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Mindfulness-Based Resilience Training to Reduce Health Risk, Stress Reactivity, and Aggression among Law Enforcement Officers: A Feasibility and Preliminary Efficacy Trial

Michael S. Christopher, PhD[a,*], **Matthew Hunsinger, PhD**[a], **Lt. Richard J. Goerling, MBA**[a,b], **Sarah Bowen, PhD**[a], **Brant S. Rogers, MS**[a,c], **Cynthia R. Gross, PhD**[d], **Eli Dapolonia, MA**[a], and **Jens C. Pruessner, PhD**[e]

[a]School of Graduate Psychology, Pacific University, Hillsboro, OR, USA

[b]Mindful Badge Initiative, Hillsboro, OR, USA

[c]Stress Reduction Clinic, Hillsboro, OR, USA

[d]College of Pharmacy and School of Nursing, University of Minnesota Twin Cities, Minneapolis, MN, USA

[e]Departments of Psychology, Psychiatry, Neurology and Neurosurgery Douglas Institute, McGill University, Montreal, Quebec, Canada

Abstract

The primary objective of this study was to assess feasibility and gather preliminary outcome data on Mindfulness-Based Resilience Training (MBRT) for law enforcement officers. Participants (n = 61) were randomized to either an 8-week MBRT course or a no intervention control group. Self-report and physiological data were collected at baseline, post-training, and three months following intervention completion. Attendance, adherence, post-training participant feedback, and interventionist fidelity to protocol all demonstrated feasibility of MBRT for law enforcement officers. Compared to no intervention controls, MBRT participants experienced greater reductions in salivary cortisol, self-reported aggression, organizational stress, burnout, sleep disturbance, and reported increases in psychological flexibility and non-reactivity at post-training; however, group differences were not maintained at three-month follow-up. This initial randomized trial suggests MBRT is a feasible intervention. Outcome data suggest MBRT targets key physiological, psychological, and health risk factors in law enforcement officers, consistent with the potential to improve officer health and public safety. However, follow-up training or "booster" sessions may be needed to maintain training gains. A fully powered longitudinal randomized trial is warranted.

[*]Corresponding Author: Michael Christopher, PhD, School of Graduate Psychology, Pacific University, 190 SE 8th Ave, Suite 260, Hillsboro, OR, 97123; mchristopher@pacifcu.edu; tel: 503-352-2498.

Declaration of Interest

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Keywords

mindfulness; resilience; stress; police; aggression; cortisol

1. Introduction

Policing is one of the most highly stressful occupations (Violanti et al., 2006; Violanti et al., 2011). Unpredictable exposures to critical incidents, violence, chronic stress, job dissatisfaction, and societal expectations for optimal performance can create a toxic work environment and lead to significant negative mental health, professional, and behavioral outcomes for law enforcement officers (LEOs) (Avdija, 2014; McCrathy and Atkinson, 2012; O'Hara et al., 2013).

Consistent exposure to acute and chronic stress is a risk factor for adverse mental health in LEOs, including anxiety (Gershon et al., 2009; Violanti et al., 2014), sleep problems (Bond et al., 2013; Neylan, 2013), depression (Garbarino et al., 2013; Wang et al., 2010) and suicidal ideation (He et al., 2002; McCafferty et al., 1992; Wang et al., 2010). LEO suicide rates are up to three times higher than those in the general public (Clark et al., 2012; Violanti, 2010); as a consequence, LEOs are more likely to die from suicide than in the line of duty (Violanti, 2004), with an estimated LEO suicide occurring every 17 hours (Larned, 2010).

Effects of LEO stress are also evident in elevated rates of burnout and addictive behaviors. LEOs report higher rates of job dissatisfaction and burnout than most other occupations (Backteman-Erlanson et al., 2013; De la Fuente Solana et al., 2013; Schaible and Six, 2016), and they may rely on negative and avoidant coping strategies in response to stress and burnout, including alcohol use and other avoidance-based behaviors (Gershon et al., 2009; Ménard and Arter, 2013; Pasillas et al., 2006; Smith et al., 2005; Willman, 2012). Relative to the general public, LEOs have elevated rates of alcohol consumption (Ballenger et al., 2011) and binge drinking (Weir et al., 2012).

Appropriate use of force is a necessary component of successful policing; however, psychologically impaired LEOs are more likely to use excessive force (Kop et al., 1999; Kurtz et al., 2015; Nieuwenhuys et al., 2012b), be aggressive toward suspects (Can and Hendy, 2014; Gershon et al., 2009; Griffin and Bernard, 2003; Kurtz et al., 2015; Rajaratnam et al., 2011), and exhibit poor decision-making (Nieuwenhuys et al., 2012a; Rajaratnam et al., 2011; Violanti et al., 2014). Bureau of Justice Statistics (https://www.bjs.gov) estimates that among 59.4 million U.S. residents age 16 or older who had face-to-face contacts with police, 2.3 million experienced LEO threat or use of force, and nearly 75% of those who reported force described it as excessive (Berzofsky, 2017).

Several key factors are associated with LEO excessive and inappropriate use of force, including burnout (Kop et al., 1999; Kop and Euwema, 2001; Queirós et al., 2013; Sack III, 2009), abnormal stress reactivity (Groer et al., 2010; Strahler and Ziegert, 2015; Yao et al., 2016), and poor psychological health (Ménard and Arter, 2013; Nieuwenhuys et al., 2012b). Physiological indices may also reflect effects of stress on LEO behavior. Studies on human

responses to stressful events demonstrate neuroendocrine factors play an important role in stress reactivity (Bibbey et al., 2013; Nater et al., 2013). Abnormal secretion of the glucocorticoid cortisol as the final product of the hypothalamic-pituitary-adrenocortical (HPA) axis is considered a crucial factor in the link between chronic psychosocial stress and the adverse effects on health (Chrousos, 2009). Changes to the circadian regulation of cortisol secretion are also considered important to stress reactivity (Menet and Rosbash, 2011; Nader et al., 2010). The cortisol awakening response (CAR), frequently used as a biomarker of HPA axis status or functioning, combines features of a reactivity index (awakening) with circadian regulation (Stadler et al., 2016). Findings on the relationship between CAR and occupational stress are mixed. Several studies among LEO samples have yielded significant positive relationships between cortisol and occupational stress (Austin-Ketch et al., 2012; Groer et al., 2010; Walvekar et al., 2015), and greater CAR has been found to be prospectively predictive of increased acute stress disorder (Inslicht et al., 2011); however, another recent study (Violanti et al., 2017) found a significant negative association between the most stressful occupational events and slope of the CAR pattern among LEOs.

Despite the many risks to LEO health, and the consequential risks to public safety, effective LEO trainings and interventions to mitigate these harms are still lacking. Studies have reported improvements in LEO stress and mental health risk factors following an intervention (e.g., Arnetz et al., 2013; Arnetz et al., 2009; McCrathy and Atkinson, 2012); however, a recent meta-analysis examining effectiveness of stress reduction programs among LEOs found small effect sizes, concluding that, “insufficient evidence exists to demonstrate the effectiveness of stress management interventions for reducing negative physiological, psychological or behavioral outcomes among police officers and recruits.” (Patterson et al., 2014, p. 508).

Interventions suited to the unique context, vulnerabilities, and strengths of this population are needed to improve LEO stress reactivity and psychological health, and reduce aggression and violence. Preliminary evidence suggests mindfulness training (MT) may be a promising approach. MT has garnered significant empirical support in lab, clinical, and community-based research, evincing outcomes such as reduced aggression (Fix and Fix, 2013; Kelley and Lambert, 2012; Zoogman et al., 2014) and anger (Peters et al., 2015; Singh et al., 2014). MT has also been shown to reduce stress reactivity, including reductions in pre- to post-training CAR levels (Brand et al., 2012; Lengacher et al., 2012; Marcus et al., 2003); however, others (Black et al., 2017; Matousek et al., 2011) have found prolonged increase in CAR after awakening at the post-training assessment. MT may therefore exert its effect by helping to normalize CAR, increasing it in samples with dampened stress reactivity and reducing it in those with heightened stress reactivity. A sample of military veterans experienced reduced CAR pre- to post-MT (Bergen-Cico et al., 2014), and improvement in mental health was related to reduced CAR in an LEO sample who received MT (Christopher et al., 2016). Despite mixed findings, given the outcomes in the military and LEO MT studies, along with the majority of studies identifying a positive association between cortisol and stress among LEOs, our expectation in the current study was that MT would reduce CAR levels. Additionally, a recent study concluded that salutary effects of MT may be most likely in high-stress populations, in which stress is known to affect onset or aggravation of poor mental and physical health outcomes. MT may reduce stress reactivity, and

subsequently impact stress-related disease-specific biological processes (Creswell and Lindsay, 2014).

Recent meta-analyses suggest MT reduces negative psychological health and risk factors common among LEOs, including stress levels (Khoury et al., 2013; Khoury et al., 2015), depression and suicidal ideation (Hofmann et al., 2010; Khoury et al., 2013), alcohol misuse (Chiesa and Serretti, 2014; Goyal et al., 2014), sleep difficulties (Gong et al., 2016; Yu et al., 2017), anxiety (Hofmann et al., 2010; Zhang et al., 2015), and burnout (Luken and Sammons, 2016; Regehr et al., 2014), and increases psychological resilience (Kallapiran et al., 2015; Zenner et al., 2014), mindfulness (Gu et al., 2015; Visted et al., 2015), psychological flexibility (Cavanagh et al., 2014) and self-compassion (Chiesa and Serretti, 2009). MT has been shown to be feasible and lead to improved health outcomes among several high-stress cohorts, including military personnel (Johnson et al., 2014; Stanley et al., 2011), physicians (Epstein and Krasner, 2013; Schroeder et al., 2016), and inner-city teachers (Meiklejohn et al., 2012).

Despite evidence of MT's effects on outcomes relevant to risk factors amongst LEOs, its feasibility and preliminary efficacy in this population has not yet been systematically evaluated. In the current randomized controlled trial (RCT), we hypothesized that Mindfulness-Based Resilience Training (MBRT; Christopher et al., 2016), a program adapting MT for LEOs, would be feasible to implement and acceptable to the target population. We additionally hypothesized that, relative to a no intervention control (NIC) group, at post-training and three-month follow-up, MBRT participants would evidence: 1) improved psychological health and risk outcomes (i.e., decreased sleep disturbance, alcohol use, anxiety, depression, suicidal ideation, stress, and burnout, and increased resilience, mindfulness, psychological flexibility, and self-compassion); 2) reduced aggression and anger; and 3) improved regulation of stress reactivity (i.e., reduced post-training CAR levels).

2. Method

2.1 Participants

LEOs were recruited from law enforcement agencies in a large urban area and surrounding metro region in the Pacific Northwestern United States through emails, fliers, and in-person presentations (See Table 1 for participant demographics).

2.2 Measures

2.2.1 Feasibility and Acceptability.—Feasibility benchmarks included study enrollment (targeted goal of 60 participants), acceptance of randomization to MBRT or NIC (≥ 90% acceptance), MBRT class attendance (≥ 75% of weekly sessions for MBRT participants who maintained study enrollment throughout the 8-week intervention), and overall study attrition (≤ 20%). Acceptability was assessed using three Likert-type scale (0 to 6) items: likelihood of recommending the course to a fellow officer, likelihood of attending the course again in the future, and reasonableness of assigned home practice (minimum benchmark score of four out of six on all acceptability items, indicating "likely"

or “reasonable”). Adherence to meditation practice assigned to MBRT participants as homework was assessed using iMINDr (Wahbeh et al., 2011), a software application on an iPod Touch (Apple, Inc.) provided to MBRT participants during the first class, which tracked time, date, and length of listening for each guided meditation.

2.2.2 Treatment Expectancy and Credibility.—Expectancy and credibility were measured by the Expectancy/Credibility Questionnaire (E/CQ; Devilly and Borkovec, 2000; Hicks et al., 2016) to determine whether expectancy was associated with any differential improvements observed in the MBRT condition. Participants were asked to evaluate the expected effectiveness of the program, both by how much they *thought* it would improve their symptoms and how much they *felt* it would improve their symptoms.

2.2.3 Psychological Health and Risk—PROMIS® (v1.0) short form versions were used to assess sleep disturbance (6 items), alcohol use (7 items), anxiety (6 items), and depression (6 items). Scores are reported on the *T* score metric ($M = 50$; $SD = 10$), centered on the general U. S. population mean in terms of age, gender and race/ethnicity. PROMIS measures have variable ranges (sleep disturbance [32–76], alcohol use [39–77], anxiety [39–83], and depression [38–80]), with higher scores indicating a higher rate of the measured outcome. These short forms have demonstrated acceptable internal consistency and correlations with expected legacy measures (Cella et al., 2010). In the present sample, alcohol use ($\alpha_{Pre} = .94$; $\alpha_{Post} = .94$; $\alpha_{Follow\text{-}up} = .90$), anxiety ($\alpha_{Pre} = .90$; $\alpha_{Post} = .91$; $\alpha_{Follow\text{-}up} = .92$), depression ($\alpha_{Pre} = .90$; $\alpha_{Post} = .84$; $\alpha_{Follow\text{-}up} = .93$), and sleep disturbance ($\alpha_{Pre} = .87$; $\alpha_{Post} = .88$; $\alpha_{Follow\text{-}up} = .93$) demonstrated good to excellent internal consistency. Minimally important difference (MID) provides an estimate of the amount of change or difference people consider meaningful (Wyrwich et al., 2005). MIDs are important reference values used to evaluate the effectiveness of interventions in clinical research using PROMIS symptom measures (Thissen et al., 2016). Among adult clinical samples (Lee et al., 2017; Purvis et al., 2017; Yost et al., 2011), PROMIS short form MID estimates range from 2.5–5.5 *T*-score points for anxiety, depression, and sleep disturbance.

Suicidal ideation was assessed using the 7-item Concise Health Risk Tracking scale (CHRT; Trivedi et al., 2011). The CHRT ranges from 7–35, with higher scores indicating greater suicidal ideation. In a normative sample of depressed outpatient treatment seekers, the authors found $M = 16.1$ and $SD = 5.0$ (Trivedi et al., 2011). The CHRT has demonstrated good internal consistency and is correlated with depression and hopelessness (Celano et al., 2016). The CHRT demonstrated adequate internal consistency in the present study ($\alpha_{Pre} = .79$; $\alpha_{Post} = .75$; $\alpha_{Follow\text{-}up} = .69$).

The Police Stress Questionnaire (PSQ; McCreary and Thompson, 2006) is a 40-item questionnaire consisting of two subscales measuring operational stressors (20 items) and organizational stressors (20 items). Each subscale ranges from 1–7, with higher scores indicating greater perceived stress. In a normative LEO sample, the authors found operational $M = 3.26$, $SD = 1.22$ and organizational $M = 3.53$, $SD = 1.57$ (McCreary et al., 2017). The subscales have demonstrated excellent internal consistency, factorial validity, and convergent validity (Shane, 2010). Similarly, in our sample, both operational ($\alpha_{Pre} = .93$;

α_{Post} = .93; $\alpha_{Follow\text{-}up}$ = .94) and organizational (α_{Pre} = .93; α_{Post} = .93; $\alpha_{Follow\text{-}up}$ = .94) factors demonstrated excellent internal consistency.

The Oldenburg Burnout Inventory (OLBI; Demerouti et al., 2003; Halbesleben and Demerouti, 2005) is a 16-item measure of burnout that assesses exhaustion and disengagement from work. The OLBI has acceptable internal consistency, factorial validity, and expected correlations with other constructs (Demerouti et al., 2010). The OLBI ranges from 1–4, with higher scores indicating greater burnout. In a normative sample of employees, the authors found M = 2.07, SD = .44 (Demerouti et al., 2010). In the present sample, the OLBI demonstrated adequate internal consistency (α_{Pre} = .73; α_{Post} = .76; $\alpha_{Follow\text{-}up}$ = .73).

The Five Facet Mindfulness Questionnaire-Short Form (FFMQ-SF; Bohlmeijer et al., 2011), a 24-item version of the FFMQ (Baer et al., 2006), assessed dispositional tendency to be mindful in daily life. The observe and describe facets of the scale have demonstrated weaker psychometric properties and issues with novice and non-meditating samples (de Bruin et al., 2012; Lilja et al., 2013). Thus, the current study used three of the five facets—acting with awareness, nonjudging of experience, and nonreactivity to inner experience. Each facet has five items, resulting in a 15-item scale. Each facet ranges from 5–25, with higher scores indicating greater mindfulness. In a normative non-meditating sample, the authors found acting with awareness M = 13.19, SD = 3.32, nonjudging M = 14.09, SD = 3.63, and nonreactivity M = 13.47, SD = 3.07 (Bohlmeijer et al., 2011). In the present sample, internal consistency for the acting with awareness (α_{Pre} = .81; α_{Post} = .81; $\alpha_{Follow\text{-}up}$ = .86), nonjudging (α_{Pre} = .86; α_{Post} = .70; $\alpha_{Follow\text{-}up}$ = .81); and nonreactivity (α_{Pre} = .74; α_{Post} = .80; $\alpha_{Follow\text{-}up}$ = .85) facets were acceptable to good.

The Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011) is a seven-item measure that assesses psychological flexibility, defined as a willingness to experience unwanted private experiences, such as bodily sensations, emotions, thoughts, and memories, in the pursuit of one's values and goals. The AAQ-II ranges from 7–49, with lower scores indicating greater psychological flexibility. In a normative sample of people who were seeking outpatient psychological treatment for substance misuse, the authors found M = 28.34 and SD = 9.92 (Bond et al., 2011). The AAQ-II has good internal consistency, factorial validity, and expected correlations with other constructs (Fledderus et al., 2012). The internal consistency in the present sample was good to excellent (α_{Pre} = .89; α_{Post} = .89; $\alpha_{Follow\text{-}up}$ = .93).

The Self-Compassion Scale-Short Form (SCS-SF; Raes et al., 2011) is a 12-item version of the 26-item SCS (Neff, 2003). It assesses kindness and understanding toward oneself in instances of pain or failure, perception of one's experiences as part of the larger human experience, and ability to hold painful thoughts and feelings in mindful awareness. The SCS-SF ranges from 12–60, with higher scores indicating greater self-compassion. In a normative university student sample, the authors found M = 36.00 and SD = 7.33 (Raes et al., 2011). The SCS-SF demonstrated good internal consistency, factorial validity, and expected correlations with other constructs (Raes et al., 2011). The SCS-SF demonstrated good internal consistency in the present sample (α_{Pre} = .84; α_{Post} = .80; $\alpha_{Follow\text{-}up}$ = .85).

The Connor-Davidson Resilience Scale (CD-RISC; Connor and Davidson, 2003) contains 25 items designed to measure resilience, defined as characteristics that allow individuals to cope with adversity. The CD-RISC ranges from 0–100, with higher scores indicating greater resilience. In a large LEO sample, the authors found $M = 77.28$ and $SD = 10.40$ (Devilly and Varker, 2013). The CD-RISC has demonstrated excellent internal consistency, factorial validity, and expected correlations with other constructs across various populations, including LEOs (McCanlies et al., 2014). The CD-RISC demonstrated good to excellent internal consistency in the present sample ($\alpha_{Pre} = .90$; $\alpha_{Post} = .89$; $\alpha_{Follow\text{-}up} = .91$).

2.2.4 Aggression and Anger—The Buss-Perry Aggression Questionnaire-Short Form (BPAQ-SF; Bryant and Smith, 2001) is a 12-item scale of aggression derived from the 29-item BPAQ (Buss and Perry, 1992). The BPAQ-SF was developed to assess four dispositional sub-traits of aggression: physical aggression, verbal aggression, anger, and hostility. The BPAQ-SF ranges from 1–5, with higher scores indicating greater aggression. In a validation sample of newly incarcerated federal offenders, the authors found $M = 2.12$ and $SD = 1.05$ (Diamond and Magaletta, 2006). The BPAQ-SF has demonstrated good internal consistency and strong convergent and discriminant validity (Diamond and Magaletta, 2006). The BPAQ-SF demonstrated good internal consistency in the present sample ($\alpha_{Pre} = .83$; $\alpha_{Post} = .83$; $\alpha_{Follow\text{-}up} = .81$).

The PROMIS® (v1.0) short form version of anger (5 items) was used, and has shown acceptable internal consistency and correlations with expected legacy measures (Cella et al., 2010). PROMIS anger demonstrated good internal consistency in the present sample ($\alpha_{Pre} = .89$; $\alpha_{Post} = .87$; $\alpha_{Follow\text{-}up} = .86$).

2.2.5 Cortisol Awakening Response—Using the passive drool method, participants collected 2–3 ml of saliva at home at 0, 30, and 45 minutes after awakening (spontaneous or by alarm clock) on three consecutive days in the week pre-training, and three consecutive days in the week post-training, with waitlist collection times yoked to MBRT. Participants were asked to refrain from eating, drinking any liquids except for water, smoking, brushing teeth, taking medications, and exercising before completing sample collections. Participants returned completed samples to the research team by mail, using prepaid insulated boxes. Samples were stored in a minus 80°C freezer until thawed for assay. Saliva was processed and assayed for cortisol with an FDA-approved direct (non-extracted) salivary EIA cortisol kit (Pantex; Santa Monica, CA) at ZRT Laboratory (Beaverton, OR). Cortisol was measured in 25 microliter saliva samples with slight modifications of a previously described method (Du et al., 2013). Inter-assay coefficient of variation for cortisol is 8% at 1 ng/ml, 7.1% at 4 ng/ml, and 7.6% at 12.9 ng/ml. The detectable limit is 0.1 to 30ng/ml. All cortisol values were converted from ng/ml to nmol/L.

2.3 Procedures

Beginning in April 2016, two MBRT groups were conducted, and NIC participants were offered the training at no charge after the final follow-up assessment (October 2016). This allowed LEOs who may have been interested in MBRT, but were assigned to the NIC condition, to access the training. The Pacific University IRB approved all study procedures.

Potential participants were recruited using several methods. Recruitment emails with study information and attached informational flyers were sent to police department chiefs in the urban area and surrounding metro region where the study was conducted. We asked police chiefs to distribute the email to their officers and to post the informational flyers. Research team members also delivered 10–15 minute in-person informational and recruitment sessions to groups of LEOs at a number of police departments. To be eligible for study participation, interested individuals had to be a full-time sworn LEO with no exposure to MBRT or a similar mindfulness course. Those meeting criteria were scheduled for an initial pre-training assessment appointment, during which they provided written informed consent and completed all measures via computer. LEOs were subsequently randomly assigned using permuted-block randomization (1:1 ratio) with stratification (gender and age) to MBRT or NIC. Participants completed a similar computer-administered battery of measures post-training and at three-month follow-up. Participants were given kits at pre- and post-training to collect awakening saliva samples and mail back to the research lab.

2.3.1 Mindfulness Training.—MBRT was designed to enhance resilience for LEOs in the context of acute and chronic stressors inherent to policing. Based on a Mindfulness-Based Stress Reduction (Kabat-Zinn, 1990) framework, MBRT was delivered in eight weekly 2-hour sessions with an extended 6-hour class in the seventh week. Sessions contained experiential and didactic exercises, including body scan, sitting and walking meditations, mindful movement, and group discussion. Content and language were adapted for an LEO population; the primary focus of the curriculum was learning strategies to manage stressors inherent to police work, including critical incidents, job dissatisfaction, and public scrutiny, as well as interpersonal, affective and behavioral challenges common to LEOs' lives. The adaptation process was overseen by a co-developer of MBRT (co-author R.G.), who is a police lieutenant and certified mindfulness trainer. Several LEOs in the training division in their respective departments were additionally consulted on program content and delivery. An initial version of MBRT was pilot tested and qualitative feedback solicited from LEO participants, leading to further adaptations. To supplement in-session content and support practice between sessions, MBRT participants were each given an iPod Touch programmed with guided practices and monitoring software (iMINDr; (Wahbeh et al., 2011).

2.3.2 Fidelity.—All MBRT sessions were audio-recorded for instructor fidelity rating. Three of the eight sessions from each cohort were randomly selected using a web-based randomizer, for a total of six coded sessions. The rating team was comprised of two doctoral students and one clinical psychologist (co-author S.B.), none of who were involved in the study intervention or assessment. Two raters independently rated each of the six selected sessions. Raters assessed MBRT content, themes and instructor skill for each of the selected sessions. Protocol-specified session content was assessed using a 4-point scale (0 = *not at all present*, 1 = *somewhat present*, 2 = *thorough*), presence of session themes were assessed using a 4-point scale (0 = *absent*, 1 = *minimally present*, 2 = *present*, 3 = *thorough*), and global ratings of MBRT-specific skill used a 4-point scale (0 = *none*, 1 = *minimal*, 2 = *adequate*, 3 = *mastery*).

2.4 Data Analytic Approach

We examined change from pre- to post-training for each self-report outcome using a multi-level modeling (MLM) approach with restricted maximum likelihood estimation, which is appropriate for smaller sample sizes (Maas and Hox, 2005; Snijders and Bosker, 1993). Each MLM model included participant as a random effect; group, time, and the group-by-time interaction were included as fixed effects. Expectancies at pre-training (due to pre-training differences between the MBRT and NIC conditions) and years on the police force (due to pre-training correlations between years on the police force and multiple outcomes) were included as covariates. Intent-to-treat (ITT) analyses, without imputed missing data, assessed pre-training between-group differences for all outcomes, demographic variables, and expectancy data. For variables with no significant pre-training differences, we examined post-training between-group differences. When pre-training differences existed, we conducted an analysis of covariance (ANCOVA) to examine post-training differences with pre-training responses as an additional covariate. Group-by-time interactions were tested for all outcomes, but a significant interaction effect was not required for further analysis of post-training differences. This strategy is consistent with the feasibility design and avoids inflating Type II errors. All findings are reported with exact *p*-values, and interpretation of magnitudes of confidence intervals and effect sizes are intended to guide further research.

We conducted the same analyses with an ITT sample with imputed data using maximum likelihood estimation in order to investigate the robustness of our results. Conclusions with imputed data differed for four outcomes (see Table 3). However, given that the means in the imputed dataset were in the same direction as the non-imputed data set, and that data were likely missing completely at random (based on data we were able to collect from participants who dropped out of the study after randomization and the results of Little's Missing-ness test, $p > .10$), we report results of analyses without imputed data. To examine MBRT group maintenance of improvements three months after the training, we conducted MLM analyses examining change from pre-training to three-month follow-up for all outcomes.

Three analyses were used to assess stress reactivity. First, cortisol data from the three days of post-training sampling were combined with the three days of pre-training cortisol data to assess cortisol change over time using a four-factor mixed design ANOVA (group [MBRT, NIC] by time [pre-, post-training] by day [1, 2, 3] by minute [0, 30, 45]). Second, we computed the area under the curve with respect to increase (AUC_I) for each day to assess overall change in CAR from pre- to post-training by group. Demographic (gender and age), mental health (traumatic experiences and depression) variables, and other potential confounds (time between waking and first saliva collection and shift worked) were entered as covariates in the first two sets of analyses. Third, we regressed each variable post-training on the same variable at pre-training and saved the standardized residuals (e.g., we regressed responses on the PROMIS measures at post-MBRT on PROMIS responses at pre-training); creating a residualized change score variable for each measure. Pearson's zero-order correlations using the residualized change scores were used to investigate whether changes in AUC_I from pre- to post-training correlated with changes in self-report measures across the same assessment points in the MBRT group.

3. Results

3.1 Feasibility and Acceptability

Results suggest MBRT was feasible to implement among LEOs, as evidenced by number of participants enrolled, acceptance of randomization, session attendance, and overall attrition rate. Sixty-eight potential participants were screened, 61 of who were enrolled in the study; 97% (n = 59) of participants accepted the condition (MBRT or NIC) to which they were randomly assigned. Overall, 20% of participants withdrew from the study prior to completing 3-month follow-up measures (n = 12) (see Figure 1 for CONSORT flow diagram for details). Of MBRT participants who remained enrolled throughout the 8-week intervention period, session attendance was 79% (range = 0–3 absences).

Results suggest MBRT was generally acceptable to participants (all items range from 0–6), as evidenced by the likelihood of recommending the class to a fellow officer (M = 5.08, SD = 1.79) and attending the same course or a similar training in the future (M = 4.45, SD = 2.02). Mean participant report of amount of time required to complete homework outside of class indicated it was somewhat reasonable (M = 3.56, SD = 1.59). Regarding adherence to assigned practice, MBRT participants engaged in an average of 322.35 minutes of out-of-class meditation practice (SD = 357.49; range = 1–1340) over the 8-week training, on an average of 13.85 (SD = 12.63; range = 1–44) out of a possible 56 days, with an average of 10.62 minutes per day (SD = 9.52; range = 1–77).

Regarding instructor fidelity, one-way random-effects models showed inter-rater consistency was excellent for mean ratings of coverage of session content, ICC = .85, with mean rating of content indicating somewhat present to thorough (M = 1.49; SD = .25). For presence of main themes, inter-rater consistency was excellent, ICC = .83, with mean rating indicating present (M = 1.99; SD = .50). For global ratings of instructor skill, inter-rater consistency was good, ICC = .71, and mean value indicated skill was rated between adequate and mastery (M = 2.65; SD = .28).

3.2 Preliminary Outcome Data

Given the nature of this feasibility RCT trial, the primary focus was on indices of feasibility, and on pre- to post-training between-group differences. Secondarily, we assessed whether pre- to post-training changes were maintained at the three-month follow up.

There were no statistically significant differences between NIC and MBRT groups at pre-training on demographic variables (see Table 1), motivation to start and complete MBRT, and E/CQ treatment credibility items. The majority of E/CQ treatment expectancy items and main outcomes did not evince significant differences (ps > .10); however, relative to NIC, MBRT participants endorsed a lower composite E/CQ score of responses assessing the degree to which they felt the intervention would improve job stress, job performance, and resilience (p = .04). MBRT participants also endorsed higher self-compassion (p = .05) and trend-level higher resilience (p = .06) compared to NIC participants. Therefore, pre-training composite E/CQ feelings were included as covariates in all outcome analyses; when examining post-training between-group differences for self-compassion and resilience, scores at pre-training were included as covariates.

3.3 Psychological Health and Risk

Analyses revealed a significant group-by-time interaction for burnout ($p = .01$), organizational stress ($p = .05$), alcohol use ($p = .01$), FFMQ non-reactivity ($p = .04$), and psychological flexibility ($p = .01$) (see Table 2 for outcome means/SDs, and Table 3 for interaction analyses and effect sizes). At post-training, planned follow-up analyses revealed MBRT participants endorsed a significant improvement in burnout ($p = .006$; $d = .73$), organizational stress ($p = .05$; $d = .52$), FFMQ non-reactivity ($p = .04$; $d = .60$), and psychological flexibility ($p = .006$; $d = .73$) and trend-level improvement in sleep disturbance ($p = .08$; $d = .60$). Although there was a significant group-by-time interaction, planned follow-up analyses indicated a non-significant pre- to post-MBRT effect on alcohol use relative to NIC ($p = .12$, $d = .37$) Analyses also revealed no significant main or interaction effects for anxiety, depression, suicidal ideation, operational stress, psychological resilience, FFMQ nonjudging or acting with awareness, and self-compassion.

3.4 Aggression and Anger

Analyses revealed a significant group-by-time interaction for aggression ($p = .05$); at post-training, planned follow-up analyses revealed MBRT participants endorsed significantly less aggression than NIC participants ($p = .03$; $d = .55$). There were no significant interaction effect or main effects for anger, $p > .10$.

3.5 Cortisol Awakening Response

Analyses revealed a significant group-by-time by day-by-minute interaction ($F = 2.88$, $p = .02$). Follow-up analyses revealed that on post-training sampling day three, MBRT participants had higher waking (0 minute) salivary cortisol than NIC participants ($M_{MBRT} = 14.99$, $SD_{MBRT} = 6.70$; $M_{NIC} = 11.46$, $SD_{NIC} = 5.12$; $p = .05$; $d = .59$), whereas MBRT participants had trend-level lower 45 minute salivary cortisol ($M_{MBRT} = 14.79$, $SD_{MBRT} = 6.10$; $M_{NIC} = 18.02$, $SD_{NIC} = 9.10$; $p = .08$; $d = -.42$). Additionally, there was a significant group-by-time interaction for day three AUC_I ($F = 3.88$, $p = .03$). Although there was no group difference in day three AUC_I levels at pre-training; MBRT participants had significantly lower AUC_I levels on day three post-training ($M = 45.16$; $SD = 199.80$) than NIC participants ($M = 187.67$; $SD = 206.75$; $p = .02$; $d = -.70$). Analyses revealed no significant group-by-time interaction for overall AUC_I ($F = 1.44$, $p = .24$); however, gender was a significant covariate ($p = .05$). A post-hoc test in only men in the sample ($n = 41$) revealed a group-by-time interaction for overall AUC_I ($F = 2.94$, $p = .04$), and follow-up within group analyses revealed MBRT participants experienced a significant reduction in overall AUC_I ($\Delta AUC_I = -61.11$, $t = 1.97$, $p = .05$, $d = .58$), whereas as NIC experienced no significant change ($\Delta AUC_I = 35.07$, $t = -.74$, $p = .47$, $d = .13$).

Analyses revealed a significant correlation between residualized change scores for AUC_I and depression ($r = -.42$; $p = .04$) in the MBRT group. There were no other significant correlations between residualized change scores for AUC_I and self-report variables.

Analyses assessing whether MBRT participants maintained changes in outcomes relative to NIC participants at three-month follow-up revealed no significant main or interaction

effects; however, no significant between-group outcome differences evident at post-training were present at three-month follow-up (*p*'s > .05).

4. Discussion

The primary goals of this randomized controlled trial were to assess feasibility and acceptability, and to gather preliminary outcome data for MBRT. Results suggest MBRT is feasible and acceptable to LEOs, evidenced by meeting benchmarks for participant enrollment ($n = 61$), acceptance of randomization (97%), class attendance (79%), and overall attrition rate (20%). The 20% attrition rate is consistent with several recent mindfulness-based intervention (MBI) meta-analyses, in which average attrition rates were approximately 16% (Khoury et al., 2013) and 29% (Nam and Toneatto, 2016). Given the demanding, frequently changing nature of LEO work schedules evidenced in our open trial (Christopher et al., 2016), we established a 20% attrition rate as our benchmark. Indeed, 45% withdrew due to a change in work schedule preventing them from attending MBRT sessions. The enrollment and attrition rates are consistent with previous MT research among high-stress cohorts, including military personnel (Johnson et al., 2014; Stanley et al., 2011), healthcare professionals (Gauthier et al., 2015; Klatt et al., 2015), and inner-city teachers (Kuyken et al., 2013; Meiklejohn et al., 2012). The current trial used weekly reminders and follow-up text/phone calls after a missed session to enhance retention, as participant contact has been shown to help enhance retention in clinical trials (e.g., Brueton et al., 2011), including MT (Crane and Williams, 2010). Supporting acceptability, a majority of participants reported "high-likelihood" of attending MBRT in the future and recommending the course to a fellow LEO, which mirrors MBRT group quantitative improvements in psychological health, aggression, and CAR. Fidelity results, including coverage of content, presence of main themes, and instructor skill, provide further support for the feasibility and acceptability of MBRT, supporting it as a replicable protocol. High levels of interrater consistency suggests instructor fidelity can be reliably coded in future studies.

Preliminary outcome data support several psychological health and risk hypotheses. Relative to NIC, MBRT participants endorsed improvements in psychological health outcomes (burnout, organizational stress, and sleep disturbance [trend-level significance]) and potential mechanisms (psychological flexibility and non-reactivity). This replicates previous MT meta-analyses of RCTs across various healthy and clinical populations (e.g., Cavanagh et al., 2014; Gong et al., 2016; Goyal et al., 2014; Luken and Sammons, 2016) including military personnel (Kearney et al., 2013; Omidi et al., 2013). We are only aware of one other published study on the impact of MT on LEO psychological health outcomes – a single-arm study in which participants also endorsed post-training reduction in burnout, organizational stress, and sleep disturbance, and increases in mindfulness (Christopher et al., 2016).

Relative to NIC, MBRT participants endorsed improvement in burnout, which was assessed using a measure that includes both affective and behavioral aspects of this construct (i.e., exhaustion and disengagement). However, despite this and significant improvements in several domains of psychological health, no significant immediate effects emerged on anxiety, depression, or suicidal ideation. This could indicate that while many affective experiences themselves may not change, their effects on behaviors, such as sleep

disturbance, reactivity or avoidance, may shift. This shift in reaction to emotion or stress, while the emotion or stress itself may not change, is aligned with mindfulness-based practices, and has been seen in other MBI trials (Bowen and Marlatt, 2009; Elwafi et al., 2013; Garland et al., 2014; Witkiewitz and Bowen, 2010; Witkiewitz et al., 2011).

The lack of significant improvement in resilience and self-compassion was surprising, given that these can also be understood as ways of relating to experiences. High rates of stress and trauma in LEOs' routine work are not dissimilar to those seen in military personnel, and previous MT research with military cohorts has found increases in cognitive (Jha et al., 2015), physiological (Johnson et al., 2014), and psychological (Meredith et al., 2011) resilience, as well as self-compassion (Mantzios and Wilson, 2015). A recent study suggests engaging in MT practice protects against attentional lapses over high-demand intervals among military cohorts, and is an important method by which to build cognitive resilience (Jha et al., 2017). The non-significant improvement in psychological resilience (and other health and risk outcomes) may also be related to a small sample size and reduced power. MBRT had a medium-to-large effect size ($d = .64$) on psychological resilience, suggesting that it may indeed be a key outcome. Similarly, as noted above, although there was no statistically significant improvement in anxiety and only trend-level improvement in sleep disturbance, participants in the MBRT group endorsed a pre- to post-training assessment mean reduction of 3.42 and 4.74 *T*-score points for anxiety and sleep disturbance respectively, which is within the range of a minimally important difference in symptoms.

To our knowledge, this is the first RCT to demonstrate a reduction in aggression in an LEO sample. Given the link between aggressive tendencies and excessive use of force among LEOs (Griffin and Bernard, 2003; Koepfler et al., 2012; Sellbom et al., 2007), this is an important outcome. A recent systematic review (Fix and Fix, 2013) and meta-analysis (Zoogman et al., 2014) provide support for MT as a method to reduce aggression, including in high-stress contexts such as correctional settings (Milani et al., 2013; Murphy, 1994; Shonin et al., 2013). MBRT, and MBIs in general, focus on shifting the relationship to an experience (self-judgment or denial) versus the experience itself (e.g., an emotion). Current study results showing significant reductions in aggression, but not in anger, may reflect this; while a participant may still feel anger in response to an event, the habitual aggressive reaction may change, wherein the individual is able notice the emotion, then pause, observe, and choose a skillful response.

While exposure to trauma and stressors is an inherent part of a first responder's job, programs enhancing the ability to relate to stressors more skillfully may reduce harmful effects of stress on health and behavior. Cortisol results suggest that MBRT may lead to reduced cortisol increase after awakening, while at the same time increasing the level at awakening. More specifically, we observed reduced waking cortisol levels increases post-training for male participants, and on day three post-training for both male and female participants. This outcome may indicate recovery of an impaired cortisol regulation where individual days start looking more robust and healthy again, in an otherwise chronically stressed sample. However, these data should be interpreted with caution, because the other two days did not show the same pattern of change. Several studies have examined the impact of MT on CAR and have found mixed results. One way to interpret these mixed findings is

to consider that CAR levels might be too low or high, and as such, normalization would consist of bringing levels either up, or down. Along those lines, among samples of military veterans with PTSD (Bergen-Cico et al., 2014), substance use disorders patients (Marcus et al., 2003), cancer patients and their caregivers (Lengacher et al., 2012), and healthy adults (Brand et al., 2012), participants experienced significant reductions in CAR levels from pre- to post-training. Alternatively, among samples of patients currently receiving chemotherapy for colorectal cancer (Black et al., 2017) and who completed treatment for breast cancer (Matousek et al., 2011), CAR showed a prolonged increase after awakening at the post-training assessment. In these studies, authors suggest that given the prolonged traumatic nature of cancer and its treatment, it may have resulted in participants exhibiting a blunted CAR at pre-training, and therefore MT would be expected to increase, and not decrease, CAR. Additionally, residualized change in AUC_I and depression were significantly inversely correlated in the MBRT group. This may indicate that the recovery of cortisol regulation is associated with reduction in depression, which indirectly supports the interpretation of day three cortisol change.

Sex hormones have also been implicated in differences in CAR profiles between men and women (Juster et al., 2016), and different facets of mindfulness are also linked to sex variation in cortisol reactivity (Laurent et al., 2013). The sex differences on immediate post-training cortisol levels certainly merit further study. In a recent meta-analysis of MT RCTs among healthy female and male adults (Sanada et al., 2016), despite a scarce number of studies ($n = 5$) and variability in MT's and data collection protocols, results suggest MBIs appear to have beneficial effects on cortisol secretion on healthy adults.

The current study also assessed outcomes three months following completion of the intervention, and found no significant between-group differences. One possible explanation is low adherence to ongoing mindfulness practice after completion of the 8-week training. Only 2 out of 24 MBRT participants endorsed any mindfulness practice from post-training to three-month follow-up. Poor adherence to ongoing mindfulness practice is common in MT RCTs, particularly once the active intervention has ceased (Virgili, 2015). Qualitative studies of MBIs have identified several key barriers to practice, including difficulty finding time without the structure of the class, difficulty with long meditations, and self-critical thinking (Banerjee et al., 2017; Martinez et al., 2015; Morgan et al., 2015). Future MT research with high-stress populations must also identify barriers specific to this population, and address them during training and ongoing to assess their impact on practice. This is important because a number of RCT studies found a relationship between mindfulness practice and positive outcomes (e.g., (Carmody and Baer, 2008; Crane et al., 2014; Morgan et al., 2014), although others found that amount of mindfulness practice is unrelated to outcomes (e.g., Quach et al., 2017).

Alongside evidence of feasibility and preliminary support for primary psychological, behavioral and physiological outcomes, there are several limitations to consider, suggesting caution in interpretation of results. First, given our aim to assess feasibility and acceptability of MBRT among LEOs, we purposefully concentrated on a small sample at first. Although recent guidelines suggest preliminary efficacy testing not be included in pilot studies (Leon et al., 2011), given the dearth of effective interventions among LEOs (Patterson et al., 2014),

we deemed it important to include these promising outcome data. However, the small sample size may have resulted in Type II errors as evidenced by medium effect sizes for several outcomes that were not statistically significant (e.g., alcohol use [$d = .37$], resilience [$d = .64$], self-compassion [$d = .57$]). Future research should plan to examine the efficacy of MBRT in a fully powered multisite RCT. Second, similar to military samples, police samples may be prone to underreport mental health symptoms due to stigma and concerns regarding confidentiality (Fox et al., 2012), therefore the mean endorsed values for several outcomes, such as suicidal ideation and alcohol use, may be lower than actually experienced in this sample. Third, although the attrition rate met our 20% benchmark, future research with LEOs and other groups of first responders should explore various MT delivery schedules, including a briefer protocol, intense immersion models, and integrating the training into the workplace. Fourth, although we included a number of covariates in the salivary cortisol analyses, we did not assess for menstrual phase among female participants, which may have contributed to the observed sex differences in AUC_I. Fifth, although we assessed police stressors, we did not assess other factors such as non-work-related stress and level of social support, which may have impacted outcomes. Finally, the sample was gathered from a single metropolitan area, which limits the generalizability of the findings.

Despite these limitations, the current study is the first RCT of an MT tailored to the unique stressors inherent to policing, laying a foundation for future trials assessing outcomes and mechanisms of a mindfulness-based approach to mitigating effects of stressors and stress on law enforcement and other first responder populations. In addition to demonstrating feasibility and acceptability, preliminary outcome data suggest MBRT may lead to short-term improvement in aspects of LEO psychological health and risk, aggression, and stress reactivity. Future trials should focus on supporting enactment of regular mindfulness practice following course completion, address barriers to practice, and perhaps provide “booster” sessions to support training gains. While exposure to trauma and stressors is an inherent part of a first responder’s job, programs that teach these individuals to relate to these experiences more skillfully may help reduce the harmful effects of stress on their own health as well as their behaviors with citizens they serve.

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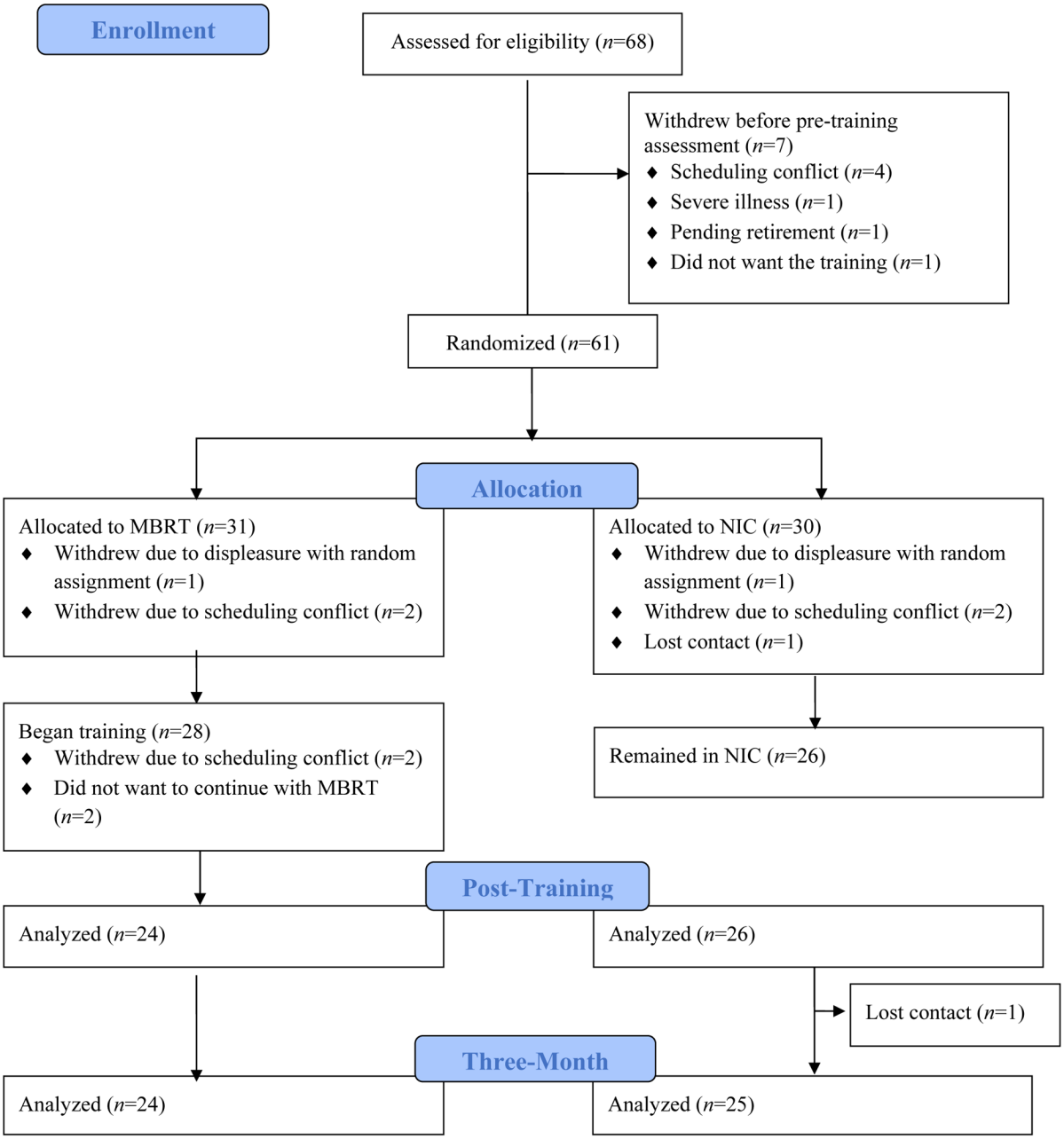

Figure 1.
Participant Flow

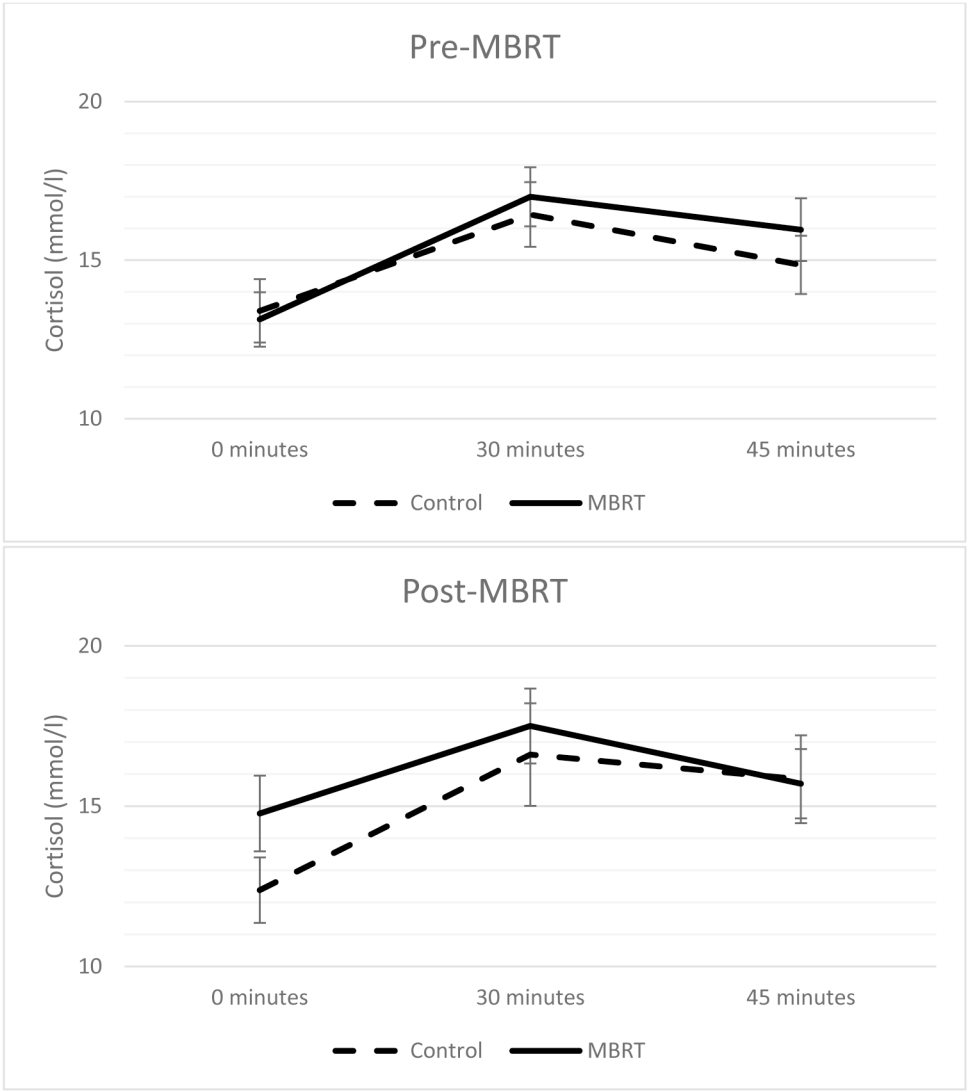

Figure 2.
Pre- to post-training changes in cortisol awakening response by group.

Table 1

Participant Demographics at Pre-Training

	MBRT		NIC			
	N or Mean	%	*N* or Mean	%	χ^2 / *t* / *F*	*p*
N	31	--	30	--		
Age (*SD*)	44.73 (6.63)	--	43.22 (5.43)	--	$t = 0.98$	.17
Gender					$\chi^2 = 0.20$	.65
Female	3	10%	4	10%		
Male	28	90%	26	90%		
Race					$\chi^2 = 5.06$	.54
White	27	88%	25	84%		
Black	1	3%	0	0%		
Native		3		3		
Hawaiian/Pacific Islander						
Native American/ Alaskan	0	0%	1	3%		
Asian	1	3%	1	3%		
Multi-racial	1	3%	0	0%		
Other	0	0%	2	7%		
Ethnicity					$\chi^2 = 2.07$	.15
Hispanic/Latino	1	3%	4	13%		
Not Hispanic/Latino	30	97%	26	87%		
Years of education (*SD*)	15.89 (2.37)	--	14.75 (2.35)	--	$t = 1.59$	.14
Years on the job (*SD*)	18.50 (6.98)	--	17.97 (6.69)	--	$t = 0.30$	.38
Relationship status					$\chi^2 = 7.74$	.17
Married	23	74%	25	83%		
Divorced	4	13%	2	7%		
Widowed	1	3%	0	0%		
Cohabitating	0	0%	1	3%		
Single	3	10%	0	0%		
Other	0	0%	2	7%		
Rank					$\chi^2 = 11.90$	.16
Officer	9	29%	4	13%		
Deputy	3	10%	5	17%		
Criminalist	0	0%	1	3%		
Detective	3	10%	6	20%		
Sergeant	6	19%	10	33%		
Lieutenant	3	10%	5	17%		
Commander	1	3%	1	3%		
Captain	4	13%	0	0%		
Other	2	6%	0	0%		

Note. MBRT = Mindfulness-Based Resilience Training; NIC = no intervention control

Table 2

Descriptive Statistics for Outcomes at all Time Points

	Pre-Training		Post-Training		Three-Month Follow-Up	
	NIC (*n* = 30) *M* (*SD*)		NIC (*n* = 26) *M* (*SD*)		NIC (*n* = 25) *M* (*SD*)	
	MBRT (*n* = 31) *M* (*SD*)		MBRT (*n* = 24) *M* (*SD*)		MBRT (*n* = 24) *M* (*SD*)	
Alcohol Use	46.38	(7.83)	46.89	(8.69)	46.59	(7.98)
	46.44	(7.99)	44.04	(6.29)	45.70	(6.60)
Anxiety	52.25	(5.43)	48.70	(8.26)	49.28	(7.72)
	51.91	(9.62)	48.83	(8.69)	50.66	(8.79)
Depression	48.36	(6.90)	47.32	(6.34)	46.27	(7.37)
	47.49	(8.58)	46.69	(6.69)	48.15	(8.50)
Sleep Difficulties	52.14	(7.63)	51.25)	(5.83)	51.59	(8.74)
	50.69	(8.37)	47.40	(6.93)	49.62	(8.67)
Suicidal Ideation	8.30	(2.16)	7.69	(1.86)	7.80	(1.38)
	8.54	(3.15)	8.29	(2.40)	8.45	(1.88)
Organizational Stress	3.11	(1.13)	3.25	(1.14)	2.95	(1.27)
	2.99	(1.32)	2.65	(1.13)	2.76	(1.20)
Operational Stress	2.82	(.98)	2.76	(1.02)	2.79	(1.19)
	2.92	(1.30)	2.66	(1.17)	2.73	(1.14)
Cortisol AUC_I	26.38	(59.16)	45.42	(64.26)	--	
	39.25	(51.48)	24.77	(44.78)	--	
Burnout	2.43	(.31)	2.44	(.36)	2.37	(.34)
	2.36	(.35)	2.20	(.29)	2.25	(.29)
Resilience	76.10	(9.34)	77.07	(9.50)	77.48	(10.19)
	81.48	(12.36)	83.66	(10.73)	83.20	(11.38)
Anger	52.89	(8.24)	50.69	(7.71)	49.90	(7.32)
	51.34	(8.55)	50.05	(6.89)	51.02	(8.16)
Aggression	1.86	(.61)	1.74	(.57)	1.63	(.53)
	1.87	(.63)	1.47	(.43)	1.60	(.51)
Nonreactivity	16.93	(3.16)	17.30	(4.04)	18.28	(3.83)
	17.35	(3.35)	19.54	(2.96)	18.41	(3.97)
Nonjudging	18.13	(3.13)	20.03	(3.09)	19.12	(3.41)
	17.12	(4.79)	19.37	(3.22)	18.04	(4.04)
Acting with Awareness	18.10	(3.29)	18.26	(3.67)	19.20	(3.52)
	18.16	(3.42)	18.29	(3.09)	18.70	(2.86)
Psychological Flexibility	14.56	(6.64)	13.88	(5.46)	10.76	(5.50)
	14.45	(6.69)	11.70	(6.52)	12.75	(6.88)
Self-Compassion	36.33	(6.89)	37.61	(6.20)	38.64	(6.58)
	39.93	(6.59)	40.95	(5.70)	41.62	(7.12)

Note. MBRT = Mindfulness-Based Resilience Training; NIC = no intervention control; AUC_I = area under the curve(increase)

Table 3

Time by Group Interactions and Effect Sizes for Outcomes

	Pre- to Post-Training Time × Group *F*-Value, *p*-Value		Pre- to Post-Training Time × Group *F*-Value, *p*-Value (Imputed Dataset)		Pre-Training to Three-Month Follow-Up Time × Group *F*-Value, *p*-Value		Pre- to Post-Training Cohen's *d* Effect Size (Non-Imputed Dataset)
Psychological Health/Risk							
Alcohol use	5.29,	.02	5.29,	.02	.46,	.49	.37
Anxiety	.04,	.83	.13,	.71	.09,	.75	.01
Depression	.03,	.95	.01,	.89	.12,	.72	.09
Sleep difficulties	.75,	.39	1.28,	.26	.04,	.83	.60
Suicidal ideation	.07,	.78	.00,	.98	.35,	.55	.16
Organizational stress	3.77,	.05	2.45,	.08*	3.69,	.06	.52
Operational stress	2.26,	.13	.77,	.38	1.44,	.23	.09
Burnout	6.37,	.01	5.79,	.01	.58,	.45	.73
Resilience	2.38,	.13	.82,	.36	.84,	.36	.64
Nonreactivity	4.22,	.04	.86,	.35*	.03,	.86	.60
Nonjudging	.50,	.48	.44,	.50	3.37,	.07	.20
Acting with awareness	.62,	.43	.06,	.80	.56,	.45	.00
Psychological flexibility	6.51,	.01	2.82,	.09*	.23,	.62	.73
Self-compassion	1.88,	.17	1.64,	.20	1.02,	.32	.57
Aggression/Anger							
Anger	.26,	.60	.11,	.74	.50,	.48	.08
Aggression	4.09,	.05	2.65,	.10*	.03,	.84	.53
Cortisol Awakening Response							
AUC_I	1.24,	.24	--		--		.37

Note.

*Results differ between imputed and non-imputed data sets. AUC_I = area under the curve(increase)