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Research paper

A randomised trial comparing a brief online delivery of mindfulness-plus-values versus values only for symptoms of depression: Does baseline severity matter?

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ABSTRACT

Background: : Acceptance/mindfulness-based interventions often focus on (a) developing dispositional mindfulness and (b) pursuing personally meaningful and valued activities. Acceptance/mindfulness-based interventions can reduce depression, but little is known about the combined effects of components or the influence of baseline variables on outcomes. This study tested whether practicing a brief (10-min) mindfulness meditation over a 2-week period followed by a single values session (mindfulness + values) was more effective than values alone (values only) in reducing symptoms of depression. The study was delivered online and modules were fully self-help (i.e., no therapist contact).

Methods: : 206 participants (M_{age} = 23.4 years, SD = 6.53) with elevated depression scores (DASS-depression ≥ 10) were randomised to: mindfulness + values condition or a 2-week wait period followed by the values session (i.e., values only condition). Symptoms of depression were assessed at baseline, after the 2-week mindfulness practice/wait period, and 1-week following the values session.

Results: : Reductions in depression and recovery rates were significantly greater following mindfulness + values than values only. Baseline severity affected outcomes: mindfulness + values was significantly more beneficial than values only for individuals with high baseline levels of depression. Outcomes did not differ for those with low levels of depression. Rates of deterioration were higher than expected for values only participants.

Limitations: : Conclusions are preliminary and tentative due to no follow-up period and a small sample. Drop-out was high (50%) and findings cannot be assumed to generalise to treatment seeking or more diverse samples.

Conclusions: : Tentatively, results suggest mindfulness + values can significantly reduce depression, especially for individuals with higher baseline depression.

1. Introduction

Depression is a serious problem worldwide. Global estimates suggest over 264 million people experience depression (James et al., 2018). Furthermore, depression is recurrent (Steinert et al., 2014) and commonly co-morbid with other diagnoses (Eaton et al., 2008). Taxonomic studies support the notion of a depression continuum in the general population, identifying symptoms of depression as the most important risk factor for developing major depressive disorder (Cujipers and Smit, 2004). An important strategy for reducing the prevalence of depression, therefore, is to develop low-intensity, easy to access, community-based resources that have the potential to reduce distress and improve psychosocial functioning on a large scale (i.e., society; Kazdin and Blasé, 2011). Online, self-help resources are well-suited to these aims, showing that even brief interventions can achieve significant improvements (Spijkerman et al., 2016). Online interventions are also useful for examining treatment effects with scientific precision: standardising treatment delivery across participants enables one to control for non-specific factors (e.g., therapist contact, therapeutic relationship), as well as to examine the unique and combined effects of treatment components. Online interventions thus provide a useful platform for testing theoretical aspects of psychological interventions (Levin et al., 2020).

Mindfulness and acceptance-based approaches for depression have received substantial attention (e.g., Acceptance and Commitment Therapy (ACT), Hayes et al. (1999); Mindfulness-Based Cognitive Therapy (MBCT), Segal et al. (2012); and Compassion Focused Therapy (CFT), Guilbert (2010)). This diverse set of empirically supported, multicomponent, treatments differ conceptually and methodologically from one another, but share important commonalities. Central points of

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unity are the intention to: (1) enhance non-judgemental awareness and mindful acceptance of experiences, including difficult ones, to allow them to be fully in awareness and to let them pass and (2) help individuals identify and pursue personally meaningful activities that focus on values, life satisfaction and meaning (Beaumont and Irons, 2017; Hayes et al., 2011; Segal et al., 2012). These two components (i.e., mindfulness and values) are arguably most central to ACT, which proposes that the two components interact: developing open, accepting, and non-judgmental awareness of difficult experiences (mindfulness) reduces excessive avoidance of those experiences (Hayes et al., 2006) such that individuals are more able to make choices guided by personal values – what they most care about in life - rather than by avoidance (values and values-consistent action).

Despite an expansive literature examining acceptance and mindfulness-based treatments for depression (Bai et al., 2020; Clarke et al., 2015), no studies have yet examined the independent and/or combined effects of these components (mindfulness and values) on depression. In a multiple-baseline study, Villatte et al. (2016) examined the independent effect of an 8-week ACT-Open module that focused on developing acceptance-based skills to an 8-week ACT-Engage module that focused on developing value clarity and value-consistent action. Using face-to-face treatment delivery in a US treatment-seeking sample ($n = 15$), they examined the effects of these modules on psychiatric symptoms (composite measure of somatization, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism). Both modules resulted in significant improvements in psychiatric symptoms, but ACT-Open was associated with greater improvement in psychiatric symptoms and ACT-Engage was associated with greater improvements in quality of life. Subsequently, Petersen et al. (2019) conducted a three-armed RCT online, comparing the impact of 12-sessions of ACT-Open, ACT-Engage, or the full ACT programme (i.e., ACT-Open followed by ACT-Engage) on distress (composite of depression, anxiety, and stress) in a general community sample ($n = 55$). Overall, improvements in distress were greatest for participants receiving the values module (ACT-Engage) or the full programme (ACT-Open followed by ACT-Engage), but only the full programme maintained benefits over 4-week follow-up. The small sample and high attrition (a third completed the programme, $n = 31$) limits the conclusions that can be drawn however. Finally, Levin et al., (2020) used a four-armed RCT to compared the effects of ACT-Open, ACT-Engage, Full-ACT, and a wait-list condition on distress (composite of depression, general anxiety, social anxiety, academic distress, and hostility) in college students ($n = 181$), reporting comparable effects of all conditions on reducing distress. The values module and the full programme exceeded the benefits of the acceptance module when considering rates of reliable change.

So far, therefore, two studies have examined whether an acceptance/mindfulness-based therapy module followed by a values module is more beneficial than either module in isolation for reducing distress, tentatively suggesting that the values module and the full programme were most effective. Although the research is in its infancy, the findings are contrary to predictions from the ACT model; that training in acceptance/mindfulness can enhance values-consistent action (Hayes et al., 2006). Several aspects remain to be examined. Firstly, existing studies have used composite measures of distress that combine topographically dissimilar manifestations of psychological difficulty. As such, it has not been possible to ascertain the effects of these modules on specific difficulties such as symptoms of depression. This is important because clinical decision-making in treatment settings is often driven by specific difficulties. Furthermore, it is possible that modules asserted different effects on different manifestations of distress, which would not be detected using composite measures. Secondly, the possible influence of baseline factors is not well understood (Levin et al., 2020). The MBCT literature suggests that individuals with higher baseline symptom severity may derive greater benefit from including mindfulness in treatment as compared to those with milder symptoms (e.g., Arch and Ayers, 2013; Kuyken et al., 2016; Ma and Teasdale, 2004; Piet and Hougaard, 2011; Williams et al., 2014). Understanding the influence of baseline factors on the effectiveness of treatments and treatment modules is fundamental to effective treatment delivery.

The primary aim of this study, therefore, was to examine whether completing a brief (10-min) online mindfulness practice (daily for 2-weeks) followed by a single online values session (mindfulness + values condition), was more effective than the values session alone (values only condition) in reducing symptoms of depression and increasing value-consistent action. We used a randomised experimental design and recruited a UK sample with elevated symptoms of depression. Consistent with the ACT model (Hayes et al., 2006), we predicted that mindfulness + values would result in greater improvements in depression, greater progress towards values and greater likelihood of engaging in value-consistent acts than values only. To examine whether the brief mindfulness practice contributed to improvements in depression (i.e., rather than by-products such as relaxation or simply by virtue of having an active intervention), dispositional mindfulness was measured pre and post the 2-week mindfulness practice period. Consistent with previous studies (e.g., Quaglia et al., 2016) we predicted a rise in dispositional mindfulness for those completing the 2-week mindfulness meditation practice and that this increase would mediate the effect of condition on subsequent levels of depression. The secondary aim was to examine whether severity of depressive symptoms at baseline influenced the effectiveness of these two conditions. Based on the MBCT literature reviewed above, we predicted that individuals with higher depression at baseline would benefit more from mindfulness + values than values only. We predicted no between-group difference for those with low levels of depression at baseline.

2. Method

2.1. Participants and design

Power calculations were based on the aforementioned studies (Levin et al., 2020; Petersen et al., 2019; Vilatte et al., 2016), predicting a small between group effect size (Cohen's $f = .10$). With power at .90 and $\alpha = .05$, a total sample of $N = 186$ was required. Two hundred and six individuals with elevated levels of depressive symptoms (DASS-depression score $\geq$ 10, see measures) were recruited online, using advertisements at a London university campus, research recruitment sites, and snowballing on social media. Sociodemographic information is reported in Table 1.

A single blind randomised-controlled design was used. Participants were randomised to a brief online mindfulness + values or values only condition. Mindfulness + values participants completed a 10-min mindfulness practice, daily, for 2-weeks whilst values only participants had a two-week wait period. All participants then received the single online values module (see Fig. 2). The dependent variable was symptoms of depression, measured at baseline (T1), post 2-week mindfulness/inactive wait period (T2), and one-week following the values module (T3). Study flow and details of modules are outlined in Fig. 2. The study protocol was approved by the Institutional Ethics Committee (Project ID 783), and all participants gave online informed consent prior to participation, and were free to withdraw at any time.

2.2. Modules

Mindfulness Module. Participants were asked to complete a 10-min mindfulness meditation practice daily for 2 weeks (see Fig. 2 for details). The practice was delivered fully online and was recorded by the first author who has over 10 years' experience practicing and delivering mindfulness-based therapy. The meditation script, originally developed for individuals with distressing psychotic experiences (Chadwick, 2006), has been used in studies with clinical (e.g.

Table 1
Sociodemographic details at baseline, split by condition, with comparison statistics.

		M + V (n = 103) *M (SD) or %*	V only (n = 103) *M (SD) or %*	Comparison statistics
Age		24.13 (7.59)	22.80 (5.32)	F = 1.406, *p* = .161
Gender				
	Female	82%	86%	χ^2 = .464, *p* = .793
	Male	17%	14%	
	Other	1%	2%	
Ethnicity				
	White British	73%	71%	χ^2 = 8.795, *p* = .360
	European	4%	7%	
	Mixed Race	4%	5%	
	Asian	9%	13%	
	Black	2%	2%	
	American	2%	0%	
	Other	5%	1%	
Country of residence				
	UK	78%	78%	χ^2 = 6.866, *p* = .651
	USA	9%	9%	
	Europe	7%	8%	
	Asia	2%	2%	
	Other	4%	2%	
Occupation				
	Student	63%	61%	χ^2 = 3.82, *p* = .873
	Healthcare worker	11%	7%	
	Retail worker	4%	5%	
	Software / IT services	2%	3%	
	Scientist / researcher	5%	8%	
	Admin	2%	1%	
	Managerial	2%	5%	
	Unemployed	2%	3%	
	Other	9%	7%	

Note: M + V = mindfulnesss + values condition; V only = values only condition.

Chadwick et al., 2005; Dannahy et al., 2011; Ellett, 2013) and non-clinical (Cavanagh et al., 2013; Evans et al., 2019; Kingston et al., 2019; Shore et al., 2018) populations including those experiencing depression (Ellett et al., 2020; Strauss et al., 2012). Each time participants accessed the recording, they were asked to report whether they had completed the practice that day.

Values module. The values module was a single session computerised version of the values intervention described by Evans et al. (2019; summarised in Fig. 2). Participants read a brief description of values (e.g. Chase et al., 2013; Harris, 2013) and completed a digital card-sort task, allocating 58 values cards to one of three piles: *very important to me; quite important to me; not important to me* (Ciarrochi & Bailey, 2008; Harris, 2011). Example values were "*Compassion: to act with kindness towards those who are suffering*", "*Creativity: to be creative or innovative*". Participants selected a *very important* value to write about for 10-min, focusing on why it was meaningful to them and describing a time that exemplified that value. As a manipulation check, participants provided two reasons why their chosen value was important to them (Sherman et al., 2000) and rated the extent to which the value has influenced their life, and the care and personal importance they placed on this value (Sherman et al., 2000; Evans et al., 2019) using a six-point Likert scale (1 – "strongly disagree" to 6 – "strongly agree"). Participants were then guided in setting a value-based goal for the week ahead using 'SMART' (specific, meaningful, adaptive, realistic, time-framed) principles. A week later, participants indicated whether they had completed their goal.

3. Measures

3.1. Primary outcome

Depression subscale of Depression Anxiety and Stress Scale 21 (DASS-D, Lovibond & Lovibond 1995)[1]. This 7-item depression subscale measures symptoms of dysphoric mood (e.g., sadness, worthlessness) over the last week using a four-point scale (0 = *never* to 3 = *almost always*), with total scores ranging from 0 to 21. For consistency with the DASS-42, scores are doubled to create a range of 0–42. Depression cut-off scores are as follows: 0–9 normal range, 10–13 mild range, 14–20 moderate range, 21–27 severe range and 28 + extremely severe range. The subscale had good internal consistency in this sample (α = .81).

3.2. Secondary outcome

Value-based activity was assessed in two ways. At the final data collection point (T3), all participants were asked whether they had achieved the values-based goal they set during the values component ('yes/no'). Also at T3, participants were asked to rate the extent to which they had acted consistently with their most personally important value over the *past week*. This was measured using a single item, 10-point, self-report visual analogue scale (VAS), with the following anchors "1 = *not at all consistent*" to "10 = *completely consistent*".

3.3. Process measure

Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006) is a 39-item self-report measure of dispositional mindfulness which assesses five independent facets: observing, describing, acting with awareness, non-judging of inner experience and non-reactivity to inner experience. Participants rate each item on a five-point scale (1 = *Never or rarely true* to 5 = *Very often or always true*), with total scores ranging from 39 to 195 and higher scores indicating greater mindfulness. The FFMQ had high internal consistency in the current sample (α = .90).

3.4. Procedure

Consenting participants completed demographic and baseline questionnaires online (T1) before being randomised to mindfulness + values (10 min daily mindfulness practice for two weeks followed by values module) or the values only condition (2 week wait period followed by values module). Mindfulness + values participants were sent three automated emails (every 4 days) during the 2-week period reminding them to complete the meditation practice. After two weeks, all participants were emailed a link to T2 measures. All participants then completed the values module. Three days later, participants were sent an email encouraging them to continue pursuing their value-based goal, before being sent the final questionnaires and debrief sheet 1-week after the values module (T3). Participants were sent a reminder email within a week if they did not complete T2/T3 measures. The study was accessible using computers, tablets and mobile phones. First year undergraduate students received course credits for participating and all other participants were entered into a prize draw (£50 voucher).

3.5. Analysis strategy

All analyses were conducted using SPSS v.25 (SPSS Inc, Chicago, IL). Equivalence of sociodemographic and study variables across conditions at baseline was tested using two-sided independent *t*-tests and Pearson χ^2-tests. Systematic attrition was assessed by comparing the sociodemographic and study variables of participants that completed

[1] The full measure was administered but only the depression items were analysed.

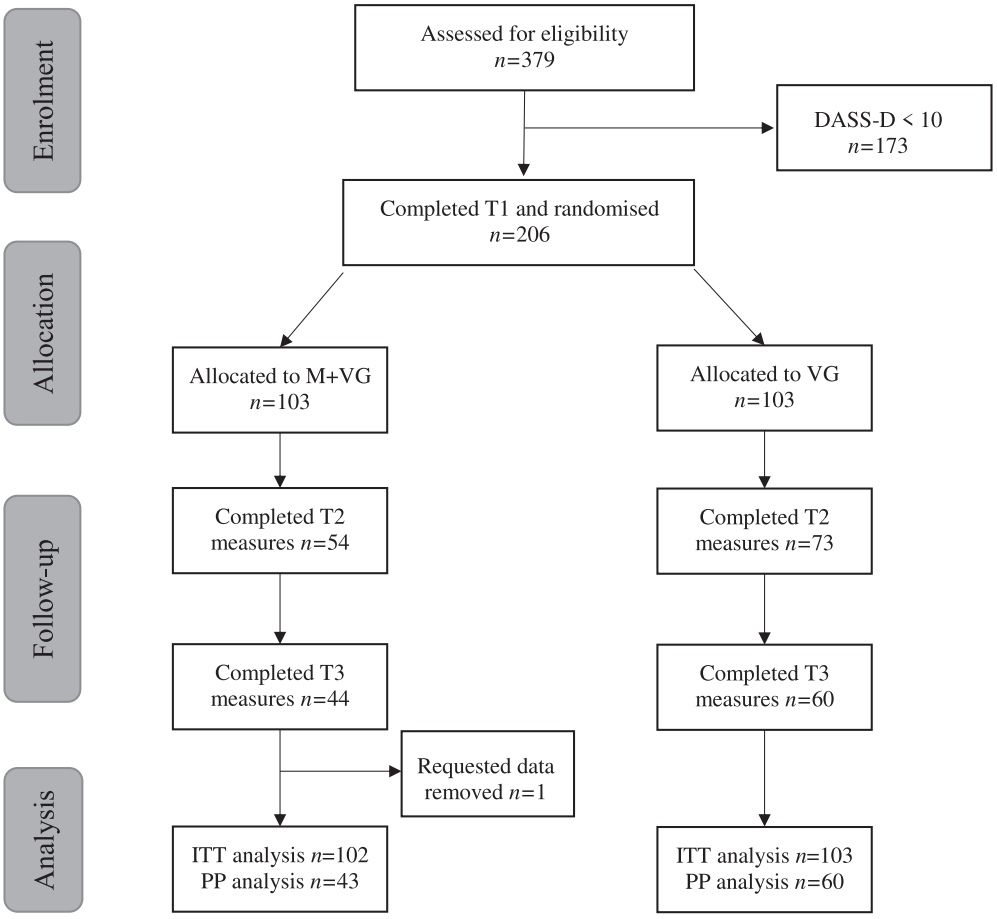


Fig. 1. CONSORT diagram outlining participant flow through the study.

the study to those who dropped out. Changes in dispositional mindfulness pre-post the 2-week mindfulness practice phase (i.e., T1-T2) was assessed using paired samples t-test. Mediation was assessed using PROCESS model 4 (Hayes, 2017). Condition was entered as the predictor, T1 dispositional mindfulness as a covariate, T2 dispositional mindfulness as the mediator, and T4 depression as the criterion. As a manipulation check for the values writing task, manipulation check items were examined to check that participants had indeed identified and written about a highly valued domain.

To examine the effects of condition on symptoms of depression, the primary analysis was carried out as *Intention to Treat* (ITT), with missing data imputed using last observation carried forward (LOCF). This approach includes the data of all those participants entering the study and assumes that all those individuals dropping out of the study did not experience any change since their last data point. LOCF was considered to be appropriate. Firstly, if unobserved outcomes improve over time, LOCF favors groups with less drop-out (White et al., 2012). Drop-out was greater in the mindfulness + values condition thus favoring the null hypothesis. Secondly, most attrition occurred from T1–T2 (see Results). For the values only condition, supplementing T2 data with T1 data was justifiable as this group had no active intervention during this time. For the mindfulness + values condition, where most attrition occurred, there was a trend ($p = .089$) towards greater depression scores at baseline. As such, supplementing T2 data with T1 data was conservative as it favored the null hypothesis.

We were also interested in examining the effects of the modules when administered to and used by the target population. Thus, secondary analysis were computed in the "per protocol" sample, defined as those participants who: (1) met inclusion criteria, (2) completed all assessments, and (3) completed all aspects of their allocated condition (i.e., reported engaging in mindfulness practice, completed the values task and specified goals). To examine the effect of condition on depression scores over time, a 2 (Condition: mindfulness + values versus values only) X 3 (Depression: T1, T2, T3) repeated measures ANOVA was computed, with follow-up within and between post-hoc tests. Effect size estimates were used to quantify the magnitude of change. To quantify the clinical significance of change, each participant was classified as either *recovered/recovering, improved, same* or *deteriorated* using criteria published by Ronk et al. (2013). Chi-square analyses were computed to assess whether group allocation differentially affected the likelihood of completing the value-based goal (yes/no response).

To assess whether the effects of the two conditions differed as a function of baseline severity, two groups were created using established DASS-D cut-offs: a low (10-20 DASS-D scores) and a high (21 + DASS-D scores) depression group. Repeated measures ANOVAs, with follow-up post-hoc tests, were computed for each group. Because we aimed to examine whether baseline severity affected the impact of the modules on depression, only those completing the study were included ($n = 43$ mindfulness + values and $n = 60$ values only).

4. Results

4.1. Descriptives and preliminary analyses

Depression scores ranged from 10 to 42 ($M = 20.68$, SD = 8.35): 21% ($n = 41$) reported mild symptoms, 35% ($n = 72$) moderate, 24% ($n = 50$) severe, and 21% ($n = 43$) very severe. All variables were normally distributed and groups were equivalent on sociodemographic variables at baseline (see Table 1). Depression scores were non-significantly ($t_{(1,\ 204)} = 1.710$, $p = .089$) higher in the mindfulness

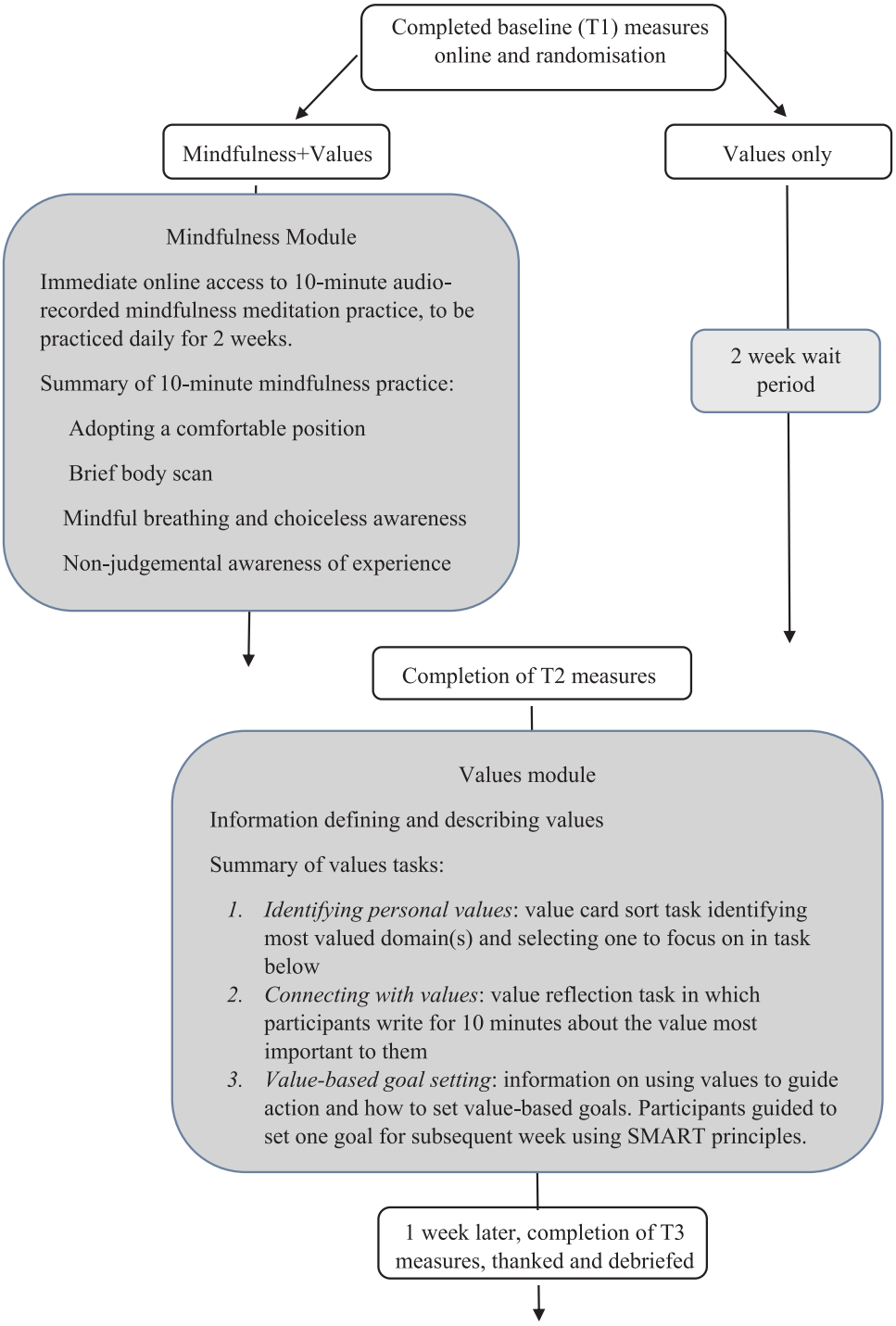


Fig. 2. Summary of study flow and details of modules.

+values as compared to values only condition.

Attrition was high. From T1–T2, 47% ($n=49$) of mindfulness+values participants and 28% ($n=29$) of values only participants dropped out ($n=36$ students and $n=42$ community participants). From T2-T3, $n=23$ dropped out of the study (mindfulness+values $n=10$ and values only $n=13$), of which $n=12$ were students. Dropout was therefore higher in mindfulness+values as compared to in the values only condition, but rates of drop-out were comparable across student and community participants. In the per protocol sample, groups were also equivalent on all sociodemographic and study variables at baseline.

Mindfulness+values participants reported practicing mindfulness an average of seven times (SD = 4.57) over the 2-week mindfulness period (median=7.5). Dispositional mindfulness significantly increase from T1–T2 for participants in the mindfulness+values condition ($t_{(53)}$ = 3.48, p =.001, 95% CI 7.24 to 1.94, d=.47). Manipulation check items for the values task (scale 1–6) indicated that participants wrote about a value that: was influential in their life (M = 5.35, SD = .787), they live up to (M = 5.40, SD = .749), is important to who they are (M = 5.35, SD = .852) and is something they care about (M = 5.61, SD = .698).

4.2. Mediation analysis

Controlling for baseline levels of dispositional mindfulness,

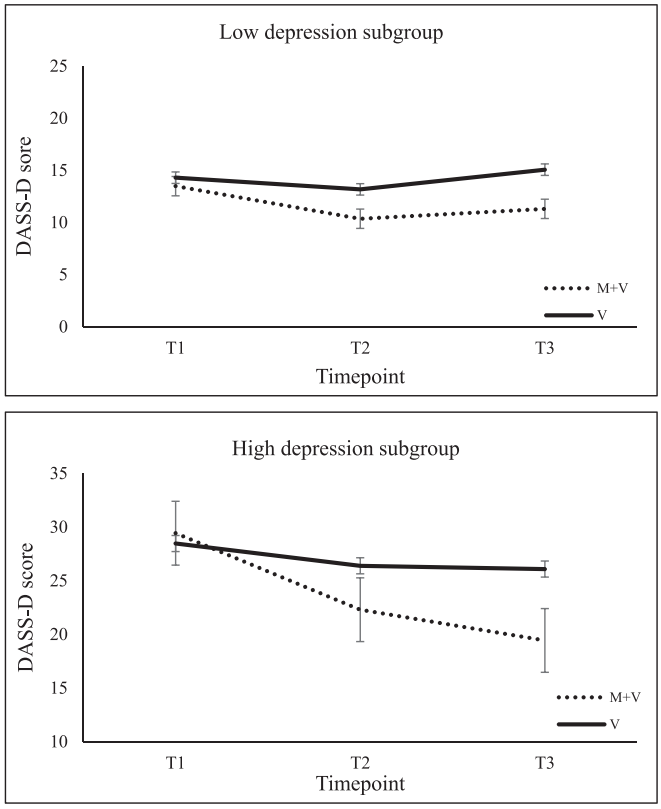


Fig. 3. Line graphs depicting T1, T2 and T3 depression scores for high and low depression subgroups.

mediation analysis indicated that T2 dispositional mindfulness scores mediated the effect of condition on T4 depression (indirect effect $\beta = 1.13$, SE = .63, CI .01 to .22). The direct effect was also significant ($\beta = 4.44$, SE = 1.80, CI .88 to 7.99) indicating that dispositional mindfulness did not fully explain the effect of condition on T4 depression.

4.3. Main analyses

ITT. Means (SE) and comparison data are reported in Table 2. The Time*Condition interaction was significant. Controlling for baseline levels of depression, depression was significantly lower in the mindfulness + values condition as compared to the values only condition at T2 and T3. Reductions in depression in the mindfulness + values group were statistically significant from T1–T2 ($t_{(1,\ 101)} = 4.91$, $p = .000$, d = 0.42) and T1–T3 ($t_{(1,\ 101)} = 4.13$, $p = .000$, $d = 0.41$) but not T2–T3 ($t_{(1,\ 101)} = .812$, $p = .419$, $d = 0.08$). Changes in the values only condition were not significant (T1–T2: $t_{(101)} = 1.073$, $p = .286$, $d = 0.105$; T1–T3: $t_{(101)} = 0.212$, $p = .833$, $d = 0.020$ and T2-T3: $t_{(101)} = -.881$, p = .380, $d = 0.09$).

PP: The Time*Condition interaction was significant. Controlling for baseline depression, depression was significantly lower in mindfulness + values condition as compared to the values only condition at T2 and T3. In the mindfulness + values condition, depression scores significantly reduced from T1–T2 ($t_{(42)} = 3.99$, $p = .000$, $d = 0.61$), T1–T3 ($t_{(42)} = 3.95$, $p = .000$, $d = 0.62$), but not T2–T3 ($t_{(42)} = .810$, $p = .423$, $d = 0.12$). In the values only condition changes were not significant (T1–T2: $t_{(72)} = 1.458$, $p = .150$, $d = 0.18$; T1–T3: $t_{(59)} = 0.496$, $p = .621$, $d = 0.06$; T2–T3 $t_{(72)} = -.880$, $p = .382$, $d = 0.11$).

Chi-square analyses were computed to assess whether condition differentially affected the completion of the value-based goal. Of the $n = 103$ participants completing the study, $n = 70$ (70%) reported completing their goal: 72% mindfulness + values participants and 65% values only participants ($\chi^2_{(2)} = .579$, $p = .447$). An independent samples *t*-test was computed to examine the VAS data on value-consistent behaviour at T3, indicating no significant between-group difference ($t_{(102)} = -.509$, $p = .612$).

4.4. Clinical significance of change

Forty-five percent of participants in the mindfulness + values condition experienced reductions in depression that were categorised as recovered/recovering ($n = 20$); 0% were classified as improved; 48% ($n = 21$) were unchanged and 5% ($n = 2$) deteriorated. In the values only group, 25% ($n = 15$) were categorised as recovered/recovering; 2% ($n = 1$) improved, 50% ($n = 30$) unchanged and 23% ($n = 14$) deteriorated. The clinical significance of change was statistically different across conditions ($\chi^2_{(4)} = 11.72$, $p = .020$).

4.5. Subgroup analysis: depression severity at baseline (see Fig. 3)

Low depression subgroup. Fifty-seven participants in the low depression subgroup completed the study (mindfulness + values $n = 23$ and values only $n = 34$). The Condition*Time interaction was not significant ($F_{(2,\ 110)} = .965$, $p = .384$, partial $\eta^2 = 0.017$). Rates of goal completion ($\chi^2_{(2)} = .146$, $p = .703$) and value-consistent behaviour were equivalent across conditions ($t_{(55)} = -.689$, $p = .521$).

High depression subgroup. Forty-six participants in the high depression subgroup completed the study (mindfulness + values $n = 20$ and values only $n = 26$). The Time*Condition interaction was significant ($F_{(2,\ 88)} = 4.425$, $p = .015$, partial $\eta^2 = 0.10$). Controlling for baseline scores, depression was significantly lower in mindfulness + values condition as compared to the values only condition at T2 ($F_{(1,\ 53)} = 4.48$, $p = .04$, partial $\eta^2 = 0.078$) and T3 ($F_{(1,\ 44)} = 7.87$,

Table 2
Mean (SE), Mean change and Difference Mean Change scores (95% CI) for DASS-D scores, by condition, for Intention-to-Treat (ITT), Per Protocol (PP) samples.

DASS-D Scores	M + V Mean (SE)	V Only Mean Change (95% CI)	M + V v V Only Mean (SE)	Mean Change (95% CI)	Diff Mean Change (95% CI)	Effect size (partial eta)	p-value
ITT (n = 205)							
T1	21.49 (.85)		19.69 (.77)				
T2	18.94 (1.01)	2.55 (1.34 to 3.76)	18.99 (.97)	.69 (−.59 to 1.99)	1.86 (3.61 to .09)	0.019	.047
T3	18.58 (1.01)	2.90 (1.50 to 4.30)	19.53 (1.04)	.16 (−1.30 to 1.61)	2.74 (4.74 to .74)	0.032	.001
*Condition*Time Interaction: F(2, 406) = 4.91, p = .010, partial η^2 = 0.025*							
PP (n = 103)							
T1	20.65 (1.31)		20.43 (1.11)				
T2	15.72 (1.64)	4.93 (2.43 to 7.42)	18.90 (1.39)	1.53 (.57 to 3.63)	3.40 (.17 to 6.61)	0.060	0.006
T3	14.88 (1.72)	5.76 (2.82 to 8.71)	19.83 (1.46)	.60 (1.81 to 3.01)	5.17 (1.42 to 8.91)	0.073	0.001
*Condition*Time Interaction: F(2,202) = 4.845, p = .009, partial η2 = 0.049*							

Note: ITT = Intention to Treat; PP = Per Protocol; T1 = baseline, T2 = immediately after 2-week mindfulness practice phase (mindfulnesss + values) or 2-week wait period (values only), T3 = 1 week after values session).

p = .001, partial η^2 = 0.152). In the mindfulness + values condition, reductions in depression were significant from T1–T2 ($t_{(19)}$ = 3.185, p = .005, d = 0.74) and T1–T3 ($t_{(19)}$ = 4.997, p = .000, d = 1.16) but not T2–T3 ($t_{(19)}$ = 1.829, p = .083, d = .41). There were no significant changes in the values only condition (T1–T2: $t_{(25)}$ = 1.30, p = .206, d = 0.254; T1–T3: $t_{(25)}$ = 1.269, p = .216, d = 0.248 and T2–T3: $t_{(25)}$ = .197, p = .846, d = 0.04). Valued behaviour did not differ between groups (valued goal completion: $\chi^2_{(2)}$ = .494, p = .482 and value consistent behaviour: $t_{(45)}$ = −.040, p = .968).

5. Discussion

Understanding how and why acceptance/mindfulness and values-based treatment components improve depression is essential for optimising treatment outcomes, informing clinical decision-making, and determining what works best for whom (Holmes et al., 2014; Segal et al., 2013; Van de Velden et al., 2015). The first main finding is that practicing a brief (10-min) mindfulness meditation over a 2-week period followed by a single values session was superior to values alone in reducing symptoms of depression, in individuals with at least mild levels of depression at baseline. Forty-five percent of participants in the mindfulness + values condition, compared to 25% of participants in the values only condition, reported changes in depression that were classified as recovered/recovering (Ronk et al., 2013). This can be benchmarked against published recovered/recovering rates of 51.6% for patients receiving face-to-face CBT (average 8.4 sessions or 14.9 days of inpatient admission; Ronk et al., 2013). Moreover, despite the brief nature of the mindfulness module, significant improvements in dispositional mindfulness were reported and these improvements mediated the effect of condition on T3 depression scores. This suggests that improvements in dispositional mindfulness was a process through which condition affected subsequent improvements in symptoms of depression.

The clinical significance data also showed differences in symptom deterioration: 23% of participants in the values only condition (n=14) experienced a clinically significant deterioration in symptoms as compared to 5% (n=2) in mindfulness + values. Although deterioration rates are infrequently reported in the literature, the proportion of individuals experiencing symptom deterioration during face-to-face psychological interventions is estimated to range between 3% and 14% (Ebert et al., 2016; Cujipers et al., 2018; Ronk et al., 2013), which is comparable to deterioration rates for online interventions (Ebert et al., 2016). This raises the possibility that a brief values module delivered online and without additional therapeutic guidance could negatively impact symptoms of depression for some individuals. One possibility is that some participants were experiencing difficulties in the valued domain that they focused on in the values module, resulting in increased distress and rumination. However, it is also possible that the wait period in-and-of itself disadvantaged these participants. At this stage, it is not possible to draw any conclusions about the impact of values work on symptom deterioration, its cause or meaning. However, the findings signal possible adverse effects for some, which requires further investigation.

The second main finding was that baseline symptom severity influenced outcomes. Individuals in the low depression subgroup did not experience meaningful reductions in depression, regardless of condition. Individuals with high levels of depression showed a medium to large (partial η^2 =.10) effect of completing mindfulness + values as compared to values only. These participants experienced a large within-subjects improvement in depression, which equated to an average 10 point reduction in DASS depression scores relative to an average reduction of 2.38 for values only.

Although these sub-analyses involved small sample sizes, the findings are consistent with several studies showing the superior effects of mindfulness-based interventions for individuals with greater baseline symptom severity (Arch and Ayers, 2013; Roos et al., 2017) more complex presentations (e.g., Wolitzky-Taylor et al., 2012) and/or greater baseline "vulnerability" (e.g., greater childhood trauma, more previous episodes of depression, earlier onset of depression, persistent residual symptoms, and greater risk or relapse; e.g., Ma and Teasdale, 2004; Teasdale et al., 2000). It is possible that the fundamental nature of mindfulness meditation – that is, developing an accepting and non-judgemental attitude towards one's experiences, is particularly well suited to individuals with more severe symptoms (Williams et al., 2014). An important future direction is to examine the replicability of the current findings and to examine effects over a longer follow-up period.

The current data also provide interesting information about the relative contributions of the components themselves on symptoms of depression. Overall, the data suggest that the mindfulness module was most influential in reducing depressive symptoms. The values module, in isolation or in combination with mindfulness, affected small-medium (uncontrolled) improvements in depression at best (i.e., severe-extremely severe group and when preceded by the mindfulness module). This is in contrast to previous research, which found comparable effects across therapy components, or greater benefits following the values-based module (Levin et al., 2020; Petersen et al., 2019; Villatte et al., 2016). In previous studies, participants received 6–12 values sessions as opposed to one single session in the current study. Our data suggest that a single session on values, in isolation, was not sufficient to improve symptoms of depression. Future research investigating whether the amount of time allocated to different treatment components influences the effectiveness of ACT, and for whom, would be useful.

Finally, the self-report behavioural data on goal completion and value-consistent behaviour suggest that participants from both conditions were equally likely to complete their goals. On the one hand, this could suggest that the values component (received by everyone) was the driver of value-consistent behaviour. However, without a control condition this interpretation is tentative. Future research would benefit from examining how the current findings compare to an active control group as well as a goals only group (i.e., isolating the specific impact of values). Examining whether values-based goals are more effective in reducing depression than goals that are not explicitly linked to an individual's values is an important future direction. It would also be useful for research to collect more detailed behavioural data, for example by using a valued activities diary to record details of valued acts over the full study duration, rather than fixing one goal and assessing goal completion with a yes/no format.

The study has several limitations. Participants were recruited using a non-diagnostic and self-report measure of depression and as such findings cannot be assumed to generalise to groups diagnosed with depression in clinical settings. Given the over-representation of White female participants, findings may also not generalise to more diverse groups. Furthermore, subgroup analyses should be interpreted with caution given the small sample sizes. With regard to design, the 1-week follow-up period is insufficient to examine effects over time which is especially important given the recurrent nature of depression. Without a mindfulness only condition and/or active controls, it is also not possible to rule out that mindfulness + values was superior for extraneous reasons (e.g., less motivated participants dropped out of the mindfulness + values condition; mindfulness + values participants received two active interventions, irrespective of their content). As with many online studies, attrition was high and we were unable to determine whether this varied accordingly to incentive type (i.e., course credits versus prize draw). Future research would benefit from assessing usability and acceptability. Related to this, whilst LOCF was considered an appropriate way of managing missing data, it is possible that data were not missing at random. For example, those dropping out may have experienced a worsening of symptoms such that the ITT analysis underestimated the levels of depression for those who dropped out. The consistent findings across PP and ITT are encouraging, however. Finally, the use of an online platform for delivering the modules has

some limitations: we lacked control over the process of individuals engaging with the treatment modules (e.g., the extent to information was read, understood, applied; whether (and if so how) mindfulness influenced valued living etc.), and the online platform excluded those without regular internet access.

Notwithstanding these limitations, the current findings have some implications. Although in need of replication in a larger sample with follow-up data of at least 6-months, the findings tentatively suggest that a 2-week period of practicing a brief (10-min) mindfulness meditation followed by a single values session can result in meaningful reductions in depression. This occurred despite the modules being fully online and without therapist support. The data also suggest that for individuals with lower baseline severity, neither condition affected a change in depression, whereas for individuals with higher baseline severity, practicing mindfulness meditation before the values component resulted in significantly better outcomes. Tentatively, our data raise the possibility that a single online values-based session may increase symptoms for some individuals, although this needs to be investigated further in future research before any firm conclusions can be drawn.

Contributions

JK: Research design, supervision of research implementation, analysis and write up

LE: Contributed to research design and provided comments on final draft

LB: Conducted research and provided comments on final draft

JW: Conducted research

All authors have approved the final article

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Declaration of Competing Interest

All authors declare that there are no conflicts of interest.

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