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**Written benefit finding for improving psychological health
during the Covid-19 pandemic first wave lockdown**

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Abstract

Objectives. Written benefit finding is known to improve psychological and physical health in a range of patient groups. Here, we tested the efficacy of written benefit finding, delivered online during the Covid-19 pandemic lockdown, on mood and physical symptoms. We also investigated perseverative thinking as a moderator of these effects. *Design.* A quantitative longitudinal design was employed. *Main Outcome Measures.* Participants (n = 91) completed self-report measures of anxiety, depression, stress and physical symptoms at baseline, and two weeks after being randomised to complete three consecutive days of writing about the positive thoughts and feelings they experienced during the pandemic (written benefit finding) or to unemotionally describe the events of the previous day (control). State anxiety was measured immediately before and after writing. Perseverative thinking was measured at baseline. *Results.* Anxiety and depression symptoms decreased between baseline and the two week follow-up, but did not differ significantly between the two conditions. Perseverative thinking was negatively associated with changes in symptoms of anxiety, depression and stress, but did not moderate any writing effects. There was a significant reduction in state anxiety in the written benefit finding condition. *Conclusions.* Written benefit finding may be a useful intervention for short-term improvements in wellbeing.

Keywords: written benefit finding, expressive writing, stress, anxiety, depression, physical symptoms

Introduction

The coronavirus disease 2019 (Covid-19) pandemic has substantially impacted every aspect of day-to-day life both in the United Kingdom (UK) and around the world. In many countries, including the UK, a number of measures have been put in place in an attempt to control the spread of the virus, which have involved various measures to reduce social contact. On 23rd March 2020, the UK government imposed a nationwide lockdown, which required people to stay at home at all times, other than to shop for food or essential medicines, to undertake limited exercise once per day with members of the same household or to go to work, but only where the individual's job role was essential to healthcare delivery or maintaining the food supply chain. It is evident that the lockdown, coupled with substantial worry about the future, has led to an increase in psychological morbidity (Pierce et al., 2020); indeed, the pandemic has been described as a 'collective trauma' (Silver, 2020). While the consequences of living through a pandemic lockdown may have led directly to increases in distress and deterioration of mental health, support mechanisms that individuals have in place involving social contact may no longer have been available, further exacerbating any adverse consequences of the lockdown on psychological health (Saladino, Algeri, & Auriemma, 2020). Given the fluid situation with respect to measures which may be needed to control Covid-19 progression and transmission, the likelihood of further localised or nationwide lockdowns, and to consider how to address the mental health consequences of any similar pandemic lockdowns in the future, it is important to consider the efficacy of psychological interventions for enhancing psychological wellbeing during a pandemic lockdown.

There has been a call for internet-mediated interventions to tackle the increase in psychological ill-health that has arisen during the pandemic, and to repurpose existing psychological interventions to meet this need (Holmes et al., 2020; O'Connor et al., 2020). One potential avenue for intervention is expressive writing. Expressive writing refers to a range of brief writing techniques aimed at improving psychological or physical health outcomes. The most utilised form of expressive writing is written emotional disclosure (WED), whereby participants are typically required to focus

on, and disclose in writing, their negative thoughts and feelings related to a stressful, emotional or traumatic event, for 15-20 minutes over 3-5 consecutive days (Pennebaker, 1997). A plethora of research has focused on the benefits of expressive writing, with a number of randomised controlled trials comparing WED to various neutral writing tasks in which participants are required to write about a neutral, mundane topic in a factual manner (Smyth, 1998). Medium-to-long-term benefits from WED have been observed between one week and one year post-writing (Nyssen et al., 2016), and have included reductions in depression and anxiety (Krpan et al., 2013), self-reported physical symptoms (Greenberg & Stone, 1992), work absenteeism (Francis & Pennebaker, 1992) and GP visits (Baikie, 2008). Evidence from a large evidence base which has accrued over the past 30 years suggests that writing to disclose negative thoughts and feelings about a stressful experience can, after an initial increase in distress, elicit beneficial effects on health (Frattaroli, 2006; Nyssen et al., 2016; Smyth, 1998).

In the context of Covid-19, advantages of expressive writing are that it is inexpensive in comparison to many other therapeutic approaches, it can be delivered online without the need for direct involvement of a therapist and can be conducted at a time and a place which is convenient for the individual (i.e. their own home; Allen, Wetherell, & Smith, 2020). As an alternative to WED, positive expressive writing techniques, whereby participants write about a positive life experience in an otherwise similar format to WED (Baikie, Geerligs, & Wilhelm, 2012), have been previously been administered successfully in an online context (Allen et al., 2020). Positive expressive writing has been associated with a number of beneficial health outcomes in both clinical and non-clinical populations, including a reduction in stress and anxiety symptoms (Smith, Thompson, Hall, Allen, & Wetherell, 2018), self-reported physical symptoms (Burton & King, 2008) and health centre utilisation (Burton & King, 2004). Relative to WED, positive expressive writing may be a more appropriate expressive writing technique intervention to administer remotely online, because there is a reduced chance that the intervention will evoke short-term increases in distress which can arise following WED (Pennebaker, 1997). Indeed, one study which investigated WED as an intervention to

reduce distress during the Covid-19 pandemic actually observed a significant increase in psychological distress following WED, compared to control participants (Vukčević Marković, Bjekić, & Priebe, 2020).

A form of positive writing which may be of particular relevance in the Covid-19 context is written benefit finding. Benefit finding has been defined as “the process of deriving positive growth from adversity” (Cassidy, McLaughlin, & Giles, 2014) and buffers against adverse stress responses via changes in psychological domains such as appraisal, coping processes, self-esteem, perceived social support, goals and positive affect (Bower, Low, Moskowitz, Sepah, & Epel, 2008). A meta-analysis of studies investigating the relationship between benefit finding and health outcomes found that benefit finding improved wellbeing and reduced depression among individuals who had undergone a traumatic experience (Helgeson, Reynolds, & Tomich, 2006). It is therefore perhaps unsurprising that writing about benefits of a stressful experience is also associated with positive outcomes. Like WED, written benefit finding requires individuals to think about a stressful, emotional or traumatic event/experience, but rather than disclose the negative emotions associated with this experience, participants are required to focus on any positive thoughts or feelings that they have about this experience, and disclose them in writing. Written benefit finding has been associated with improvements in physical and psychological health in breast cancer patients (Henry, Schlegel, Talley, Molix, & Bettencourt, 2010; Low, Stanton, & Danoff-Burg, 2006; Stanton et al., 2002) and parents of children with leukaemia (Martino, Freda, & Camera, 2013). In lupus and rheumatoid arthritis patients, written benefit finding has been demonstrated to reduce fatigue, and is associated with attenuated levels of self-reported pain in those with higher levels of trait anxiety (Danoff-Burg, Agee, Romanoff, Kremer, & Strosberg, 2006). Further, Lovell and colleagues (2016) found that parental caregivers of children with autism were less likely to report anxiety scores that fell within the clinical range following written benefit finding. Taken together, these findings support the notion that written benefit finding may be a useful intervention for improving physical and psychological health outcomes associated with a traumatic experience. A further study found that health centre visits

decreased over five months following both written benefit finding and WED in relation to a previous trauma in a student sample (King & Miner, 2000). However, there is limited evidence available to support the efficacy of written benefit finding in the general population, possibly because it is difficult to establish a standardised stressful experience from which individuals randomly recruited from the general population will be exposed. The Covid-19 pandemic represents an opportunity to investigate whether written benefit finding can mitigate against the adverse psychological and physical wellbeing effects of a stressful experience in the general population in a standardised way.

An important consideration in relation to benefit finding is that it can evoke intrusive and avoidant thoughts about the stressful experience (Helgeson et al., 2006). Indeed, Helgeson and colleagues (2006) suggest that post-traumatic growth necessitates a period of reflection about the stressor, and therefore the experience of intrusive thoughts may be both unsurprising and an essential aspect of the healing process. However, O'Connor and colleagues (2013) argue that expressive writing may promote perseverative thinking and that perseverative thinking may also hinder any writing benefits by preventing the assimilation of aversive thoughts and memories in relation to the stressful experience. Perseverative thinking is a term utilised to describe intrusive, repetitive and unproductive thoughts which are difficult to engage from and which capture mental capacity (Ehring et al., 2011). Research has found that perseverative thinking can predict the onset and maintenance of anxiety and depression in both clinical and non-clinical samples (Spinhoven, van Hemert, & Penninx, 2018). It is also associated with increased psychological symptoms, anger, shame and general distress and has been identified as a potential vulnerability risk for a range of psychopathology and comorbidities (Hijne, Penninx, van Hemert, & Spinhoven, 2020). On this basis, it seems pertinent to investigate the moderating role of perseverative thinking on the efficacy of written benefit finding.

As aforementioned, it is difficult to ascertain the potential efficacy of written benefit finding for improving psychological wellbeing in the general population in a standardised way, because it can be difficult to establish an adverse experience, common to all participants, around which to

frame the written benefit finding intervention. Therefore, the overarching objectives of this study are twofold: i) to explore the efficacy of written benefit finding in relation to the Covid-19 pandemic for reducing self-reported stress, anxiety, depression and physical symptoms during the pandemic, and ii) to determine whether written benefit finding is an effective tool for improving self-reported psychological and physical health in the 'general population'. Specific aims of the study were i) to determine the effects of a written benefit finding intervention on self-reported stress, anxiety, depression and physical health in the general population during the Covid-19 pandemic, relative to a neutral control writing task, and ii) to investigate whether these effects are moderated by perseverative thinking. It was hypothesised that written benefit finding would be associated with a reduction in symptoms of anxiety, stress, depression and self-reported physical symptoms, relative to the neutral control writing task. Predicated by the notion that perseverative thinking is a key mechanism via which benefit finding improves wellbeing (Helgeson et al., 2006), it was also hypothesised that the benefits derived from the written benefit finding intervention will be greater for individuals with higher perseverative thinking scores. These hypotheses were established prior to data collection and were pre-registered on the Open Science Framework (osf.io/eqxfr).

Methods

Participants

All participants were unpaid volunteers, recruited by opportunistic sampling via advertisements posted on Facebook and Twitter and emailed to postgraduate psychology students at a university in the North of England. Participants were required to be aged between 18 and 65 years, fluent in written English and have no current diagnosis of a psychological or physical health condition. Participants were also required to be resident in the UK at the time of participation.

An a priori power calculation revealed that a sample size of 77 would be required to observe a significant medium effect (Cohen's $f = 0.15$) at an alpha level of 0.05 with 80% power. However, a

decision was made a priori to exceed this target if possible, given that we anticipated a high dropout rate and that the actual magnitude of the effects under investigation were difficult to anticipate.

Materials

Perseverative Thinking Questionnaire (PTQ; Ehring et al., 2011). The PTQ is a 15-item measure of repetitive negative thought, capturing the core characteristics of repetitive negative thought (repetitiveness, intrusiveness and difficulties to disengage) in addition to unproductiveness and capturing mental capacity. Responses to each statement are made on a 5 point Likert scale ranging from 0 (never) to 4 (almost always). In accordance with the recommendations provided by Ehring and colleagues (2011) a total score, ranging between 0 and 60, was computed for each participant, with higher scores indicating higher levels of perseverative thinking. The internal consistency of the PTQ total score has been demonstrated previously ($\alpha = 0.95$; Ehring et al., 2011).

State-Trait Anxiety Inventory (STAI; Spielberger, 1983). The STAI comprises two 20 item subscales, one measuring state anxiety and the other measuring trait anxiety. For the purposes of the present study, only the state anxiety subscale was utilised. Participants are asked to indicate how they 'feel right now' on range of statements e.g. "I am tense" on a scale ranging between 0 (not at all) and 3 (very much so). Positively worded items e.g. "I feel calm" are reverse scored. The total score is calculated by summing each item, yielding a score of between 0 and 60 for each participant and with higher scores indicating higher levels of subjective state anxiety. The internal consistency of the STAI subscales has been estimated to range between $\alpha = 0.86$ and 0.95 (Spielberger, 1983).

Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). The HADS was utilised to measure symptoms of anxiety and depression. The instrument comprises two 7-item subscales: anxiety e.g. "I feel tense or wound up", and depression e.g. "I have lost interest in my appearance". Participants respond on a scale ranging between 0 and 3. A number of items are reversed scored e.g. "I can laugh and see the funny side of things". Subscale scores for depression and anxiety, ranging between 0 and 21, with higher scores indicative of higher levels of anxiety and

depression symptoms, respectively. The internal consistency for the anxiety subscale has been estimated to range between $\alpha = 0.78$ and 0.93 , and for the depression scale between $\alpha = 0.82$ and 0.90 (Mykletun, Stordal, & Dahl, 2001).

Perceived Stress Scale-10 (PSS; Cohen, Kamarck, & Mermelstein, 1983). The PSS was utilised to measure participants' perceived background stress. The scale comprises ten items and typically asks participants about their potentially stressful thoughts and feelings during the last month e.g. "How often have you felt nervous or stressed?". However, for the purposes of the present study, the instructions were modified in that participants were asked to respond according to their levels of stress over the past two weeks. Four positively worded items on the scale are reverse scored e.g. "How often have you felt like you were on top of things?". Participants respond on a 5 point Likert scale ranging between 0 (never) and 4 (very often), yielding a total score between 0 and 40, with higher scores indicating higher levels of perceived stress. The internal consistency of the PSS-10 has been estimated to range between $\alpha = 0.74$ and 0.91 (Lee, 2012).

Cohen-Hoberman Inventory of Physical Symptoms (CHIPS; Cohen & Hoberman, 1983). The CHIPS is a 33-item measure which asks participants to rate the extent to which a list of 33 physical symptoms (e.g. "back pain", "diarrhoea", "muscle tension or soreness") have caused them bother over the preceding two weeks. Participants respond on a five point Likert scale ranging from 0 (indicating they have not been bothered by the problem) to 5 (indicating the problem has been an extreme bother). The responses for each item are summed to yield a total score ranging between 0 and 132. Internal consistency of the CHIPS total score has been demonstrated (Allen, Wetherell, & Smith, 2017).

Procedure

The study was approved by the Faculty of Health and Life Sciences Ethics Committee at Northumbria University, prior to participant recruitment. Data collection took place during May and June 2020, during the first wave of the Covid-19 pandemic in the UK. Figure 1 displays the dates

during which data were collected for each phase of the study, relative to Covid-19 deaths and key dates in the first wave of the pandemic. Participation in the study took place entirely online, via the survey platform Qualtrics. The successful delivery of expressive writing interventions online via Qualtrics has been demonstrated previously (Allen et al., 2020). To reduce demand characteristics and expectancy biases, participants were told that the purpose of the study was to investigate the effects on health of expressive writing, without providing further details of the expected wellbeing enhancing effects of written benefit finding or that writing unemotionally about the previous days' activities was a control writing condition. Participants were unaware that there were two writing conditions.

Participants who were interested in taking part in the study after viewing the study advertisement were invited to click a link which took them to a Qualtrics page, where they were able to view further information about the study and if they were keen to take part, to provide informed consent. They were then asked to provide demographic data (age, gender) and to complete the PTQ, PSS, HADS and CHIPS.

Following the completion of the baseline measures, participants were randomly allocated to the written benefit finding or control writing condition via a simple randomisation technique. They were emailed a link the following day to complete their first writing task. Participants were asked to complete the writing tasks at any time in the day (as long as the days were consecutive) that was convenient to them, in a place where they were likely not to be disrupted. Participants first completed the STAI State Anxiety subscale, before engaging with their assigned writing task for 15 minutes. Following instructions adapted from Crawford and colleagues (2019), participants in the written benefit finding condition were required to write about any positive thoughts or feelings they've had in relation to their experience of the Covid-19 pandemic. The importance of focussing on positive emotions was emphasised. Participants in the neutral condition were required to write an account of what they did the previous day in as much detail as possible. Participants were informed to write objectively, focussing on facts and details rather than emotions or opinions. Task

instructions are available at <https://osf.io/rmpk7/>. An on-screen timer counted down for 15 minutes during the writing task, and participants were unable to progress to the next screen until the 15 minutes had elapsed. Subsequently, participants again completed the STAI State Anxiety subscale and were requested to provide details of any disruptions that occurred while they were writing (If a participant reported a disruption of over 5 minutes, their data will have been removed from the analysis; however, no participant reported disruptions that lasted for more than 5 minutes). Participants were emailed a reminder to again complete these tasks on each of the two days following the first writing day.

Two weeks after the last writing day, participants were emailed a link to complete the follow-up questionnaires, which required them to again complete the PSS, HADS and CHIPS. Once these questionnaires were completed, participants were presented with a debrief which outlined the true aims of the study and disclosed that there were two writing conditions.

The Procedure is summarised in Figure 2. The study protocol was preregistered on the Open Science Framework on 4th May 2020, prior to the commencement of data collection (osf.io/eqxfr).

INSERT FIGURES 1 AND 2 ABOUT HERE

Design and Analysis

Design. A quantitative, longitudinal, 2 (condition: written benefit finding, neutral writing) x 2 (time: pre-writing, post-writing) mixed design was employed, with condition as a between-subjects variable and time as a repeated measures variable. Dependent variables were self-reported state anxiety, anxiety symptoms, depression symptoms, perceived stress and physical symptoms.

Data screening. All variables were screened for extreme outliers (> 3.24 SD above or below the mean). One extreme outlier was detected on the CHIPS score at baseline. Whether this participant was included in the analyses pertaining to physical symptoms did not impact the significance of any effects, so this participant was retained for all reported analyses.

Baseline differences and manipulation check. A series of independent samples t-tests was performed to determine whether there were any significant differences between the conditions with respect to age or any of the baseline self-report measures. Subsequently, for the purposes of a manipulation check, the text submitted by each participant during the writing tasks was analysed using Linguistic Inquiry and Word Count (LIWC) software (Pennebaker, Booth, Boyd, & Francis, 2015). To ascertain whether participants randomised to the two conditions wrote a similar amount, the LIWC Word Count variable, averaged across the three days of writing, was compared between the two conditions via an independent samples t-test. Further, to determine whether participants in the written benefit finding condition and the control writing condition followed instructions to write emotively or unemotively, respectively, independent samples t-tests were conducted to compare the two conditions on emotive word use (affective process words, positive emotion words, negative emotion words, anxiety words, sadness words and anger words).

Analysis of state anxiety data. To determine the influence of written benefit finding, relative to control writing, on acute changes in anxiety, a change score was computed for each participant, on each writing day, by subtracting pre-writing state anxiety scores from post-writing scores. The change scores were then averaged across the three writing days for each participant, to determine the average change in state anxiety which the writing tasks evoked. A negative score indicated that state anxiety decreased, on average, across the three days of writing. An independent samples t-test was conducted to compare the state anxiety change scores between the two conditions. Further, within each condition, a one-sample t-test was conducted to determine whether any change in state anxiety was significantly different from 0, to ascertain whether any change observed within each group was significant.

Analysis of two-week follow-up data. To determine whether there were any differences in anxiety symptoms, depression symptoms, perceived stress or self-reported physical symptoms between baseline and two weeks post writing, a series of 2 (condition: written benefit finding,

neutral writing) x 2 (time: baseline, 2 weeks follow-up) mixed ANOVAs were conducted, with condition being a between subjects variable and time being a repeated measures variable.

Moderation analysis. Finally, to determine whether perseverative thinking moderated any effects of condition on state anxiety, a moderation analysis was performed using the PROCESS Macro version 3.5 for SPSS. Condition was entered as the independent variable, the state anxiety change score (computed as outlined above) was entered as the dependent variable and the perseverative thinking total score was entered as the moderator variable. To determine whether perseverative thinking moderated any effects of condition on symptoms of anxiety, depression, perceived stress or self-reported physical symptoms, change scores were computed by subtracting the baseline score from the two-week follow-up score for each of these four variables. Four separate moderation analyses were then conducted as above, with these change scores entered as the dependent variable in each respective analysis.

Results

Randomisation

In total, 160 participants completed the baseline measures and data were analysed for 91 participants aged between 20 and 65 years who fully completed the study (33 males, $M_{\text{age}} = 37.6$, $SD_{\text{age}} = 15.5$; 58 females, $M_{\text{age}} = 40.0$, $SD_{\text{age}} = 13.7$; see Figure 3 for a depiction of the number of participants randomised to each condition and retained per condition at each phase of the study). State anxiety data were available for only 84 of these individuals due to a technical error which meant that post-writing state anxiety was not obtained for seven individuals.

INSERT FIGURE 3 ABOUT HERE

Baseline Data and Manipulation Check

There were no significant differences between participants randomised to the written benefit finding condition, relative to those randomised to the control writing condition, with respect to age, $t(89) = 0.45, p = 0.66$, or any of the self-report measures at baseline: anxiety symptoms, $t(89) = 0.86, p = 0.40$; depression symptoms, $t(89) = 1.08, p = 0.28$; perceived stress, $t(89) = 1.77, p = 0.08$; physical symptoms, $t(89) = 0.27, p = 0.79$; or perseverative thinking, $t(89) = 1.57, p = 0.12$ (see Table 1).

There was no significant difference between the two conditions with respect to the word count, indicating that participants wrote a similar number of words in each condition, $t(89) = 0.97, p = 0.33$. In order to ascertain whether participants in the written benefit finding condition wrote relatively more emotively than participants in the control writing condition, the proportion of emotion words used were compared between the two groups. Participants in the written benefit finding condition used a greater proportion of affective process words, $t(89) = 14.02, p < 0.001$ positive emotion words, $t(89) = 15.19, p < 0.001$, anxiety words, $t(89) = 2.14, p = 0.04$, and sadness words, $t(89) = 3.07, p = 0.003$. There were no significant differences between the two groups with respect to negative emotion word use or anger word use (see Table 1).

INSERT TABLE 1 ABOUT HERE

State Anxiety

There was a significantly greater reduction in state anxiety between pre- and post-writing for the written benefit finding condition, relative to the control condition, $t(82) = 2.47, p = 0.015$, with a medium effect size, $d = 0.54$. The state anxiety change scores were significantly lower than 0 for both the written benefit finding ($p < 0.001$) and control condition ($p = 0.001$) indicating that state anxiety reduced significantly between pre- and post-writing for both conditions (see Figure 4A).

Two-week follow up

On HADS Anxiety there was a significant main effect of time, $F(1, 89) = 4.35, p = 0.04$, with a small effect size, partial $\eta^2 = 0.047$. Anxiety symptoms decreased between baseline and the two week follow-up. The main effect of condition and time x condition interaction was nonsignificant for HADS anxiety (see Figure 4B). For the depression scale there was a significant main effect of time, $F(1, 89) = 5.77, p = 0.018$, with a medium effect size, partial $\eta^2 = 0.061$. Depression symptoms decreased between baseline and the two week follow-up. The main effect of condition and time x condition interaction was nonsignificant for the depression scale (see Figure 4C). For perceived stress and physical symptoms, the main effects of time and condition, as well as the time x condition interaction, were nonsignificant. For physical symptoms, the main effects of time and condition, as well as the time x condition interaction, were nonsignificant.

INSERT FIGURE 4 ABOUT HERE

Moderation by Perseverative Thinking

As indicated by the lack of significant interaction effects, perseverative thinking did not significantly moderate any effects of condition on any outcome variables. However, there was a significant, negative relationship between perseverative thinking and the change between pre-writing and post-writing state anxiety, $b = -0.14, t = -2.45, p = 0.02$, indicating that lower levels of perseverative thinking were associated with a greater decrease in state anxiety between pre- and post-writing. Further, there was a significant, negative relationship between perseverative thinking and the change between baseline and 2 week follow-up scores for anxiety symptoms, $b = -0.08, t = -2.77, p = 0.006$; depression symptoms, $b = -0.08, t = -2.50, p = 0.01$; and perceived stress, $b = -0.16, t = -2.45, p = 0.02$. These effects indicate that lower levels of perseverative thinking were associated with a greater decrease in anxiety symptoms, depression symptoms and perceived stress between baseline and the two-week follow-up (see Table 2).

INSERT TABLE 2 ABOUT HERE

Discussion

The aim of the present study was to investigate the influence of written benefit finding during the Covid-19 pandemic on changes in self-reported symptoms of anxiety, depression, stress and physical symptoms in the general population. A second aim was to investigate whether any of these effects are moderated by perseverative thinking. Analysis of the two-week follow-up data revealed a significant decrease in symptoms of anxiety and depression between baseline and the two week follow-up across both writing conditions, but no significant differences between the two writing conditions. Further, written benefit finding significantly reduced state anxiety between pre- and post-writing, and this state anxiety effect was significantly greater than the change in state anxiety which was observed in the control condition. Perseverative thinking did not significantly moderate any writing effects. However, lower levels of perseverative thinking were associated with a greater decrease in state anxiety between pre- and post-writing, and with a greater decrease in symptoms of anxiety, stress and depression between baseline and the two week follow-up. These findings provide limited support for the efficacy of written benefit finding beyond short-term changes in state anxiety. The decreases in anxiety and depression symptoms that were observed across the two week period post-writing likely reflect the improving situation with the pandemic at that time, including substantial reductions in the number of daily deaths being caused by the pandemic and the easing of pandemic restrictions which had been announced or introduced by the time participants took part in the two week follow-up. However, we discuss below an alternative interpretation of the findings which suggests that both i) writing about positive thoughts, and ii) writing less emotively about the previous days' events may convey beneficial effects.

It is not unusual in expressive writing studies to observe improvements in neutral writing control groups. For example, Baikié and colleagues (2012) observed significant reductions on a range of self-reported physical and psychological health measures, including symptoms of anxiety and

depression following four days of expressive writing. However, they reported no significant differences on these measures between participants who took part in WED, positive writing, or a control task which required participants to describe what they did the previous day, in a similar vein to the control task employed in the present study. In interpreting their findings, Baikie and colleagues (2012) suggest that the control task may have provided the participants with a structured activity that aids emotion regulation, in a similar way to expressive writing. It is of course plausible that providing participants with a task which allowed them to structure their thoughts about daily activities, in an unemotive way, during a pandemic lockdown could indeed be therapeutic for some people. However, Baikie and colleagues (2012) also speculate that the improvement observed across the three groups of participants in their study could reflect either regression to the mean or a general improvement over time. This latter speculation is highly plausible, particularly in the case of our study, because the severity of the pandemic receded between the time that participants completed the baseline and the two week follow-up questionnaires.

Predicated by Helgeson and colleagues (2006), we speculated that any effects of written benefit finding would be moderated by perseverative thinking. However, no significant moderation effects were observed. It may be the case that perseverative thinking is less relevant to written benefit finding than it is to WED, given the assertion of O'Connor and colleagues (2013) that perseverative thinking may prevent the assimilation of aversive thoughts and memories in relation to a stressful experience. Written benefit finding does not specifically aim to promote the assimilation of negative thoughts in the same way that WED does, so written benefit finding may not be less impacted by perseverative thoughts. However, the perseverative thinking findings need to be considered in the context of the alternative interpretations of the writing effects which did not differ between conditions. Interestingly, lower levels of perseverative thinking were associated with greater improvements in psychological wellbeing, irrespective of writing condition. This could be interpreted in one of two ways. Assuming that there was a general beneficial effect of writing, regardless of whether participants wrote about i) positive thoughts or feelings, or ii) unemotionally

about the previous day, then perhaps those individuals who are more prone to perseverative thoughts are less likely to exhibit improvements as a result of expressive writing. This would be consistent with the idea proposed by O'Connor and colleagues (2013) that perseverative thinking interferes with the cognitive mechanisms which underpin expressive writing effects. However, a more plausible interpretation of this finding is that individuals who are prone to experiencing repetitive negative thoughts showed less of a reduction in symptoms of anxiety, depression and stress as the adverse impacts of the first phase of the pandemic were easing. This has implications for the longer-term impacts of the Covid-19 pandemic on individuals who are prone to perseverative thinking, in that these individuals may continue to suffer psychologically as the pandemic subsides. It would be prudent for such individuals to be prioritised for psychological intervention.

Given that there are alternative interpretations of our findings, there are some limitations to consider. The first is whether an alternative control task should have been used which is less likely to have conveyed therapeutic benefits. Given that Baikie and colleagues (2012) observed no differences between WED, positive writing and a similar control task to the one employed here, it would have been prudent to choose a different control task. Further, we perhaps could have measured distress from the pandemic specifically, because it is likely that individuals varied substantially in this regard. For example, those with high levels of socioeconomic security may have experienced less distress in relation to the pandemic due to changes in work activities and increased time with family being less impactful, whereas others experiencing high levels of economic, social and health insecurity may have suffered more (Pierce et al., 2020). Such factors may have confounded the effects under observation. Further, with respect to physical health, despite the fact that positive expressive writing interventions have previously been associated with a decrease in health centre visits in the general population (Burton & King, 2004) and benefit finding has been associated with improvements in disability outcomes in rheumatoid arthritis patients (Danoff-Burg & Revenson, 2005), written benefit finding conveyed no benefits on self-reported physical health in the present study. It could be considered a limitation of the present study that an objective measure

of physical health was not obtained. However, seeking approval to obtain such a measure in the first phase of the Covid-19 pandemic would have delayed the commencement of data collection to the extent that the study would have become unfeasible. While medical visits are often used in expressive writing studies as a marker of physical health, such a measure would have been unreliable here given that healthcare utilisation decreased by approximately a third during the first wave of the pandemic, and this figure was even greater for less severe illness (Moynihan et al., 2020). A further limitation was that the dynamic nature of the pandemic meant that external factors such as the easing of social distancing restrictions occurred during data collection which were beyond our control. These factors impact the ease with which we were able to interpret the findings from the two week follow up, in particular. Finally, while the study hypotheses and protocol were pre-registered, the pre-registered hypotheses were non-specific with respect to whether we expected written benefit finding to reduce both state anxiety immediately post-writing and symptoms of anxiety at the two week follow-up. While any beneficial effects on short-term state anxiety are clearly important to note, the lack of specificity in the pre-registration dictates that the state anxiety findings should be considered exploratory.

Despite these limitations, there were also a number of strengths. The study was novel in that we were able to investigate the effects of an online written benefit finding intervention in the general population, in relation to a standardised stressful experience (i.e. the Covid-19 pandemic lockdown in the UK). These findings provide preliminary evidence that written benefit finding is an effective low intensity intervention for reducing state anxiety in non-clinical individuals. The fact that this intervention is relatively inexpensive, requires minimal training and can be delivered online for individuals to access at a time and place which is convenient to them, make it an appropriate and beneficial tool for reducing state anxiety. Another strength of the study was that, the adoption of LIWC analysis allowed us to determine that participants in both conditions were similarly engaged with the tasks, as indicated by the lack of significant difference in the amount of words produced by participants between the two conditions. Significant differences between the two conditions in

terms of emotional word use demonstrate that participants adhered to instructions to write emotively in the written benefit finding condition and unemotively in the control condition.

In conclusion, the present study sought to investigate whether a written benefit finding intervention, delivered online over three consecutive days during the Covid-19 pandemic first wave lockdown in the UK, could reduce self-reported anxiety, depression, stress and physical symptoms, relative to a neutral writing control condition. A further consideration was whether any effects would be moderated by perseverative thinking. The study was novel in that written benefit finding has rarely been investigated in non-clinical participants and is seldom delivered online. Self-reported anxiety and depression symptoms decreased between baseline and the two week post-writing follow-up, but there were no differences between the two writing conditions. These findings were most likely driven by the easing of pandemic restrictions and optimism that the severity of the pandemic was declining. On this basis, there is limited evidence to support the pre-registered hypothesis that written benefit finding would be associated with a reduction in symptoms of anxiety, stress, depression and self-reported physical symptoms, relative to the neutral control writing task. Lower perseverative thinking was associated with a greater decrease in self-reported symptoms of anxiety, depression and stress as the pandemic was receding, which has potential implications for managing psychological health during and after the pandemic in individuals who are prone to repetitive ruminative thought. While there were no effects of written benefit finding specifically on symptoms of anxiety, depression stress or physical symptoms, the written benefit finding intervention was associated with a significant reduction in state anxiety immediately post-writing. The latter finding suggests that there is promise in further investigating the utility of written benefit finding as a tool to improve shorter-term psychological wellbeing in the general population.

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Table 1

Baseline scores on the self-report measures, and LIWC scores averaged across each writing day, for the Written Benefit Finding ($n = 45$) and Neutral ($n = 46$) writing conditions.

	Written Benefit Finding		Control		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>p</i>
Baseline self-report					
Anxiety	6.71	3.60	6.04	3.85	0.40
Depression	7.33	3.86	6.46	3.85	0.28
Perceived Stress	18.71	7.45	15.93	7.54	0.08
Physical Symptoms	22.69	17.59	21.67	18.80	0.79
Perseverative Thinking	27.58	11.32	24.09	9.90	0.12
LIWC variables					
Word count	365.36	156.65	333.75	153.08	0.33
Affect process words	6.73	1.39	2.64	1.40	< 0.001***
Positive emotion words	5.63	1.34	1.84	1.02	< 0.001***
Negative emotion words	0.96	0.48	0.76	0.65	0.10
Anxiety words	0.34	0.29	0.22	0.25	0.04*
Anger words	0.08	0.11	0.15	0.20	0.05
Sadness words	0.28	0.23	0.14	0.21	0.003**

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2

Findings from the moderation analysis, investigating moderation by perseverative thinking of effects of condition on each of the outcome variables.

	<i>b</i> (SE)	<i>p</i>	<i>R</i> ²
State Anxiety			0.37**
Condition	-2.19 (1.55)	0.16	
Perseverative Thinking	-0.14 (0.06)	0.02*	
Condition x Perseverative Thinking	0.04 (0.06)	0.52	
HADS Anxiety			0.29*
Condition	-0.05 (0.86)	0.95	
Perseverative Thinking	-0.08 (0.03)	0.006**	
Condition x Perseverative Thinking	0.00 (0.03)	0.98	
Depression			0.28
Condition	-0.52 (0.86)	0.54	
Perseverative Thinking	-0.08 (0.03)	0.01*	
Condition x Perseverative Thinking	0.01 (0.03)	0.69	
Perceived Stress			0.27
Condition	-1.27 (1.86)	0.50	
Perseverative Thinking	-0.16 (0.07)	0.02*	
Condition x Perseverative Thinking	0.04 (0.07)	0.58	
Physical Symptoms			0.20
Condition	0.09 (3.25)	0.98	
Perseverative Thinking	-0.18 (0.12)	0.13	
Condition x Perseverative Thinking	-0.04 (0.12)	0.73	

* $p < 0.05$, ** $p < 0.01$

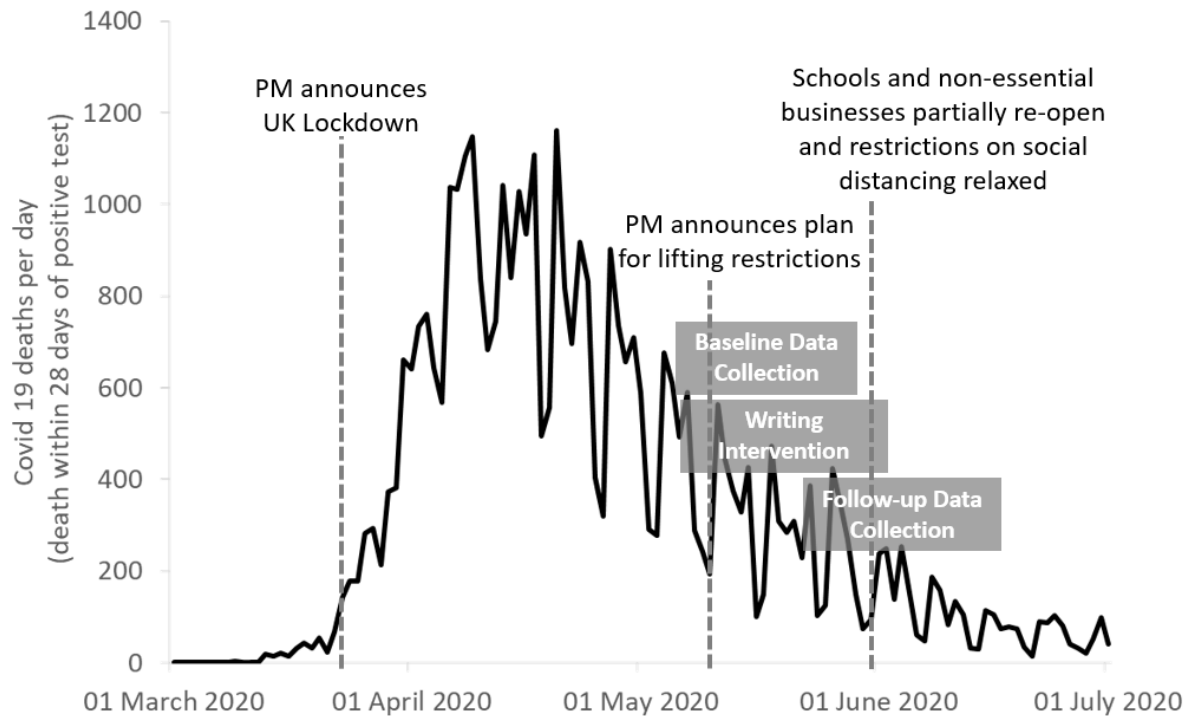


Figure 1

Timeline of baseline data collection, intervention delivery and two week follow-up data collection relative to key dates and daily reported deaths in the Covid-19 pandemic first wave in the UK. The first UK Covid-19 lockdown was announced on 23rd March 2020. Baseline data collection commenced on 5th May 2020 and the first participants began the writing tasks on 6th May 2020. On 10th May 2020 the UK Prime Minister (PM) announced plans to re-open some non-essential businesses and schools to pupils in reception, Year 1 and Year 6 on 1st June 2020. Recruitment to the study ceased on 28th May 2020 when it was confirmed that lockdown restrictions would be partially lifted on 1st June. The final participants recruited to the study completed their third writing day on 2nd June 2020. Data collection for the two week follow-up commenced on 22nd May and ceased on 17th June 2020. Data on Covid-19 deaths sourced from <https://www.gov.uk/guidance/coronavirus-covid-19-information-for-the-public>.

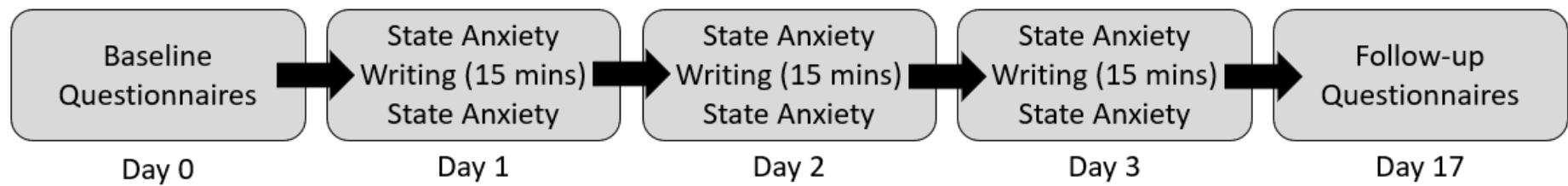


Figure 2
The study procedure.

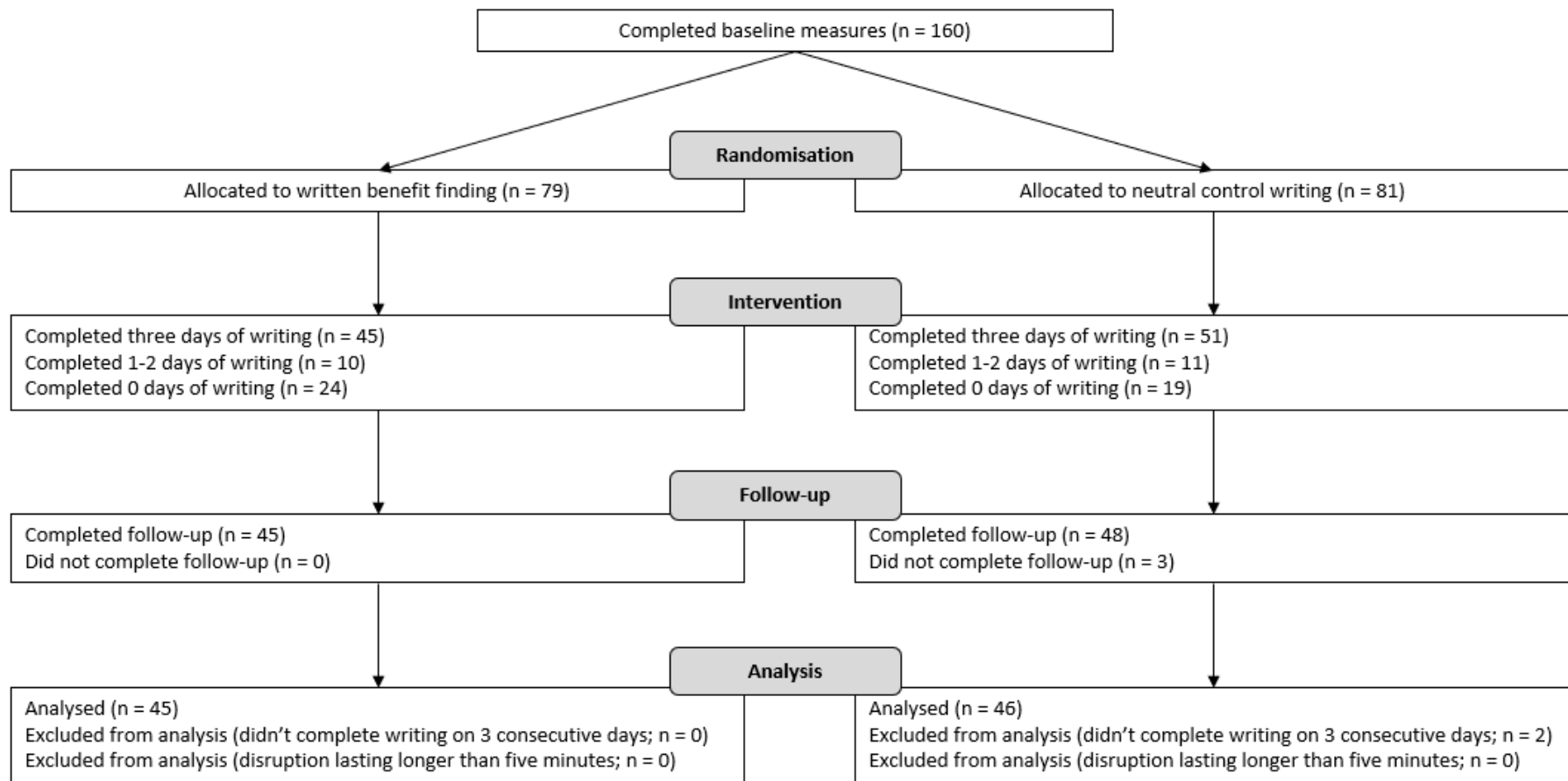


Figure 3

Flow diagram of the number of participants who were retained in each condition for each phase of the study, of the N = 160 who completed the baseline measures.

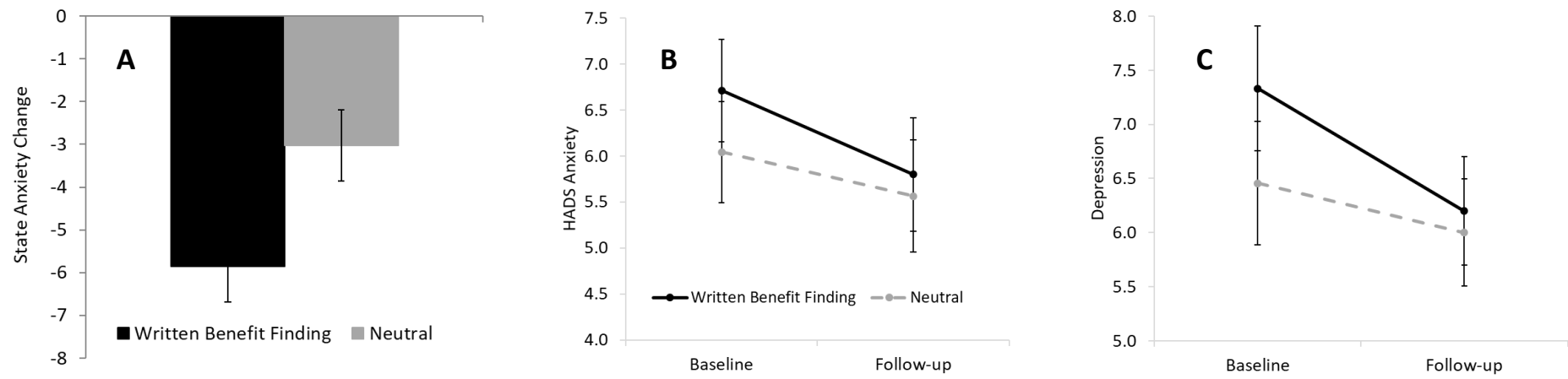


Figure 4

State Anxiety change scores between pre-and post-writing (A), and changes between baseline and the two week follow-up for HADS anxiety (B) and depression (C).