Engagement with an Online Mindfulness Intervention for 9-1-1 Telecommunicators: A Mixed Methods Study

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Abstract

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Introduction - We depend on 9-1-1 telecommunicators to coordinate emergency responses, but demanding working conditions and secondary exposure to trauma may contribute to a high burden of stress in this population, thereby decreasing their ability to work effectively and efficiently. Online mindfulness-based interventions (MBIs) have shown promising results in reducing stress in similar populations. However, low engagement may limit intervention effectiveness. Understanding who engages, as well as how and why they engage, could improve future interventions.

Objective - In this study we sought to determine demographic, psychosocial, and workplace factors associated with completion of an online, workplace MBI for stress reduction among 9-1-1 telecommunicators. Participants' lived experiences of engaging in the intervention and perceived barriers and facilitators to engagement were also explored.

Methods - This study involved a mixed methods secondary analysis. In the exploratory quantitative analysis, descriptive statistics were used to describe participant characteristics and inferential statistics were used to analyze associations. A thematic analysis of qualitative data from the intervention's six weekly check-in surveys and a final training evaluation was used to derive themes around engagement with the intervention, including barriers and facilitators to engagement.

Results - No individual participant characteristics were associated with completion of the intervention. Only call center of employment was associated with completion ($p=0.042$). Qualitative analyses resulted in four overarching themes: "incorporation into daily life", "perceived effects", "individual-level barriers and facilitators of engagement", and "workplace and intervention-level barriers and facilitators of engagement." Participants exhibited commitment to incorporating mindfulness into their daily lives and expressed positive beliefs in the perceived effects of mindfulness, including increased self-efficacy in coping with stressors, decreased stress, and increased empathy with callers. Workplace barriers and stress were identified as key barriers to engagement, while shorter practices, the use of mixed media, and belief in the benefits of practicing mindfulness were identified as key facilitators.

Conclusions - The results of this study suggest that engaging in an online MBI can reduce stress and improve wellbeing in an emergency responder population, and that the general population may benefit as a result. Future research should explore tailoring of online MBIs to reduce workplace barriers to engagement.

Introduction

9-1-1 telecommunicators arrive at work each day not knowing what they are going to hear. They listen to the worst events of our lives, experiencing a slice of each of our traumas alongside of us. While absence from the scene buffers 9-1-1 telecommunicators from experiencing primary trauma, limited control over events and the unpredictability of calls may increase emotional distress (Meischke et al., 2015; Pierce & Lilly, 2012). Recent studies suggest that peritraumatic distress, an intense, negative emotional reaction during or just after a traumatic event, is associated with symptoms of posttraumatic stress disorder (PTSD) (Pierce & Lilly, 2012; Troxell, 2008). Furthermore, the prevalence of PTSD symptoms in the 9-1-1 telecommunicator population is estimated to be comparable to first responders on the scene (Lilly & Allen, 2015).

These vicarious experiences of trauma can accumulate and become physiologically embodied (Krieger, 2010). Specifically, exposure to secondary trauma and work-related stress in 9-1-1 telecommunicators has been associated with PTSD, secondary traumatic stress, occupational burnout, and acute stress disorder (Lilly & Allen, 2015; Regehr, Leblanc, Barath, & Balch, 2013; Trachik et al., 2015; Troxell, 2008). Studies have shown that a perceived lack of appreciation, effort-reward imbalances, common organizational practices of mandatory overtime and shift work, and aspects of the physical work environment, such as ergonomics and poor technical equipment, all contribute to 9-1-1 telecommunicators' burden of stress (Meischke et al., 2015; Trachik et al., 2015; Troxell, 2008). The costs of work-related stress extend beyond the individual telecommunicator; work-related stress is associated with decreased productivity, increased absenteeism, and increased health care utilization and expenditures (Azagba & Sharaf, 2011; Goetzel et al., 1998; O'Keefe, Brown, & Christian,

2014). With the lives of others depending on the ability of 9-1-1 telecommunicators to work effectively and efficiently, there is a significant need for stress-reduction interventions within this population.

While we cannot shield 9-1-1 telecommunicators from all exposure to trauma and stress at work, a mindfulness-based intervention (MBI) could encourage adaptive responses to stress. The aim of mindfulness is not to change the content of an experience, but to encourage a nonjudgmental, non-reactive response to it (Allexandre et al., 2016; Kabat-Zinn, 2003; Smith et al., 2011). Mindfulness research within the 9-1-1 telecommunicator population is limited; however, in a recent, cross-sectional study self-reported mindfulness was found to be associated with less stress in 9-1-1 telecommunicators (Meischke et al., 2015). In addition, MBIs have been successfully applied in other high-stress occupations, such as non-emergency call centers, law enforcement, nursing, and social work, to reduce stress and related outcomes (e.g. sleep disturbances, anger, burnout, physical fatigue, and compassion fatigue), as well as increase resilience to traumatic and chronic work-related stressors (Allexandre et al., 2016; Christopher et al., 2015; Duarte & Pinto-Gouveia, 2016; Gregory, 2015).

Online MBIs may be particularly well-suited to the variable schedules, shift work, and technological proficiency of the 9-1-1 telecommunicator population. However, low engagement and high drop-out rates in online MBIs and other online health promotion interventions may limit overall intervention effectiveness (Carolan, Harris, & Cavanagh, 2017; Eysenbach, 2005; Guertler, Vandelanotte, Kirwan, & Duncan, 2015; Strecher et al., 2008). It is often argued that drop-out is a result of dissatisfaction or loss of interest in the intervention, but it could also indicate that, after reaching a satisfactory degree of behavioral capability, the participant no longer feels they need the intervention (Eysenbach, 2005; Guertler et al., 2015).

Nonetheless, several studies and meta-analyses of online interventions have reported a dose-response relationship in which increased adherence is associated with improved outcomes (Donkin et al., 2011; Glasgow et al., 2011; Strecher et al., 2008).

A recent meta-analysis of online MBIs reported adherence rates, defined as all sessions completed, between 40% and 92% (Spijkerman, Pots, & Bohlmeijer, 2016). Few studies in the first responder literature have reported on levels of engagement with MBIs beyond providing drop-out rates. Understanding who engages and how they engage with an intervention is important to maximize engagement and improve outcomes in future interventions, as well as to ensure that interventions are reaching those who will benefit most. Moreover, engagement is likely to change over the course of the intervention as participants feel more capable of engaging in the intended behavior. Therefore, quantitative measures of engagement may be insufficient in providing a comprehensive understanding of why participants engage or disengage from an intervention.

Engagement with Mindfulness Interventions

Engagement refers to how participants use an intervention, and is often measured in terms of participation, such as attendance, home practice, or homework completion (Banerjee, 2016; Owen, 2016). Theories of behavior change, bolstered by empirical findings, suggest that the simple repetition of behavior is not enough to elicit behavior change. Other factors - such as knowledge of the risks and benefits of the behavior, self-efficacy, and outcome expectations - influence an individual's likelihood of behavior adoption over time (Bandura, 2004). This is perhaps even more pertinent for MBIs since engagement in mindfulness practice inherently requires more than physical presence and the rehearsal of behaviors; it necessitates psychological involvement and the integration of mindfulness into daily life

(Banerjee, 2016; Kabat-Zinn, 2003). In a recent study, Banerjee (2016) proposed five attributes of "psychological engagement" with MBIs: (1) *motivation* to participate, (2) *intention* to formal mindfulness practice during and after the intervention, (3) *commitment* to incorporate mindfulness principles into daily life, (4) *belief* in the ability of mindfulness to one's improve health, and (5) a *therapeutic relationship* between the individual, the MBI teacher, and the group. While the underlying concepts of this framework are not new, it may elucidate the nuances of engagement that are specific to MBIs. In a brief, online mindfulness-based self-help (MBSH) intervention, Banerjee and colleagues found that both physical, defined as attendance and home practice, and psychological engagement, defined using the above framework, were associated with trait mindfulness (Banerjee, Cavanagh, & Strauss, 2017). Greater engagement predicted greater improvements in trait mindfulness during the intervention (Banerjee et al., 2017). More research is needed to explore psychological engagement in workplace MBIs, in which aspects of psychological engagement, such as motivation to participate, may differ from MBIs outside of the workplace. The purpose of the present study was to explore both forms of engagement, physical and psychological, and potential factors that influence them.

Demographic Factors Associated with Engagement

While a number of studies have investigated demographic and psychosocial factors associated with engagement in online and workplace health promotion interventions, there is a comparative dearth of literature for MBIs specifically. Several studies in the workplace health promotion literature have found that female-identifying participant are more likely to engage in workplace interventions than male-identifying participants (Hasson, H., Brown, & Hasson, D., 2010; Robroek, van Lenthe, van Empelen, & Burdorf, 2009; Terry, Fowles, & Harvey, 2010).

The findings for age have been mixed with some studies reporting no association, yet others finding that older age was associated with higher engagement or completion of workplace health promotion interventions (Grossmeier, 2013; Guertler et al. 2015; Liu & Rice, 2017; Robroek et al., 2009; Terry et al., 2010). Other demographic characteristics, such as marital status, race, and having children, have not be thoroughly researched. Thus, it is unclear whether demographic factors are related to engagement in MBIs. The current study aimed to identify any potential relationships between demographic factors and engagement in a workplace MBI through an exploratory analysis.

Psychosocial Factors Associated with Engagement

There is some evidence from the MBI literature that those who may benefit the most from MBIs may engage the least. For example, in an online MBI for United States military personnel and veterans, participants who did not complete all sessions more frequently had PTSD symptoms and lower trait mindfulness at baseline compared to completers (Liu & Rice, 2017). In another study, Banerjee (2016) found that baseline worry and trait rumination were associated with engagement in an online MBI, but not in the study's active control group, an online music therapy intervention. In the workplace, excessive rumination and worry may manifest as overcommitment, a coping pattern of "excessive striving and a strong need for approval and esteem" at work, that could impair engagement with a workplace intervention (de Jonge, Bosma, Peter, & Siegrist, 2000; Meischke et al., 2015). Stress may also make it difficult to engage in mindfulness practice; participants in a mindfulness-based cognitive therapy (MBCT) intervention reported that experiencing stress and tiredness made it difficult to practice (Langdon, Jones, Hutton, & Holttum, 2011). Moreover, the perception of being time-poor may discourage engagement in workplace interventions, which may be perceived

as detracting from work time (Carolan et al., 2017). However, studies investigating the relationship between baseline stress and engagement are limited and report insignificant results (Carmody & Baer, 2008; Carolan et al., 2017; Zarski et al., 2016). In summary, a paradoxical relationship may exist, in which the very factors that MBIs intend to ameliorate - mindfulness, adverse coping and thinking styles, and stress - may impair engagement with the intervention. This study aimed to increase our understanding of this paradox, thereby enabling future researchers to adapt MBIs to the needs of those who may benefit most. Yet we must also accept that mindfulness may not be appropriate for or acceptable to all.

Workplace Factors Associated with Engagement

In the workplace, additional barriers and facilitators to engagement may exist. Perceived social support is often considered a facilitator of engagement (Balk-Møller, Larsen, & Holm, 2017, Guertler et al., 2015; Poirier & Cobb, 2012). This may be a positive attribute of workplace interventions, in which pre-existing social networks are available (Guertler et al., 2015; Robroek et al., 2009). While there is limited research on the role of workplace social support in workplace health promotion interventions, in interventions designed with social network features, social support has been found to improve engagement (Poirier & Cobb, 2012). In a web-based health intervention, Poirier and Cobb (2012) found that participants with more social ties within the intervention engaged with the intervention content more frequently. However, others have found that the benefits of social networks do not extend beyond initial enrollment; Balk-Møller et al. (2017) found that peer pressure from colleagues encouraged participation in a workplace health promotion intervention but not active use of the intervention. This study explored the role of workplace social support and network conflict in engagement with an intervention without social network features. Factors outside of the

control or measurement of the intervention, such as the physical environment of the workplace, may also influence engagement. In this study, we explored these factors through qualitative analysis.

Objectives

This secondary, exploratory analysis used mixed methods to explore engagement with an online, workplace MBI for 9-1-1 telecommunicators. We explored multiple phenomena relating to engagement with the intervention: (1) measurable factors associated with engagement, and (2) the subjective experience of engaging. Neither method was entirely sufficient to investigate these phenomena. Therefore, it was necessary to consider a mixed methods approach (Miller, Crabtree, Harrison, & Fennell, 2013).

We used a complementary integration of methods to suit each inquiry in this analysis (Miller et al., 2013). Quantitative methods were employed to explore demographic, psychosocial, and workplace factors associated with completion of the intervention. Qualitative methods were used to explore the experience of engaging with the intervention and to investigate perceived barriers and facilitators of engagement. A qualitative rather than quantitative analysis was appropriate for this part of the study because mindfulness training is a subjective experience; an individual's understanding of mindfulness will influence how they experience the process of learning it and how they engage with this process. As mindfulness training continues, a person's subjective understanding will likely change, thus their experience and engagement with mindfulness also changes.

The primary aims of the present study were:

(1) to describe engagement with an online, workplace MBI for stress reduction among 9-1-1 telecommunicators,

(2) to explore demographic, psychosocial and workplace factors associated with completion of the intervention,

(3) to explore how participants experienced engaging with the intervention,

(4) to explore barriers and facilitators of engagement with the intervention.

We anticipate that insights gained from this study will improve our understanding of engagement in online, workplace MBIs and will have implications for the development of future interventions.

Methods

Study Design

This study was a secondary analysis of participant engagement in the treatment arm of a randomized controlled trial testing the effectiveness of an online mindfulness-based intervention to reduce stress among 9-1-1 call center telecommunicators (Meischke et al., 2018).

Recruitment

Study recruitment was conducted in two phases. First, emergency response call centers in the United States and Canada were recruited using industry publications and listserv announcements. To be eligible to participate in the study, call centers had to allow their employees to receive emails and to go online to the training website. One call center

recruited was unable or unwilling to allow web access and was excluded from the intervention. Enrolled call centers represented rural, urban, and suburban areas in the U.S., as well as two large call centers in Canada. All enrolled call centers responded to 9-1-1 calls for police, fire, or medical emergencies, or a combination of two or more emergency call types. In the second phase of recruitment, individual 9-1-1 telecommunicators were recruited from within the enrolled call centers. Individual recruitment differed per call center, but relied on staff announcements, recruitment emails and flyers, and word-of-mouth. Individual participants were required to be currently employed as a 9-1-1 telecommunicators (call-receivers, dispatchers, or both) at one of the enrolled call centers (Meischke et al., 2018).

The original study was approved by the Institutional Review Board (IRB) of the University of Washington. After obtaining electronic informed consents, participants provided demographic and employment-related (ie. length of employment) information and completed an online baseline survey (Meischke et al., 2018). This secondary analysis did not contain any participant identifiers, and was classified as IRB exempt.

Online Mindfulness Intervention

The online mindfulness intervention was based on a Mindfulness-Based Stress Reduction (MBSR) approach, which has been shown to be effective for a variety of physical and mental conditions (Baer, 2003; Chiesa & Serretti, 2009; Kabat-Zinn, 2013; Meischke et al., 2018). Clinicians and investigators trained in mindfulness developed the intervention to meet the specific needs of the 9-1-1 telecommunicator population. To this end, intervention content was adapted from its traditional in-person format to an online format, abbreviated, and tailored to increase relevance to 9-1-1 telecommunicators.

The intervention was comprised of seven online modules accessed through an online portal. Each module started with a short video introducing that week's theme followed by a short reading. The next section of the modules consisted of one longer (10-14 minutes) "daily practice" with guided audio and one to two brief "drop-in" mindfulness practices. Daily practices introduced formalized meditation skills, such as body scan and loving-kindness. Drop-in practices focused on incorporating mindfulness activities into daily life. Some of these practices, such as "body awareness at your desk" and "mindfully ending a call," were targeted at the emergency response call center work environment, while others, such as "mindful eating," could be practiced anywhere. Each module also included a weekly check-in survey and an optional, moderated discussion board. The estimated time to complete each module was between 20 and 30 minutes (Meischke et al., 2018).

Intervention Procedures

After completion of the baseline survey, participants were randomized into either immediate access to the intervention, the treatment condition, or to a wait-list control group. Those assigned to the treatment condition were contacted twice weekly throughout the intervention period. One email contained a link to the weekly training module, while the second email provided suggestions for incorporating the module's mindfulness skills into daily life. The wait-list control group did not received weekly emails. For the purposes of this study, only the treatment group was included in analysis.

Participants were instructed to complete one module per week over a 7-week period, and encouraged to complete the modules on a designated weekday if their work schedule allowed. However, modules from previous weeks could be accessed throughout the intervention period. Participants were instructed to do the "daily practice" with guided audio for

approximately 10 minutes at least 6 out of 7 days a week. Participants were able to download the audio files to practice at home. For the drop-in practices, participants were encouraged to practice the short exercises as often as they were able.

Two weeks after the online mindfulness intervention ended, both the treatment and wait-list control participants were asked to complete a second survey. A third survey was completed four months later. The second and third surveys mirrored the initial baseline survey. Measures related to psychosocial and work-related factors were included in both the baseline and follow-up questionnaire. All surveys were completed online (Meischke et al., 2018).

Weekly Check-In Surveys and Final Training Evaluation

At the beginning of each weekly session, intervention participants were asked to complete online weekly check-in surveys with a mix of close- and open-ended questions. These surveys assessed how often participants practiced mindfulness during the previous week ("How many days this week did you practice formal mindfulness with the guided audio?"), how they incorporated mindfulness into their daily lives ("Did you incorporate mindfulness into your daily life this week?" and "If so, can you give one or two examples of how you incorporated mindfulness into your daily life this week?"), and any perceived effects ("Please share anything you've noticed this week about the effects of your mindfulness practice."). There were 6 weekly check-in surveys in total.

A final training evaluation after the last weekly session (week 7), assessed participant satisfaction ("How would you rate this training overall?"; "What did you like about this training"; "What did you dislike, or what would you change, about the training?"; "Would you encourage other telecommunicators to take this training?"), perceived effects ("What effect has this

training had on you stress level, if any?"), and overall experience ("Is there anything else you'd like to share with us about your experience with this training?").

Measures

Main Outcome

Completion: Engagement in the intervention was measured objectively as the number of modules completed. For the purposes of this analysis, we created a binary variable to compare participants who completed all seven modules of the invention to those who did not (1-6 modules completed). We excluded participants who enrolled in the intervention but did not complete any modules (n = 40).

Demographic

Participants were asked to self-report their age, gender, race, ethnicity, marital status, highest level of education, and whether they currently had children under the age of 18. Due to racial homogeneity of the sample (94.1% White), a binary White-non-White variable was tested as well. Participants also self-reported years of experience as a 9-1-1 telecommunicator. The call center the participant was employed at was also collected.

Psychosocial

Self-reported stress: The Calgary Symptoms of Stress Inventory (c-SOSI) is a 56-item scale measuring subjective symptoms of stress with 8 subscales: depression, anger, muscle tension, cardiopulmonary arousal, sympathetic arousal, neurological/gastrointestinal, cognitive disorganization, and upper respiratory symptoms. Participants rate the frequency of experiencing the stress-related symptoms on a 5-point Likert rating scale from *never* to

frequently during the past week (Carlson & Thomas, 2007*)*. Higher scores indicate higher frequency of stress-related symptoms.

Mindfulness*:* The Mindful Attention Awareness Scale (MAAS) is a 15-item validated scale that assesses mindfulness as a unidimensional construct of attentional awareness in the present moment. Participants are asked how frequently or infrequently they have each stated experience of mindlessness, conceptualized as the inverse of mindfulness, on a 6-point Likert scale from 1 (*almost always*) to 6 (*almost never*) (Brown & Ryan, 2003). Higher scores reflect higher trait mindfulness.

Work-related

Social support in the workplace: The 6-item social support subscale of the Swedish Demand-Control-Support Questionnaire (DCSQ) assesses overall workplace atmosphere and social support from coworkers and supervisors. Participants are asked to report to what degree they agree with the statements on a 4-point Likert scale ranging from *strongly disagree* to *strongly agree*. Total scores range from 6 to 24, with higher scores indicating higher perceived social support. The subscale has good internal consistency (α=0.83) (Sanne, Torp, Mykletun, & Dahl, 2005). In addition, a visual analog scale (VAS) measuring overall level of satisfaction with social support in the participant's workplace was used. The scale ranges from 0 to 100 with 0 representing "completely dissatisfied with social support at work" and 100 representing "completely satisfied with social support at work." Prior research in a first responder population established the concurrent validity of this VAS (Beaton, Murphy, Pike, & Corneil, 1997).

Network conflict in the workplace: A VAS measuring perceived degree of conflict in the participant's workplace social network was used. The scale ranges from 0 to 100 with 0

representing “little or no conflict with coworkers” and 100 representing “frequent, intense conflict with coworkers.” Again, the concurrent validity of this VAS was established in prior research (Beaton et al., 1997).

Overcommitment*:* The 6-item overcommitment subscale of the Effort-Reward-Imbalance (ERI) questionnaire measures an individual’s tendency to engage in a coping pattern of excessive commitment and high need for approval at work (Siegrist et al., 2004). Responses are indicated on a 4-point Likert scale with total scores ranging from 6 to 24. Higher scores indicate greater overcommitment at work. The subscale has sound psychometric properties, including satisfactory confirmatory factor analysis, internal consistency, and reliability (Siegrist, Li, & Montano, 2014).

Table 1. Baseline variables tested in the present study

Variables	
Demographic factors	Gender, age, marital status, race, ethnicity, children in the household, education, years of experience as a 9-1-1 telecommunicator
Psychosocial factors	Stress (c-SOSI) and mindfulness (MAAS)
Work-related factors	Overcommitment (ERI overcommitment subscale), network conflict in the workplace (VAS), social support in the workplace (DCSQ social support subscale; VAS)

Analyses

Statistical analyses were conducted using the R statistical package version 3.4.3 (R Core Team, 2017). For descriptive analysis, counts and frequencies for categorical variables and means and standard deviations for continuous variables were calculated. Bivariate associations between demographic, psychosocial, and workplace characteristics and the main outcome variable, completion, were tested using chi-square for categorical variables and

unpaired t-tests for continuous variables. When the number of observations within categories was small, Fisher's exact tests were used. In the original analysis plan, characteristics identified as factors associated with completion were to be included in a multivariate logistic regression model with completion as the binary dependent variable. However, based on the results of the bivariate analysis, this analysis was not conducted.

Thematic analysis was used to analyze the qualitative data from the weekly check-in surveys and training evaluation (Creswell, 2012). Thematic analysis is an iterative process that aims to identify patterns across qualitative data while maintaining theoretical and epistemological flexibility (Braun & Clarke, 2006). This study approached qualitative analysis from an interpretivist paradigm, which is based in the belief that reality is based on social construction, thus multiple truths are always available (Tolley, Ulin, Mack, Robinson, & Succop, 2016). In this research paradigm, the interpretation of results is inextricably tied to the investigator, such that the investigator's perception of reality shapes the interpretation of results. Nonetheless, multiple steps were taken to establish trustworthiness of the analysis.

The author first read the entirety of the data to become familiar with the content, then independently developed an initial coding schema through a hybrid deductive and inductive approach (Fereday & Muir-Cochrane, 2006). Deductive coding relies on a theory or set of research questions to drive the analysis from the 'top-down' (Braun & Clarke, 2006). In this analysis, deductive coding was used to create an initial codebook derived from Banerjee's framework for psychological engagement (Banerjee, 2016). Based on the content of the survey questions and the depth and breadth of the answers, only two of the five facets, commitment and belief, were included in the initial codebook. Meanwhile, inductive coding is a 'bottom-up' approach in which the data itself drives the analysis and no existing coding frame is used (Braun & Clarke, 2006). Inductive coding allowed for inclusion of themes outside the

bounds of the theoretical framework. After the creation of the initial codebook based on the deductive approach, additional broad code categories and subcodes were added based on the initial reading of the data. Once the codebook was complete, a second coder was trained on the coding schema, then the two team members independently piloted the schema to establish an initial agreement on how to apply the codes. Coding was conducted in Google Sheets to facilitate ease of communication between coders. The two team members met iteratively to establish intercoder agreement, verbally negotiate any discrepancies during coding, and ensure credibility of the analysis. Once the coding was complete, the first coder identified major themes and the second coder reviewed the themes to ensure credibility. Sample quotations were identified to illustrate each theme. ID number, gender, and call center region of the participant are provided alongside the quotations.

Results

Quantitative

Of the 161 participants who agreed to take part in the study, 43 (26.7%) were excluded in this analysis. Among the participants excluded, 40 participants completed the baseline survey, but did not complete any lessons. The other three excluded participants completed at least one lesson but did not complete all seven lessons and/or the final training evaluation. Of these three participants, one did not complete the baseline survey and was therefore excluded from analysis. The remaining two left employment during the study and it was unknown whether they departed before having access and ability to complete all seven lessons. This resulted in 118 participants being included in the analysis (73.3% of the original sample).

There were no significant differences between those excluded and those included in the analysis in relation to demographic, psychosocial, or work-related characteristics.

Table 2 summarizes the demographic, psychosocial, and work-related characteristics of the analytic sample. Most participants were female (86.4%), White (94.1%), non-Hispanic (94.1%), between the ages of 18 and 35 years old (41.5%), and had at least some college education (93.2%). The majority of participants (67.8%) were married or living with a partner and 49.2% reported having children under the age of 18. Of the 31 call centers in the intervention, 27 had at least one participant included in this analysis. The majority (88.9%) of call centers had 5 or fewer participants (range = 1-38).

Table 2 also shows the pattern of engagement for the sample. The majority of participants (60.2%) completed all seven lessons, and were thus classified as “completers” for this analysis. A minority of participants (39.8%) did not complete all seven lessons, but completed at least one lesson. Of these participants, the majority (25, 53.2%) completed five or six lessons.

Overall satisfaction with the intervention is also presented in Table 2. A slight majority (53.4%) of all participants completed the final training evaluation question related to satisfaction: 73.2% of those who completed the intervention content and 23.4% of those who did not complete the intervention content. The majority of these participants (82.5%) rated the training as somewhat or very helpful.

The comparison between those who completed all seven modules and those who did not showed that demographic, psychosocial, and work-related characteristics were not strongly associated with completion of the intervention content. Only call center of employment had a statistically significant association ($p=0.042$) with completion of the intervention (Table 2).

Table 2: Characteristics of participants, by engagement group

	Non-complete 47 (39.8%)	Complete 71 (60.2%)	Combined[a] (n= 118)	Between-group differences
Demographic Characteristics				
Age (years), n(%)				0.130
18 - 35	16 (32.7%)	33 (67.3%)	49	
36 - 45	21 (52.5%)	19 (47.5%)	40	
46 - 64	10 (34.5%)	19 (65.5%)	29	
Gender n(%)				0.304
Female	43 (42.2%)	59 (57.8%)	102	
Male	4 (25.0%)	12 (75%.0)	16	
Race n (%)[b]				0.894
American Indian or Alaska Native	2 (33.3%)	4 (66.7%)	6	
Asian	1 (100.0%)	0 (0.0%)	1	
Black	1 (25.0%)	3 (75.0%)	4	
Multiracial	2 (33.3%)	4 (66.7%)	6	
Other	1 (25.0%)	3 (75.0%)	4	
White	44 (39.6%)	67 (60.4%)	111	
Binary Race n(%)				0.866
White	44 (39.6%)	67 (60.4%)	111	
Non-White	3 (42.9%)	4 (57.1%)	7	
Ethnicity n(%)				1.000
Hispanic	2 (50.0%)	2 (50.0%)	4	
Non-Hispanic	43 (38.7%)	68 (61.3%)	111	
Years of Experience				0.910
Less than 2 years	5 (29.4%)	12 (70.6%)	17	
2 - 5 years	11 (37.9%)	18 (61.1%)	29	
6 - 10 years	10 (43.5%)	13 (56.5%)	23	
11 - 20 years	15 (41.7%)	21 (58.3%)	36	
21 - 30 years	5 (41.7%)	7 (58.3%)	12	
Married				0.510
Yes	34 (42.5%)	46 (57.5%)	80	
No	13 (34.2%)	25 (65.8%)	38	
Children				0.944
Yes	21 (41.2%)	30 (58.8%)	51	
No	26 (38.8%)	41 (61.2%)	67	
Education				0.929
High school/GED	3 (37.5)	5 (62.5%)	8	
Some college	19 (37.3%)	32 (62.7%)	51	
Associates	5 (50.0%)	5 (50.0%)	10	
Bachelors	17 (42.5%)	23 (57.5%)	40	
Post-graduate study or degree	3 (33.3%)	6 (66.7%)	9	
Call Center[b]	----------	----------	----------	0.042
Psychosocial Characteristics				

Stress (cSOSI) mean (sd)	61.8 (35.5)	53.5 (21.9)	56.8 (28.3)	0.155
Mindfulness (MAAS)	4.0 (1.0)	4.1 (0.8)	4.0 (0.9)	0.461
Work-related Characteristics				
Social Support (VAS) mean (sd)	66.0 (28.6)	68.2 (22.4)	67.3 (24.9)	0.674
Social Support (DCSQ subscale)	17.5 (3.2)	17.9 (2.2)	17.7 (2.6)	0.500
Network Conflict (VAS)	30.4 (20.6)	33.4 (25.9)	32.2 (23.9)	0.493
Overcommitment (ERI subscale)	12.7 (3.7)	13.6 (3.6)	13.2 (3.7)	0.170
Engagement				
Number of Lessons Completed				----------
1	----------	----------	1 (0.8%)	
2	----------	----------	7 (5.9%)	
3	----------	----------	7 (5.9%)	
4	----------	----------	7 (5.9%)	
5	----------	----------	8 (6.8%)	
6	----------	----------	17 (14.4%)	
7	----------	----------	71 (60.2%)	
Satisfaction[c]	**11 (23.4%)**	**52 (73.2%)**	**63 (53.4%)**	
Overall Rating of Training				----------
Not at all helpful	0 (0.0%)	3 (5.7%)	3 (4.8%)	
Not helpful	1 (9.1%)	7 (13.5%)	8 (12.7%)	
Somewhat helpful	9 (81.8%)	28 (53.8%)	37 (58.7%)	
Very helpful	1 (9.1%)	14 (26.9%)	15 (23.8%)	

[a] Some frequencies do no sum to column total due to missing responses.
[b] A Fisher's exact test was used due to small sample sizes per category.
[C] Column percentages presented for this section.

Qualitative

For the qualitative analysis, participants were included in the analysis regardless of completion of the baseline survey or number of lessons completed. This resulted in a sample of 121 participants, however, 12 participants (9.9%) did not answer any of the open-ended questions. In total, 822 open-ended answers from 109 unique participants at 26 call centers were analyzed. Four overarching themes were identified: (1) incorporation into daily life, (2) perceived effects, (3) individual-level barriers and facilitators of engagement, and (4)

workplace and intervention-level barriers and facilitators of engagement. The themes and subthemes are described, followed by a summary in Table 3.

Incorporation into Daily Life

This theme describes how participants incorporated mindfulness into their daily lives. Although this was a robust theme in terms of quantity, it lacked breadth. No subthemes were identified.

Many participants described using mindfulness in many aspects of their lives, both at work and at home, and for a diverse set of purposes. While some participants described using specific exercises from the training, more commonly participants reported incorporating overall concepts of mindfulness, like present-centeredness and non-judging. Many participants reported bringing present-centered awareness into their daily routines, for example, “I tried to be more conscious and aware of my surroundings while driving to work each day” (I68 - female, West U.S.) and “[when] making coffee every morning - and being very aware of the smell and textures instead of mindlessly moving through the task” (I298 - female, West U.S.). Some described bringing non-judgmental acceptance into their interpersonal communications, for instance, “While communicating with my husband, I used the tools to be mindful of the situation and remember my thoughts are not facts and step back from the situation and revisit it later when my mind was calm” (I3 - female, West U.S.).

Participants commonly reported using mindfulness to cope with psychological stressors, such as “when I've started feeling stressed, I've thought about what it is that's stressing me and closed my eyes taking myself to a place that makes me happy,” (I173 - female, Midwest U.S.) as well as physical stressors, “I used mindful breathing when I was

having some trouble with headaches and neck strain this week" (I274 - female, West Canada). Incorporation of mindfulness was common at both work and home.

Perceived Effects

This theme describes the perceived effects of engaging in the intervention and mindfulness practice. In general, the perception of positive effects was a facilitator of engagement, and the perception of negative effects was a barrier to engagement. Six subthemes were identified: *stress*, *general wellbeing*, *work-specific*, *being mindful*, *interpersonal relationships*, and *physical health*.

Stress

Many participants reported a belief that practicing mindfulness reduced their stress. For some participants, this belief facilitated engagement, for example, my stress level is "definitely lower and I will continue to use it [mindfulness] to keep stress at bay" (I58 - male, Northeast U.S.). Some participants categorized the effect on stress as short-term, and this encouraged them to continue practicing, "It caused immediate short term relief, especially mindful breathing. I need to do it more frequently and see if it helps long term" (I20 - male, West U.S.).

More commonly participants reported uncertainty of a direct effect on their stress level, but that practicing mindfulness positively changed how they coped with stressors. For example, "I am not suddenly Zen, but I feel I can identify stress quicker and shake it off easier" (I270 - female, West Canada). Moreover, for many participants, mindfulness did not eliminate stressors, but enabled them to cope with stressors in a more beneficial way, for instance,

“Work still causes the same stress but I am more equipped to manage it and release it” (I256 - female, West Canada).

Some participants also reported on how they believed mindfulness reduced their stress. For example, one participant noted how mindfulness increased their control over stress, “It's almost like the stress is still hovering there, but I can choose to not think about the stress” (I66 - female, West U.S.). A few participants reported that identifying stress as a changeable state of mind was beneficial, for example, “What it [the intervention] helped was rationalization that it is simply my stress... my stress doesn't have to be real, it is only a frame of mind at the time” (I182 - female, West Canada). These responses indicate a positive belief in not only the benefits of mindfulness practice, but also in one’s ability to apply the concepts of mindfulness to reduce stress.

Few participants did not believe the intervention affected their stress levels, with some of these participants attributing the lack of effect to being a “low stress” person. For example, “I do not feel like I am a very stressed person and do not think this [intervention] affected me” (I98 - male, Midwest U.S.). Others expressed the belief that they did not practice enough to perceive long-term benefits, for instance, “I didn't get to utilize the training as much as I would have liked, so I didn't notice any significant long-term improvement with my stress level. It did help on the days that I did use it though” (I31 - female, West U.S.).

Some participants may have disengaged from the intervention because they believed engaging in it was stressful. This was always described in terms of the intervention procedures, rather than as an effect of mindfulness practice. For example,

> [The learning modules] seemed to sneak up on me and I felt overwhelmed by trying to get time off the board to complete the trainings. The next thing I knew I was behind

> and was getting emails from my training supervisor which actually caused more stress. (I20 - Male, West U.S.)

General Well-being

One of the most common perceived effects reported was feeling calmer, for example, “I feel calmer. I try not to fret about things that I can not change” (I42 - female, West U.S.). Many participants also noted that practicing mindfulness made them feel relaxed, energized, and happier, for example, “I found this week's practices to be very relaxing and rejuvenating without trying to achieve these specific feelings” (I295 - male, West Canada). Additionally, many participants described being more accepting of themselves, others, and external situations as a result of mindfulness, for example,

> I made it through the month less irritable and with less anxiety. As a person who is extremely self critical it never feels good enough. That is the next hope, that I can continue being more mindful but also more accepting and grateful. (I297 - female, West U.S.)

Many participants also described becoming more patient and less emotionally reactive, “I feel like I don't get worked up as easily. I have more patience at work and in my home life” (I68 - female, West U.S.). Changes in self-compassion, self-reflection, and self-care were also frequently described. For example, “I noticed a calmer sense of self while practicing loving-kindness” (I139 - female, Midwest U.S.) and “I feel that I have started to reflect on myself more often and think about my actions and behavior” (I291 - female, Midwest U.S.). A few participants described how these effects facilitated engagement, “It had a calming effect

and I enjoyed being a part of it [the intervention]. I really want to keep this up ” (I270 - female, West Canada).

Work-Specific

Participants also described the perceived effects of practicing mindfulness on their work as 9-1-1 telecommunicators. This theme manifested in several ways, such as by increasing empathy and improving focus. First, many participants reported that mindfulness enabled them to be more empathetic to callers, for instance, “I have been trying to change how I think of our callers that frustrate me. Instead of thinking that they are all stupid, I am trying to think they are being silly, or to be more empathetic” (I298 - female, West U.S.). Some reported that this improved their overall communication with callers. For example,

> When you approach someone from a place of sincere kindness, it is harder for them to be rude, angry or hostile. I talked to many people on the phones this week very escalated and upset with the police response time, and by using this approach and using my breath to remain aware and present, and non-reactive, I was able to establish better rapports with these callers. (I256 - female, West Canada)

Second, some participants reported that mindfulness improved their focus at work, especially when multitasking, for example, “In our career we have to multitask all the time… it can be easy to overlook something. I tried to put more of my focus into the audible while still multitasking but noticed I was catching things clearer” (I292 - female, West Canada). For some participants, practicing mindfulness after difficult calls allowed them to refocus for the next caller, for example,

> When I did have time at work to take a moment after a call, it helped me to come back into the now and if I just finished a particularly bad or annoying call, I was able to regroup and really give my next caller the attention they deserved. (I199 - Female, West Canada)

Being Mindful

Commonly, participants reported that practicing mindfulness made them feel less rushed, which in turn increased their appreciation of life and their self-awareness. Many shared the perception that time slowed, for instance, “when practicing mindfulness, it seems to slow things down. [It] gives me a moment to ‘just be’” (I218 - female, West Canada). Many participants reported becoming more present-centered, “Being more mindful has made me more aware of my surroundings and has taught me to be in the moment as we can slowly drift into autopilot” (I232 - female, West Canada). Some reported how present-centeredness provided new perspectives,

> While taking a walk, I slowed my pace down to focus on the how the sun felt on my face with my eyes closed. There was so much peace in that one moment I don't know how I haven't thought to do that before. (I189 - female, Midwest U.S.)

Many participants also noted how being more aware of the present moment increased their appreciation of life: “I never realized how much of my life goes by without giving thought to it” (I272 - female, West Canada). And for some it also increased their enjoyment of everyday tasks, “Rather than rushing from task to task I became more present and slowed

down, and enjoyed the process of even mundane tasks like folding laundry or putting away groceries" (I256 - female, West Canada).

Some participants noted that the intervention increased their self-awareness, "I think it has made me more aware of how I'm feeling and how my feelings are affecting me both physically and mentally," (I109 - female, Midwest U.S.) and sense of control over their thoughts, "I feel more in control of what I'm thinking, acknowledging the randomness of some thoughts" (I189 - female, Midwest U.S.). A few participants noted that greater self-awareness and control enabled them to identity their thought process as changeable rather than static, "I have found that my mind is capable of changing in the moment [...] My habitual way of being is just that.... a habit" (I182 - female, West Canada). And for some, mindfulness practice enabled them to make positive changes to their thought process, for example, "I liked the practice of being kind and using self-talk to overcome any insecurities of feeling fake. I often internalize frustrations. This made it easier to overcome them and to instead, focus my energy positively outward" (I81 - female, Midwest U.S.).

Interpersonal Relationships

Many participants noted the perceived consequences of practicing mindfulness in their interpersonal relationships, for example, "I was able to have a difficult conversation with a family member (parent) much more calmly and less emotionally than in the past. I feel it was different this time because of the mindfulness practices" (I270 - female, West Canada). Additionally, some participants noted that bringing present-centered awareness improved the quality of their relationships, for example, "my kids are excited to tell me about their day because I'm taking more time to focus (that's hard for me sometimes) and really hear them. They love seeing me excited about 'their' day" (I255 - female, West Canada). Some noted that

present-centered awareness allowed them to be more empathetic, for example, “I have noticed that I can appreciate and feel more empathy towards someone when I actively listen to things I may have not deemed as important” (I284 - female, West Canada).

Physical Health

Another common theme was the perceived effect of mindfulness on physical health. Most commonly, participants described practicing mindfulness to disrupt ruminative thought patterns when trying to fall asleep, “I had a hard time sleeping one night because my mind was non-stop about work, I used the body scan to relax” (I304 - female, West U.S.). Some participants reported that practicing mindfulness allowed them to fall asleep more quickly and improved the quality and quantity of their sleep. This was often mentioned in relation to shift work and night shift schedules. For example, “one morning when I was having difficulty falling asleep I became mindful of my breathing… and I felt more relaxed. I was able to fall asleep and got some good sleep hours in” (I314 - male, West U.S.). A few participants reported that engaging in mindfulness practices helped to manage physical discomfort or pain, for instance,

> My back and legs were tense last night as I lay down for bed, so rather than taking an Advil, I did a mindfulness body scan and stretched the areas that I felt pain… and with each breath, I mentally said I'm letting go of this pain and it seemed to work. (I139 - female, Midwest U.S.).

Individual-Level Barriers and Facilitators

This theme describes perceived barriers and facilitators to engagement. The following subthemes were described: *state of mind*, *familiarity*, *attitudes towards mindfulness*, *becoming mindful*.

State of Mind

While many participants described using mindfulness to cope with stressors, some participants described being in a stressful state as a barrier to practicing mindfulness. For example, practicing mindfulness "was difficult this week as my stress and anxiety level was much higher this week… I tried to be mindful as a way of reducing that, but it was difficult" (I298 - female, West U.S.). Being in a stressful state made it more difficult to have present-centered awareness, "I still find during stressful events at work I lose this feeling of awareness and hours can go by where I haven't focused on my breathing or awareness once" (I256 - female, West Canada). Conversely, a few participants described being in a non-stressed state as a facilitator to practice, for instance, "I have an easier time being focused during mindfulness practices if I am doing something relaxing beforehand (yoga, nap, walk), rather than if I'm doing something stressful (after my commute, break time at work)" (I224 - female, West Canada).

Familiarity

Familiarity with mindfulness informed the attitudes of participants towards the intervention, thus acting as either a barrier or a facilitator to engagement. A few participants described being familiar with the concept of mindfulness or meditation as a motivation to participate in the intervention and to continue engaging. For example, "before I started this, meditation was something I was wanting to get more into and by going through this [the

intervention] I learned a lot of how I can apply different meditation techniques to my everyday life" (I68 - female, West U.S.). For a few other participants, unfamiliarity with mindfulness acted as a barrier, for instance, "I didn't utilize any of the other techniques [besides the breathing exercises]. I believe it was because they were too new and I wasn't as familiar with them" (I81 - female, Midwest U.S.). For a few participants, prior knowledge of or familiarity with mindfulness or meditation may have decreased their satisfaction with the intervention. These participants reported that the intervention did not provide them with new information, "I thought this training would be something new or different… I've done various things that have been taught in this course over the years… had I known it was what it is, I would have opted out" (I293 - female, West Canada).

Attitudes towards Mindfulness

Most participants expressed positive attitudes towards mindfulness, which facilitated engagement. For example,

> I liked that it was nonjudgmental. I felt like every time I thought I wasn't doing it right because I was being critical or my mind wandered, that the training acknowledged it and had me acknowledge it as well. It made it seem more real. (I20 - male, West U.S.)

However, a few participants reported that practicing mindfulness felt uncomfortable or that the concepts felt disingenuous, for example, "some of the ideas felt a bit forced or cheesy," (I227 - female, West Canada) which may have led them to disengage.

A few participants felt that mindfulness was incongruous with their work as a 9-1-1 telecommunicator. These participants described 9-1-1 telecommunicators as "not the

yoga/mindfulness type people who think about thoughts" (I260 - female, West Canada). The nature of their work as a 9-1-1 telecommunicators was perceived as a barrier to engaging, for example, "I think that with our job, we do so much multitasking that it becomes hard to focus on just one thing" (I153 - female, West Canada). Others noted the limited time telecommunicators have to engage in mindfulness on the job, for example, "When it is busy on the dispatch floor, there really isn't time to stop and do anything for yourself for the calls that stress you out. Dispatching isn't that kind of job" (I23 - female, West U.S.). Lastly, a few participants felt that the perceived benefits of mindfulness seemed incommensurate to the stressors facing 9-1-1 telecommunicators:

> Although there are obvious benefits to mindfulness and being present, unfortunately it does not change the nature of our work environment. It will always be demanding and stressful. Managing our thoughts, while giving us periodic reprieves, will not change the overall stress load. (I66 - female, West U.S.).

Becoming Mindful

The process of becoming mindful acted as both a barrier and facilitator to engagement. Many participants noted that incorporating mindfulness into their daily life facilitated continued engagement: "I continue to reflect on my first cup of coffee, as that reminds me to continue to practice throughout the day" (I153 - female, West Canada). With more practice, many participants felt more able and willing to continue, mindfulness is "becoming easier to incorporate into my everyday the more I practice it, the more I want to do it as I am noticing it's helpful to relax" (I132 - female, West Canada). Others indicated awareness and acceptance that process of becoming more mindful is a practice in

mindfulness itself, such as, “The mind tending to wander doesn't diminish but I have started to tell myself that that is okay, it is natural” (I231 - female, West Canada).

Participants often described mindfulness as an exercise rather than a way of being. This perspective may be attributable to how the intervention was introduced to them - as a stress reduction training. Some participants described the difficulty of incorporating a new activity into daily life, for example, “I don't think I practiced the mindfulness activities enough. It's hard to remember to do these exercises when they are not part of a daily routine” (I81 - female, Midwest U.S.). Viewing mindfulness as an exercise or activity may have been a barrier to practicing for some:

> It was tough for me to remember to practice the techniques every week with the busy schedule that I have. I think next time I'd try making little notes in my day planner to try and have a schedule for myself would be helpful. (I152 - male, West Canada).

Becoming mindful was difficult for some participants due to discordance between their habitual thought process and present-centered awareness. However, this may represent a growing awareness of mindfulness and present-centered thinking rather than a barrier to engagement. For example, “I have not yet calmed my mind where I'm not multitasking several things or not planning or thinking about my next move” (I182 - female, West Canada). A few participants also articulated the difficulty of changing the way they think, for example,

> I still find that I am doing things out of habit without even thinking about them. I really do feel both in both work and personal life that I am such a creature of habit that I just go through the motions without any reflection. (I272 - female, West Canada)

A few participants described engaging in ruminative thought patterns while practicing mindfulness, “I noticed while doing my mindfulness exercises that I have 'worry' thoughts and it surprised me how often my mind goes into worry mode and starts making checklists of what I need to do” (I256 - female, West Canada). The acknowledgement of rumination may indicate a step towards mindfulness rather than a barrier. Lastly, a few participants noted that mindfulness practice prompted negative thoughts, “I thought I was quite body-confident, but I struggled with this during the body scan exercise, especially when focusing on certain areas” (I231 - female, West Canada).

Workplace and Intervention Barriers and Facilitators

This theme describes the workplace and intervention characteristics that acted as barriers or facilitators to engagement. Workplace and intervention characteristics often interacted, such that workplace characteristics influenced perceptions of intervention characteristics and vice versa.

Workplace Physical Environment

Some participants described physical aspects of the workplace as barriers to engaging with the intervention, “I attempted and failed many times at work due to the noise level of many people coming and going as well as the noise of our building even if I was alone” (I269 - female, West Canada). In addition, some reported that frequent interruptions may have limited the effectiveness of the training, “It's a difficult training to get done in our center due to shared computers and busy shifts. It's not possible to do the segments in our center without interruption and I think this causes it not to be as effective” (I76 - female, Midwest U.S.).

Workplace Policies

Many participants reported difficult finding time to complete the intervention while at work. Individuals from nearly 50% of call centers in the intervention reported not having designated time-off to complete the intervention, despite intervention protocol. This was a described as barrier to completing the intervention, and some participants may have disengaged from the intervention due to the added stress it caused. For example,

> I am finding it is almost causing more stress trying to find the time to get practice in and to do the weekly lessons. We do not have the staffing to permit us time off the floor to complete training so we must do it while on duty on the floor. (I102 - female, Midwest U.S.)

Some participants reported completing the intervention modules while actively working or while at home, for instance, “It was difficult to listen to the longer listening exercises at our desks while still answering calls and radio traffic. At times, there were too many interruptions that I would get frustrated and just do it at home” (I139 - female, Midwest U.S.) and “I don’t have the capability (due to staffing or due to all our internet being blocked in the room, etc.) to practice at work where it actually should be” (I136 - female, West Canada).

Intervention Procedures

Some participants noted that the intervention increased accountability and facilitated engagement, for instance, “having this system as a reminder to actually practice mindfulness means it is getting done more often” (I297 - female, West U.S.). Conversely, the intervention

procedures may have deterred others from engaging, “I hated waking up to a mindfulness email, or juggling family and errands and then seeing an email staring me in the face saying ‘’here's another thing you don't have time for’” (I230 - female, West Canada).

Length of Practices

Many participants reported difficulty finding time to do the longer practices at work due to interruptions, “I definitely see the value in the longer exercises, but for me, it was not practical to do it at work” (I139 - female, Midwest U.S.). Some participants also described difficulty maintaining present-centered awareness during longer practicing. For example,

> I found it hard to concentrate for the longer exercises, like 12-14 minutes. I know [Name of Instructor] said it was ok to wander, that is part of the process, but I wandered a lot - and kept checking the timer. (I270 - female, West Canada)

Many participants described shorter practices as easier to engage with, thus a facilitator of engagement, for example, “I like the idea of short sessions because it seems like an attainable goal” (I231 - female, West Canada). Some participants felt that, due to time constraints 9-1-1 telecommunicators face at work, they would be more able to apply shorter practices, “we are used to short breaks, always being in a rush... short 5 minute meditations are much more realistic and practical” (I169 - female, West Canada).

Types of Practices

Some participants described the mix of different types of content as a facilitator to engagement, “Having the video, reading and audio portions was a nice combination to put

things together. If one way didn't quite sit well maybe another would sink in" (I152 - male, West Canada). However, some participants preferred one type of content over the other. Many participants noted that it was difficult to use the audio content at work due to busy working conditions. For example, "I did not like the mindfulness audio. I was not able to use it while at work due to how busy it was, and it was much easier to practice it without the audio on my own time" (I95 - female, Midwest).

Table 3: Qualitative themes and quotes

Themes	Sub-themes, and sample quotes
Incorporation into Daily Life	"I took time to just enjoy the presence of my daughters and the little things they do that make me happy."
Perceived Effects	*Stress*: "I feel more in control of my stress level and how it affects me." *Work-specific*: "I paid more attention to the tone and feelings of the caller." *General well-being*: "I feel like I am more peaceful when I stay in the moment." *Being mindful*: "I made it a point to notice my thoughts are not facts and to allow my thoughts to just be and examine them individually." *Physical health effects*: "I was pleasantly surprised to find that I could use this training to help with my sleep (or lack thereof)." *Interpersonal relationship effects*: "I feel more present and more connected to others, especially my son."
Individual-level barriers and facilitators	*State of mind*: "It's difficult to be mindful during stressful times." *Attitudes towards mindfulness*: "I liked the ideas that it gave: to calmly react, practice mindfulness daily, and to be kind to yourself and others." "It seems a little awkward at first." *Familiarity*: "It helped reinforce what I had already been teaching myself." "I had a meditation practice before beginning this. I found these guided meditations less helpful than the ones I was already using." *Becoming mindful*: "The more you practice the more you want to incorporate [mindfulness] into [your] lifestyle" "I have trouble just being with my thoughts."
Workplace and Intervention Characteristics	*Workplace physical environment*: "I found I was frustrated at work not being able to find a somewhat quiet spot [to practice]." *Workplace policies*: "We did not get time off the floor to do this training" *Intervention procedures*: "For me, the method of carrying out the research was annoying, made me somewhat resentful." *Length of practices*: "The practices are very simple, short and can be done a anywhere which makes them very easy to continue." "I find the guided exercises too long to enjoy." *Types of practices*: "I like that there was a variety of practices to try. Different things work for different people and that was taken into account." "The pace at work makes it impossible to use the guided audio without being interrupted."

Discussion

Principal Findings

The overarching goal of the present study was to explore engagement with an online, workplace MBI for 9-1-1 telecommunicators with the aims of (1) investigating demographic, psychosocial, and workplace factors associated with completion of the intervention, (2) exploring participants' lived experiences of engaging in the intervention, and (3) identifying perceived barriers and facilitators to engagement. Results of the quantitative analysis showed that no individual-level demographic, psychosocial, or workplace factors examined in this study were associated with completion. Call center location was the only factor associated with completion, indicating that workplace-level characteristics rather than individual-level characteristics may be more relevant to engagement. The qualitative results supported this finding; difficulties engaging with the intervention at work was identified as a common barrier for participants. Despite this and other barriers to engaging with the intervention, participants exhibited a high degree of commitment to incorporating mindfulness into their daily lives and expressed positive beliefs in the perceived effects of practicing mindfulness. Indeed, participants described a broad range of perceived benefits, particularly in relation to stress and coping with stressors. The most salient outcomes pertain to how the intervention improved participants' ability to focus at work and to empathize with callers. These findings have implications for the role of mindfulness in improving not only the lives of 9-1-1 telecommunicators, but also the lives of those they serve in their work.

Engagement and Attrition

The attrition rate (40%) in this study was comparable to those reported in studies of other online MBIs (Liu & Rice, 2017; Spijkerman, Pots, & Bohlmeijer, 2016). However, this rate was high in comparison to the median attrition rate (28%) reported in an analysis of 24 workplace health promotion interventions targeting behavior change (e.g. smoking cessation, dietary change, and physical activity (Bull et al., 2003). This may indicate that elements specific to emergency response call centers or to online MBIs increase the rate of attrition compared to interventions in other workplaces or compared to other types of workplace health promotion interventions.

Individual-Level Associations

No associations between any of the demographic factors included in this study and completion of the intervention were found. While some studies have found that older age is associated with completion of workplace health interventions, the results have been largely conflicting (Grossmeier, 2013; Guertler et al. 2015; Liu & Rice, 2017; Robroek et al., 2009; Terry et al., 2010). We found no association between age and completion, however, our sample was relatively young with three-quarters of participants age 45 years and younger. Despite findings that females are more likely to engage in workplace health promotion interventions, we found no association between gender and intervention completion (Hasson et al., 2010; Robroek et al., 2009; Terry et al., 2010). This lack of association may be due to the small proportion of men in our study (16%). Findings on an association between level of education and engagement in health promoting interventions has been inconsistent - some studies have found those with less education are more likely to engage while others have found an inverse relationship (Hasson et al., 2010; Strecher et al., 2008). We found no association with level of education, which may indicate that education is not a significant factor

influencing engagement in MBIs. Other demographic factors, such as race and ethnicity, marital status, and having children, were not associated with completion, nor have they been widely reported on in the MBI or workplace health promotion literature. These findings largely confirm results from other literature on the topic, but future research is needed to explore associations between engagement and demographic factors in a population with greater heterogeneity.

We did not find any associations between psychosocial or workplace variables and completion of the intervention. While no studies have been conducted examining overcommitment specifically, other characteristics indicative of perseverative thinking, such as worry, rumination, brooding, and cognitive reactivity, have been associated with difficulty engaging in mindfulness interventions (Banerjee, 2016; Crane & William, 2010). Indeed, rumination is the antithesis of mindfulness, so it is not surprising that some participants expressed difficulty disengaging from their accustomed perseverative cognitive style and engaging in mindfulness instead. In addition, stress may be associated with both overcommitment and mindfulness (Meischke et al., 2015). By not controlling for possible confounders in analysis, we may have masked a potential association between overcommitment and completion or mindfulness and completion. However, the evidence for an association between baseline mindfulness and engagement is more equivocal. Carmody and Baer (2008) found no association between baseline mindfulness and amount of at-home mindfulness practice in a MBSR intervention. Meanwhile, Liu and Rice (2017) found that lower trait mindfulness was associated with completion of an online MBI. In sum, individual-level factors were not associated with completion of an online, workplace MBI. Yet this does not imply that engagement is independent; other factors not measured in this study may be more pertinent in determining who engages and who does not.

Workplace Barriers to Engagement

In the quantitative analysis, only call center location was associated with intervention completion. No associations were found between social support or network conflict at work and completion. As self-reported measures these capture perceptions, which may differ between individuals within the call centers. Therefore, it is unsurprising that these factors were not associated with completion even though call center location was. Overall, these findings suggest that characteristics of the call centers influenced engagement more so than the individual characteristics of the participants measured in this intervention.This may be an advantageous finding; workplace-level characteristics may be more malleable than individual participant characteristics. Furthermore, tailoring future interventions to the workplace in which they take place may be more effective, cheaper, and more sustainable than tailoring to the individual employee.

More information on how differences between call centers may have influenced engagement can be gleaned from the qualitative analysis. Participants frequently described workplace barriers to completing the intervention. Perhaps most importantly, at nearly 50% of call centers at least one participant described not having designated time off to complete the intervention despite intervention protocol requiring it. Whether this depended on the shift or was consistent throughout the course of the intervention is unknown. As a result of not having time to engage with the intervention content, some participants reported completing the intervention materials at home or not being able to complete them at all. Even if these participants completed the intervention, they may not have engaged with the content as originally intended, thereby potentially reducing the effectiveness of the intervention. The intervention may have had adverse effects as well; some participants described that trying to

complete the intervention at work was an added stressor. While these situations were clearly undesirable for the current intervention, they can inform us on how to adapt future interventions to increase engagement, decrease the risk of unintended consequences, and maximize engagement. When developing future interventions in this and other high-stress workplaces, the research team should work with workplace managerial staff to identify potential barriers to employee engagement, as well as to develop practical solutions to overcome these barriers that will not have adverse effects on the wellbeing of employees or the quality of their work.

Other workplace barriers in this intervention likely stemmed from not having time off at work to complete the intervention content. Participants described not being able to use the guided audio or to engage with longer practices because they did not have the time to do so between calls or other interruptions. However, the availability of different formats of intervention materials (e.g. written, video, and audio) and shorter practices, such as Three-Minute Breathing Space, may have enabled participants to complete the intervention while actively working. Lastly, not having an adequate physical environment at work to practice mindfulness was an additional barrier. While some aspects of the work environment of 9-1-1 telecommunicators may be difficult to change, such as the physical environment and staffing policies, the use of shorter practices and a mix of media formats may enable participants to engage despite these barriers.

Psychological Engagement

The same aspects of behavioral change that are important in other health promotion interventions are relevant for MBIs as well. In this intervention, participants demonstrated four of the five aspects of psychological engagement - motivation to participate, commitment to

incorporating mindfulness into daily life, belief in the ability of practicing mindfulness to improve health, and intention to maintain a practice (Banerjee, 2016). The fifth aspect, a therapeutic relationship with the teacher and group, was not seen, which can be attributed to the online, non-group nature of the intervention (Banerjee, 2016). Interplay between the facets of psychological engagement were also noted. For example, participants reported that the perception of positive benefits as a result of practicing mindfulness encouraged them to continue practice. This is similar to previous findings that suggest a positive feedback loop of practice; mindfulness practice prompts greater perceived benefits, which in turn increases motivation to practice (Langdon et al., 2011). This may support the suggestion that over time participants may disengage from the intervention due to the feeling that they have received what they need from the intervention and do not need the guidance of the intervention any longer.

Informal practice of mindfulness, or the integration of mindfulness concepts like present-centered awareness into daily life, is considered an essential aspect of engaging in mindfulness. While formal practice, or the daily rehearsal of specific meditation practices like body scan and mindful eating often with guided audio, is needed to increase self-efficacy in one's ability to "attend," informal practice is needed to cultivate "a continuity of awareness in all activities of daily living" (Kabat-Zinn, 2003). While several studies have found that amount of formal, but not informal practice is associated with changes in intervention outcomes, more research is needed to understand the potential interaction between informal practice and formal practice (Carmody & Baer, 2008; Hawley et al., 2013; Parsons, C., Crane, Parsons, L., Fjorback, Kuyken, 2017). Informal practice may encourage formal practice. In this intervention, participants frequently incorporated the concepts of mindfulness into everyday aspects of their life from the routine activities like making coffee to interpersonal

communications with friends and family. This commitment to practice facilitated continued engagement with the intervention, including formal mindfulness practices. This intervention provided recommendations for how to integrate mindfulness into daily life via weekly emails. This mechanism may have increased participants' self-efficacy and commitment to informal practice. Future studies are needed to understand the relationship between informal practice and formal practice. Nonetheless, MBIs should continue to encourage informal practice as it is essential in the development of a mindful way of being.

Participants also commonly reported a positive belief in the ability of mindfulness to reduce stress and improve physical health and general wellbeing. Positive beliefs increased intent to continue practice after completion of the intervention. Findings from an online workplace stress reduction program corroborate this effect; having positive expectations of the ability of the program to reduce stress was associated with engagement in the intervention (Hasson et al., 2010). While mindfulness is inherently not outcome-focused, future MBIs could highlight the positive benefits of mindfulness practice in order to encourage continued engagement. In summary, more research is needed to understand if factors related to psychological engagement are more relevant for engagement in MBIs than other health promotion interventions.

Stress as a Barrier

While the association between baseline stress and completion of the intervention was non-significant, there was a large difference in scores - over 8 points - between those who completed the intervention content and those who did not. This suggests a possible association between baseline stress and completion of the intervention. Sample size may have been a factor in the finding of a non-significant difference. Few quantitative studies have

reported on baseline stress levels and engagement in MBIs. Carmody and Baer (2008) also found no association between baseline stress and engagement in at-home formal practice during a MBSR intervention. Yet, participants in this intervention commonly described stress as a barrier to engagement. This does not imply that there is a discrepancy between quantitative and qualitative findings. Instead, it suggests that quantitative measures of stress may be unable to capture the nuances of experiencing stress. More research, both quantitative and qualitative, is needed to explore the potential association between stress and intervention engagement.

The perception of stress may function as a barrier to engagement in two ways. First, stressed participants may perceive themselves as time poor resulting in an perceived inability to engage with the intervention. Second, being in a stressed state of mind may affect an individual's ability to be mindful. Some participants described difficult with engaging in present-centered awareness when they were stressed. Conversely, participants described that being in a non-stressed state of mind, ie. being relaxed or calm, made it easier to practice mindfulness. This is similar to previous research that indicated that "the state of participants' minds and bodies" was a barrier to practicing mindfulness (Langdon et al., 2011). While the perception of being time poor may be a barrier to engaging with any health promotion intervention, being in a stressed state of mind may be a barrier specific to mindfulness interventions. To ensure that those who may benefit most from mindfulness receive the full intervention content, future research should explore how to tailor MBIs for high-stress populations.

Stress Outcomes

Workplace MBIs may be unable to decrease the presence of stressors, but they can provide participants with tools to cope with these stressors in a more effective way. The main outcome paper for the present intervention found significant improvements in the stress scores of intervention group participants compared to wait-list control group participants at both post-intervention and three month follow-up (Lilly et al., 2018). While the present study did explore relationships between intervention outcomes and engagement, it does illuminate how participants believed the intervention affected their stress levels and ability to cope with stressors. Most commonly participants reported that while their stress was still present, they felt more aware, accepting, and in control of how their stress affected their mental and physical wellbeing. Mindfulness practice enabled participants to recognize that stress is a changeable state of mind and increased their efficacy in enacting change. This relates strongly to previous research suggesting that increases in mindfulness mediate the relationship between mindfulness practice and stress reduction (Baer, Carmody, & Hunsinger, 2012; Carmody and Baer, 2008). Moreover, belief in the ability of the intervention to reduce stress facilitated engagement. While this may run counter to the “emphasis on nonattachment to outcome” in mindfulness practice, encouraging positive beliefs in the ability of mindfulness to enact change could be a way to get people “in the door” (Kabat-Zinn, 2003). Future interventions should encourage positive beliefs while acknowledging that mindfulness is not a means to an end, but a constantly evolving way of life.

Workplace Outcomes

The benefits of mindfulness practice extend beyond the individual practicing. Mindfulness practice can increase empathy and improve job performance (Lomas et al., 2017). In the emergency response field, this could result in benefits for the general public as

well as the individual telecommunicator. Previous workplace MBIs in high-stress populations have been effective in increasing compassion satisfaction, decreasing compassion fatigue, and in bringing about positive changes in how participants interact with clients or patients (Duarte & Pinto-Gouveia, 2016; Gregory, 2015). In the current study, participants described "paying more attention to the tone and feeling of the caller," being more aware of the "stressful circumstances which led them to call 911," and putting "things in perspective when feeling negative about a caller." These responses reflect an increase in empathy towards callers that could improve communications overall. In addition, participants also noted increased focus at work, including while speaking with callers. This could also facilitate improvements in emergency communications and response. Given the importance of the role of 9-1-1 telecommunicators in maintaining public safety, these results are noteworthy.

Strengths and Limitations

A key strength of this study was the use of both qualitative and quantitative methods to explore engagement. Unlike previous studies which have studied the association of individual characteristics with engagement, this approach provided a richer understanding of not only who engages with an intervention, but also how and why (Hasson et al., 2010; Liu & Rice, 2017; Robroek et al., 2009; Terry et al., 2010). However, we acknowledge the biases introduced in the convergent interpretation of results based on two different research paradigms, quantitative positivist and qualitative interpretivist, and the study of two different phenomena, engagement and the lived experience of engagement (Sale, Lohfeld, & Brazil, 2002). Another strength of this study was the inclusion of more than one intervention site. This allowed use to compare organizational-level factors and their influence on engagement. Lastly, the psychosocial, demographic, and work-related characteristics of the study sample

were similar to those found in the 9-1-1 telecommunicator population or similar emergency responder populations suggesting generalizability of the study findings (Beaton et al., 1997; Martin, Meischke, & Painter, 2016; Meischke et al., 2015; Smith et al., 2011).

Several limitations of the study warrant discussion. As a secondary analysis, we were limited to the data collected in the original study which yields two primary limitations. First, quantitative measures of outcome expectations, beliefs, attitudes, or self-efficacy were not collected. It is possible the these factors were associated with engagement, which could have implications for the design of future MBIs. Future research should include measures of these factors to explore their relationship with engagement. Second, the use of secondary data limited the qualitative analysis as well, primarily in the limited quantity and breadth of the weekly check-in survey and final training evaluation questions. It is possible that with additional questions or a different form of qualitative data, such as one-on-one interviews or focus groups, other themes may have been identified. Future research should explore the use of other qualitative methods to explore engagement with online, workplace MBIs, especially within the emergency response sector.

The use of a dichotomous measure of engagement presents a third limitation. Individuals who completed the intervention content versus those who did not were close in terms of number of sessions completed; the majority of participants who did not complete the intervention content did five or six of the seven total sessions. This may have limited the ability to discern significant differences between the two groups.

Another limitation was the significant loss to follow-up; 40 participants (26.7% of the intervention group) completed the baseline survey, but did not complete any intervention content. Some or all of these participants may have no longer been employed at the enrolled call center, but per intervention procedures call center managers were asked to report

whether employees enrolled in the intervention left employment at any point during the intervention. While these participants were not significantly different in terms of demographic, psychosocial, or workplace characteristics than the participants who completed some amount of intervention content, they may differ in other ways that may have influenced their decision or ability to engage with the intervention. For example, these participants may have been less motivated to engage with the intervention than the participants who completed some intervention content. This could have biased the quantitative results, but in which direction or to what extent is unknown. In addition, had these participants engaged with the intervention, they may have had different experiences to share that could have altered them qualitative thematic analysis.

An additional limitation was the collection of qualitative data through the intervention portal. The data collected may not be representative of all participants because those who were more engaged may have been more likely to comment. Participants who did not complete the intervention and who, therefore, did not complete all of the weekly check-in surveys or the final training evaluation, may have provided novel themes on the experience of engaging with the intervention.

Lastly, the demographic homogeneity of the telecommunicator population - mostly female, white, and young - studied in this intervention is a limiting factor. This homogeneity may have hindered the ability to identify significant associations between baseline factors and engagement that may indeed be present. It also restricts the ability to generalize the results outside of this population. Future research on engagement with online, workplace MBIs should be conducted in other, more heterogenuous populations.

Conclusions

The objective of this study was to explore engagement with an online, workplace MBI for stress reduction in a population of 9-1-1 telecommunicators. No demographic, psychosocial, or workplace variables were associated with completion of the intervention except for the call center of employment. Significant workplace barriers may have prevented participants from completing or fully engaging with the intervention content, which in turn may limit the effectiveness of the intervention. Nonetheless, significant reductions in stress scores post-intervention suggest that tailored mindfulness interventions are efficacious in this population (Lilly et al., 2018). In addition, stress had a multitudinous role in this intervention; a stressed state of mind was a barrier to engagement, stress reduction was a facilitator of engagement, and perceived stress was an overall intervention outcome.

The results of this study indicate that engagement in online, workplace MBIs can promote improvements in the physical and mental wellbeing of 9-1-1 telecommunicators. The general population may benefit as well; mindfulness was found to increase focus at work and empathy with callers. Future research should explore the tailoring of MBIs in high-stress work environments. This may include shorter practices, the use of mixed media, and emphasis on the benefits of practicing mindfulness.

References

Allexandre, D., Bernstein, A. M., Walker, E., Hunter, J., Roizen, M. F., & Morledge, T. J. (2016). A web-based mindfulness stress management program in a corporate call center. *Journal of Occupational and Environmental Medicine*, *58*(3), 254–264. https://doi.org/10.1097/JOM.0000000000000680

Azagba, S., & Sharaf, M. F. (2011). Psychosocial working conditions and the utilization of health care services. *BioMed Central Public Health*, *11*(642).

Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice*, 10(2), 125–143. http://doi.org/10.1093/clipsy/bpg015

Baer, R. A., Carmody, J., & Hunsinger, M. (2012). Weekly change in mindfulness and perceived stress in a mindfulness-based stress reduction program. *Journal of Clinical Psychology*, 68(7), 755–765. https://doi.org/10.1002/jclp.21865

Balk-Møller, N. C., Larsen, T. M., & Holm, L. (2017). Experiences from a web- and app-based workplace health promotion intervention among employees in the social and health care sector based on use-data and qualitative interviews. *Journal of Medical Internet Research*, 19(10), e350. https://doi.org/10.2196/jmir.7278

Bandura, A. (2004). Health promotion by social cognitive means. *Health Education and Behavior*, *31*(2), 143–164. https://doi.org/10.1177/1090198104263660

Banerjee, M. (2016). To “ be ” or not to “ be ”: The paradox of engagement in mindfulness-based interventions (Doctoral dissertation). University of Sussex. Retrieved from: http://sro.sussex.ac.uk/68785/

Banerjee, M., Cavanagh, K., & Strauss, C. (2017). Barriers to mindfulness: A path analytic model exploring the role of rumination and worry in predicting psychological and

physical engagement in an online mindfulness-based intervention. *Mindfulness*. https://doi.org/10.1007/s12671-017-0837-4

Beaton, R. D., Murphy, S. A., Pike, K. C., & Corneil, W. (1997). Social support and network conflict in firefighters and paramedics. *Western Journal of Nursing Research*, 19(3), 297–313.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, 77–101. https://doi.org/10.1191/1478088706qp063oa

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, 84(4), 822–848. http://doi.org/10.1037/0022-3514.84.4.822

Bull, S. S., Gillette, C., Glasgow, R. E., & Estabrooks, P. (2003). Work site health promotion research: To what extent can we generalize the results and what is needed to translate research to practice? *Health Education and Behavior*, *30*(5), 537–549. https://doi.org/10.1177/1090198103254340

Carlson, L. E., & Thomas, B. C. (2007). Development of the Calgary Symptoms of Stress Inventory (C-SOSI). *International Journal of Behavioral Medicine*, *14*(4), 249–256. http://doi.org/10.1007/BF03003000

Carmody, J., & Baer, R. A. (2008). Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. *Journal of Behavioral Medicine*, 31, 23–33. https://doi.org/10.1007/s10865-007-9130-7

Carolan, S., Harris, P. R., & Cavanagh, K. (2017). Improving employee well-being and effectiveness: Systematic review and meta-analysis of web-based psychological

interventions delivered in the workplace. *Journal of Medical Internet Research*, *19*(7), 1–18. https://doi.org/10.2196/jmir.7583

Chiesa, A., & Serretti, A. (2009). Mindfulness-based stress reduction for stress management in healthy people: A review and meta-analysis. *The Journal of Alternative and Complementary Medicine*, 15(5), 593–600. http://doi.org/10.1089/acm.2008.0495

Christopher, M. S., Goerling, R. J., Rogers, B. S., Hunsinger, M., Baron, G., Bergman, A. L., & Zava, D. T. (2015). A pilot study evaluating the effectiveness of a mindfulness-based intervention on cortisol awakening response and health outcomes among law enforcement officers. *Society for Police and Criminal Psychology*, *31*, 15–28. https://doi.org/DOI 10.1007/s11896-015-9161-x A

Creswell, J. (2012). *Qualitative inquiry & research design: Choosing among five approaches* (Third ed.). Los Angeles: Sage Publications.

de Jonge, J., Bosma, H., Peter, R., & Siegrist, J. (2000). Job strain, effort-reward imbalance and employee well- being: A large-scale cross-sectional study. *Social Science & Medicine*, *50*, 1317–1327.

Donkin, L., Christensen, H., Naismith, S. L., Neal, B., Hickie, I. B., & Glozier, N. (2011). A systematic review of the impact of adherence on the effectiveness of e-therapies. *Journal of Medical Internet Research*, 13(3), e52. https://doi.org/10.2196/jmir.1772

Duarte, J., & Pinto-Gouveia, J. (2016). Effectiveness of a mindfulness-based intervention on oncology nurses' burnout and compassion fatigue symptoms: A non-randomized study. *International Journal of Nursing Studies*, *64*, 98–107. https://doi.org/10.1016/j.ijnurstu.2016.10.002

Eysenbach, G. (2005). The law of attrition. *Journal of Medical Internet Research*, 7(1), E11.

Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods*, 5(1), 80–92. https://doi.org/10.1177/160940690600500107

Goetzel, R. Z., Anderson, D. R., Whitmer, R. W., Ozminkowski, R. J., Dunn, R. L., & Wasserman, J. (2017). The relationship between modifiable health risks and health care expenditures: An analysis of the multi-employer HERO health risk and cost database. *Journal of Occupational and Environmental Medicine*, *40*(October 1998), 843–854.

Grossmeier, J. (2013). The influence of worksite and employee variables on employee engagement in telephonic health coaching programs: A retrospective multivariate analysis. *American Journal of Health Promotion*, *27*(3), e69-81. https://doi.org/10.4278/ajhp.100615-QUAN-190

Glasgow, R. E., Christiansen, S. M., Kurz, D., King, D. K., Woolley, T., Faber, A. J., … Permanente, K. (2011). Engagement in a diabetes self-management website: Usage patterns and generalizability of program use. *Journal of Medical Internet Research*, 13(1), e9. https://doi.org/10.2196/jmir.1391

Gregory, A. (2015). Yoga and mindfulness program: The effects on compassion fatigue and compassion satisfaction in social workers. *Journal of Religion & Spirituality in Social Work: Social Thought*, 34(4), 372–393. https://doi.org/10.1080/15426432.2015.1080604

Guertler, D., Vandelanotte, C., Kirwan, M., & Duncan, M. J. (2015). Engagement and nonusage attrition with a free physical activity promotion program: The case of 10,000

steps Australia. *Journal of Medical Internet Research*, 17(7), 1–22. https://doi.org/10.2196/jmir.4339

Hasson, H., Brown, C., & Hasson, D. (2010). Factors associated with high use of a workplace web-based stress management program in a randomized controlled intervention study. *Health Education Research*, *25*(4), 596–607. https://doi.org/10.1093/her/cyq005

Hawley, L. L., Schwartz, D., Bieling, P. J., Irving, J., Corcoran, K., Farb, N. A. S., … Segal, Z. V. (2014). Mindfulness practice, rumination and clinical outcome in mindfulness-based treatment. *Cognitive Therapy and Research*, 38(1), 1–9. https://doi.org/10.1007/s10608-013-9586-4

Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice*. 144–156. https://doi.org/10.1093/clipsy/bpg016

Kabat-Zinn, J. (2013). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness* (Revised and updated ed.). New York: Bantam Books.

Krieger, N. (2010). Workers are people too: Societal aspects of occupational health disparities-an ecosocial perspective. *American Journal of Industrial Medicine*, *53*(2), 104–115. https://doi.org/10.1002/ajim.20759

Langdon, S., Jones, F. W., Hutton, J., & Holttum, S. (2011). A grounded-theory study of mindfulness practice following mindfulness-based cognitive therapy. *Mindfulness*, 2(4), 270–281. https://doi.org/10.1007/s12671-011-0070-5

Lilly, M. M., & Allen, C. E. (2015). Psychological inflexibility and psychopathology in 9-1-1 telecommunicators. *Journal of Traumatic Stress*, *28*(3), 262–266. https://doi.org/10.1002/jts.22004

Lilly, M.M., Calhoun, R., Painter, I., Beaton, R., Stangenes, S., Reaves, D.,.. Meischke, H. (2018). Destress 9-1-1: Efficacy of an online mindfulness-based intervention in reducing stress among 9-1-1 telecommunicators. Manuscript in preparation.

Liu, B., & Rice, V. J. (2017). Characteristics of United States military personnel and veterans who complete mindfulness training. In V. Duffy & N. Lightner (Eds.), *Advances in Human Factors and Ergonomics in Healthcare and Medical Devices* (pp. 22–32). Springer International Publishing AG. https://doi.org/10.1007/978-3-319-60483-1

Lomas, T., Medina, J. C., Ivtzan, I., Rupprecht, S., Hart, R., & Eiroa-Orosa, F. J. (2017). The impact of mindfulness on well-being and performance in the workplace: an inclusive systematic review of the empirical literature. *European Journal of Work and Organizational Psychology*, 26(4), 492–513. https://doi.org/10.1080/1359432X.2017.1308924

Martin, S. C., Painter, I., & Meischke, H. (2016). Examining the relationship between secondary traumatic stress and sickness absenteeism within 9-1-1 emergency call centers (Master's thesis). University of Washington.

Meischke, H., Painter, I., Lilly, M., Beaton, R., Revere, D., Calhoun, B., … Baseman, J. (2015). An exploration of sources, symptoms and buffers of occupational stress in 9-1-1 emergency call centers. *Annals of Emergency Dispatch & Response*, *3*(2), 28–35.

Meischke, H., Lilly, M., Beaton, R., Calhoun, R., Tu, A., Stangenes, S., … Baseman, J. (2018). Protocol: A multi-level intervention program to reduce stress in 9-1-1 telecommunicators. BMC Public Health, 18(1), 1–10. https://doi.org/10.1186/s12889-018-5471-0

Miller, W. L., Crabtree, B. F., Harrison, M. I., & Fennell, M. L. (2013). Integrating mixed methods in health services and delivery system research. *Health Services Research*, 48(6, PART II), 2125–2133. https://doi.org/10.1111/1475-6773.12123

O'Keefe, L. C., Brown, K. C., & Christian, B. J. (2014). Policy perspectives on occupational stress. *Workplace Health & Safety*, *62*(10), 432–438. https://doi.org/10.3928/21650799-20140813-02

Owen, J. E. (2016). Engagement with a social networking intervention for cancer-related distress. *Annals of Behavioral Medicine*, *49*(2), 154–164. https://doi.org/10.1007/s12160-014-9643-6.Engagement

Parsons, C. E., Crane, C., Parsons, L. J., Fjorback, L. O., & Kuyken, W. (2017). Home practice in Mindfulness-Based Cognitive Therapy and Mindfulness-Based Stress Reduction: A systematic review and meta-analysis of participants' mindfulness practice and its association with outcomes. *Behaviour Research and Therapy*, 95, 29–41. https://doi.org/10.1016/j.brat.2017.05.004

Pierce, H., & Lilly, M. M. (2012). Duty-related trauma exposure in 911 telecommunicators: Considering the risk for posttraumatic stress. *Journal of Traumatic Stress*, *25*(2), 211–215. https://doi.org/10.1002/jts.21687

Poirier, J., & Cobb, N. K. (2012). Social influence as a driver of engagement in a web-based health intervention. *Journal of Medical Internet Research*, 14(1), 2–10. https://doi.org/10.2196/jmir.1957

R Core Team (2017). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

Regehr, C., Leblanc, V. R., Barath, I., & Balch, J. (2013). Predictors of physiological stress and psychological distress in police communicators, *Police Practice and research , 14*(December), 451–463. https://doi.org/10.1080/15614263.2012.736718

Robroek, S. J. W., van Lenthe, F. J., van Empelen, P., & Burdorf, A. (2009). Determinants of participation in worksite health promotion programmes: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, *6*(26). https://doi.org/10.1186/1479-5868-6-26

Sale, J. E. M., Lohfeld, L. H., & Brazil, K. (2002). Revisiting the quantitative-qualitative debate: Implications for mixed-methods research. *Quality and Quantity*, 36(1), 43–53. https://doi.org/10.1023/A

Sanne, B., Torp, S., Mykletun, A., & Dahl, A.A. (2005). The Swedish Demand-Control-Support Questionnaire (DCSQ): Factor structure, item analyses, and internal consistency in a large population. *Scandinavian Journal of Public Health*, 33(3), 166–174. http://doi.org/10.1080/14034940410019217

Siegrist, J., Starke, D., Chandola, T., Godin, I., Marmot, M., Niedhammer, I., & Peter, R. (2004). The measurement of effort-reward imbalance at work: European comparisons. *Social Science and Medicine*, 58(8), 1483–1499. http://doi.org/10.1016/S0277-9536(03)00351-4

Siegrist, J., Li, J., & Montano, D. (2014). Psychometric properties of the effort-reward imbalance questionnaire. Duesseldorf University, 1–14. http://doi.org/10.1007/s00420-009-0460-3.

Smith, B. W., Ortiz, J. A., Steffen, L. E., Tooley, E. M., Wiggins, K. T., Yeater, E. A., … Bernard, M. L. (2011). Mindfulness is associated with fewer PTSD symptoms, depressive symptoms, physical symptoms, and alcohol problems in urban firefighters.

Journal of Consulting and Clinical Psychology, *79*(5), 613–617. https://doi.org/10.1037/a0025189

Spijkerman, M. P. J., Pots, W. T. M., & Bohlmeijer, E. T. (2016). Effectiveness of online mindfulness-based interventions in improving mental health: A review and meta-analysis of randomised controlled trials. *Clinical Psychology Review*, *45*, 102–114. https://doi.org/10.1016/j.cpr.2016.03.009

Strecher, V. J., McClure, J., Alexander, G., Chakraborty, B., Nair, V., Konkel, J., … Pomerleau, O. (2008). The role of engagement in a tailored web-based smoking cessation program: Randomized controlled trial. *Journal of Medical Internet Research*, *10*(5), e36. https://doi.org/10.2196/jmir.100=

Terry, P. E., Fowles, J. B., & Harvey, L. (2010). Employee engagement factors that affect enrollment compared with retention in two coaching programs - The ACTIVATE Study. *Population Health Management*, *13*(3). https://doi.org/10.1089/pop.2009.0040

Tolley, E. E., Ulin, P. R., Mack, N., Robinson, E. T., & Succop, S. M. (2016). *Qualitative methods in public health: A field guide for applied research*. San Francisco, CA: Wiley.

Trachik, B., Marks, M., Bowers, C., Scott, G., Olola, C., & Gardett, I. (2015). Is dispatching to a traffic accident as stressful as being in one? Acute stress disorder, secondary traumatic stress, and occupational burnout in 911 emergency dispatchers. *Annals of Emergency Dispatch & Response,* 3(1): 27–38.

Troxell, R. M. (2008). Indirect exposure to the trauma of others: The experiences of 9-1-1 telecommunicators (Doctoral dissertation). *ProQuest Dissertations and Theses*, 308–n/a. Retrieved from http://search.proquest.com/docview/304351154?accountid=14553%5Cnhttp://openurl.library.uiuc.edu/sfxlcl3?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:dissertati

on&genre=dissertations+%26+theses&sid=ProQ:ProQuest+Dissertations+%26+Theses+Full+Text&a

Zarski, A., Lehr, D., Berking, M., Riper, H., & Cuijpers, P. (2016). Adherence to internet-based mobile-supported stress management: A pooled analysis of individual participant data from three randomized controlled trials. *Journal of Medical Internet Research*, *18*(6), 1–15. https://doi.org/10.2196/jmir.4493