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Mood and personality predict improvement in creativity due to meditation training

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ABSTRACT

Previous investigations into creative performance following meditation have shown a mean improvement but not all people improve. In these studies, inter-individual differences have been almost completely neglected. In this paper we examine whether short-term integrative body–mind training (IBMT), one form of meditation, can improve creative performance and seek to determine which people are more likely to have more creative improvement triggered by IBMT. Eighty-four Chinese undergraduates were randomly assigned to a short-term IBMT group or a relaxation training control group. Mood, personality and creative performances were assessed by the Profile of Mood States (POMS), the Eysenck Personality Questionnaire (EPQ) and the Torrance Tests of Creative Thinking (TTCT) questionnaire respectively. As predicted, the results indicated that short-term (30 min per day for 7 days) IBMT improved creative performance significantly more than a relaxation control. Furthermore, the TTCT score improved significantly after IBMT. However, some IBMT participants showed trends that differed from the mean values. A linear regression showed that five significant predictors in pre-tests including depression, anger, fatigue, introversion × vigor, and emotional stability × vigor accounted for 57% of the variance in the change in TTCT score from before to after IBMT. Therefore, the mood and personality may be useful tools to predict individual variation in improved creative performance following meditation training.

1. Introduction

Creativity is commonly defined as work that is both novel (i.e., original and unexpected) and appropriate (i.e., valuable and adaptive concerning task constraints) (Sternberg & Lubart, 1999). Creativity is essential to the development of human civilization and plays a crucial role in cultural life (Hennessey & Amabile, 2010). Hence, various fields of research are interested in the potential for fostering creative performance through technology and training. It has been the contribution of cognitive psychology to understand mental processes in terms of component operations (Posner, 1978). Our choice of tests to measure creative performance including the Torrance Test of Creative Thinking (TTCT) is based on that theoretical perspective. Of special important is the ability to measure aspects of creative performance particularly as it relates to divergent thinking as measured by the TTCT (Torrance, 1972). Divergent thinking pertains primarily to information retrieval and the call for a number of varied responses to a certain item (Guilford & Paul, 1967). Prior study demonstrated that divergent thinking as a key aspect of creative performance has the validity to predict creative ability (Kim, 2008).

For the past four decades, the popularity of meditation in the Western world has led to extensive research into both its physiological and behavioral effects, including creative performance (Murphy, Donovan, & Taylor, 2004). For example, transcendental meditation training enhances creative performance as assessed by TTCT (Ball, 1980). Moreover, maintaining a mindful and alert state during meditation results in better creative thinking (solving insightful problem) (Ren et al., 2011). In addition, Zen practitioners who meditated in the laboratory performed better on the creative thinking (as measured by Remote Associate Test) than those who did not meditate (Strick, Van Noorden, Ritskes, De Ruiter, & Dijksterhuis, 2012). The open-monitoring meditation, in which an individual is open to perceive and observe any sensation, promotes creative thinking (Colzato, Ozturk, & Hommel, 2012). Our recent work also suggested that short-term IBMT can enhance the creative thinking including divergent thinking (Ding, Li, & Tang, 2011; Ding, Tang, Tang, & Posner, 2014b) and insightful problem solving (Ding et al., 2014a).

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It should be noted that research into a connection between creative performance and meditation has shown a mean improvement of creative performance following meditation training (Ball, 1980; Colzato et al., 2012; Ding et al., 2011; Ding, Tang, Cao, et al., 2014a; Ding, Tang, Tang, & Posner, 2014b; Ren et al., 2011; Strick et al., 2012), but there were individuals who showed the opposite effects (O'Haire & Marcia, 1980; Otis, 1974). One study revealed no improvement in creative performance proceeding three months meditation training, though many individuals reported an increase in their creative ability (Otis, 1974). Another study tested creative thinking skills with the TTCT—Form B and found an unsupportable relationship between three years meditation experience and creative performance, although some meditators scored highest on figural originality (O'Haire & Marcia, 1980). These differences could be due to error of measurement in the TTCT or other factors such as the aspects of the individuals' personality and mood.

Mental state and personality have been associated with creative performance. For example, people with more positive emotion had more flexible and original responses (Brand & Opwis, 2007; Davis, 2009; De Dreu, Baas, & Nijstad, 2008). Moreover, creative people in general are more autonomous, introverted, mood stable, and energized (Barron & Harrington, 1981; Feist & Barron, 2003; Furnham & Bachtiar, 2008). Similarly, both mental state and temperament are related to individual differences in meditation. For example, anxiety and neuroticism are negatively related to the ability to achieve an appropriate meditative state (Lykins & Baer, 2009; Murata et al., 2004). These findings suggest that mood states and temperament may be indicative of an individual's capacity to benefit in creative ability from meditation training.

The current study focuses on individual differences of meditation training on divergent thinking as an aspect of creativity using TTCT. In previous work (Ball, 1980; Colzato et al., 2012; Ding et al., 2011; Ding, Tang, Cao, et al., 2014a; Ding, Tang, Tang, & Posner, 2014b; Ren et al., 2011; Strick et al., 2012), it has been established that creative performance increases following meditation, but not all persons improve in creative performance, we hypothesize that those with specific personality and/or mood will improve more than those without these characteristics.

Many studies of meditation compare long term meditators with a control group. However, integrative body–mind training (IBMT), one form of meditation, has been shown in just five days to improve many aspects of cognition including attention (Tang et al., 2007). IBMT originates from ancient eastern contemplative traditions (e.g., traditional Chinese medicine and Zen) and incorporates key components of meditation training including body relaxation, mental imagery and mindfulness (Tang & Posner, 2009; Tang et al., 2007). IBMT is designed to facilitate the achievement of a meditative state with a balance and optimization between mind and body (Tang et al., 2007). On the other hand, relaxation training (RT) involves the relaxing of different muscle groups over the head to the abdomen and forces one to concentrate on the feelings of warmth and heaviness (Bernstein & Borkovec, 1973). This progressive muscle training helps a participant achieve physical (body) and mental (mind) relaxation and calmness (Tang et al., 2007, 2009). Since both RT and IBMT effort to achieve their desired states through regulating the body and the mind, RT matches IBMT in the training and thus we chose RT as an active control condition. Recent studies have shown IBMT to be effective with a U.S. population (Tang et al., 2009, 2007; Tang, Tang, & Posner, 2013). We have found that a few hours IBMT significantly improved creative performance including divergent thinking (Ding et al., 2011; Ding, Tang, Tang, & Posner, 2014b) and insightful problem solving (Ding, Tang, Cao, et al., 2014a). Hence, IBMT is being used as a meditation intervention to test our hypothesis.

Taken together, we hypothesize that compared to RT (i) IBMT will produce greater creative performance (as measured by TTCT) (ii) There will be a relation between pre-test score (Profile of Mood States (POMS) or Eysenck Personality Questionnaire (EPQ)) and improvement (post-test TTCT score minus pre-test TTCT score) following IBMT.

2. Method

2.1. Participants

Eighty-four healthy undergraduates (49 males, aged 21 ± 1.5 years old) at Dalian University of Technology (DUT) without any meditation or relaxation experiences were recruited. They were evenly randomly assigned to an IBMT group or an RT group (42:42). Forty-two participants in the IBMT group completed the whole training of 30 min/day for 7 days (3.5 h in total) and 42 participants in the RT group were given the same amount and length of RT (Tang et al., 2007). The study was approved by DUT Institutional Review Board and informed consent was obtained from each participant. The consent form explained that participants would complete the POMS and the EPQ before training, and complete the TTCT before and after training.

2.2. Profile of Mood States (POMS)

The POMS (Spinella, 2007) is a psychological rating scale used to assess transient and distinct mood states. Previous studies have shown improved moods measured by POMS following IBMT (Tang et al., 2007). Validation studies have reported internal consistency (alpha) coefficients for the POMS subscales ranging from .84 to .95 and test–retest reliability coefficients ranging from .65 to .74 (McNair, Lorr, & Droppleman, 1971). It applies to people over the age of 18 and its administration time is 5 to 10 min. The respondent rates each item on a five-point scale ranging from 1 'very slightly or not at all' to 5 'very much'. Factor analytic replications provide evidence of the factorial validity of the six mood factors: T (tension/anxiety), D (depression/dejection), A (anger/hostility), F (fatigue/inertia), C (confusion/bewilderment) and V (vigor/activity), and an examination of the individual items defining each mood state supporting the content validity of the factor scores (Shacham, 1983). The first five mood factors represent negative mood and the sixth factor stands for positive mood.

2.3. Eysenck Personality Questionnaire

The 101-item EPQ is a questionnaire to assess the personality traits of a person (Eysenck & Eysenck, 1994). The Revised Eysenck Personality Questionnaire in Chinese has been demonstrated to be reliable and valid for Chinese participants (Chen, 1998). The respondent rates each item on "Yes" or "No". It applies to people over the age of 16. The inventory contains four personality trait subscales: Psychoticism/Socialization (P), Extraversion/Introversion (E), Neuroticism/Stability (N), and Social Desirability (L). The L scale contains questions on which individuals tend to lie for social desirability, and the scoring standard is the same for everyone. If a participant received a score of one instead of zero on an L scale question, then this response was recorded as a lie. In each subscale, high score is on behalf of the former traits and low score is on behalf of the latter traits.

2.4. Creativity assessment

The subject's performance of creativity was assessed through TTCT (Torrance, 1972), which has been translated into Chinese language version and standardized for the use in China (Wu, Gao, Wang, & Ding, 1981). The TTCT—Verbal and the TTCT—Figural are two versions of the TTCT (Torrance & Ball, 1984; Torrance, Ball, & Safter, 1981). The creative scalogram in this study consists of two activities (Product Improvement, and Unusual Uses) from TTCT—Verbal and two activities (Picture Completion, and Repeated Figures of Lines) from TTCT—Figural. All participants answered the same questions. Ten minutes were required to complete each activity to generate as many answers as possible.

The four subscales, with descriptions about scoring and the content measured, are listed as following: (a) Fluency, which is the number of relevant responses to the questions, shows the ability to produce and

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