



COMPARATIVE CONTROLLED STUDY

Effect of Pilates and taiji quan training on self-efficacy, sleep quality, mood, and physical performance of college students

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Summary Methods of exercise such as Pilates and taiji quan, which have been shown to have beneficial effects on physical and mental characteristics, have been studied more often in samples of older participants. The purpose of this investigation was to examine the effects of a semester of either Pilates or taiji quan training on perceived self-efficacy, sleep quality and mood, as well as strength and balance in college-age individuals. Self-efficacy was found to be improved in the Pilates and taiji quan groups and there was a trend towards improvement in sleep quality. Mood was found to be improved significantly in the Pilates group while the taiji group showed a trend towards improvement. There were no changes or group differences in the strength or balance measures. Pilates and taiji quan are effective exercise modes to improve mental parameters in college-age individuals.

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Introduction

In developing his method, Joseph Pilates “combined the mental focus of and specific breathing of yoga with the physicality of gymnastics and other

sports” (Ungaro, 2002, p. 8) for the ideal of attaining a complete coordination of body, mind, and spirit (Gallagher and Kryzanowska, 2000). The mind–body approach is further elucidated by the principles (CCCPFB) that Pilates founded his method on: *centering, concentration, control, precision, flow, and breath* (Adamany and Loigerot, 2004; Adams and Quin, 2007; Gallagher and Kryzanowska, 1999; Siler, 2000; Ungaro, 2004).

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Anecdotal evidence suggests that as the Pilates method increases core strength, the natural flexibility of the spine and limbs returns. However, there has been little research on the effectiveness of Pilates exercise and any studies found have been poorly controlled (Herrington and Davies, 2005). A recent review of literature identified only three published clinical trials investigating the effectiveness of Pilates training in healthy adults (Bernardo, 2007).

Another mind-body method is taiji quan (also transliterated as tai chi chuan), an ancient Chinese martial art characterized by slow circular movements, breath regulation, and concentration or mindfulness. It is a low-impact, moderate-intensity aerobic exercise (Lan et al., 2004). Most studies of the effect of taiji quan practice have focused on middle-aged to older adults and have documented improvements in health parameters such as immune function, balance, and strength.

Perceived self-efficacy is related to maintenance, effort, and performance of various specific behaviors, including health-promotion activities (Bandura, 1997; Noble and Robertson, 1996). Perceived self-efficacy is one's judgment of his/her ability to perform a specific activity. This judgment is based on four sources of information: (1) mastery experiences that serve as indicators of capability; (2) vicarious experiences [observations of others] that alter efficacy beliefs through transmission of competencies and comparison with the attainments of others [if she can do it, I can do it]; (3) verbal persuasion and social influences that one possesses certain capabilities [you can dance very well]; and (4) physiological and affective states from which people partly judge their capableness, strength, and vulnerability to dysfunction [my stomach is in knots, I feel exhausted] (Bandura, 1997).

Research reviewed by Bandura (1997) across a wide variety of activities shows that, controlling for ability, one's reported perceived self-efficacy regarding a specific task remains a significant contributor to performance accomplishment. Using pre- and post-exercise program self-efficacy and physical fitness measures, McAuley et al. (1991) investigated the influence of both short- and long-term exercise programs on physical activity self-efficacy, adherence to exercise self-efficacy and physiological function of middle-aged, previously inactive adults. Both short- and long-term groups showed significant gains in physical activity and adherence self-efficacy as well as significant gains in physiological functioning.

An additional important health indicator is sleep quality. Epidemiologic studies have consistently

shown an association between self-reports of exercise and better sleep, and exercise is often recommended as an important sleep aid (Hublin et al., 2001). However, experimental studies demonstrate that there is no single effect of exercise on sleep (O'Connor and Youngstedt, 1995; Youngstedt et al., 2003). King et al. (1997) found a regular moderate-intensity exercise program to be effective in improving sleep complaints of older adults, and Li et al. (2004) found improved sleep quality in older practitioners of taiji quan.

In addition to the effects of exercise on self-efficacy and sleep quality, the differential effects of various types of moderate physical exercise on mood enhancement are still a question of interest. A number of studies have shown that changes in mood and anxiety through physical exercise may be related to the form of the exercise (Berger and Owen, 1988, 1992; Jin, 1989, 1992). Taiji quan practice, with its emphasis on physical and mental training, has been found to have a positive impact on mood in a number of these studies, but most of these are focused on middle-aged to older adults.

The few studies that include college-aged students (aged 18–30) have generally found positive effects of taiji quan on the self-assessed physical and mental health of college students. Jin's (1989) study of 33 beginning (average age: 33.2 ± 9 years) and 33 experienced (average age: 37.7 ± 14.3 years) taiji quan practitioners found that the practice of taiji quan raised heart rate, increased noradrenaline excretion in urine, and decreased salivary cortisol concentration at levels comparable to those found with moderate exercise. The subjects also reported improvements in mood and fatigue. A second study by Jin (1992) focused on the efficacy of taiji, brisk walking, meditation, and reading in reducing mental and emotional stress ($n = 96$). Mood states were improved and salivary cortisol levels dropped significantly for all treatments. However, the adrenaline level after taiji quan exercise dropped more in comparison with that after meditation, and the noradrenaline level was higher after taiji quan than after reading. Taiji participants also reported greater reduction of state anxiety and enhancement of vigor as compared to the reading control group, but this discrepancy disappeared when expectancy regarding the outcome of treatments was used as a covariate. Szabo et al. (1998) compared aerobic dance, weight training, martial arts, taiji quan, yoga and music appreciation and found the combined taiji and yoga group reported higher levels of tranquility than all other exercise groups. This group also reported lower psychological distress, fatigue, and exhaustion than participants in the

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