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Three randomized experiments on the longitudinal effects of the Transcendental Meditation technique on cognition☆

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Abstract

Three studies on 362 high school students at three different schools in Taiwan tested the hypothesis that regular practice of the Transcendental Meditation (TM) technique for 15–20 min twice a day for 6 to 12 months would improve cognitive ability. The same seven variables were used in all studies: Test for Creative Thinking-Drawing Production (TCT-DP); Constructive Thinking Inventory (CTI); Group Embedded Figures Test (GEFT); State and Trait Anxiety (STAI); Inspection Time (IT); and Culture Fair Intelligence Test (CFIT). Univariate testing showed that TM practice produced significant effects on all variables compared to no-treatment controls (*P*s ranged from .035 to $<.0001$). Napping for equivalent periods of time as TM practice had no effect. Contemplation meditation improved inspection time and embedded figures, but not the other variables. The TM technique was superior to contemplation meditation on five variables. The effect sizes for TM practice were in the order of the variables listed above.

1. Introduction

The hypothesis for the present research was that regular experience of the wakeful hypometabolic state produced by the Transcendental Meditation program develops general cognitive ability (Alexander et al., 1990; Dillbeck & Alexander, 1989; Orme-Johnson, Zimmerman, & Hawkins, 1997; So, 1995). This state is called "wakeful hypometabolic"

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or "restful alertness" because it is a combination of markedly decreased metabolism, heart rate, respiration rate, etc., as in sleep, together with mental alertness, as indicated by increased EEG alpha power and coherence (Dillbeck & Orme-Johnson, 1987; Jevning, Wallace, & Beidebach, 1992; Orme-Johnson, 1973; Travis & Wallace, 1999; Wallace, 1970, 1986). A number of physiological changes during the TM technique predict cognitive improvement, such as increased blood flow to the brain (Jevning, Anand, Beidebach, & Fernanco, 1996; Jevning, Wilson, Smith, & Morton, 1978) and increased EEG coherence in parameters that are correlated with cognitive improvement (Dillbeck & Araas-Vesely, 1986; Dillbeck & Bronson, 1981; Levine, 1976; Nidich, Ryncarz, Abrams, Orme-Johnson, & Wallace, 1983; Orme-Johnson & Haynes, 1981). Studies of the effects of the TM program on event-related potentials show shorter latency, higher amplitude, and broader cortical representation of sensory and cognitive evoked responses, all predictive of improved cognitive performance (Banquet & LeSevre, 1980; Cranson, Goddard, Orme-Johnson, & Schuster, 1990; Goddard, 1989; Kobal, Wandhofer, & Plattig, 1975; Lyubimov, 1994; Wandhofer, Kobal, & Plattig, 1976). TM practice has been shown to increase the neuropeptide vasopressin (O'Halloran et al., 1985) and to improve memory (Dillbeck, 1982; Pagano & Frumkin, 1977), which could be expected, since there is evidence that increased vasopressin enhances memory (Van Londen et al., 1998). TM practice also reduces the major stress hormone cortisol, both during meditation (Jevning, Wilson, & Davidson, 1978) and longitudinally outside of meditation (MacLean et al., 1997; Walton & Levitsky, 1994; Walton, Pugh, Gelderloos, & MacRae, 1995). The relevance of this to cognition is that studies have shown that increasing cortisol levels impair memory (Lupien & McEwen, 1997), and that prolonged cortisol elevation may induce hippocampal atrophy with associated deficits in hippocampal-dependent memory tasks (Lupien et al., 1998).

1.1. Variables studied

The variables chosen for the present research were intended to represent different levels of the mental functioning (senses, mind, intellect, feeling, ego) as described in Maharishi's Vedic psychology (Alexander et al., 1990; Dillbeck & Alexander, 1989; Orme-Johnson et al., 1997; So, 1995). Some of the variables have been used previously in research on the TM program, and others are studied here for the first time. This is the first time that any of the variables have been studied in a Chinese population.

1.1.1. Culture Fair Intelligence Test (CFIT)

The CFIT is said to be a measure of "fluid intelligence," the ability to successfully reason in novel situations (Bickley, Keith, & Wolfle, 1995; Horn & Cattell, 1967; McGrew, 1997). Fluid intelligence is correlated with the executive control functions of the frontal lobes, which involve keeping attention on task requirements that are understood and remembered (Duncan, Emslie, Williams, Johnson, & Freer, 1996; Isingrini & Vazou, 1997). Previous research has indicated that TM practice increases CFIT performance by approximately two IQ points per year (Aron, Orme-Johnson, & Brubaker, 1981; Cranson et al., 1991; Dillbeck, Assimakis, Raimondi, Orme-Johnson, & Rowe, 1986). However, this is the first randomized TM study on the CFIT.