

Short report

Boosting positive mood in medical and emergency personnel during the COVID-19 pandemic: preliminary evidence of efficacy, feasibility and acceptability of a novel online ambulatory intervention

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ABSTRACT

Objectives The aim of this project was to test the efficacy of a brief and novel online ambulatory intervention aimed at supporting psychological health and well-being for medical personnel and first responders during the COVID-19 pandemic.

Methods Interested participants, n=28, actively employed as medical personnel, support staff and emergency responders, in the Midwestern USA in May–June of 2020, provided informed consent and were randomised to complete either low-dose or high-dose intervention, one time daily for 1 week via smartphone application. Each daily intervention included expressive writing, adaptive emotion regulation activity and (one vs two) positive emotion-generation activities, lasting 3–6 min a day. Ratings of negative and positive emotion were provided before and after each activity daily. Analyses tested compliance, acceptability, as well as efficacy at increasing positive emotion and decreasing negative emotion with each use and across time.

Results The results indicated a 13% increase in positive emotion, $t(25)=2.01$, $p=0.056$; and decrease in negative emotion by 44%, $t(25)=-4.00$, $p=0.001$ across both doses. However, there was a clear advantage for individuals in the high-dose condition as daily boosts in positive emotion were significantly greater (an additional 9.4%) $B=0.47$, $p=0.018$. Overall, compliance was good. Acceptability ratings were good for those who completed the follow-up assessment.

Conclusion Front-line personnel, including medical staff and emergency responders, are experiencing unprecedented psychological stress during the COVID-19 pandemic. This investigation suggests both feasibility and efficacy for a brief, daily, ambulatory intervention which could provide essential psychological support to individuals at risk in the workplace.

The excessive psychological burden of the COVID-19 pandemic on medical and emergency personnel is well documented.¹ However, time, resource and pandemic restrictions make conventional interventions less feasible. Moreover, some prior research suggests that conventional interventions are less effective at this time.² Decrements to

Key messages

What is already known about this subject?

- It is well documented that front-line responders are struggling with a significant psychological burden during the COVID-19 pandemic.
- Some research testing conventional interventions during this pandemic has shown limited benefit.

What are the new findings?

- This brief daily online ambulatory intervention, based on a novel combination of existing efficacious interventions, is feasible and efficacious in boosting positive and reducing negative emotions, key elements of psychological health, in front-line responders.

How might this impact on policy or clinical practice in the foreseeable future?

- This research suggests the practical utility of inexpensive ambulatory support services for at-risk personnel due to occupational stressors.
- Further research and development is needed.

mental health of essential personnel can lead to clinical practice failures, impacting patient health and increasing practitioner burnout.³ Positive emotions (PEs) broadly support physical health and well-being, and underlying psychological health and resilience.^{4,5} PEs also facilitate complex decision-making and interpersonal communication, which are essential in good clinical practice.⁶

Research over the last several decades has demonstrated the daily toll that highly aversive events can take on individuals, even those who will show resilient outcomes. Although the preponderance of research argues strongly against traditional psychotherapeutic approaches for most individuals during crises,⁷ there is evidence that even the most resilient will experience symptoms and disruptions in functioning.⁸ During the current COVID-19 pandemic, communities are relying heavily on medical personnel and first responders to maintain

high levels of psychological functioning so as to ensure adequate patient care. As such, it is essential to support personnel, leveraging factors that facilitate management of daily distress and maintenance of well-being, even during a crisis.

There has been compelling evidence of the broad benefits of expressive writing for stressed populations to facilitate the review of emotionally evocative experiences in relation to health and occupational functioning.⁹ One mechanism may be the role documentation of stressful experience plays, but also the emotion-regulatory benefit of self-distancing from the evocative elements of experience through shifts in perspective.¹⁰ In addition, positive emotional responses are broadly considered to be the cornerstone of well-being and happiness, and are consistently predictive of psychological health over time.^{4,5} This may be due in part to the strong predictive association between PEs and self-care behaviours that serve to maintain those emotions over time (eg, seeking support, exercise).¹¹ Importantly, there is also evidence that well-being and health can be enhanced and maintained, even in those under significant stress, through brief PE prompts directing people to savour the good (eg, gratitude journaling).¹²

Prior research has largely examined expressive writing, self-distancing, and PE generation individually and for longer duration, although efficacy for each is clear. However, during this unprecedented time of high anxiety and extreme overtaxing of medical and first responder resources, there is little, if any time for individuals to engage in longer interventions yet clear evidence for a need for support.

This investigation tests a novel combination of these three elements *for the first time* by applying a two-level randomised treatment design. If efficacious, the intervention would serve as a feasible and invaluable resource for medical personnel and first responders to facilitate adaptive coping responses and support long-term adjustment now and in future crises. Given the considerable supporting evidence, we anticipated benefits at both doses as evident by within-person increases in PE and decreases in negative emotion (NE) across uses. However, participants randomised to high dose received two PE prompts each day, as compared with one in the low dose. We hypothesised that those in the high-dose condition would receive greater benefit with significantly increased positive emotional responses, suggesting greater efficacy at boosting mood.

METHODS

Study design, recruitment and procedures

Medical and emergency personnel from two urban hospital centres, as well as police and fire departments were invited via email and targeted postings on social media to test the 'Daily Coping Toolkit' intervention in May/June of 2020 in the Midwestern, USA. According to the National Institute of Environmental Health Sciences' COVID-19 Pandemic Vulnerability Index (covid19pvi.niehs.nih.gov), the region was considered at heightened vulnerability due to elevated infection rates and still limited medical resources. Twenty-eight participants provided informed consent, completed online measures of demographics, mental health symptoms and general well-being (online supplemental table S1), and downloaded the research application onto their smartphone. Participants were adults ($M_{\text{age}}=45.33$; $SD=9.60$), largely female (75%) and Caucasian (89%). These were experienced front-line personnel (M_{years} in position=13.74; $SD=9.85$), including first responders (21%), medical personnel (46%) and support staff (29%), and the majority (54%) were directly working with patients with

COVID-19. Participants were randomised (using a random number generator) to one of two intervention doses and blinded to condition (participants were blinded to the specifics of their condition and were told they would 'receive a set of shorter (3–4 min) or slightly longer (4–6 min) daily activities so that we (the researchers) can test which works best'). The initial participation period was 7 days. No compensation was offered.

Daily Coping Toolkit intervention

The once-a-day (3–6 min) intervention included three steps: (1) typing a narrative of challenges occurring that day, which constituted an expressive writing activity; (2) practising adaptive emotion regulation by revisiting distressing events from a distanced perspective, which constituted an explicit self-distancing activity; and (3) responding to one or two, depending on dose, (of eight) randomised prompts to generate PE. Overall compliance was adequate. Mean participation was 3.14 days of toolkits, $SD=2.62$, or 45%. Importantly, when the intervention was used, compliance with activities was high (88.34%). This was coded based on responses to steps 1 and 3. Intervention details are in online supplemental materials.

Daily emotion ratings

Before and after each toolkit session, participants rated intensity of specific negative (disgust, anger, sadness, fear, distress) and PE (happiness, amusement, affection, contentment, relief) words on a 5-point scale (from 1='not at all' to 5='extremely') used commonly in ambulatory research.¹¹ The primary outcomes were PE and NE rated post-toolkit. Pre-toolkit ratings were covariates or used to derive change scores for analyses.

Post-intervention treatment acceptability

The day after the 1-week intervention, participants were prompted via email to respond to follow-up assessments to index acceptability of the intervention. These were single-item ratings that included perceived efficacy and likelihood of negative impact. Twelve participants responded (43%). There was no difference in condition between those that responded to follow-up assessment and those that did not ($X^2=0.19$, $p=0.66$), nor differences in compliance, demographics or exposure to patients with COVID-19.

RESULTS

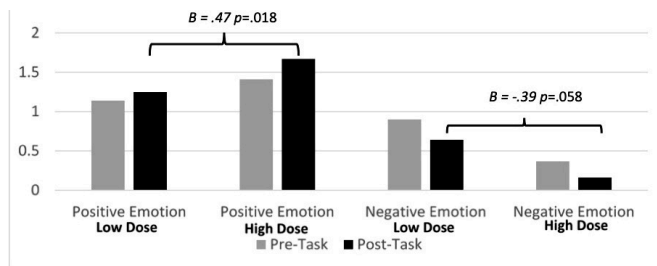
Preliminary analyses

Comparisons across groups revealed successful randomisation indicated by no significant differences across all baseline variables: psychiatric/treatment history, current symptoms, psychological well-being and compliance (online supplemental table S1).

Primary analyses

Initial analyses of within-person average change scores confirmed all participants received benefit. Toolkit sessions significantly decreased NE by 44%, $M\Delta=-0.28$, $t(25)=-4.00$, 95% CI: -0.43 to -0.14 ; $p=0.001$; $SD=0.40$, $d=0.80$ and increased PE by 13%, $M\Delta=+0.17$, $t(25)=2.01$, 95% CI: 0.00 to 0.35 ; $p=0.056$; $SD=0.43$, $d=0.40$. Post-hoc exploration revealed that completion of the PE prompt (step 3) was key—when prompts were *not* completed ($n=13$, 6.6%), there were no gains in PE: $M\Delta=-0.02$, $SD=0.38$.

To test the dose hypothesis, individuals who completed at least two toolkit sessions ($n=19$, range 2–7) were included in linear mixed-effects models. As predicted, for those in the higher



Testing the Dose Effect: Fixed Effects (df = 19)							
Post-task Positive Emotion				Post-task Negative Emotion			
	B ¹ (SE)	p	Effect ²		B ¹ (SE)	p	Effect ²
Pre-task Positive Emotion	.62 (.08)	<.001	.42	Pre-task Negative Emotion	.48 (.08)	<.001	.34
Dose: (Low v. High)	.47(.18)	.018	.23	Dose: (Low v. High)	-.39 (.19)	.058	.19
Time Between Sessions	-.03 (.03)	.30	.17	Time Between Sessions	.00 (.02)	.90	.01
# of Sessions	-.02 (.04)	.52	.02	# of Sessions	.04 (.03)	.24	.04
Pre-Intervention Symptoms	-.22 (.16)	.18	.05	Pre-Intervention Symptoms	.08 (.16)	.63	.09
Pre-Intervention Wellbeing	.06 (.13)	.66	.14	Pre-Intervention Wellbeing	-.10 (.13)	.41	.05
Psych/Treatment History	-.11 (.38)	.77	.03	Psych/Treatment History	.25 (.37)	.51	.07

Figure 1 Mean momentary change in positive and negative emotion when using the Daily Coping Toolkit. ¹B = indicates the expected mean difference in post-toolkit emotion by condition (high versus low dose) while considering pre-toolkit emotion. ²Effect size as the standardized raw score of the fixed effect: Baldwin, S. A., Imel, Z. E., Braithwaite, S. R., & Atkins, D. C. (2014). Analyzing multiple outcomes in clinical research using multivariate multilevel models. *J Consult Clin Psychol* 82(5), 920.

dose condition, PE increased from pre-session to post-session by an additional 9.4%, $B=0.47$, $SE=0.18$, $p=0.018$, while NE decreased by an additional 7.8%, $B=-0.39$, $SE=0.19$, $p=0.058$, with time between sessions, number of sessions, symptoms, wellbeing and psychiatric/treatment history included as covariates (see figure 1).

Follow-up acceptability analyses

Ratings from the 12 participants (43%) who responded to follow-up suggested that acceptability and perceived efficacy were good: 70% rated the intervention as having moderate to high effectiveness and 70% rated negative side effects as unlikely.

DISCUSSION

COVID-19 has created a crisis of burnout and distress across medical and emergency personnel. This novel intervention, tested with experienced medical and emergency personnel during early pandemic months, significantly decreased NE and increased PE after only 3–6 min of daily activity. Those randomised to the higher dose and who completed at least two sessions benefited significantly more. Importantly, participants who did complete follow-up ratings rated the intervention as acceptable and effective.

The results suggest considerable potential for this brief, smartphone intervention to support professionals at risk due to occupational stressors. Although limitations include the small sample size and limited response to follow-up, the potential of these findings is clear. The COVID-19 pandemic presents an unprecedented taxing on the mental health resources of front-line personnel and need for intervention is great. Moreover, a broad consensus from public health experts suggests that the mental health impacts of this pandemic may impact some more than others. Notably, a relatively large proportion of our sample

reported some psychiatric history (80%–89%), suggesting that this intervention has potential to benefit even those at greatest risk. Finally, the online nature of our intervention may also increase its accessibility to other at-risk communities impacted by COVID-19 or in other high-risk contexts.

Emotional experiences of essential personnel impact their own health as well as patient care. This ambulatory tool may fill a critical need as adjuvant to conventional treatments and institutional support structures for personnel at risk due to occupational stress. Future research should replicate and extend findings by including a no-treatment control, larger samples and longer assessment.

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