

# The Effectiveness of Mindfulness-Based-Stress-Reduction for Military Cadets on Perceived Stress

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## Abstract

This study aimed to develop a program of mindfulness-based stress reduction for military cadets (MBSR-MC). On the basis of a pretest–posttest design, participants were assigned to either a control or an experimental group to examine the effectiveness of MBSR-MC. First, 60 volunteering cadets of National Defense University were randomly assigned to the MBSR-MC group ( $n = 30$ ) and the control group ( $n = 30$ ). In the pretest, all participants were required to complete the Taiwanese version of the Five Facet Mindfulness Questionnaire (T-FFMQ) and a perceived stress

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scale (PSS). Subsequently, the MBSR-MC group participated in the 8-week MBSR-MC program, whereas the control group did not receive any experimental treatment. One week following the completion of the program, a posttest consisted of the same questions as the pretest was conducted. Statistical analysis showed that (1) Comparing with the control group, the MBSR-MC group showed superior performance in three subscales of T-FFMQ, namely Acting with awareness, Non-judgment, and Non-reactivity. However, no significant difference was found in the remaining two facets: Observing and Describing. (2) The perceived stress score of the MBSR-MC group was significantly lower than that of the control group. Furthermore, an analysis of mediating effect showed that Acting with awareness, Non-judgment, and Non-reactivity were mediating variables of the relationship between MBSR-MC and perceived stress. The aforementioned results indicated that MBSR-MC training significantly increased military cadets' Acting with awareness, Non-judgment, and Non-reactivity, thereby significantly reducing their perceived stress. Therefore, this study supported the effectiveness of the MBSR-MC program on perceived stress.

### **Keywords**

MBSR-MC, mindfulness, perceived stress, military cadets, mediating effect

## **Introduction**

A military unit is a stressful environment for most of the people (Office of the Surgeon General, 2008). Military academies that cultivate military officers can also be stressful (Myers & Bechtel, 2004). Some research has emphasized stress in students of military academies (e.g., Cosman et al., 2013; D. M. Gibson & Myers, 2006; Jain et al., 2018; Myers & Bechtel, 2004). This is because students of military academies play leadership roles after they successfully finish their studies and training. Stress can have negative effects on the health of military cadets (Glaser et al., 1999) and can make them more vulnerable to injury (Lazar, 1997). Stress also negatively affects decision-making and leadership effectiveness (Atwater et al., 1999), task performance and intellectual abilities (F. W. Gibson et al., 1993). Therefore, stress coping in military cadets is a crucial topic. There are many interventions to reduce the perception of personal stress, such as attention allocation (e.g., Shechner et al., 2017), cognitive reappraisal (Perchtold-Stefan et al., 2020) strategies, and the recent popularity of mindfulness training (MT)(e.g., Finkelstein-Fox et al., 2019) for reducing stress.

Mindfulness training is an evidence-based intervention to support participants' innate resources to cope with stress in life (Boe & Hagen, 2015; Frank et al., 2015; Walsh et al., 2019). Mindfulness can be defined as "a mental

mode characterized by attention to present-moment experience without judgment, elaboration, or emotional reactivity” (Kabat-Zinn, 2013). Creswell and Lindsay (2014) contended that mindfulness is the ability to pay attention to currently occurring matters. Regardless of whether such experiences are positive, negative, or neutral to an individual, that individual can still directly pay attention to them and accept them (Quaglia et al., 2015). Garland (2007) found that the state of mindfulness refers to the nonjudgmental cognition, emotions, perception, and metacognitive monitoring of each moment. Moreover, mindfulness does not fixate on thinking about the past and the future.

Mindfulness-Based Stress Reduction (MBSR) is a relatively representative form of mindfulness training. MBSR was developed by Kabat-Zinn (1990) in the early stage and methods such as mindful yoga, sitting meditation, body-scan meditation, mindful walking, and mindful eating were used to reduce perceived stress (Cordon et al., 2009; Demarzo et al., 2014; Snippe et al., 2017). MBSR is a structured 8-week group training course, where session lasts approximately 2–2.5 hours; a full-day meditation practice typically takes place between the fifth and sixth weeks. The goal of MBSR is to help individuals increase mindful awareness and practice responding intentionally under stressful situations instead of automatically reacting to stressful events (S. C. Hayes et al., 2004).

An empirical study (Frank et al., 2015) implemented an 8-week MBSR program targeting 36 high school teachers. The study reported considerable stress reduction and marked sleep quality improvement in teachers following MBSR training. Carlson and Garland (2005) trained 63 patients with cancer using an 8-week MBSR program, and reported considerable reduction of insomnia and noticeable improvement in sleep quality. Moreover, the assessment of patients’ emotions conducted by the same study showed that their stress and fatigue were reduced significantly. Hoge et al. (2015) trained 38 patients with generalized anxiety disorder through an 8-week MBSR program; 19 participants were in a mindfulness stress reduction group, whereas the remaining 19 participants were in a stress management education group (control group). The result showed that participants’ anxiety reduced significantly in the MBSR group. The implementation of such programs also yielded the same anxiety reduction effect in patients with social anxiety disorder (Goldin et al., 2016).

Walsh et al. (2019) recently applied MBSR to a smartphone app that instructed users on breathing, body scans, monitoring practices, as well as provided messages about the benefits of mindfulness training. The result showed that mindfulness training through a smartphone can produce positive outcomes such as improved mood, reduction of stress, improved attentional control, and subjective well-being. In summary, MBSR is an effective training.

MBSR can also be applied to military contexts. Guo et al. (2019) used the Armed Police Force as participants in an eight-week MBSR program to improve positive thinking and health and reduce feelings of stress compared to the waitlist group. Some researchers have modified MBSR to make it suitable

for military settings and developed Mindfulness-Based Mind Fitness Training (MMFT). The program was designed for the high-stress organizational context. Similar to MBSR, MMFT involved 24-hr of instruction over 8 weeks, with weekly 2-hr instruction and a full-day silent practice (Stanley et al., 2011). MMFT integrated mindfulness skills training, specific applications for the military environment (e.g., decision making under stress), and information on stress, trauma, and physical resilience. Stanley et al. conducted MMFT on the marines before their deployment from the United States and found greater mindfulness and decreased perceived stress among them (Stanley et al., 2011).

Jha et al. (2010) conducted 8-week MMFT on soldiers who were preparing for a high-stress deployment to Iraq and asked the soldiers to record their time spent on MMFT practices outside the course. The results showed that a high amount of time spent on mindfulness training practice significantly corresponded to more positive emotions and fewer negative emotions. Additionally, working memory capacity mediated the relationship between mindfulness training practice time and lower negative emotion. Jha et al. (2015) conducted MMFT on soldiers who were preparing for a high-stress deployment to Afghanistan. The results showed that mindfulness training could restrain military cohorts' stress-induced attentional lapses. In 2017, Jha et al. found that high quantities of MMFT practice time were correlated with relatively few attentional lapses in military cohorts who were under stress during deployment. Johnson et al. (2014) investigated Marine infantry platoons who were preparing for deployment to Afghanistan and found that marines who received MMFT showed faster recovery from combat training than those who did not receive mindfulness training.

In addition, there is also a short-term mindfulness training for military students. Boe and Hagen (2015) recruited students of Norwegian Military Academy as participants and used mindfulness to reduce their stress of taking parachute courses. The intervention consisted a 4 hour lecture on mindfulness training. During this lecture, military students received information about the conception of mindfulness and training of how to practice mindfulness. After the lecture these military students were given an Mp3 player with two sound-tracks and a booklet with instructions of how to practice mindfulness (focusing on body scans and breathing attention exercises). Following the mindfulness training, participants' stress levels were separately measured 4.5 hours and 30 minutes before their first parachute exercise. The results showed that mindfulness training could significantly reduce perceived stress relative to the control group.

The aforementioned discussion showed that mindfulness training has a considerable stress reduction effect. However, the existing MMFT which is designed for the military environment is not applicable to cadets of military academy; short-term mindfulness training (Boe & Hagen, 2015) which is developed for cadets of military academy is not suitable for military school life. Due to their

regulated lifestyle, military cadets are unable to freely participate in mindfulness activities. Therefore, MBSR should be customized for military academy contexts. That is, mindfulness training activities must be customized such that they can be practiced by students at military academies. For example, the posture practice of standing at attention when military cadets assemble can be used as a form of mindful training, which is convenient for cadets to practice in military academies. Therefore, it is necessary to develop a form of MBSR suitable for military cadets, which enables them to practice and apply mindfulness in their existing military academy lives. The proposed MBSR targeting military cadets was termed as MBSR for military cadets (MBSR-MC). Therefore, the focus of this study is to design MBSR-MC that is appropriate for military school life, and to examine its effectiveness in improving cadets' mindfulness and reducing stress.

In summary, through mindfulness training, mindfulness could be improved (Stanley et al., 2011) and perceived stress could be reduced (Boe & Hagen, 2015). Additionally, in order to determine that mindfulness level of military cadets will be increased after receiving MBSR-MC training, thereby reducing their perceived stress, how mindfulness mediates MBSR-MC in reducing perceived stress will be explored in this study. To achieve the purpose of this research, we examined the hypotheses which are listed below: Hypothesis 1: Military cadets in the MBSR-MC group show more mindfulness than those in the control group. Hypothesis 2: Military cadets in the MBSR-MC group show less perceived stress than those in the control group. Hypothesis 3: MBSR-MC training mediates the effect of MBSR-MC on perceived stress.

## Method

This study aimed to investigate the stress reduction effect of MBSR-MC in military cadets. The independent variables were the training group consisted of the MBSR-MC and the control group. Except the attendance of MBSR-MC program, both of the military cadets in

the MBSR-MC and the control groups had the same life experience, management, and training in the military. In addition, the control group was not exposed to any mindfulness training-related information at all to avoid threatening the internal validity of the experiment.

The dependent variables were the perceived stress and mindfulness of military cadets. In terms of mindfulness measurement, the Taiwanese version of the Five Facet Mindfulness Questionnaire (T-FFMQ) (Huang et al., 2015) was used. The original perceived stress scale (PSS) was developed by Cohen et al. (1983). This study selected the Chinese version of PSS translated by Chu and Kao (2005) for stress measurement.

## Participants

The participants were 60 undergraduate-level military cadets from National Defense University, Taiwan. The MBSR-MC and control groups each contained 30 participants; among those, 47 (78%) were male and 13 (22%) were female (mean [ $M$ ] = 20.50 years, standard deviation [ $SD$ ] = 1.28).

## Instrument

**T-FFMQ.** T-FFMQ was used to measure the level of mindfulness (Huang et al., 2015). This scale is a translated form of the FFMQ developed by Baer et al. (2006). The T-FFMQ scale contains five factors: Acting with awareness (8 questions), Description (8 questions), Non-judgment (8 questions), Observation (8 questions), and Non-reactivity (7 questions). This scale was measured using a 5-point Likert scale, ranging from *not at all* (1), *seldom* (2), *occasionally* (3), *usually* (4), to *almost always* (5). A high score indicated high mindfulness in an individual. Cronbach's  $\alpha$  for the overall scale was .88 and that for each subscale was as follows: acting with awareness = .86, description = .88, non-judgment = .83, observation = .74, and non-reactivity = .80. The retest reliability conducted two weeks after was .95.

**Perceived Stress Scale (PSS).** To measure the level of perceived stress in participants' daily lives (Cohen et al., 1983), the traditional Chinese version of the PSS developed by Cohen et al. (1983) was applied in the study. The translation was done by Chu and Kao (2005). The employed PSS had 14 items, all of which were rated using a 5-point scale (0 = *never*, 1 = *almost never*, 2 = *occasionally*, 3 = *usually*, and 4 = *always*). A high total score suggested a high level of perceived stress in one's daily life; the Cronbach's  $\alpha$  of the traditional Chinese version of PSS was .85.

**MBSR for military cadets.** The design of MBSR-MC was based on the four components of MBSR proposed by Kabat-Zinn (1990), namely (1) teaching psychological and physiological concepts such as mindfulness, stress, and anxiety, (2) mindfulness practices and assignments, (3) practice of mindfulness activities (e.g., body scan, sitting meditation with awareness of breath, and mindful movement), and (4) introducing application of mindfulness into daily living. In addition to the content of stress, this program also taught participants about mindfulness concepts such as non-judgment, acceptance, letting go, focused perception, living in the present, beginner's mind, openness, curiosity, patience, trust, and non-striving or non-doing (Kabat-Zinn, 1990). With slight modifications made to the mindfulness skills training, MBSR-MC retained the breathing practice, body scan, mindfulness sitting meditation, mindful walking meditation, and application of mindfulness to daily living. To make MBSR-MC comply with the military academy life, military mindfulness activities including

standing at attention, standing at ease, singing military songs, physical training (e.g., pushups), receiving scolding, and cleaning in a mindfulness state, were incorporated into program. An example of a script for mindfulness-based standing at attention instruction is as follows: “While maintaining the posture of standing at attention, please keep perceiving changes in your body. Use your sense of touch to feel how your feet are in contact with the ground and how your palms are tightly attached to your trousers. Feel the tightness of your muscles. Which part of your body is sore? Which part of your body feels painful when standing for a long time? Please be open and curious to what your body is conveying to you without being judgmental. Accept your physical state and truly experience the feeling of standing at attention.” Please refer to Table 1 for the content of MBSR-MC.

### *Procedure*

This study was divided into three stages. The first stage was participant recruitment and the pretest; the second stage was experimental intervention of the programs; and the third stage was the posttest. First, this study recruited 60 military cadets from National Defense University, Taiwan. After obtaining their informed consent, pretesting, T-FFMQ, and PSS were conducted sequentially. Subsequently, participants were randomly assigned to the MBSR-MC and the control groups. Finally, they were asked to fill out the posttest T-FFMQ and PSS one week following the completion of the 8-week program. For ethical considerations, debriefing was conducted following the stress assessment to inform the participants of the purpose and meaning of this experiment.

### *Statistical analyses*

In this study, SPSS 20.0 software was used for data analysis and MANCOVA was applied to examine Hypothesis 1. When testing Hypothesis 1, firstly we must determine whether mindfulness level increased significantly in participants following MBSR-MC; if proven, such a result could prove the effectiveness of the proposed MBSR-MC. We regarded groups as independent variables, the pretest T-FFMQ as a covariate variable, and posttest T-FFMQ as a dependent variable when performing multivariate analysis of variance (MANOVA). MANOVA analysis was used to control the bias caused by the correlation between the variables. Therefore, in the analysis procedure, the five pretest T-FFMQ subscales were included as covariate variables into the analysis at the same time, and the five posttest T-FFMQ subscales were included as dependent variables into the analysis at the same time. When examining Hypothesis 2, we regarded groups as independent variables, the pretest PSS as a covariate variable, and posttest PSS as a dependent variable when performing analysis of covariance (ANCOVA). While examining Hypothesis 3, the PROCESS

Table 1. MBSR-MC content.

Lesson no.	Program content	Lesson no.	Program content
1	<ol style="list-style-type: none"><li>1. The origin of mindfulness and introduction to its seven attitudes.</li><li>2. Mindfulness: Discussion of mindfulness-based eating of a raisin.</li><li>3. Experience sharing</li><li>4. Body scan practice</li><li>5. Experience sharing</li><li>6. Assignment: body scan practice in bed before sleeping and having a mindfulness-based meal</li></ol>	2	<ol style="list-style-type: none"><li>1. Sharing experiences of the previous assignment</li><li>2. Body scan practice</li><li>3. Experience sharing</li><li>4. Breathing practice</li><li>5. Experience sharing</li><li>6. Mindfulness-based military training: standing at attention</li><li>7. Experience sharing.</li><li>8. Assignment: body scan practice, breathing practice, and mindfulness-based military training: standing at attention</li></ol>
3	<ol style="list-style-type: none"><li>1. Sharing experiences of the previous assignment</li><li>2. Breathing practice</li><li>3. Experience sharing.</li><li>4. Mindfulness-based military training: standing at ease</li><li>5. Experience sharing</li><li>6. Introduction to stressors and stress</li><li>7. Sharing about stressors in small groups</li><li>8. Assignment: breathing practice and mindfulness-based military training: standing at ease</li></ol>	4	<ol style="list-style-type: none"><li>1. Sharing experiences of the previous assignment</li><li>2. Breathing practice</li><li>3. Body scan</li><li>4. Mindfulness-based military training: singing military songs</li><li>5. Mindfulness-based walking</li><li>6. Assignment: body scan or breathing practice, mindfulness-based walking, and mindfulness-based military training: singing military songs</li></ol>
5	<ol style="list-style-type: none"><li>1. Sharing experiences of the previous assignment</li><li>2. Breathing practice</li><li>3. Body scan</li><li>4. Mindfulness sitting meditation</li></ol>	6	<ol style="list-style-type: none"><li>1. Sharing experiences of the previous assignment</li><li>2. Breathing practice</li><li>3. Mindfulness-based military training: standing at ease</li><li>4. Meditation sitting</li></ol>

(continued)



**Table 1.** Continued

Lesson no.	Program content	Lesson no.	Program content
7	5. Assignment: mindfulness sitting meditation and breathing practice	8	5. Mindfulness-based military training: standing at attention 6. Mindfulness-based military training: singing military songs 7. Assignment: body scan, mindfulness-based military practice: standing at attention, standing at ease, and singing military songs
	1. Sharing experiences of the previous assignment 2. Sitting meditation 3. Mindfulness-based military training: cleaning 4. Mindfulness-based walking 5. Mindfulness-based military training: pushups and situps 6. Body scan 7. Assignment: mindfulness-based military training: cleaning and situps		1. Sharing experiences of the previous assignment 2. Sitting meditation 3. Mindfulness-based military song singing 4. Mindfulness-based walking 5. Mindfulness program review 6. Continual practices and persistent application of mindfulness to daily life

bootstrapping command with 5000 iterations (model 4) (A. F. Hayes, 2013) was used to examine how mindfulness mediates the MBSR-MC effect on the perceived stress.

In the analysis procedure, the mediation effect of the five dimensions of T-FFMQ is analyzed, respectively. For example, when analyzing the mediation effect for Acting with awareness, pretest PSS and pretest Acting with awareness were included as the covariant variables into analysis; MBSR-MC was included as the independent variable into analysis; posttest Acting with awareness was included as the dependent variable. The analyses of the mediation effect of the other dimensions were using the same method.

Results

Effect of mindfulness

Descriptive statistics of the pretest and posttest T-FFMQ obtained from the two groups involved the original means, standard deviations, and adjusted means are listed in Table 2.

In terms of main result analysis, we examined the difference in the two groups' performance on T-FFMQ through MANCOVA. The obtained results showed that  $\Lambda = .69$ ,  $p = .002$ , and the effect size ( $\eta_p^2 = .31$ ) all reached statistical significance. Subsequently, a Roy-Bose simultaneous confidence interval (SCI) method was used to examine dimensions of T-FFMQ for which the two groups' performance levels were significantly different. The exclusion of 0 in the 95% confidence interval indicated that the adjusted  $M$  of the MBSR-MC group and

**Table 2.** Mean scores, standard deviations, and adjusted means of the pretest and posttest obtained from the two groups.

		MBSR-MC group			Adjusted M	Control group			
		<i>n</i>	<i>M</i>	<i>SD</i>		<i>n</i>	<i>M</i>	<i>SD</i>	Adjusted M
Acting with awareness	Pre	30	23.93	5.71	28.05	30	25.53	4.54	25.22
	Post	30	27.50	5.44		30	25.77	4.33	
Observation	Pre	30	28.23	4.95	28.54	30	26.57	4.45	27.16
	Post	30	28.80	4.21		30	26.90	4.71	
Description	Pre	30	27.27	4.59	28.65	30	27.53	5.45	27.92
	Post	30	28.40	4.23		30	28.17	5.23	
Non-judgment	Pre	30	21.30	5.01	23.75	30	22.13	3.91	21.35
	Post	30	23.50	4.23		30	28.17	5.23	
Non-reactivity	Pre	30	20.23	3.46	23.54	30	20.50	3.90	20.59
	Post	30	23.23	4.10		30	20.90	4.14	

*N* = 60.

that of the control group were significantly different in that dimension. This means that MBSR-MC had an effect on that particular dimension. The results of analysis are listed in Table 3, which shows that the dimensions of Acting with awareness, Non-judgment, and Non-reactivity all reached statistical significance ( $ps < .01$ ). Additionally, the 95% confidence interval did not include 0, indicating that the performance levels of the two participating groups were significantly different in these three subscales. However, no significantly different effect was found on the remaining two subscales, namely Observation and Description. Table 2 shows that the adjusted mean of MBSR-MC group in Acting with awareness ( $M = 28.18$ ) was higher than that of the control group ( $M = 25.31$ ). Similarly, the adjusted means of the MBSR-MC group in Non-judgment ( $M = 23.82$ ) and Non-reactivity ( $M = 21.40$ ) were also higher than the adjusted means in Non-judgment ( $M = 23.75$ ) and Non-reactivity ( $M = 20.75$ ) of the control group. This indicated that MBSR-MC group's performance levels in the Acting with awareness, Non-judgment, and Non-reactivity following the MBSR-MC were significantly higher than those of the control group. However, no significant effect of training was found in the remaining two subscales, namely Observation and Description.

*Effect on the perceived stress*

Descriptive statistics for the two participant groups' performance levels in pre-test and posttest PSS involving original means, standard deviations, and adjusted means are listed in Table 4. An analysis of covariance suggested that  $F(1, 57) = 11.40, p = .001$ , indicating statistical significant. This showed that, excluding the effect of covariate variable, the performance of the MBSR-MC group in PSS following the intervention of MBSR-MC practice was superior to that of the control group. That is, after the intervention of MBSR-MC, scores in the perceived stress increased significantly, yielding an effect size of  $\eta_p^2 = .167$ .

**Table 3.** Post-hoc comparison result of difference in the means of MBSR-MC and the control groups.

Subscale	Mean difference	SD	<i>p</i>	95% confidence interval	
				Upper limit	Lower limit
Acting with awareness	2.84	1.07	.01	0.69	4.98
Observation	1.38	0.96	.16	−0.55	3.31
Description	0.72	0.79	.36	−0.86	2.30
Non-judgment	2.40	0.79	.004	0.82	3.98
Non-reactivity	2.95	0.81	<.001	1.32	4.58

**Table 4.** Means, standard deviations, and adjusted means of the MBSR-MC and the control groups.

		MBSR-MC group				Control group			
		N	M	SD	Adjusted M	N	M	SD	Adjusted M
Perceived stress	Pre	30	31.17	6.79		30	28.17	8.45	
	Post	30	24.47	10.93	23.19	30	27.73	7.06	29.01

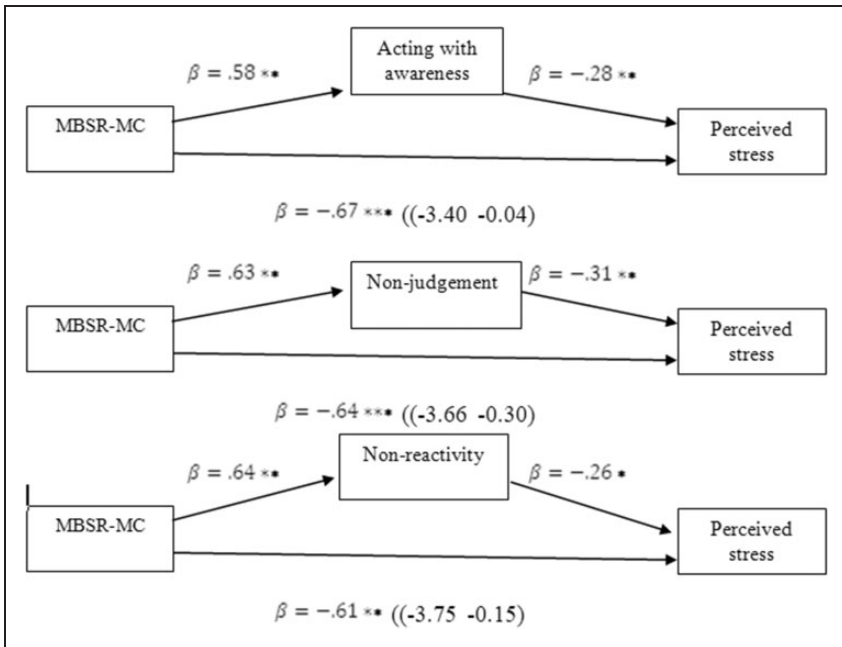
### Mediating effect analysis

According to the previous results, MBSR-MC only has effects on indicators of acting with awareness, non-judgment, and non-reactivity. Therefore, the mediating effect of MBSR-MC on perceived stress was only analyzed separately for the three indicators mentioned above, we tested a mediation model with the following causal sequence: (i) MBSR-MC training increased mindful level (acting with awareness, non-judgement, and non-reactivity, respectively); (ii) the mindfulness decreased stress. In the analysis procedure of the mediating effect, Process v3.4 was used to test how acting with awareness, non-judgement, and non-reactivity mediate the effect of MBSR-MC on perceived stress, respectively.

The model presented in Figure 1 suggests that, as expected, the MBSR-MC increased acting with awareness ( $\beta = .58$ ,  $t = 2.73$ ,  $p = .008$ ), non-judgement ( $\beta = .63$ ,  $t = 2.93$ ,  $p = .005$ ), and Non-reactivity ( $\beta = .64$ ,  $t = 3.34$ ,  $p = .002$ ), respectively, which in turn decreased perceived stress ( $\beta = -.28$ ,  $t = 2.68$ ,  $p = .001$ ;  $\beta = -.31$ ,  $t = 2.80$ ,  $p = .007$ ;  $\beta = -.26$ ,  $t = 2.11$ ,  $p < .04$ ). More importantly, the analysis revealed that MBSR-MC training effect on decreasing participants' stress ( $\beta = -.67$ ,  $t = 3.87$ ,  $p < .001$ ;  $\beta = -.64$ ,  $t = 3.40$ ,  $p = .001$ ;  $\beta = -.61$ ,  $t = 3.33$ ,  $p = .002$ ) was reduced after the mediators were considered in the model ( $\beta = -.51$ ,  $t = 2.91$ ,  $p = .005$ ;  $\beta = -.44$ ,  $t = 2.34$ ,  $p = .02$ ;  $\beta = -.44$ ,  $t = 2.28$ ,  $p = .03$ ), and the indirect effect of MBSR-MC training (mindfulness training  $\rightarrow$  acting with awareness, non-judgement, and non-reactivity  $\rightarrow$  perceived stress) was significant [confidence interval (CI):  $(-3.40, -0.04)$ ,  $(-3.66, -0.30)$ , and  $(-3.75, -0.15)$ , respectively]. Because zero is not on the 95% CI, the indirect effect is significantly different from zero ( $p < .05$ ).

### Discussion

The study aimed to develop an MBSR-MC program suitable for military cadets in military contexts. The effectiveness of MBSR-MC was determined by two indicators namely, mindfulness level and the perceived stress. Results suggested in terms of the mindfulness indicator, three dimensions namely, acting with awareness, non-judgment, and non-reactivity can be improved following the



**Figure 1.** Mediating effect;  $*p < .05$ ,  $**p < .01$ ,  $***p < .001$ .

MBSR-MC training. However, no significant effect of training was found for the remaining two dimensions, namely observation and description. The aforementioned results mostly supported Hypothesis 1: Military cadets in the MBSR-MC group demonstrate higher mindfulness than those in the control group. The perceived stress indicator suggested that individuals' perceived stress can be reduced following the MBSR-MC training. Therefore, the results of analysis supported Hypothesis 2: Military cadets in the MBSR-MC group show less perceived stress than those in the control group. In terms of the mediating effect, we found that three mindfulness indicators (acting with awareness, non-judgment, and non-reactivity) mediated the effect of MBSR-MC on individuals' perceived stress. Therefore, in addition to observing and describing, acting with awareness, non-judgment, and non-reactivity indicators support Hypothesis 3. The implications, research limitations, recommendations for future research, and practical applications of this study are discussed separately as follows.

Previous studies have used T-FFMQ to examine the effectiveness of MBSR. However, the results varied across studies. In some studies, the MBSR training was found effective for each subscale of T-FFMQ (Baer et al., 2012; Carmody & Baer, 2008; Carmody et al., 2009). Frank et al., 2015) indicated that MBSR

training was found effective for three indicators namely, Observation, Non-judgment, and Non-reactivity, but not in other indicators. Another study revealed that the MBSR training was effective for three indicators (i.e., Description, Observation, and Non-reactivity) but not on other indicators (Goldberg et al., 2016). Josefsson et al. (2011) suggested that the MBSR only affected Non-reactivity and Observation. Mehling et al. (2018) discovered that MBSR was only effective for Non-reactivity. Alternatively, MBSR mindfulness was effective for all indicators except for Description (Carmody & Baer, 2008). The aforementioned results showed that MBSR-MC was effective for all scales or partially effective for some scales if T-FFMQ was used as an indicator. This study and previous studies have found that the effect of MBSR seems to be most stable on Non-reactivity. That is, MBSR is highly effective for promoting individual identification and preventing individuals from evaluating their own thoughts or feelings (Baer et al., 2006). The results of this study suggested that in terms of mindfulness increase, the proposed MBSR-MC program was effective for three indicators, namely Acting with awareness, Non-judgment, and Non-reactivity. However, the proposed program exerted no effect on two indicators, namely Observation and Description. Therefore, following the intervention of MBSR-MC, participants were able to focus on current activities and their behaviors were less automatized (i.e., Acting with awareness); the participants were also more likely to perceive their own feelings, cognition, and emotions from a non-judgmental perspective (i.e., Non-judgment). That is, letting thoughts and emotions come and go without responding to them (i.e., Non-reactivity).

Regarding Observation and Description, both of which were not affected by the MBSR-MC, a possible explanation was that participants were asked to describe their present-moment experience through words during MBSR-MC training. Moreover, previous research has suggested that the effect of MBSR on descriptive dimensions can be limited (Baer et al., 2012; Carmody & Baer, 2008); this finding may be applicable to these two dimensions. It could also be because MBSR-MC training is less likely to enable participants to learn about Observation and Description. Another possibility may lie in the environment or the context of activities in a military academy, which might offset the effect of training for these two dimensions. For example, the highly stressful and intensive military management of a military academy could cause MBSR-MC to be ineffective for these two dimensions.

This research findings indicated that the perceived stress can be reduced through by implementing MBSR-MC. This was consistent with previous findings, which concluded that MBSR is effective for reducing the perceived stress (Baer et al., 2012; Carmody & Baer, 2008; Carmody et al., 2009; Chiesa & Serretti, 2009; Garland et al., 2011; Irving et al., 2009). One might seek to discover how MBSR-MC was able to reduce military cadets' perceived stress in daily life in their military academy. The result of this study also suggested that

three mindfulness indicators namely, Acting with awareness, Non-judgment, and Non-reactivity mediated the MBSR-MC effect on the perceived stress. In five dimensions of mindfulness of FFMQ, Non-judgment, Non-reactivity, and Acting with awareness were negatively correlated with psychological symptoms (de Bruin et al., 2012). This revealed that Acting with awareness and Non-judgment were crucial components of stress reduction. That is, training participants to pay attention and perceive their own thoughts and emotions without being judgmental can enable them to refrain from have further responses to their own thoughts and emotions. These alternative ways in response to negative emotional experiences are crucial mechanisms to reducing the perceived stress (Garland et al., 2013).

In addition to the aforementioned explanation of the MBSR-MC mechanism in relation to the perceived stress, the effect of MBSR and the reasons behind its effectiveness were addressed through a mindful coping model (Garland et al., 2011). Firstly, an individual's disengagement from he or her negative appraisal of an event is crucial. If an event is evaluated and considered to exceed an individual's ability, the individual can adopt decentering stress appraisal through the mindfulness process. This can produce an adaptive response and induce a state of mindful awareness that expands one's attention and increases one's cognitive flexibility. Such cognitive flexibility is more likely to generate positive reappraisal of an environment, thereby generating positive emotions and reducing stress. Furthermore, other theoretical explanations also exist. For example, Schutte and Malouff (2011) suggested that mindfulness can increase emotional intelligence and thus reduce stress. However, Jha et al. (2010) suggested that low working memory capacity (WMC) can be affected by intrusive thoughts. This made it more difficult to successfully suppress negative emotions (Brewin & Smart, 2005). Jha et al. found that more mindfulness training practice can improve one's WMC and thus reduce negative emotions. Therefore, WMC has been proven to exert a mediating effect on the relationship between MBSR-MC and negative emotions. MBSR-MC could increase an individual's WMC, enabling him or her to become more capable of dealing with negative thoughts, through which the perceived stress is reduced.

The experiment of this study verified that the proposed MBSR-MC designed specifically for military cadets showed practical effects. However, the following research limitations existed: (1) The control group in this study consisted of military cadets of the same characteristics, but they did not undergo interventions. This could reduce the internal validity of this study. (2) This study only tested the effect of MBSR-MC program one week following its completion and did not examine its long-term effects. Therefore, this study warrants further follow-up studies to investigate the long-term effects of this program. For example, investigation of the effects of training one month, three months, or half a year following the training could be conducted by future studies. Additionally, future studies may even follow up with the military cadets after their graduation

to evaluate their work performance in a troop. (3) Self-reporting indicators were used to measure the effect of MBSR-MC training in this study. One limitation of self-reporting is that participants may be affected by social desirability bias (Razavi, 2001) when filling out the questionnaires. Additionally, introspective limits of self-reporting may also cause biases in validity of measurement (Perugini & Banse, 2007). Therefore, future studies may benefit from adding more objective evidence for effect assessment. For example, neuroscience research also found that dorsomedial prefrontal cortex and the amygdala play a crucial role in mindfulness (Frewen et al., 2010). Therefore, future studies may also include neuroscience-related indicators. Moreover, heart rate variability developed in recent years can also be incorporated and used as an indicator for the testing stress reduction effect of MBSR-MC (Hunt et al., 2018). Diverse assessment approaches may yield evidence to support the training effect of MBSR-MC, making it more trustworthy. (4) Cultural differences may also limit the receptivity of MBSR-MC for cadets from other countries. The possible reasons are cultural variations between countries (Tsai et al., 2006). For example, the Individualism-Collectivism issues in Eastern and Western countries (Triandis, 2001) might have impacts on the effect of MBSR-MC. Therefore, future studies could examine the effectiveness of MBSR-MC in other countries to test the external validity of MBSR-MC.

The study aimed to develop an MBSR-MC program suitable for military cadets while examining its effectiveness. The training of this MBSR-MC program was found to significantly and largely improve the mindfulness dimensions in military cadets, thereby significantly reducing the perceived stress. Training of military cadets who can confront the stress of a military academy and finish the course of study is paramount. Past research has found that grit could predict whether military cadets at United States Military Academy West Point were able to complete the stern summer training and continue to finish their study (Duckworth & Quinn, 2009). Moreover, mindfulness was positively correlated with grit (Vela et al., 2018). This means that MBSR-MC may also facilitate military students' successful completion of their study by increasing their grit. Therefore, the proposed MBSR-MC is applicable to military academy training, thereby assisting military cadets' successful completion of study and facilitating them to work in a troop after graduation.

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