that the eight-week online mindfulness intervention was more efficacious than a waitlist control group at improving depression and anxiety over time, but not perceived stress, in university students.

Study 6 reported a statistically significant group x time interaction for perceived stress, but not for depression. Post-hoc analyses showed that the mindfulness intervention was statistically significantly more efficacious at improving perceived stress than the active control group. These results indicate that the 12-week online mindfulness intervention for work-related stress was more efficacious than yoga and the active control group in improving perceived stress over time, but no more efficacious in improving depression, in employees with moderate to high levels of perceived stress.

In summary, the intervention in study 3 was more efficacious than waitlist at improving depression and anxiety but not perceived stress in university students, and the intervention in study 6 was more efficacious than yoga and active control group in improving perceived stress but not depression in employees with moderate to high perceived stress. Overall, these findings show that the efficacy of other MBIs varied for depression, anxiety and perceived stress depending on the target population (students or employees) and problem. Therefore, the efficacy of other MBIs on psychological outcomes in non-clinical populations (i.e., students and employees) is unclear given these mixed and conflicting results.

3.3.4 Combined Summary of Results

In summary the results from this review found: adapted MBSR interventions to be efficacious in improving depression, anxiety and quality of life in those with physical health conditions (clinical populations); adapted MBCT interventions to not be efficacious in improving anxiety and quality of life and to have mixed results on depression in those with physical health conditions; and other MBIs to have mixed results on depression, anxiety and perceived stress in students and employees (non-clinical populations).

4.0 Discussion

4.1 Overview and Existing Literature

The current SR aimed to explore whether group-facilitated online mindfulness-based interventions (GFO-MBIs) are efficacious in improving psychological outcomes such as depression and anxiety using standardised psychometric measures. Findings suggest evidence for GFO-MBIs overall is currently insufficient and too inconsistent to allow us to conclude with any certainty whether they are efficacious at improving psychological outcomes (see Table 3.2). Although there are no other reviews that specifically explore GFO-MBIs to directly compare these findings to, there are few reviews/meta-analyses that assessed the efficacy of online MBIs in general on psychological outcomes. For example, a SR and MA by Spijkerman et al. (2016) found that overall online MBIs improved depression, anxiety and wellbeing with small effect sizes and stress with moderate effect size, which is in contrast to the inconclusive overall findings from this review. In addition Spijkerman et al. (2016) found that guided online MBIs led to greater reductions in stress than unguided online MBIs, suggesting that the current review that focused on guided i.e., facilitated MBIs should have found better efficacy for stress, however this was not the case. These differences in findings could be for a number of reasons. Spijkerman et al. (2016) included 15 RCTs of which five were based on ACT, which was not included in the current review as an MBI, and six were based on MBSR, which was included in the current review but led to only one suitable study. Another important distinction is that Spijkerman et al. (2016) reported only three studies (out of 15) that were delivered via virtual online classroom with the rest being delivered via a website or smartphone app, whereas in the current review all studies were delivered by videoconference as this was the format of interest, which may contribute to the difference in findings. Unfortunately Spijkerman et al. (2016) did not report subgroup analyses for studies

that used a virtual online classroom delivery format and as such it is difficult to compare efficacy with the level of precision required.

In order to explore findings further, results for each type of GFO-MBI included in the current review will be discussed in turn. From the two studies in the 'other MBIs' category, one found the MBI used to be more efficacious than waitlist at improving depression and anxiety but not perceived stress in university students, whilst the other study found the MBI used was more efficacious than yoga and an active control group in improving perceived stress but not depression in employees with moderate to high perceived stress. These results are partly supported by other reviews/RCTs in the literature that found online MBIs were efficacious at improving depression, anxiety and stress (Querstret et al., 2018; Sevilla-Llewellyn-Jones et al., 2018; Sommers-Spijkerman et al., 2021; Spijkerman et al., 2016). However in the current review, the efficacy of other MBIs appeared to vary according to the target population and psychological outcomes. This may be because two different GFO-MBIs that were each designed for a specific population i.e., students or employees and purpose were combined into an 'other MBIs' category.

In this review, adapted MBSR was found to be efficacious in improving depression, anxiety and quality of life in people with MS compared to an active psycho-educational control group, however this was only based on one study therefore may be insufficient to draw wider conclusions. These findings are similar to those reported by Spijkerman et al. (2016) that found online MBIs improved depression, anxiety and wellbeing, and was based on several studies that used MBSR, making this a meaningful comparison. These findings are also similar to a SR and MA by Liu et al. (2022) that found online MBIs were efficacious in improving depression, anxiety and stress in people with physical health conditions.

In this review, adapted MBCT was found to be more efficacious than treatment-as-usual for depression in epilepsy, but no more efficacious than treatment-as-usual for

depression and anxiety in PD and quality of life in epilepsy. Therefore, the efficacy of adapted MBCT seems to vary according to the population and outcome. The positive findings for those with epilepsy and depression are in agreement with Liu et al. (2022), however the inefficacy found in improving depression and anxiety in those with PD is contradictory to their findings. It could be that those with PD are more likely to have cognitive impairments that affect their ability practice mindfulness thus reducing the efficacy, compared to those with epilepsy who may be unaffected cognitively between seizures.

4.2 Strengths and Limitations of Studies

All studies included in the current review were of a good standard due to a minimum level of methodological quality (as assessed by the RCT-PQRS tool) being set, and the PICOS criteria requiring psychometrically valid and reliable outcome measures to be used. This helps to reduce bias and increase the validity of findings. In addition, the majority of studies (5 out of 6) used intention-to-treat analysis that has the advantage of preserving the benefits of randomisation and minimising bias (McCoy, 2017). Another strength of the included studies is that all had a relatively large sample size (ranging from 53 to 239), allowing robust comparisons between mindfulness and control groups to be carried out, and there was good representation of adult working ages (mean age ranging from 22 to 60 years), meaning results are more generalisable to the population. Also most (4 out of 6) included studies had a follow-up assessment timepoint of at least eight-weeks, which provides useful information about the longitudinal efficacy of GFO-MBIs.

There were also limitations to the studies selected in this review. Out of the six studies, five had an unequal gender split with many more females than males, meaning that results may not be generalisable to male populations and therefore should be interpreted accordingly. However this is in-keeping with general trends within psychotherapeutic

literature and may be due to gender differences in mindfulness participation and help-seeking behaviours (Liddon et al., 2018). Another limitation was that most studies in the review did not compare the mindfulness intervention to an active control group (4 out of 6 used waitlist or treatment-as-usual as a comparator), and the two studies that did, did not use a psychological therapy such as CBT. This makes it difficult to fully understand how GFO-MBIs compared to existing psychotherapeutic interventions and therefore findings may need to be considered tentatively until further research addresses this. In terms of geographical and cultural representation, all six selected studies were from Western countries such as the UK and USA, meaning that findings from this review may not be generalisable to those from non-Western cultures. Before studies were excluded based on insufficient methodological quality, there were 15 studies including those from Eastern countries such as Iran, China and Singapore (see Appendix C). However these did not make the minimum quality level (RCT-PQRS score > 30) required for inclusion. It may be that there is a lack of high-quality randomised control trials being conducted in these countries or perhaps that the rating tool is better suited to Western research methodologies.

4.3 Strengths and Limitations of Review

A strength of this review is that it is the first study to focus specifically on the efficacy of GFO-MBIs which has not yet been reported in the existing literature and as such adopted a more stringent entry criteria to create a robust trial of efficacy. In addition the distinction between individual self-directed and facilitated/guided group online MBIs is often overlooked and/or not clearly stated in the literature despite these types being fundamentally different in nature. Therefore this review could also help to more clearly define GFO-MBIs as a specific type of MBI in the literature and encourage future studies to specify the type of MBIs they are utilising in these terms. This is especially important given that many face-to-

face facilitated group MBIs transitioned to an online format during the recent Covid-19 pandemic thus causing an upsurge in the number of GFO-MBIs being delivered and studied.

Furthermore, a comprehensive methodological quality assessment tool (RCT-PQRS) that is specifically designed for psychotherapy studies was used on all studies in this review, which was appropriate for the therapeutic context and provided a quantitative measure of study quality. Three randomly selected studies were independently assessed for quality by two raters (see Appendix B) and inter-rater reliability was calculated as 0.98, which is considered excellent suggesting that the assessment of study quality in this review was reliable and replicable (Koo & Li, 2016; Shrout & Fleiss, 1979). In addition, only those studies with at least moderately good methodological quality were included in this review, meaning that results obtained and conclusions drawn are more likely to be valid.

A potential limitation of this review is that both clinical and non-clinical populations were part of the inclusion criteria, as the study aimed to investigate the efficacy of GFO-MBIs overall on psychological outcomes. However this meant that the final selected studies included findings related to a mixture of clinical i.e., those with physical health conditions and non-clinical populations i.e., students and employees, which are very different groups and therefore difficult to generalise across without losing important distinctions. In this review the type of population i.e., clinical or non-clinical could have been selected in order to provide more specific findings, however this would have severely limited the number of studies included in the review, which was already small. It would have also rendered the results less generalisable. Once more studies have been published on the efficacy of GFO-MBIs, future reviews could build on this research by investigating GFO-MBIs for either clinical or non-clinical populations, in order to report the efficacy for each specific subgroup.

4.4 Implications and Future Research

Given the increase in GFO-MBIs being offered to a range of populations during the Covid-19 pandemic, and the unique nature of GFO-MBIs compared to individual self-directed online MBIs, it is important for research to explore how efficacious these interventions are, both overall and in specific populations. GFO-MBIs may have advantages over other types of online MBIs (e.g., those that are accessed individually in a self-help format), such as peer support and learning through group members, and enhanced learning experiences through facilitation by a trained and experienced instructor who can help navigate new and difficult concepts. Understanding whether MBIs are efficacious when delivered online (instead of face-to-face), in a group format (instead of individual), and facilitated (instead of self-directed), is beneficial in guiding the type of MBIs that should be developed and offered by NHS services to provide clients with efficacious treatment options and utilise resources more effectively.

The current review seems to suggest that the efficacy of GFO-MBIs varies for different types of MBI, populations and psychological outcomes, which may have led to the inconsistent and uncertain picture regarding their efficacy overall when combining these findings. Therefore further research is needed to clarify whether GFO-MBIs are efficacious in improving psychological outcomes overall, and to understand why some types of GFO-MBIs were efficacious on certain psychological outcomes with particular populations, by exploring the mechanisms of treatment effects. It may also be advantageous to focus future reviews on a particular type of GFO-MBI such as MBSR or population subgroup, in order to draw more specific and clearer conclusions. The current review primarily included those with physical health conditions (i.e., epilepsy, MS and PD) and non-clinical populations (i.e., university students and employees), therefore future studies could explore the efficacy and acceptability of GFO-MBIs with people with mental health conditions such as clinical

depression and/or anxiety. In contexts where GFO-MBIs are found to be efficacious for certain clinical populations (e.g., this review suggested adapted MBSR was efficacious in improving outcomes in those with MS), this could provide individuals with more treatment choices, which may enhance engagement.

4.5 Conclusions

The current review is the first review to date that explored whether group facilitated online MBIs are efficacious in improving psychological outcomes. A systematic search of the literature was conducted based on the PICOS criteria and studies were screened for quality using a specific rating tool for psychotherapeutic RCTs. The findings suggest that the evidence for GFO-MBIs is currently insufficient and inconsistent to allow us to conclude with any certainty whether they are efficacious at improving psychological outcomes. However it was found that the efficacy varied depending on the type of MBI, population and psychological outcomes being measured, suggesting further research is needed to clarify the efficacy of GFO-MBIs in specific subgroups.

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Appendices

Appendix A: RCT-PQRS Tool

RCT of Psychotherapy Quality Rating Scale (RCT-PQRS)

Description of subjects

Item 1. Diagnostic method and criteria for inclusion and exclusion

0	poor description and inappropriate method/criteria
1	full description **or** appropriate method/criteria
2	full description **and** appropriate method/criteria

Item 2. Documentation or demonstration of reliability of diagnostic methodology – use of psychometric evaluation of psychological distress in subjects

0	poor or no reliability documentation
1	brief reliability documentation (documentation in the literature is sufficient, even if it is not explicitly cited)
2	full reliability documentation (documentation of within-study reliability necessary)

Item 3. Description of relevant comorbidities

0	poor or no description of relevant comorbidities
1	brief description of relevant comorbidities
2	full description of relevant comorbidities

Item 4. Description of numbers of subjects screened, included, and excluded

0	poor or no description of numbers screened, included, and excluded
1	brief description of numbers screened, included, and excluded
2	full description of numbers screened, included, and excluded

Definition and delivery of treatment

Item 5. Treatment(s) (including control/comparison groups) are sufficiently described or referenced to allow for replication

0	poor or no treatment description or references
1	brief treatment description or references (also if full description of one group and poor description of another)
2	full treatment description or references (manual not required)

Item 6. Method to demonstrate that treatment being studied is treatment being delivered (only satisfied by supervision if transcripts or tapes are explicitly reviewed)

0	poor or no adherence reporting
1	brief adherence reporting with standardized measure or full adherence reporting with non-standardized measure (e.g. non-independent rater)
2	full adherence reporting with standardized measure (must be quantitative and completed by an independent rater)

Item 7. Therapist training and level of experience in the treatment(s) under investigation

0	poor description and underqualified therapists
1	full description or well-qualified therapists
2	full description and well-qualified therapists

Item 8. Therapist supervision while treatment is being provided

0	poor description and inadequate therapist supervision
1	full description or adequate therapist supervision
2	full description and adequate therapist supervision

Item 9. Description of concurrent treatments (e.g. medication) allowed and administered during course of study (if patients on medication are included, a rating of 2 requires full reporting of what medications were used; if patients on medications are excluded, this alone is sufficient for a rating of 2)

0	poor or no description of concurrent treatments
1	brief description of concurrent treatments
2	full description of concurrent treatments

Outcome measures

Item 10. Validated outcome measure(s) (either established or newly standardized)

0	poor or no validation of outcome measure(s)
1	brief validation of outcome measure(s) (shown or cited)
2	full validation of outcome measure(s) (shown or cited)

Item 11. Primary outcome measure(s) specified in advance (although does not need to be stated explicitly for a rating of 2)

0	poor or no specification of primary outcome measure(s) in advance
1	brief specification of primary outcome measure(s) in advance
2	full specification of primary outcome measure(s) in advance

Item 12. Outcome assessment by raters blinded to treatment group and with established reliability

0	poor or no blinding of raters to treatment group (eg, rating by therapist, non-blind independent rater, or patient self-report) and reliability not reported
1	blinding of independent raters to treatment group or established reliability
2	blinding of independent raters to treatment group and established reliability

Item 13. Discussion of safety and adverse events during study treatment(s)?

0	poor or no discussion of safety and adverse events
1	brief discussion of safety and adverse events
2	full discussion of safety and adverse events

Item 14. Assessment of long-term post-termination outcome (should not be penalized for failure to follow comparison group if this is a wait list or nontreatment group that is subsequently referred for active treatment)

0	poor or no post-termination assessment of outcome
1	medium-term assessment of post-termination outcome (2-12 months post-termination)
2	long-term assessment of post-termination outcome (≥12 months post-termination)

Data analysis

Item 15. Intent-to-treat method for data analysis involving primary outcome measure

0	no description or no intent-to-treat analysis with primary outcome measure
1	partial intent-to-treat analysis with primary outcome measure
2	full intent-to-treat analysis with primary outcome measure

Item 16. Description of dropouts and withdrawals

0	poor or no description of dropouts and withdrawals
1	brief description of dropouts and withdrawals
2	full description of dropouts and withdrawals (must be explicitly stated and include reasons for dropouts and withdrawals)

Item 17. Appropriate statistical tests (eg, use of Bonferroni correction, longitudinal data analysis, adjustment only for a priori identified confounders)

0	inappropriate statistics, extensive data dredging, or no information about appropriateness of statistics
1	moderately appropriate, though unsophisticated, statistics and/or moderate data dredging
2	fully appropriate statistics and minimal data dredging in primary findings

Item 18. Adequate sample size

0	inadequate justification and inadequate sample size
1	adequate justification or adequate sample size
2	adequate justification and adequate sample size

Item 19. Appropriate consideration of therapist and site effects

0	therapist and site effects not discussed or considered
1	therapist and site effects discussed or considered statistically
2	therapist and site effects discussed and considered statistically

Treatment assignment

Item 20. A priori (before starting study) relevant hypotheses that justify comparison group(s)

0	poor or no justification of comparison group(s)
1	brief or incomplete justification of comparison group(s)
2	full justification of comparison group(s)

Item 21. Comparison group(s) from same population and time frame as experimental group

0	comparison group(s) from significantly different population and/or time frame
1	comparison group(s) from moderately different population and/or time frame
2	comparison group(s) from same population and time frame

Item 22. Randomized assignment to treatment groups

0	poor (e.g. pseudo-randomization, sequential assignment) or no randomization
1	adequate but poorly defined randomization procedure
2	full and appropriate method of randomization performed after screening and baseline assessment

Overall quality of study

Item 23. Balance of allegiance to types of treatment by practitioners

0	no information or poor balance of allegiance to treatments by study therapists (eg, therapy in experimental and control groups both administered by therapists with strong allegiance to therapy being tested in the experimental group)
1	some balance of allegiance to treatments by study therapists
2	full balance of allegiance to treatments (eg, therapies administered by therapists with allegiance to respective techniques)

Item 24. Conclusions of study justified by sample, measures, and data analysis, as presented

0	poor or no justification of conclusions from results as presented or insufficient information to evaluate (eg, sample or treatment insufficiently documented, data analysis does not support conclusions, or numbers of withdrawals or dropouts makes findings unsupportable)
1	some conclusions of study justified or partial information presented to evaluate
2	all conclusions of study justified and complete information presented to evaluate

Item 25. Omnibus rating: please provide an overall rating of the quality of the study, taking into account the adequacy of description, the quality of study design, data analysis, and justification of conclusions.

1 = exceptionally poor (0-5)
2 = very poor (6-12)
3 = moderately poor (13-19)
4 = average (20-27)
5 = moderately good (28-33)
6 = very good (34-40)
7 = exceptionally good (41-46)

Appendix B: Quality Rating Scores for IRR

			Description of subjects				Definition and delivery of treatment					Outcome measures					Data analysis					Treatment assignment			Overall quality of study				
Study	Author	Scored by	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	Item 15	Item 16	Item 17	Item 18	Item 19	Item 20	Item 21	Item 22	Item 23	Item 24	Item 25	24 ITEM TOTAL	25 ITEM TOTAL
1	Zhang et al. (2021)	KL + SN	2	1	0	1	2	0	1	0	0	2	2	N/A	0	0	2	1	1	1	0	1	2	2	2	2	4	25	29
2	Bogosian et al. (2021)	KL	2	1	1	2	2	0	2	1	1	2	2	0	0	1	2	2	2	2	0	2	2	2	1	1	5	33	38
		SN	2	1	1	2	2	0	2	1	1	2	2	0	0	1	2	2	2	2	0	0	2	2	1	2	5	32	37
3	El Morr et al. (2020)	KL	1	0	1	1	2	1	1	2	0	2	2	0	0	0	2	2	2	2	0	2	2	2	0	2	5	29	34
		SN	1	0	1	1	2	1	1	2	0	2	2	0	0	0	2	2	2	2	0	2	2	2	0	2	5	29	34
4	Cavalera et al. (2019)	KL	2	1	1	2	2	0	2	0	0	2	2	0	0	1	1	1	2	2	0	2	2	2	1	1	5	29	34
		SN	2	1	1	2	2	0	2	0	0	2	2	0	0	1	1	1	2	2	0	2	2	2	1	1	5	29	34

Appendix C: Quality Rating Scores with Cut-Off Line

		Description of subjects				Definition and delivery of treatment					Outcome measures					Data analysis					Treatment assignment			Overall quality of study				
Study	Author (year)	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	Item 15	Item 16	Item 17	Item 18	Item 19	Item 20	Item 21	Item 22	Item 23	Item 24	Item 25	24 ITEM TOTAL	25 ITEM TOTAL
1	Thompson et al. (2015)	2	1	2	2	2	2	2	1	1	2	2	0	2	1	2	2	2	1	0	1	2	2	2	2	6	38	44
2	Wolever et al. (2012)	2	1	2	2	2	0	2	0	1	2	2	0	0	0	2	2	2	1	1	2	2	2	2	2	6	34	40
3	Bogosian et al. (2021)	2	1	1	2	2	0	2	1	1	2	2	0	0	1	2	2	2	2	0	0	2	2	1	2	5	32	37
4	Thompson et al. (2010)	2	1	1	1	2	0	0	1	2	2	2	0	2	1	0	1	2	1	0	2	2	2	2	2	5	31	36
5	El Morr et al. (2020)	1	0	1	1	2	1	1	2	0	2	2	0	0	0	2	2	2	2	0	2	2	2	0	2	5	29	34
6	Cavalera et al. (2019)	2	1	1	2	2	0	2	0	0	2	2	0	0	1	1	1	2	2	0	2	2	2	1	1	5	29	34
7	Zhang et al. (2021)	2	1	0	1	2	0	1	0	0	2	2	0	0	0	2	1	1	1	0	1	2	2	2	2	4	25	29
8	Latendresse et al. (2021)	2	1	1	2	2	1	2	0	1	2	2	0	0	1	0	2	2	1	0	0	0	0	0	2	4	24	28
9	Ma et al. (2018)	1	0	0	2	2	0	2	0	0	2	2	0	0	0	0	1	2	1	0	2	2	1	1	2	4	23	27
10	Pang et al. (2021)	2	0	1	0	2	0	1	0	0	2	2	0	0	0	1	0	2	2	0	2	2	0	1	2	4	22	26
11	Lim et al. (2021)	0	0	0	0	2	0	2	0	0	2	2	0	0	0	0	1	2	1	0	2	1	0	1	2	3	18	21
12	Lunsky et al. (2021)	0	0	0	1	2	0	2	0	0	2	2	0	0	1	0	2	2	1	0	0	1	0	0	2	3	18	21
13	Khazaeili et al. (2019)	1	0	1	0	2	0	0	0	0	2	2	0	0	0	0	0	1	2	0	0	2	1	0	1	3	15	18
14	Khazaeili et al. (2019; caregivers)	1	0	1	0	2	0	0	0	0	2	2	0	0	0	0	0	1	2	0	0	2	1	0	1	3	15	18
15	Farver-Vestergaard et al. (2019)	0	0	0	0	2	0	1	0	0	2	2	0	0	0	0	1	2	0	0	0	0	0	0	1	2	11	13

Appendix D: Journal Submission Guidelines

Psychological Medicine (part of Cambridge University Press)

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Important notice: We have become aware that there are websites such as University Press Journals, Association of British University Presses and International Agency for Development of Culture, Education and Science (IADCES) which are claiming to offer publication in certain Cambridge University Press journals for a fee. We do not work with such companies. Submissions to Cambridge University Press journals can only be made via the online peer review systems linked to from this Cambridge Core website, or else directly to the editorial offices of those journals that do not operate online peer review systems. To submit a paper, go to the 'Submission of manuscripts' section below and follow the instructions. For more information on predatory publishing, please visit the Think Check Submit website

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Please see the below table for the types of papers accepted:

Article Type	Usual Max Word count*	Abstract	References	Tables/ figures**	Supplementary material online only
Original article	4500	250 words, structured, using subheadings Background, Methods, Results, Conclusions	APA style – see elsewhere in this document for full details	Usually up to 5 total	Yes
Review article	4500	250 words, not structured	APA style	Usually up to 5 total	Yes
Editorial	3500	No	APA style	Usually up to 5 total	Yes
Correspondence* **	1500	No	max 20 APA style	Max 1	No
Commentary	2000 By invitation of editor	No	max 20 APA style	Not usually	Yes

*** Editors may request shortening or permit additional length at their discretion in individual cases**

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NOTE:

1. Figures should be submitted as discrete files, not embedded in the text of the main document.
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Generally papers should not have text more than 4500 words in length (excluding abstract, tables/figures and references) and should not have more than a combined total of 5 tables and/or figures. Papers shorter than these limits are encouraged. For papers of unusual importance the editors may waive these requirements. Articles require a structured abstract of no more than 250 words including the headings: Background; Methods; Results; Conclusions. Review Articles require an unstructured abstract of no more than 250 words. The name of an author to whom correspondence should be sent must be indicated and a full postal address given in the footnote. Any acknowledgements should be placed at the end of the text (before the References section).

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3. 3. Foreign quotations and phrases should be followed by a translation.
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References

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Where research involves human and/or animal experimentation, the following statements should be included (as applicable): "*The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008*." and "*The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional guides on the care and use of laboratory animals*."

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SCHOOL OF PSYCHOLOGY

DOCTORATE IN CLINICAL PSYCHOLOGY

EMPIRICAL PAPER

The Impact of Attending Online Mindfulness Drop-In Sessions on Depression, Anxiety, Distress and Wellbeing in the General Population

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Abstract

Objectives: There is a lack of research into online mindfulness drop-in sessions (OMDIS) that have been offered freely to the public, especially during the Covid-19 pandemic. These sessions offer more flexibility than standard mindfulness-based interventions that run for a set number of sessions, as individuals can 'drop in' to as many sessions as and when they like. This research aimed to explore the impact of attending group facilitated OMDIS on psychological outcomes in the general population.

Methods: A quantitative cross-sectional retrospective design was adopted in this study. Participants (n=112) were recruited online through OMDIS providers in the UK and internationally. Attendees were asked to complete an online survey with measures of depression, anxiety, distress and wellbeing, both for their current state and retrospectively for their state before attending any OMDIS. They also reported the number, duration and frequency of sessions attended, as well as their ease and accuracy of retrospective recall.

Results: Paired T-tests and two-way repeated measures ANOVAs were conducted. Findings indicated that: OMDIS were efficacious in improving depression, anxiety, distress and wellbeing; attending more sessions, more frequently, for longer durations was not required to attain these benefits; and being on a psychology waitlist or having prior mindfulness experience did not lead to greater benefits, whereas having depression prior to attending OMDIS did lead to greater improvements in psychological outcomes.

Conclusions: The current study is the first to explore and provide evidence for the efficacy of OMDIS on psychological outcomes. OMDIS are cost-effective and readily available and therefore could be offered to those on waiting lists for psychological interventions, who often wait prolonged periods without any support. Further research is needed to understand other factors that may impact efficacy in order to maximise the utility of OMDIS.

Keywords: *Online, mindfulness, drop-in, mental health, depression, anxiety*

1.0 Introduction

1.1 Background

Over the past two decades, mindfulness as a psychological intervention has become visible to the general population as well as increasingly popular for examination and exploration within clinical and research communities. Mindfulness can be defined as a nonjudgmental moment-to-moment awareness of one's thoughts, feelings and bodily sensations, with an attitude of openness and acceptance (Kabat-Zinn, 1990). The two most well-established mindfulness-based interventions (MBIs) are Mindfulness-Based Stress Reduction (MBSR; J. Kabat-Zinn, 1982) and Mindfulness-Based Cognitive Therapy (MBCT; Segal et al., 2002; Teasdale et al., 2000), which were developed to operationalise mindfulness as a healthcare intervention (Mars & Abbey, 2010). Mindfulness has also been incorporated into third wave therapies such as Dialectical Behaviour Therapy (DBT; Linehan, 1993) and Acceptance and Commitment Therapy (ACT; Hayes et al., 1999).

1.2 Online Mindfulness-Based Interventions

With advances in technology and wider availability of internet access, MBIs have increasingly been offered online, which has several benefits including: accessibility from any geographical location, increased capacity and flexibility, shorter or no waiting lists, and highly time and cost effective (Andersson & Titov, 2014; Barak et al., 2009; Cuijpers et al., 2009). Some studies suggest that people prefer online MBIs compared to individual and face-to-face formats (Wahbeh et al., 2014), suggesting that online MBIs are an acceptable and desirable alternative to traditional delivery formats.

Several studies investigating the effects of online MBIs in clinical and non-clinical populations have been published in the literature. Spijkerman et al. (2016) conducted a meta-analysis that found online MBIs were efficacious with small effect sizes for depression,

anxiety and wellbeing, and medium effects on stress, in clinical (those with somatic or psychological illness) and non-clinical populations (students or employees). Although effect sizes varied considerably, perhaps due to a range of populations and online MBI types being included, this review had a good number of studies (15), all of which were RCTs.

An RCT by Querstret et al. (2018) found online MBCT to be efficacious in reducing perceived stress, anxiety and depression in the general population compared to waitlist controls. Large effect sizes were reported for participants in the active treatment condition with statistically significant differences for outcome reported in comparison to participants allocated to the waitlist condition. This is in contrast to the overall small effect sizes reported by Spijkerman et al. (2016) on similar psychological outcomes, however both found that online MBIs had the largest effects on stress compared to other outcomes measured.

Studies exploring brief online MBIs (2-4 weeks instead of the standard 8-weeks) with non-clinical populations (i.e., university students and staff and company employees), reported that they were effective in improving perceived stress, distress, anxiety and depression, with small to medium effect sizes (Cavanagh et al., 2013, 2018; Demarzo et al., 2017; Glück & Maercker, 2011; Mantzios & Giannou, 2019).

Sevilla-Llewellyn-Jones et al. (2018) report online MBIs are efficacious in improving depression, anxiety, and quality of life, in those with diagnosed mental health disorders of sufficient clinical severity. Results were significant for the total sample and for the anxiety disorder subgroup, but not for the depression disorder subgroup, suggesting online MBIs may be more beneficial for those with anxiety disorders than those with depression disorders. Alternatively, these non-significant results may be due to limitations of the review, such as the low number of included studies and statistical heterogeneity.

1.3 Covid-19 Pandemic and Mental Health

The coronavirus (Covid-19) is a respiratory infection caused by the SARS-CoV-2 virus that originated from Wuhan in China in 2019 (Pollard et al., 2020). In the UK, the prevalence of clinical levels of mental distress increased by 8.4% from pre-pandemic (2018–19) to one month post-lockdown (Pierce et al., 2020). In response to this upsurge in mental health difficulties experienced during the pandemic, that has been described as a global mental health pandemic (Antonova et al., 2021; Hossain et al., 2020), and given that people were unable to access traditional forms of support during lockdown, several online mindfulness initiatives were implemented (Widha et al., 2021).

Some limited new literature on the impact of online MBIs on mental health outcomes during the Covid-19 pandemic, has recently been published. A study conducted during the initial months of the pandemic in Australia, found that a brief four-lesson self-help online MBI was efficacious in improving psychological distress and wellbeing with small to medium effect sizes reported for participants allocated to treatment (Li et al., 2022). These findings were reported in both pre-pandemic and during-pandemic groups, supporting the generalisability of established online MBIs to pandemic situations (Li et al., 2022). In an RCT conducted in America an adapted MBSR 8-week course that was delivered online via a videoconferencing platform during the pandemic, reported small but statistically significant effects on wellbeing in healthy college students, compared to a control group (MacDonald & Neville, 2022). Another study conducted during the Covid-19 outbreak in China explored the impact of mindfulness training on mental health and found that those who practiced mindfulness had lower distress scores compared to those who did not, and that practice frequency predicted improvement in depression, anxiety, and stress scores at follow-up (Zhu et al., 2021). A systematic review by Yeun & Kim (2022) included six RCTs that consisted of the general population with pandemic-related worry, clinical populations (Covid-19 and

obstetrics and gynaecology patients during the pandemic) and Covid-19 healthcare workers. It found significant reductions in anxiety, depression and stress levels in those who attended online MBIs compared to control groups, suggesting that online MBIs are efficacious in a variety of populations during a pandemic (Yeun & Kim, 2022).

1.4 Drop-In Sessions and Rationale for Current Study

In addition to standard online MBIs being delivered during the Covid-19 pandemic, this extraordinary and unprecedented period of life in a global pandemic saw a huge rise in online mindfulness drop-in sessions (OMDIS) being offered to the general public by companies, organisations and universities globally through their websites and social media. OMDIS were either newly developed during the pandemic in response to the increased need for mental health support or existed previously as face-to-face drop-in sessions that were switched to online delivery during lockdown. OMDIS potentially have several benefits over face-to-face and standard online MBI protocols that are offered as a treatment programme over a fixed duration, such as: time and cost effectiveness as many people from all over the world can attend one session, increased uptake by a wider population as OMDIS are easily accessible online and mostly offered free of charge, and increased flexibility and autonomy, as people can choose to attend any number of sessions as and when they like. As such, OMDIS may be highly valuable to resource-strapped NHS services, as they could offer an alternative feasible and cost- and time-effective solution to people on waiting lists with mild distress, anxiety or depression.

However the literature on drop-in sessions in therapeutic contexts is currently very limited, with only a handful of studies e.g., on smoking cessation (Bauld et al., 2012), canine therapy (Binfet et al., 2018), and homeless youth (Slesnick et al., 2008). Furthermore, there are currently no studies to date that explore the impact of OMDIS on the mental health and

wellbeing of attendees. This gap in research knowledge is important because OMDIS are currently being offered without specific evidence to guide their delivery or knowledge about their effectiveness on psychological outcomes. Therefore the current empirical study aims to investigate the impact of attending OMDIS on depression, anxiety, distress and wellbeing in the general population. It also explores factors that may moderate the impact of OMDIS on psychological outcomes including: number of sessions attended, session duration and frequency of attendance, being on a waiting list for psychological treatment, and prior experience of mindfulness.

1.5 Research Questions & Hypotheses

The study research questions are as follows:

- Are OMDIS efficacious in improving psychological outcomes? (H1)
- How much engagement with OMDIS is required to attain mental health benefits? (H2)
- Who benefits most from OMDIS? (H3-H5)

There is one primary hypothesis (H1) and four secondary hypotheses (H2–H5) that will now be discussed in turn. Since online MBIs have been shown to be efficacious in improving psychological outcomes in a range of populations during the Covid pandemic (Yeun & Kim, 2022), it was hypothesised that: H1 - attendance at OMDIS will result in statistically significant improvements in depression (PHQ-8), anxiety (GAD-7), distress (K10) and wellbeing (SWEMWBS), between pre-intervention (the timepoint prior to attending any OMDIS recalled retrospectively; T1) and post-intervention (the timepoint at which the survey was completed after attending at least three OMDIS; T2).

As there is evidence to suggest that mindfulness practice frequency predicts improvement in psychological outcomes (Zhu et al., 2021), it was hypothesised that: H2 -

higher levels of OMDIS engagement, defined as attending more sessions, more frequently, for longer durations, will result in statistically significant greater improvements in depression (PHQ-8), anxiety (GAD-7), distress (K10) and wellbeing (SWEMWBS), between T1 and T2.

There is evidence to suggest that greater gains are experienced in the early phases of new therapeutic interventions such as MBCT (Ietsugu et al., 2015) and cognitive behavioural therapy (CBT; Busch et al., 2006; Hunnicutt-Ferguson et al., 2012). Therefore it was hypothesised that: H3 - those with no experience of mindfulness prior to attending OMDIS, will report statistically significant higher levels of improvements in depression (PHQ-8), anxiety (GAD-7), distress (K10) and wellbeing (SWEMWBS), between T1 and T2, compared to those with prior mindfulness experience.

Those on a waiting list for psychological treatment are likely to have poorer mental health and greater need, which may result in higher motivation and engagement, that is associated with better intervention outcomes (Bachelor et al., 2007; Black et al., 2005; Rosen et al., 2004). Furthermore, those with poorer mental health are likely to have worse scores on psychological measures to begin with, and are therefore able to report greater change on measures over time compared to those with better scores to begin with, due to floor/ceiling effects. Therefore it was hypothesised that: H4 - those on a psychological waitlist will report statistically significant higher levels of improvements in depression (PHQ-8), anxiety (GAD-7), distress (K10) and wellbeing (SWEMWBS), between T1 and T2, compared to those not on a psychological waitlist. For similar reasons including greater clinical need and more scope to indicate change on measures, it was also hypothesised that: H5 - participants with depression prior to attending OMDIS (PHQ-8 $\geq$ 5 at T1) will report statistically significant greater improvements in depression (PHQ-8), anxiety (GAD-7), distress (K10) and wellbeing (SWEMWBS), between T1 and T2, compared to those who were not depressed (PHQ-8 < 5 at T1).

2. 0 Method

2.1 Design

A quantitative cross-sectional design was employed using a web-based online survey developed for the purposes of this research. Online survey methods provide good ecological validity as the intervention of interest (OMDIS) is delivered in an online format. Participants were recruited opportunistically. They were asked to complete a series of demographic questions and prevalidated standardised psychometric measures of mood and wellbeing.

A retrospective design was used to obtain current and pre-test scores of standardised measures (Pratt et al., 2000). Participants were directed to complete the same measures for two different time points, now and in the past by thinking back to a timepoint that was prior to starting any OMDIS.

2.2 Inclusion and Exclusion Criteria

The inclusion and exclusion criteria are outlined in Table 2.1.

Table 2.1

Inclusion and Exclusion Criteria for Study Recruitment

Inclusion criteria	Exclusion criteria
Aged ≥ 18 years Any geographical location	Aged < 18 years Severe depression (indicated by a score of 18 or above on the PHQ-8)
Attendance at 3 or more OMDIS in past 6 months	No or less than 3 OMDIS attended in past 6 months

OMDIS that meet the following criteria: • focussed on mental health (could be worded as stress or wellbeing) • have mindfulness as its major component • delivered based on standard mindfulness protocols	OMDIS that: • focus on outcomes other than mental health e.g., physical health or skills such as productivity • do not provide mindfulness as a major component of the sessions • are not delivered based on a standard mindfulness protocols
English speaking as all questions and measures used are in English	Cannot read or understand English
Access to the Internet to enable completion of the online survey	No access to the Internet

2.3 Survey Questions & Measures

An online survey consisting of questions developed for the current study and prevalidated outcome measures was created using the Qualtrics platform. Participants were asked to complete prevalidated measures of depression (PHQ-8), anxiety (GAD-7), distress (K10) and wellbeing (SWEMWBS), twice to capture both current post-intervention and retrospective pre-intervention mood states.

2.3.1 Questions Developed for The Current Study

To obtain sample characteristics, demographic questions were asked including: age, gender, ethnicity, geographical location, marital, parental and employment status, highest level of education attained, and subjective physical health status. Participants were also asked about the number, duration and frequency of sessions attended in the past six months, and whether they were on a waiting list for psychological therapy or had prior experience of mindfulness.

2.3.2 Measures

2.3.2.1 Patient Health Questionnaire-8 (PHQ-8). The PHQ-8 (Appendix A; (Kroenke et al., 2009) is an established brief measure designed to detect the presence and severity of current depressive symptoms. It contains eight items based on the criteria for depressive disorders in the DSM-IV. Each item is scored on a four-point Likert scale (0 = not at all to 3 = nearly every day). The total score ranges from 0 to 24 and is used as a severity measure, where 5, 10, 15 and 20 represent cutpoints for mild, moderate, moderately severe, and severe depression, respectively (Kroenke et al., 2009). The PHQ-8 was utilised both as a screening question at the start of the survey to identify those with severe depression, and to measure current and retrospective levels of depression in the survey itself. The PHQ-8 has good internal reliability (Cronbach's α = 0.85-0.92) and test-retest reliability (0.83), as well as good construct and concurrent validity (Mattsson et al., 2020; Pavlov et al., 2022; Shin et al., 2019). The PHQ-8 also has excellent sensitivity (100%) and specificity (95%) for major depressive disorder (score $\geq$ 10), and good sensitivity (70%) and specificity (98%) for any depressive disorder, in the general population (Kroenke et al., 2009).

2.3.2.2 Generalized Anxiety Disorder-7 (GAD-7). The GAD-7 (Appendix B; Spitzer et al., 2006) is a brief measure of generalised anxiety disorder (GAD) symptoms of over a two-week period. It is based on the DSM-IV criteria for GAD and contains seven items. Each item is scored on a four-point Likert scale (0 = not at all to 3 = almost every day) with total scores of 5, 10 and 15 representing cut-off points for mild, moderate, and severe anxiety respectively. It has excellent internal reliability with a Cronbach alpha of 0.92, good test-retest reliability (0.83), and good criterion, construct, factorial and procedural validity (Spitzer et al., 2006).

2.3.2.3 Kessler Psychological Distress Scale-10 (K10). The K10 (Appendix C; Kessler et al., 2003) is a brief measure of psychological distress designed for use in the general population. It contains ten items that ask about emotional states experienced in the last 4 weeks. Each item is scored on a five-point Likert scale (1 = none of the time to 5 = all of the time). Total scores range from 10 to 50, where higher scores indicate higher levels of distress. Scores brackets of 10-19, 20-24, 25-29 and 30-50 indicate the likelihood of being well or having a mild, moderate or severe mental health disorders respectively (Victorian Government - Department of Human Services, 2002). The K10 strongly discriminates between clinically and non-clinically significant disorders as defined by the DSM-IV. It has shown excellent internal reliability (Cronbach alpha 0.93) and good construct and criterion validity (Bougie et al., 2016; Kessler et al., 2002; Pereira et al., 2019; Sampasa-Kanyinga et al., 2018).

2.3.2.4 Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS). The SWEMWBS (Appendix D; Stewart-Brown et al., 2009) is brief measure of wellbeing containing seven positively worded items. Each item is scored on a five-point Likert scale (1 = none of the time to 5 = all of the time) and relates to the past two weeks. Total scores range from 7 to 35, where higher scores indicate higher levels of mental wellbeing. The SWEMWBS has good internal reliability with a Cronbach's alpha of 0.84 and good construct, criterion and discriminant validity (Fat et al., 2016; Haver et al., 2015; Vaingankar et al., 2017).

2.4 Procedure

2.4.1 Ethical Approval & Considerations

Ethical approval was granted by the School of Psychology Ethics Committee at the University of Exeter, prior to recruitment and data collection (Appendix E - Ethics Approval

Letter). No deception was involved regarding the purpose of the study and no personal identifying information was collected about participants. Participants were reminded that their participation was entirely voluntary and that they could omit any questions they did not wish to answer or withdraw from the study at any time by closing the survey window.

2.4.2 Recruitment

Private companies and organisations including universities and charities that provide OMDIS were contacted online using search websites to support participant recruitment. OMDIS providers that met the inclusion requirements were emailed to request permission to pass on the survey link to their attendees. The email invitation contained a hyperlink that interested participants could click to access the online survey.

2.4.3 Survey Structure

At the start of the survey, participants were provided with a Participant Information Sheet (Appendix F) and then asked for their informed consent (Appendix G) to participate in the study. The inclusion requirements of understanding English and having internet access were presumed at this stage of the survey. The next stage was screening, followed by demographic questions, questions developed for the study, current outcome measures, and retrospective outcome measures. The online survey was piloted by the lead researcher to take approximately 15 minutes to complete.

2.4.4 Screening

After providing consent, participants were asked to answer two screening questions that confirmed that they were: 1. aged 18 or above and 2. have attended three or more OMDIS in the past 6 months. Those who answered no to either question were not shown the

survey and instead advised that they did not meet the inclusion criteria. Those who answered yes to both screening questions, were asked to complete the PHQ-8 measure to screen for severe depression, as this was an exclusion criterion. Participants who scored above the cut-off for severe depression (decided as 18 or above on the PHQ-8) were not entered into the survey and instead advised to seek support for their mental health (Appendix H - Signposting Information). Participants who passed all three screening requirements were entered into the study.

2.4.5 Debriefing

After completing the online survey participants were shown a debrief sheet (Appendix I), which thanked them for their participation, provided a summary of the purpose of the study, signposted them to mental health support sources, and provided contact details.

2.5 Data Analysis Strategy

Data were analysed using IBM SPSS software (Version 28) for Windows. Sample characteristics were obtained from demographic question data using descriptive statistics. Paired T-tests were used to test for significant differences between the means of retrospective and current scores on depression, anxiety, distress and wellbeing measures. Repeated measures ANOVAs were used to test for significant differences in score changes over time between different subgroups within the study relevant to the hypotheses.

2.6 Power Analysis

Power was calculated using the software G*Power (Faul et al., 2007). Carmody & Baer's (2009) review of effect sizes of several MBI programs of varying session lengths and frequencies, provided a mean effect size of 0.66 (Cohen's *d*) on psychological distress. Power

calculations were therefore conducted using the effect size 0.66 (*d*), alpha level 0.05 and power 0.80 with a two-tailed paired T-test, to obtain a required total sample size of 21 participants. For multiple regression analysis, an estimated sample size of 106 participants was obtained based on seven independent variables using the formula 50+8k, where k is the number of independent variables. Therefore, for the current study a total sample size of 106 or above would be ideal.

3.0 Results

3.1 Preliminary Data Preparation

In total 262 survey responses were received, of which 111 participants dropped out before the consent questions, 12 before the screening questions, 9 before the demographic questions, and 7 before the current (post-OMDIS) measure questions. This left 123 participants, of which 11 only completed the post-OMDIS measures and 112 went on to complete both the pre- and post-OMDIS measures. Only those 112 participants with both pre- and post-intervention data were included in the study, as data analysis was not possible for those with only post-intervention data.

The relatively large sample size (n = 112) allowed normality assumptions to be met under the central limit theorem. Two cases with extreme outliers on the session number variable were removed prior to data analyses, as these values did not fit within the expected range. Other less extreme outliers were included in the data analyses, as these were deemed to be within acceptable values on the corresponding variables e.g., 120 minutes (2 hours) session duration being a possible and reasonable response. Missing data was relatively low, as there were five missing values in the session number variable (4.5%) and two missing values in the session frequency variable (1.8%). Little's missing completely at random (MCAR) test was not significant ($p = 1.00$), therefore the data was assumed to be MCAR,

which allowed the mean imputation method to be used to replace these missing values. After removing two extreme outliers and replacing seven missing values, the final dataset (n = 110) was used for descriptive and inferential statistical analyses.

3.2 Sample Characteristics

In the study sample, participants' ages ranged from 18 to 83 years old, with a mean age of 55.7 years and standard deviation of 12.4 years. Sample characteristics of the participants in this study are presented in Table 3.1. The majority of participants were female (72.3%), from the UK (76.8%), white/white other ethnicity (89.3%), married (45.5%), employed full-time (40.7%), educated to undergraduate level (42%), in good physical health (50%), and had children (61.6%). In addition, most participants had prior experience of mindfulness before attending OMDIS (91.1%) and most were not on a waiting list for psychological treatment (91.1%).

Table 3.1
Sample Characteristics

Variables and responses	n	%
Gender		
Male	31	27.7
Female	81	72.3
Country		
UK	86	76.8
Germany	4	3.6
USA	4	3.6
Isle of Man	3	2.7
Other	15	13.4
Ethnicity		
White / White other	100	89.3
Asian / Asian other	6	5.4
Mixed ethnic background	5	4.5

Other	1	0.9
Marital status		
Married	51	45.5
Never married	25	22.3
Divorced	24	21.4
Separated	6	5.4
Widowed	5	4.5
Parental status		
Have children	69	61.6
No children	43	38.4
Employment status		
Employed full-time	48	40.7
Retired	29	24.6
Employed part-time	20	16.9
Unable to work (disability)	9	7.6
Student	7	5.9
Unemployed (seeking)	3	2.5
Unemployed (not seeking)	2	1.7
Highest education level		
Undergraduate	47	42
Postgraduate	42	37.5
College	10	8.9
Doctoral	9	8
School	4	3.6
Physical health status		
Good	56	50
Average	28	25
Very good	16	14.3
Poor	11	9.8
Very poor	1	0.9
On psychological waitlist		
Yes	10	8.9
No	102	91.1
Prior experience of mindfulness		
Yes	102	91.1

No	10	8.9

Participants were also asked about the OMDIS providers they accessed. More than half of participants (56.5%) reported attending OMDIS through only one provider, whilst 40.9% reported attending sessions through two or more OMDIS providers. The majority of participants (58.0%) accessed OMDIS through a single UK-based mindfulness charity with international recognition. The remaining participants attended OMDIS provided by other mindfulness charities/organisations (14.3%), individual mindfulness providers (12.5%), religious/spiritual centres (6.3%), universities (5.4%), company employers (1.8%) and NHS services (1.8%). OMDIS providers have not been named in order to maintain organisational confidentiality. Since this study's survey was aimed at OMDIS attendees and not providers, participants were not asked about the type of OMDIS interventions and facilitator's level of experience in mindfulness delivery, as they were not expected to know this. However when selecting OMDIS providers during study recruitment, efforts were made to ensure only those providers that offered OMDIS that were facilitated by an experienced mindfulness trainer and had mindfulness practice as the main component, were approached.

3.3 Inferential Statistics

The results of the data analyses used to answer each research question and test each hypothesis will now be presented in turn.

3.3.1 – Hypothesis H1: Attendance at OMDIS will result in statistically significant improvements in psychological outcomes between T1 and T2

In order to test H1, four paired t-tests were conducted to test whether the differences between mean scores of each outcome at T1 and T2 were statistically significant (Table 3.2).

Although some assumptions of paired T-tests were met (e.g., continuous dependent variables and independent observations), the assumption of normality was not met. However T-tests are considered robust to such violations when the sample size is large as in this case (Field, 2013; Lumley et al., 2002).

Table 3.2

Mean Comparisons Between Past and Current Scores using Paired T-Tests

	T1		T2			
	M	*SD*	*M*	*SD*	*t*	Hedges' *g*
Depression	7.2	5.9	4.6	4.0	5.64***	.53
Anxiety	7.4	5.5	4.4	4.2	7.22***	.68
Distress	20.4	8.4	16.5	5.6	6.81***	.65
Wellbeing	21.4	5.5	24.0	4.4	5.56***	.53

Note. N = 110; degrees of freedom = 109; T1 = retrospective pre-OMDIS timepoint; T2 = current post-OMDIS timepoint; Hedges' *g* = measure of effect size.
*** indicates p < .001

The paired T-tests indicate that there were statistically significant differences between the retrospective (pre-OMDIS) and current (post-OMDIS) mean scores of depression, anxiety, distress and wellbeing, each in the desired direction with medium effect sizes (Hedges' *g* ranging from .53 to .68). To confirm these results, the non-parametric alternative to a paired T-test, the Wilcoxon signed-rank test was also conducted for each variable. Effect sizes were calculated using the formula $r = z/\sqrt{N}$, where N is the total number of observations. This revealed statistically significant reductions in depression (z = -5.24, p < .001, r = -0.35), anxiety (z = -6.75, p < .001, r = -0.46), and distress (z = -6.43, p < .001, r = -0.43) scores, and a statistically significant increase in wellbeing scores (z = 5.77, p < .001, r = 0.39), from pre- to post-OMDIS, all with medium effect sizes (r). Results from both the

paired T-tests and Wilcoxon signed-rank tests suggest that attendance at OMDIS is efficacious in improving depression, anxiety, distress and wellbeing, and therefore H1 is supported.

3.3.2 – Assumptions of Repeated Measures ANOVA

The following hypotheses (H2 to H5) were tested using two-way repeated measures (RM) ANOVAs and the assumptions of independent observations, normality, sphericity and homogeneity of variance (HoV) were assessed for in each. For all RM ANOVAs, the assumption of independent observations was met (as participants were independent of each other) and sphericity was met (as all RM ANOVAs involved two levels in each factor therefore this condition did not apply). The assumption of normality was not met (as most dependent variables were positively skewed), however RM ANOVA is considered to be robust against such violations when sample sizes are reasonably large as in this study's case (Blanca et al., 2017; Pallant, 2020).

3.3.3 – Hypothesis H2: Higher levels of engagement in OMDIS, by attending more sessions, more frequently, for longer durations, will result in statistically significant greater improvements in psychological outcomes between T1 and T2

In order to test hypothesis H2, participants were divided into two groups using the transform variable tool in SPSS, based on session number (low < 25 sessions and high ≥ 25 sessions), session duration (short < 45 min and long ≥ 45 min), and session frequency (low < 3 times/week and high ≥ 3 times/week). These cut off points were decided based on trials using different cut off points, which found that splitting participants into subgroups at these points created the most equal samples possible with each given data set, which supports the ANOVA assumption of equal sample sizes in subgroups. These cut off points also have face

validity i.e., they represent what the category suggests e.g., attending more than 3 sessions a week would be considered a 'high' attendance level in the real world.

Using these transformed variables, several two-way RM ANOVAs were conducted for each psychological outcome and for each independent variable, with session number (Table 3.3), duration (Table 3.4) and frequency (Table 3.5) as the between-subjects factor in each ANOVA, and time (T1 and T2) as the within-subjects factor.

Table 3.3

Two-way Repeated Measures ANOVA for Impact of Number of Sessions Attended

Measure	Low session no. (n = 56)		High session no. (n = 54)		Main time effect		Main session no. effect		Time x Session no. interaction	
	M	*SD*	*M*	*SD*	*F*	ηp^2	*F*	ηp^2	*F*	ηp^2
Depression										
T1	7.6	6.4	6.9	5.5						
T2	5.2	4.4	4.1	3.5	31.69***	.23	1.21^{ns}	.01	0.17^{ns}	.002
Anxiety										
T1	7.2	5.5	7.5	5.5						
T2	4.7	4.1	4.1	4.3	52.47***	.33	0.06^{ns}	.001	1.23^{ns}	.01
Distress										
T1	21.0	9.0	19.8	7.8						
T2	17.3	6.1	15.6	5.0	46.12***	.30	1.44^{ns}	.01	0.13^{ns}	.001
Wellbeing										
T1	21.1	5.8	21.8	5.2						
T2	23.6	4.2	24.4	4.6	30.69***	.22	0.90^{ns}	.008	0.01^{ns}	.0001

Note. N=110; degrees of freedom = 1, 108; ANOVA = analysis of variance; no. = number; T1 = retrospective past scores; T2 = current scores; ηp^2 = partial eta squared (measure of effect size). ^{ns} indicates non-significant p value; *** indicates $p < .001$

The results indicate that there was a statistically significant main effect of time (T1 to T2) on depression, anxiety, distress and wellbeing, each with large effect sizes (all $\eta p^2 > .22$), such that all psychological outcomes improved over time, regardless of number of sessions

attended. However there were no statistically significant main effects of session number on depression, anxiety, distress or wellbeing when averaged across timepoints. Time x session number interactions were not statistically significant for depression, anxiety, distress and wellbeing, therefore H2 is not supported for session number.

Table 3.4

Two-way Repeated Measures ANOVA for Impact of Session Duration

Measure	Short duration (n = 77)		Long duration (n = 33)		Main time effect		Main duration effect		Time x Duration interaction	
	M	*SD*	*M*	*SD*	*F*	ηp^2	*F*	ηp^2	*F*	ηp^2
Depression										
T1	6.6	5.1	8.7	7.4						
T2	4.6	3.8	4.7	4.4	36.63***	.25	1.53^{ns}	.01	4.07*	.04
Anxiety										
T1	6.9	5.1	8.4	6.1						
T2	4.2	4.1	4.8	4.5	48.43***	.31	1.34^{ns}	.01	0.77^{ns}	.01
Distress										
T1	19.7	7.5	22.1	10.2						
T2	16.4	5.3	16.7	6.4	48.21***	.31	0.98^{ns}	.01	2.66^{ns}	.02
Wellbeing										
T1	22.1	5.1	19.9	6.2						
T2	24.2	4.2	23.5	4.8	32.29***	.23	2.71^{ns}	.02	1.96^{ns}	.02

Note. N=110; degrees of freedom = 1, 108; ANOVA = analysis of variance; T1 = retrospective past scores; T2 = current scores; ηp^2 = partial eta squared (measure of effect size).

^{ns} indicates non-significant p value; * indicates $p < .05$; *** indicates $p < .001$

These results indicate that there was a statistically significant main effect of time on depression, anxiety, distress and wellbeing, each with large effect sizes (all $\eta p^2 > .23$). However there were no statistically significant main effects of session duration on depression, anxiety, distress or wellbeing, averaged across timepoints. Time x session duration interaction was statistically significant for depression with a small effect size, but

not statistically significant for anxiety, distress and wellbeing. However a significant Levene's test was found for depression and distress, therefore Welch's one-way ANOVAs were performed for these two outcomes. This indicated: change in depression scores were not statistically significantly different in those who attended short sessions (M = 2.0, SD = 4.0) compared to those who attended long sessions (M = 4.0, SD = 6.2), $F(1, 43.75) = 2.90$, p = .096, $\omega^2 = .03$; and change in distress scores were also not statistically significantly different in those who attended short sessions (M = 3.3, SD = 5.1) compared to those who attended long sessions (M = 5.4, SD = 7.7), $F(1, 44.52) = 1.93$, p = .171, $\omega^2 = .02$. The findings for depression on the RM ANOVA and Welch's ANOVA are conflicting, however the latter is considered more reliable and therefore will be used to test hypothesis H2, which is not supported for session duration.

Table 3.5

Two-way Repeated Measures ANOVA for Impact of Session Frequency

Measure	Low frequency (n = 62)		High frequency (n = 48)		Main time effect		Main frequency effect		Time x Frequency interaction	
	M	*SD*	*M*	*SD*	*F*	ηp^2	*F*	ηp^2	*F*	ηp^2
Depression										
T1	7.3	6.2	7.1	5.6						
T2	5.0	4.3	4.2	3.6	32.02***	.23	0.34^{ns}	.003	0.36^{ns}	.003
Anxiety										
T1	7.0	5.4	7.9	5.6						
T2	4.4	4.2	4.4	4.2	53.65***	.33	0.26^{ns}	.002	1.43^{ns}	.01
Distress										
T1	20.5	8.8	20.2	8.1						
T2	17.0	6.3	15.8	4.6	46.66***	.30	0.34^{ns}	.003	0.49^{ns}	.004
Wellbeing										
T1	21.5	5.6	21.3	5.4						
T2	24.0	4.7	24.1	4.1	30.65***	.22	0.002^{ns}	.00002	0.10^{ns}	.001

Note. N = 110; degrees of freedom = 1, 108; ANOVA = analysis of variance; T1 = retrospective past scores; T2 = current scores; ηp^2 = partial eta squared (measure of effect size).
^{ns} indicates non-significant p value; *** indicates $p < .001$

Results indicate there was a statistically significant main effect of time on depression, anxiety, distress and wellbeing, each with large effect sizes (all $\eta p^2 > .22$). However there were no statistically significant main effects of session frequency on depression, anxiety, distress or wellbeing, when averaged across timepoints. Time x session frequency interactions were not statistically significant for depression, anxiety, distress and wellbeing, therefore H2 is not supported for session frequency.

3.3.4 – Hypothesis H3: Those with no experience of mindfulness prior to attending OMDIS, will report statistically significant higher levels of improvements in psychological outcomes measured between T1 and T2, compared to those with prior mindfulness experience

In order to test H3, a two-way repeated measures ANOVA was conducted for each psychological outcome, with prior mindfulness experience (PME) as the between-subjects factor and time (T1 and T2) as the within-subjects factor (Table 3.6).

Table 3.6
Two-way Repeated Measures ANOVAs for Impact of Prior Mindfulness Experience (PME)

Measure	Yes PME (n = 100)		No PME (n = 10)		Main time effect		Main PME effect		Time x PME interaction	
	M	*SD*	*M*	*SD*	*F*	ηp^2	*F*	ηp^2	*F*	ηp^2
Depression										
T1	6.9	5.6	10.6	8.2						

T2	4.4	3.8	6.5	5.2	16.72***	.13	3.93^{ns}	.04	1.06^{ns}	.01
Anxiety										
T1	7.2	5.3	9.0	6.7						
T2	4.4	4.3	4.2	3.2	28.42***	.21	0.30^{ns}	.003	2.02^{ns}	.02
Distress										
T1	20.1	8.1	23.9	11.4						
T2	16.5	5.6	16.7	5.9	29.53***	.21	0.90^{ns}	.01	3.26^{ns}	.03
Wellbeing										
T1	21.6	5.3	19.7	7.0						
T2	24.2	4.5	22.1	2.6	9.57**	.08	1.94^{ns}	.02	0.01^{ns}	.0001

Note. N=110; degrees of freedom = 1, 108; ANOVA = analysis of variance; T1 = retrospective past scores; T2 = current scores; ηp^2 = partial eta squared (measure of effect size).
^{ns} = non-significant p value; ** indicates $p < .01$; *** indicates $p < .001$

The results indicate that there was a statistically significant main effect of time on depression, anxiety, distress and wellbeing, with medium to large effect sizes (ηp^2 .08 to .21). However there were no statistically significant main effects of PME on depression, anxiety, distress or wellbeing, when averaged across timepoints. Time x PME interactions were not statistically significant for depression, anxiety, distress, and wellbeing, therefore H3 is not supported. However the unequal sample sizes between subgroups mean results should be interpreted with caution.

3.3.5 – Hypothesis H4: Those on a psychological waitlist will report statistically significant higher levels of improvements in psychological outcomes measured between T1 and T2, compared to those not on a psychological waitlist

To test H4, a two-way repeated measures ANOVA was conducted for each psychological outcome, with waitlist as the between-subjects factor and time (T1 and T2) as the within-subjects factor (Table 3.7).

Table 3.7

Two-way Repeated Measures ANOVA for Impact of Being on a Psychology Waitlist

Measure	On waitlist (n = 10)		Not on waitlist (n = 100)		Main time effect		Main waitlist effect		Time x Waitlist interaction	
	M	*SD*	*M*	*SD*	*F*	ηp^2	*F*	ηp^2	*F*	ηp^2
Depression										
T1	10.9	6.8	6.9	5.8						
T2	6.9	3.8	4.4	4.0	16.24***	.13	5.10*	.05	0.92^{ns}	.008
Anxiety										
T1	12.2	5.7	6.9	5.2						
T2	7.9	5.0	4.0	3.9	24.93***	.19	11.03**	.09	1.06^{ns}	.01
Distress										
T1	25.5	9.3	19.9	8.2						
T2	20.9	5.6	16.0	5.5	17.62***	.14	6.17*	.05	0.13^{ns}	.001
Wellbeing										
T1	18.2	7.3	21.8	5.2						
T2	21.7	4.5	24.2	4.3	13.80***	.11	4.60*	.04	0.41^{ns}	.004

Note. N=110; degrees of freedom = 1, 108; ANOVA = analysis of variance; T1 = retrospective past scores; T2 = current scores; ηp^2 = partial eta squared (measure of effect size).

^{ns} = non-significant p value; * indicates p < .05; ** indicates p < .01; *** indicates p < .001

There was a statistically significant main effect of time on depression, anxiety, distress and wellbeing, with medium to large effect sizes (ηp^2 .11 to .19). There was a statistically significant main effect of waitlist on depression, anxiety, distress and wellbeing, with small to medium effect sizes (ηp^2 .04 to .09), such that those on a psychological waitlist reported higher depression, anxiety and distress scores and lower wellbeing scores than those

not, when averaged across timepoints. The results indicate that time x waitlist interactions were not statistically significant for depression, anxiety, distress and wellbeing, therefore H4 is not supported. However the large difference between sample sizes of subgroups means results should be interpreted with caution.

3.3.6 – Hypothesis H5: Participants with depression prior to attending OMDIS (PHQ-8 ≥ 5 at T1) will report statistically significant greater improvements in psychological outcomes between T1 and T2, compared to those who were not depressed (PHQ-8 < 5 at T1)

In order to test H5, participants retrospective PHQ-8 scores were used to split the sample into two groups using the transform variable tool in SPSS. Those with total PHQ-8 scores of less than five were categorised as 'not depressed', and those with scores of five or more were categorised as 'depressed'. Conducting repeated measures ANOVAs revealed a significant Levene's statistic on most T1 and T2 outcome measure variables ($p < .001$), violating the assumption of HoV. Therefore Welch's one-way ANOVAs were conducted for change in scores on each psychological outcome, with past depression status as the between-subjects factor (Table 3.8).

Table 3.8

Welch's One Way ANOVAs for Impact of Past Depression on Change in Scores

Measure	Not depressed (n = 45)		Depressed (n = 65)		*df*	Welch's *F*	ω^2
	M	*SD*	*M*	*SD*			
Depression change	0.02	1.4	4.4	5.5	1, 75.58	37.10***	.19
Anxiety change	1.04	2.2	4.3	4.9	1, 95.21	22.20***	.13
Distress change	0.64	2.4	6.2	6.8	1, 84.75	37.44***	.20

Wellbeing change	-1.49	3.8	-3.3	5.4	1, 107.96	4.38*	.03

Note. N=110; ANOVA = analysis of variance; ω^2 = omega squared (for effect size).
* indicates $p < .05$; *** indicates $p < .001$

Results indicate statistically significant greater improvements in depression with large effect size ($\omega^2 = .19$), anxiety with medium effect size ($\omega^2 = .13$), distress with large effect size ($\omega^2 = .20$), and wellbeing with small effect size ($\omega^2 = .03$), in those who were depressed prior to attending OMDIS compared to those who were not depressed. This supports H5.

4.0 Discussion

4.1 Discussion of Key Findings

The current study aimed to investigate the impact of attending OMDIS on depression, anxiety, distress and wellbeing, by answering the following research questions:

4.1.1 Are OMDIS efficacious in improving psychological outcomes?

Hypothesis H1 predicted that attendance at OMDIS would result in improvements on psychological outcomes over time, and this was supported by the findings that suggest OMDIS are efficacious in improving depression, anxiety, distress and wellbeing. This is in keeping with other similar online MBIs that have well-documented efficacy in improving psychological outcomes (Liu et al., 2022; Sevilla-Llewellyn-Jones et al., 2018; Spijkerman et al., 2016; Yeun & Kim, 2022). However the current study is the first to explore the naturalistic efficacy of OMDIS and therefore provides a unique contribution to the evidence base on MBIs. This is important because OMDIS are different to other online MBIs in that they are: offered as drop-in sessions meaning people can attend for longer or shorter periods than the standard 8-week MBIs, freely available online to people from all populations, often

have no waiting lists, and often consist of more mindfulness practice than standard MBIs which include other activities, exercises and discussions. As this type and level of mindfulness service has developed organically and rapidly in recent years, researchers have not kept pace with these developments so efficacy has not been examined until now.

4.1.2 How much engagement with OMDIS is required to attain mental health benefits?

Hypothesis H2 predicted that higher levels of engagement in OMDIS, defined as attending more sessions for longer durations more frequently, will result in greater improvements in psychological outcomes over time. This was not supported as no difference in change in depression, anxiety, distress and wellbeing scores over time was found between those with low and high number of sessions attended, those who attended short and long sessions, and those with low and high frequency of attendance. These findings contrast with Zhu et al. (2021) who reported mindfulness practice frequency predicted improvement in depression and anxiety, however are in agreement with Strohmaier's findings reporting no dose-response relationships between MBIs and psychological outcomes (Strohmaier, 2020). The findings from this study suggest that high engagement with OMDIS, defined as attending 25 or more sessions, or attending sessions of 45 minutes or longer, or attending sessions three or more times a week, is not required to attain greater improvements in psychological outcomes. An explanation of this could be that the quality of mindfulness practice is more important in improving mental health outcomes than the quantity of engagement.

4.1.3 Who benefits most from OMDIS?

In order to explore who benefits most from OMDIS, the factors: prior mindfulness experience (PME), being on a psychological waitlist for treatment, and having depression

pre-OMDIS, were investigated to assess which of these impact change in psychological outcomes over time whilst attending OMDIS.

Hypothesis H3 predicted that those with no PME will report greater improvements in psychological outcomes over time compared to those with PME, and this was not supported as there was no difference in change in depression, anxiety, distress and wellbeing over time between those with and those without PME. This finding suggests that PME is not a prerequisite for OMDIS to be efficacious as it made no difference to the benefits experienced. Kiken et al. (2015) suggest that development of trait mindfulness from state mindfulness through meditation practice leads to psychological benefits, and that individuals' trajectories of this change vary. This may explain why no difference was found in change scores between those with and without PME, as each individual may be at a different stage in their development of trait mindfulness whilst attending OMDIS, regardless of whether they had PME or not. Also, in the current study participants were not asked how much PME they had, but only if they had any PME before attending OMDIS. This could therefore include a range of levels of experience in the group with PME and may also explain the findings.

Hypothesis H4 predicted that those on a psychology waitlist will report greater improvements in psychological outcomes over time compared to those not on a waitlist, and this was not supported as there was no difference in change in depression, anxiety, distress and wellbeing over time between those on a psychology waitlist and those not. This finding suggests that OMDIS are equally efficacious for those on a psychology waitlist and those who are not on a waitlist, as this factor seem to make no difference to the benefits experienced. However these findings should be interpreted with caution because there were only ten participants who were on a waitlist compared to 100 participants who were not, meaning that the former result may not be as reliable as the latter since the findings are based on a very small number of participants and is therefore susceptible to variability.

Furthermore, no studies were found that explored the efficacy of online MBIs on those on a waitlist compared to those not, as most studies used waitlist as a control group rather than an intervention condition, therefore direct comparisons are not possible. Further research with larger sample sizes of those on a waitlist attending OMDIS will enable the validity of findings in this study to checked.

Hypothesis H5 predicted that participants with depression prior to attending OMDIS will report greater improvements in psychological outcomes over time compared to those who were not depressed. This was supported by the findings that suggest those who were depressed prior to attending OMDIS showed greater improvements in depression, anxiety, distress, and wellbeing, compared to those who were not depressed. This means that those with past depression may benefit more from attending OMDIS than those not depressed, suggesting that OMDIS may be used as an alternative to antidepressants or psychological therapy. These findings are similar to several studies that also reported efficacy of MBIs in improving psychological outcomes in a clinically depressed population (Klainin-Yobas et al., 2012; Ritvo et al., 2021; Sommers-Spijkerman et al., 2021; Strauss et al., 2014), however adds a new and useful contribution to the literature by providing evidence for the efficacy of OMDIS in improving psychological outcomes in those with depression.

4.2 Clinical Implications

Since this study provides evidence to support the efficacy of OMDIS in improving psychological outcomes in the general population, OMDIS may be offered as a more flexible, convenient, and cost and time-effective alternative to standard eight-week MBIs. In addition, OMDIS may also be used as an alternative to antidepressants or psychological therapy for depression, as the findings suggest that OMDIS are efficacious in improving psychological outcomes in those with depression (PHQ-8 $\geq$ 5). Furthermore, OMDIS can be offered to

people on waiting lists for psychological treatment in the NHS, as findings from this study suggest that it is efficacious in improving psychological outcomes in this population. This could have several benefits including: providing those on waitlists a useful and flexible option that may improve their mental health instead of no support whilst waiting to be seen by a mental health professional; and reducing the burden on NHS services that are over-stretched and under-resourced. The findings of this study could also help to inform the development of future OMDIS in the most effective way for different client groups and purposes. For example since session duration did not impact changes in outcomes, OMDIS can be designed with shorter sessions as a more cost-effective and accessible intervention to a variety of people, including those with health conditions that mean longer sessions are not suitable.

4.3 Strengths, Limitations and Future Research

This is the first study to date to systematically explore the efficacy of routinely delivered OMDIS in naturalistic settings on psychological outcomes, which is important because this is an unexplored area in the literature despite the rapid increase in availability of OMDIS during the Covid-19 pandemic. As such it offers a unique insight into the demographics of people who attend OMDIS internationally, reports the efficacy of OMDIS, and explores factors that influence this efficacy in terms of the levels of engagement required to attain mental health benefits and the types of people who benefit most from OMDIS.

The current study explored many potential variables that could impact treatment efficacy (e.g., depression status and intensity of OMDIS attendance) and sets the foundation for future studies to explore potential areas of interest in more depth. The findings suggest OMDIS may have clinical utility as an option to support people on waiting lists for mental health treatment. Other potential strengths of the current study include its relatively large

sample size overall and international recruitment of participants allowing greater generalisability of findings.

In contrast, a limitation of this study was that data analysis was unreliable/under-powered in cases where one group in a repeated measures ANOVA was small e.g., those on a waitlist (n = 10), as this limits the validity of the results obtained from these analyses. Future studies should ensure sufficient and similar numbers of participants are recruited for each subgroup being explored to ensure reliable conclusions can be drawn.

Another obstacle encountered during this study was the lack of definition of OMDIS in the current literature or publicly, which meant that participants were not easy to identify or access. This made recruitment difficult as individual organisations had to be sought and approached in order to request access to their attendees, which created a barrier between the researchers and participants. This recruitment of OMDIS attendees through OMDIS providers may have led to some selection bias e.g., if the survey was only passed on to certain attendees such as those doing well. However in general OMDIS providers informed the researchers that their method of survey distribution was through mailing lists and by mentioning at the start/end of mindfulness drop-in sessions, which would suggest relatively equal distribution amongst their attendees.

Sample characteristics indicate that the majority of participants in this study were white, female, and from the UK, however since there is no standard data on the population of people who attend OMDIS, it is difficult to ascertain whether the sample in this study is representative of the overall population of OMDIS attendees. For example it may be that most OMDIS attendees are in fact based in the UK, or since recruitment took place from the UK albeit online, this may have led to UK OMDIS providers being more likely to engage in the study than those from other countries, perhaps due to familiarity and trust.

As this study used a retrospective design, it is important to consider the advantages and limitations of this approach. Although the measures used in this study were reworded for use in a retrospective context and received ethical approval for this, they currently lack psychometric support for retrospective use. Other potential limitations of the retrospective approach include recall bias due to memory distortion/degradation, demand characteristics, cognitive dissonance between attendance behaviour and intervention impact (may lead to overinflation of improvements reported), and increased participant burden due to a lengthier survey at one timepoint (Geldhof et al., 2018; Hill & Betz, 2005; Little et al., 2020; Pratt et al., 2000; Talari & Goyal, 2020). It is also unknown whether the retrospective pre-OMDIS data would have correlated with the 'real time' pre-OMDIS data had it been collected. Given these limitations, the findings from this study should be considered exploratory and interpreted with caution.

Furthermore the retrospective methodology meant that pre- (baseline) data was collected in the latter part of the survey after post-intervention data. This meant that those who did not complete the survey (11 participants), lacked baseline data and were therefore excluded from the study as data analysis was not possible. However, this is unlikely to have impacted the results given the relatively large sample size and the fact that all participants ultimately included in the study (n = 110) had a complete dataset with all pre- and post-OMDIS scores.

Advantages of using the retrospective approach include reduced response shift bias where a person's frame of reference changes from pre- to post-test having experienced an intervention, and reduced retest effects and attrition as data was collected at a single timepoint (Drennan & Hyde, 2008; Hill & Betz, 2005; Little et al., 2020; Nicholson et al., 1985; Nimon et al., 2011). Importantly, using a retrospective approach enabled data

collection from several OMDIS providers internationally, which would have been unfeasible as a longitudinal study due to limited time and resources (Geldhof et al., 2018).

4.4 Conclusion

The current study is the first to explore the impact of OMDIS on psychological outcomes in the general population. The findings suggest that: OMDIS may be efficacious in improving psychological outcomes; attending more sessions, more frequently, for longer durations may not be required to attain these benefits; and being on a psychology waitlist or having prior mindfulness experience might not lead to greater benefits, whereas having depression prior to attending OMDIS may lead to greater improvements in psychological outcomes. Therefore OMDIS may be a cost-effective option for those on mental health waiting lists or as an alternative treatment for those with depression. Further research is needed to explore the efficacy of OMDIS in specific populations e.g., those with mental health conditions and to investigate other factors that may impact the efficacy of OMDIS.

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Appendices

Appendix A: Depression Measure

Patient Health Questionnaire – 8 (PHQ-8)

PATIENT HEALTH QUESTIONNAIRE-8 (PHQ-8)

Over the last 2 weeks, how often have you been bothered by any of the following problems? *(Use "✔" to indicate your answer)*	**Not at all**	**Several days**	**More than half the days**	**Nearly every day**
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3

Appendix B: Anxiety Measure

General Anxiety Disorder-7 (GAD-7)

GAD-7 Anxiety

Over the last 2 weeks, how often have you been bothered by the following problems? *(Use "✔" to indicate your answer)*	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3

Column totals: ___ + ___ + ___ + ___

= *Total Score* _____

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
☐	☐	☐	☐

Appendix C: Distress Measure

Kessler Psychological Distress Scale – 10 (K10)

Kessler Psychological Distress Scale (K10)

Please tick the answer that is correct for you:	All of the time (score 5)	Most of the time (score 4)	Some of the time (score 3)	A little of the time (score 2)	None of the time (score 1)
1. In the past 4 weeks, about how often did you feel tired out for no good reason?					
2. In the past 4 weeks, about how often did you feel nervous?					
3. In the past 4 weeks, about how often did you feel so nervous that nothing could calm you down?					
4. In the past 4 weeks, about how often did you feel hopeless?					
5. In the past 4 weeks, about how often did you feel restless or fidgety?					
6. In the past 4 weeks, about how often did you feel so restless you could not sit still?					
7. In the past 4 weeks, about how often did you feel depressed?					
8. In the past 4 weeks, about how often did you feel that everything was an effort?					
9. In the past 4 weeks, about how often did you feel so sad that nothing could cheer you up?					
10. In the past 4 weeks, about how often did you feel worthless?					

Appendix D: Wellbeing Measure

Short Warwick–Edinburgh Mental Well-being Scale (SWEMWBS)

The Short Warwick–Edinburgh Mental Well-being Scale (SWEMWBS)

Below are some statements about feelings and thoughts.
Please tick the box that best describes your experience of each over the last 2 weeks

STATEMENTS	None of the time	Rarely	Some of the time	Often	All of the time
I've been feeling optimistic about the future	1	2	3	4	5
I've been feeling useful	1	2	3	4	5
I've been feeling relaxed	1	2	3	4	5
I've been dealing with problems well	1	2	3	4	5
I've been thinking clearly	1	2	3	4	5
I've been feeling close to other people	1	2	3	4	5
I've been able to make up my own mind about things	1	2	3	4	5

Appendix E: Ethics Approval Letter

CLES – Psychology
Psychology
College of Life and Environmental Sciences
University of Exeter
Washington Singer Building
Perry Road
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CLES – Psychology Ethics Committee

Dear Sonam Nagrani

Ethics application - eCLESPsy002056
The Impact of Attending Online Mindfulness Drop-In Sessions on Depression, Anxiety, Distress and Wellbeing in the General Population

Your project has been reviewed by the CLES – Psychology Ethics Committee and has received a Favourable opinion.

The Committee has made the following comments about your application:
Ken Laidlaw commented, These necessary final changes to the protocol strengthen the project and are more likely to make the study easier to interpret and hopefully to achieve publication therefore this will likely ensure the responde nts data are used for the purposes that they consent to: Impactful research advancing scientific kno wledge

- Please view your application at https://eethics.exeter.ac.uk/CLESPsy/ to see comments in full.
If you have received a Favourable with conditions, Provisional or unfavourable outcome you are required to re-submit for full review and/or confirm that committee comments have been addressed before you begin your research.

If you have any further queries, please contact your Ethics Officer.

Yours sincerely

Date: 14/09/2021

CLES – Psychology Ethics Committee

Appendix F: Participant Information Sheet

Title of Project: The Impact of Attending Online Mindfulness Drop-In Sessions on Depression, Anxiety, Distress and Wellbeing in the General Population

Researcher name: Sonam Nagrani

Invitation:

Thank you for your interest in this study. Please take time to consider the information provided here carefully and to discuss it with family or friends if you wish. If you wish to ask the researchers any questions before proceeding, contact details are provided at the end of this information sheet.

Purpose of the research:

The aim of this study is to understand the impact of attending online mindfulness drop-in sessions on mental health (depression, anxiety and distress) and wellbeing in people from the general population.

It is hoped that this study will help to address an area of research that is currently lacking and that the results would help to improve the awareness, understanding and delivery of such drop-in sessions, given their abundance of availability online especially during the Covid-19 pandemic.

Why have I been approached?

You have been approached because we are seeking people who have attended at least 3 online mindfulness drop-in sessions in the past 6 months to take part in our survey.

We are recruiting participants by contacting online mindfulness drop-in session providers and advertising on social media platforms; therefore you may have been approached via any of these routes.

What would taking part involve?

Participation in this study will involve completing an online survey that will take around 25 minutes to complete. The questions will be a mixture of multiple choice, yes/no, rating scales and short free text answers. The questions included will be around demographic information, the online mindfulness drop-in sessions you attended, and your current and previous (before attending any sessions) levels of depression, anxiety, distress and wellbeing.

Once you reach the end of the survey and submit your answers, you will be shown debrief information about the study and sources of support should this be required.

What are the possible benefits of taking part?

Although we cannot ensure that you will receive direct or specific benefits from taking part in the study, you may find the experience of completing the online survey about your attendance at online mindfulness drop-in sessions and your mental health and wellbeing to be validating and supportive.

Furthermore, it is hoped that the results of this research will help to improve the awareness, understanding and delivery of such drop-in sessions, which may benefit you and other people who attend these sessions in the future.

What are the possible disadvantages and risks of taking part?

We do not believe that taking part in the study has any foreseeable risks to participants. The survey does however include questions about mental health, but these do not intend to cause any distress. You will however be provided with information about sources of support at the end of the survey, in case the questions or topics raised do upset or trigger you in any way.

What will happen if I don't want to carry on with the study?

If you do not wish to proceed with the study you can stop at any time without having to give a reason. You can stop taking part in the online survey by simply closing the internet browser tab or window. However since data is collected anonymously, you cannot withdraw your responses to the questions you have already submitted, as it would be impossible to work out which answers were yours.

How will my information be kept confidential?

The University of Exeter processes personal data for the purposes of carrying out research in the public interest. The University will endeavour to be transparent about its processing of your personal data and this information sheet should provide a clear explanation of this. If you do have any queries about the University's processing of your personal data that cannot be resolved by the research team, further information may be obtained from the University's Data Protection Officer by emailing informationgovernance@exeter.ac.uk. or at www.exeter.ac.uk/ig/.

There will be no personal identifiable information asked for during the online survey, therefore your identity will remain anonymous. Only the project lead (Sonam Nagrani) and project supervisor (Prof. Ken Laidlaw) will have access to the data obtained in this study. All data will be stored securely on password-protected university servers and retained for a period of 5 years after which it will be permanently deleted. This information will be kept confidential and not shared with other members of the wider research team or university staff.

Will I receive any payment for taking part?

Unfortunately, this project is not financially funded, therefore no payment will be offered to participants for taking part. The survey will take place entirely online, therefore participants will not incur any travel expenses as a result of taking part in this study.

What will happen to the results of this study?

The results of this study will be anonymously summarised in a project report, which will be submitted to the University of Exeter as an assignment and published on the University of Exeter DClinPsy website. This would be freely accessible to participants at the end of the project, should they wish to access it. The study results may also be published as an article in a journal such as the British Journal of Clinical Psychology and presented at psychology conferences.

Steps will be taken to ensure that no participants will be personally identifiable in any reports or write-ups resulting from the study e.g. no individual responses will be referred to and only general conclusions will be drawn from the overall data.

Who is organising and funding this study?

The research is being conducted by a Clinical Psychology trainee at the University of Exeter as part of their major research project (doctoral thesis), under the supervision of a qualified clinical psychologist with expertise in research (who is also a Professor of Clinical Psychology and Programme Director at the University of Exeter). Funding has not been required or used to conduct this study.

Who has reviewed this study?

This project has been reviewed by the Psychology Research Ethics Committee at the University of Exeter.

Further information and contact details

If you would like further information about the study or have any questions, please contact the research team using the contact details below:

Sonam Nagrani - Project Lead (Clinical Psychology trainee)
sn393@exeter.ac.uk

Prof. Ken Laidlaw - Project Supervisor (Professor of Clinical Psychology and Programme Director at the University of Exeter)
k.laidlaw@exeter.ac.uk

If you are not happy with any aspect of the study or wish to make a complaint, you can contact the project supervisor (details above) or the Research Ethics and Governance Manager detailed below:

Gail Seymour - Research Ethics and Governance Manager
g.m.seymour@exeter.ac.uk
01392 726621

Finally, I would like to thank you for your interest in this project and wish you all the best for the future.

Appendix G: Consent Form

CONSENT FORM - ONLINE SURVEY

Title of Project: The Impact of Attending Online Mindfulness Drop-In Sessions on Depression, Anxiety, Distress and Wellbeing in the General Population

Name of Researcher: Sonam Nagrani

	Please tick box
1. I confirm that I have read the participant information sheet dated 16-04-21 (version 1.0) for the above project. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without my legal rights being affected.	☐
3. I understand that relevant sections of the data collected during the study, may be looked at by members of the research team from the University of Exeter, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my survey responses.	☐
4. I understand and agree that taking part in this study involves anonymous survey responses (that do not reveal your identity) to be used for the purposes of: a) inclusion in an archive for a period of up to 5 years b) an academic assignment report to be submitted to the University of Exeter and uploaded to the university's DClinPsy website c) publication in a research journal such as the British Journal of Clinical Psychology	☐
5. I agree to take part in the above project.	☐

Name of Participant	Date	Signature
Name of researcher taking consent	Date	Signature

When completed: 1 copy for participant; 1 copy for researcher/project file.

Appendix H: Signposting Information

Signposting Information

This information will be displayed to participants if their total score on the PHQ-8 screening question is above the cut off for severe depression

Thank you for answering the screening questions.

Based on your answers it seems that you may be experiencing high levels of depression and therefore are unfortunately not suitable to participate in this study.

Please bear in mind however that the questionnaire is not diagnostic and everyone experiences low mood from time to time.

We advise that you please seek help in one of the following ways:

- Contact your GP (General Practitioner Doctor) for support with your mental health
- Contact your local NHS urgent mental health helpline by visiting https://www.nhs.uk/service-search/mental-health/find-an-urgent-mental-health-helpline, which will provide you with the phone number for your local helpline (available 24 hours a day, England only)
- Call 111 for urgent advice (England only)
- If you live outside of the UK, please use the contact support numbers relevant to your country

In addition to the sources of support above, you may also find it helpful to:

- Talk to a friend or family member
- Access the Samaritans via www.samaritans.org or call 116 123 (open 24/7) free of charge for support with mental health
- Look at the Mind website at www.mind.org.uk for resources and information on mental health.

Research team's contact details:

For further information or any questions or concerns, you may also contact the research team using the details below:

- Sonam Nagrani - Project Lead (Clinical Psychology trainee) at sn393@exeter.ac.uk
- Prof. Ken Laidlaw - Project Supervisor (Professor of Clinical Psychology and Programme Director at the University of Exeter) at k.laidlaw@exeter.ac.uk

If you are not happy with any aspect of the study or wish to make a complaint, you can contact the project supervisor (details above) or the Research Ethics and Governance Manager detailed below:

- Gail Seymour - Research Ethics and Governance Manager at g.m.seymour@exeter.ac.uk or call on 01392 726 621.

Appendix I: Debrief Sheet

Debrief Sheet

Thank you for taking part in this study.

We hope that the responses received from this survey will help us to better understand the impact of attending online mindfulness drop-in sessions on the mental health and wellbeing of people in the general population, as this is currently an area that is lacking research. The results of this study could help to improve the awareness, understanding and delivery of such drop-in sessions.

Mental health concerns:

If the questions or topics raised in this study have left you feeling upset, vulnerable or triggered in any way, we advise that you please seek help in a way that is most suitable and accessible to you. Some suggestions are to:

- Talk to a friend or family member
- Access the Samaritans via www.samaritans.org or call 116 123 (open 24/7) free of charge for support with mental health
- Look at the Mind website at www.mind.org.uk for resources and information on mental health.

If you have more serious or urgent mental health concerns following this study, please:

- Contact your GP (General Practitioner Doctor)
- Contact your local NHS urgent mental health helpline by visiting https://www.nhs.uk/service-search/mental-health/find-an-urgent-mental-health-helpline, which will provide you with the phone number for your local helpline (available 24 hours a day, England only)
- Call 111 for urgent advice (England only)
- If you live outside of the UK, please use the contact support numbers relevant to your country.

Questions or concerns about the study:

If you would like further information about the study or have any questions or concerns, please contact the research team using the details below:

- Sonam Nagrani - Project Lead (Clinical Psychology trainee) at sn393@exeter.ac.uk
- Prof. Ken Laidlaw - Project Supervisor (Professor of Clinical Psychology and Programme Director at the University of Exeter) at k.laidlaw@exeter.ac.uk

If you are not happy with any aspect of the study or wish to make a complaint, you can contact the project supervisor (details above) or the Research Ethics and Governance Manager detailed below:

- Gail Seymour - Research Ethics and Governance Manager at g.m.seymour@exeter.ac.uk or call on 01392 726 621.

Appendix J: Correlational Analyses Table

Table A1

Descriptive Statistics and Correlations for Study Variables

			Pearson correlations														
Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Session number	35.9	37.8	—														
2. Session duration	39.0	18.6	-.10	—													
3. Session freq.	3.7	2.7	.38**	-.21*	—												
4. Depression diff.	2.6	4.8	.05	.11	.05	—											
5. Anxiety diff.	3.0	4.3	.19*	.00	.13	.80**	—										
6. Distress diff.	3.9	6.1	.18	.07	.07	.81**	.80**	—									
7. Wellbeing diff.	-2.6	4.8	-.06	-.07	-.11	-.60**	-.62**	-.60**	—								
8. T1 depression	7.2	5.9	.03	.12	-.01	.74**	.61**	.69**	-.50**	—							
9. T2 depression	4.6	4.0	-.01	.04	-.08	-.10	-.07	.04	-.02	.59**	—						
10. T1 anxiety	7.4	5.5	.18	.05	.11	.60**	.66**	.63**	-.43**	.80**	.46**	—					

11. T2 anxiety	4.4	4.2	.03	.06	.01	-.04	-.17	-.01	.07	.42**	.67**	.63**	—			
12. T1 distress	20.4	8.4	.07	.05	.01	.63**	.59**	.75**	-.49**	.90**	.57**	.83**	.48**	—		
13. T2 distress	16.5	5.6	-.09	-.00	-.07	.07	.02	.04	-.08	.61**	.82**	.57**	.73**	.70**	—	
14. T1 wellbeing	21.4	5.5	-.05	-.06	-.05	-.48**	-.47**	-.52**	.64**	-.73**	-.51**	-.69**	-.42**	-.74**	-.56**	—
15. T2 wellbeing	24.0	4.4	.01	.01	.06	.06	.09	.01	-.29**	-.37**	-.62**	-.39**	-.60**	-.40**	-.61**	.54**	—

Note. N=112; freq. = frequency; diff. = difference; session number = the number of OMDIS attended in the past 6 months; session duration = the average session length in minutes; session freq. = the average number of sessions attended per week; T1 = retrospective pre-OMDIS timepoint; T2 = current post-OMDIS timepoint.

* indicates $p < .05$; ** indicates $p < .01$

Appendix K: Dissemination Statement

The literature review and empirical paper will be submitted for publication in peer-reviewed journals: Psychological Medicine and Mindfulness by Springer Science respectively.

Appendix L: Journal Submission Guidelines

Mindfulness (Springer)

Instructions for Authors

Editorial procedure

Double-blind peer review

This journal follows a double-blind reviewing procedure. This means that the author will remain anonymous to the reviewers throughout peer review. It is the responsibility of the author to anonymize the manuscript and any associated materials.

- Author names, affiliations and any other potentially identifying information should be removed from the manuscript text and any accompanying files (such as figures of supplementary material);
- A separate Title Page should be submitted, containing title, author names, affiliations, and the contact information of the corresponding author. Any acknowledgements, disclosures, or funding information should also be included on this page;
- Authors should avoid citing their own work in a way that could reveal their identity.

Manuscript Submission

Manuscript Submission

Submission of a manuscript implies: that the work described has not been published before; that it is not under consideration for publication anywhere else; that its publication has been approved by all co-authors, if any, as well as by the responsible authorities – tacitly or explicitly – at the institute where the work has been carried out. The publisher will not be held legally responsible should there be any claims for compensation.

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Online Submission

Please follow the hyperlink "Submit manuscript" and upload all of your manuscript files following the instructions given on the screen.

Source Files

Please ensure you provide all relevant editable source files at every submission and revision. Failing to submit a complete set of editable source files will result in your article not being considered for review. For your manuscript text please always submit in common word processing formats such as .docx or LaTeX.

Suggested Reviewers

Authors of research and review papers, excluding editorial and book review submissions, are allowed to provide the names and contact information for, maximum, 4 to 6 possible reviewers of their paper. When uploading a paper to the Editorial Manager site, authors must provide complete contact information for each recommended reviewer, along with a specific reason for your suggestion in the comments box for each person. The journal will consider reviewers recommended by the authors only if the reviewers' institutional email is provided. A minimum of two suggested reviewers should be from a university or research institute in the United States. You may not suggest the Editor or Associate Editors of the journal as potential reviewers. Although there is no guarantee that the editorial office will use your suggested reviewers, your help is appreciated and may speed up the selection of appropriate reviewers.

Authors should note that it is inappropriate to list as preferred reviewers researchers from the same institution as any of the authors, collaborators and co-authors from the past five years as well as anyone whose relationship with one of the authors may present a conflict of interest. The journal will not tolerate this practice and reserves the right to reject submissions on this basis.

Title Page

The title page should include:

- The name(s) of the author(s)
- A concise and informative title
- The affiliation(s) and address(es) of the author(s)
- The e-mail address, and telephone number(s) of the corresponding author
- If available, the 16-digit ORCID of the author(s)

Abstract

Please provide of structured abstract of up to 250 words

Keywords

Please provide 4 to 6 keywords which can be used for indexing purposes.

Structured Abstract

The structured abstract of up to 250 words with four labelled sections should containing the following, with sub-section headers in bold:

- a. Objectives: Problem being addressed in the study
- b. Methods: The participants, essential features of the study method
- c. Results: The basic findings, including effect sizes and confidence intervals and/or statistical significance levels
- d. Conclusions: What the authors conclude from study results

Text

Text Formatting

Manuscripts should be submitted in Word. Use a normal, plain font (e.g., 12-point Times Roman) for text. Use italics for emphasis. Use the automatic page numbering function to number the pages. Do not use field functions. Use tab stops or other commands for indents, not the space bar. Use the table function, not spreadsheets, to make tables. Use the equation editor or MathType for equations. Save your file in docx format (Word 2007 or higher) or doc format (older Word versions).

Headings
Please use no more than three levels of displayed headings.

Abbreviations
Abbreviations should be defined at first mention and used consistently thereafter.

Acknowledgments
Acknowledgments of people, grants, funds, etc. should be placed in a separate section on the title page. The names of funding organizations should be written in full.

Footnotes
This journal does not allow the use of footnotes, except in reprinted papers.

Article length
Papers accepted for publication in this journal are 45 double-spaced pages, in 12-point font, inclusive of text, references, tables and figures. For manuscripts exceeding this length, authors should contact the Editor in Chief, Nirbhay N. Singh directly at nirbz52@gmail.com.

Terminology

• Please always use internationally accepted signs and symbols for units (SI units).

Scientific style

- Generic names of drugs and pesticides are preferred; if trade names are used, the generic name should be given at first mention.
- Please use the standard mathematical notation for formulae, symbols etc.:Italic for single letters that denote mathematical constants, variables, and unknown quantities Roman/upright for numerals, operators, and punctuation, and commonly defined functions or abbreviations, e.g., cos, det, e or exp, lim, log, max, min, sin, tan, d (for derivative) Bold for vectors, tensors, and matrices.

References

Citation

Cite references in the text by name and year in parentheses. Some examples:

- Negotiation research spans many disciplines (Thompson, 1990).
- This result was later contradicted by Becker and Seligman (1996).
- This effect has been widely studied (Abbott, 1991; Barakat et al., 1995; Kelso & Smith, 1998; Medvec et al., 1999).

Authors are encouraged to follow official APA version 7 guidelines on the number of authors included in reference list entries (i.e., include all authors up to 20; for larger groups, give the first 19 names followed by an ellipsis and the final author's name). However, if authors shorten the author group by using et al., this will be retained.

Reference list

The list of references should only include works that are cited in the text and that have been published or accepted for publication. Personal communications and unpublished works should only be mentioned in the text. Reference list entries should be alphabetized by the last names of the first author of each work. Journal names and book titles should be *italicized*. If available, please always include DOIs as full DOI links in your reference list (e.g. "https://doi.org/abc").

- Journal article Grady, J. S., Her, M., Moreno, G., Perez, C., & Yelinek, J. (2019). Emotions in storybooks: A comparison of storybooks that represent ethnic and racial groups in the United States. *Psychology of Popular Media Culture, 8*(3), 207–217. https://doi.org/10.1037/ppm0000185
- Article by DOI Hong, I., Knox, S., Pryor, L., Mroz, T. M., Graham, J., Shields, M. F., & Reistetter, T. A. (2020). Is referral to home health rehabilitation following inpatient rehabilitation facility associated with 90-day hospital readmission for adult patients with stroke? *American Journal of Physical Medicine & Rehabilitation*. Advance online publication. https://doi.org/10.1097/PHM.0000000000001435
- Book Sapolsky, R. M. (2017). *Behave: The biology of humans at our best and worst*. Penguin Books.
- Book chapter Dillard, J. P. (2020). Currents in the study of persuasion. In M. B. Oliver, A. A. Raney, & J. Bryant (Eds.), *Media effects: Advances in theory and research* (4th ed., pp. 115–129). Routledge.
- Online document Fagan, J. (2019, March 25). *Nursing clinical brain*. OER Commons. Retrieved January 7, 2020, from https://www.oercommons.org/authoring/53029-nursing-clinical-brain/view

Tables

- All tables are to be numbered using Arabic numerals.
- Tables should always be cited in text in consecutive numerical order.
- For each table, please supply a table caption (title) explaining the components of the table.
- Identify any previously published material by giving the original source in the form of a reference at the end of the table caption.
- Footnotes to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data) and included beneath the table body.

Artwork and Illustrations Guidelines

Electronic Figure Submission

- Supply all figures electronically.
- Indicate what graphics program was used to create the artwork.
- For vector graphics, the preferred format is EPS; for halftones, please use TIFF format. MSOffice files are also acceptable.
- Vector graphics containing fonts must have the fonts embedded in the files.
- Name your figure files with "Fig" and the figure number, e.g., Fig1.eps.

Line Art

- Definition: Black and white graphic with no shading.
- Do not use faint lines and/or lettering and check that all lines and lettering within the figures are legible at final size.

- All lines should be at least 0.1 mm (0.3 pt) wide.
- Scanned line drawings and line drawings in bitmap format should have a minimum resolution of 1200 dpi.
- Vector graphics containing fonts must have the fonts embedded in the files.

Figure Lettering

- To add lettering, it is best to use Helvetica or Arial (sans serif fonts).
- Keep lettering consistently sized throughout your final-sized artwork, usually about 2–3 mm (8–12 pt).
- Variance of type size within an illustration should be minimal, e.g., do not use 8-pt type on an axis and 20-pt type for the axis label.
- Avoid effects such as shading, outline letters, etc.
- Do not include titles or captions within your illustrations.

Figure Numbering

- All figures are to be numbered using Arabic numerals.
- Figures should always be cited in text in consecutive numerical order.
- Figure parts should be denoted by lowercase letters (a, b, c, etc.).
- If an appendix appears in your article and it contains one or more figures, continue the consecutive numbering of the main text. Do not number the appendix figures,"A1, A2, A3, etc." Figures in online appendices [Supplementary Information (SI)] should, however, be numbered separately.

Figure Captions

- Each figure should have a concise caption describing accurately what the figure depicts. Include the captions in the text file of the manuscript, not in the figure file.
- Figure captions begin with the term Fig. in bold type, followed by the figure number, also in bold type.
- No punctuation is to be included after the number, nor is any punctuation to be placed at the end of the caption.
- Identify all elements found in the figure in the figure caption; and use boxes, circles, etc., as coordinate points in graphs.
- Identify previously published material by giving the original source in the form of a reference citation at the end of the figure caption.

Figure Placement and Size

- Figures should be submitted separately from the text, if possible.
- When preparing your figures, size figures to fit in the column width.
- For large-sized journals the figures should be 84 mm (for double-column text areas), or 174 mm (for single-column text areas) wide and not higher than 234 mm.
- For small-sized journals, the figures should be 119 mm wide and not higher than 195 mm.

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