

The Effect of Meditation

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ABSTRACT

In this study, I measured the effects of a six-week course of meditation on the ability to concentrate as measured by scores on the Stroop Color and Word test. Participants were 30 undergraduate psychology students who were randomly assigned either to meditate once every day over the course of the treatment or to a control group that was instructed to sit quietly for the allotted time. Participants were tested at the beginning of the course and at the end. I hypothesized that participants who meditated would improve in scores of the Stroop test at second testing and would score higher on the Stroop test than the control group at the second test. Scores for the meditation group were found to increase at the second test, but they were not significantly higher than the control group. Future research should involve larger samples for longer periods.

INTRODUCTION

Meditation in its many variations has grown in popularity in recent years as its benefits have become more widely recognized. For instance, a participant search for "meditation" on Amazon.com, an on-line bookstore, yields 8789 books. A simple internet lycos.com search for "meditation" yields 8,678,507 hits. The purpose of meditation as classically practiced involves focusing attention on a particular participant, whether on a bodily function such as breathing, on the external world, or on the contents of one's own thoughts, as a means to "control the natural tendency of the mind to wander." (Rao, 1989) Some of the more common styles of meditation include Zen, Vipassana, Yoga, and Transcendental Meditation, all of which vary in ideology. For instance, Transcendental Meditation (TM) is one of the simplest forms of meditation where practitioners repeat to themselves a mantra, or sacred sound, as an object of attention. The chanting of the mantra becomes something to focus attention on and a place to return it to when the mind wanders. According to students and teachers of TM, regular practice of this has multiple benefits including the reduction of stress and anxiety, better health, more energy, improved concentration, reduction in substance-use problems, and increased self-actualization (Forem, 1973).

Research has validated many of these claims. Many studies have found that the practice of meditation significantly reduces self-rated perceptions of anxiety and stress by meditators (Delmonte, 1984; Fling, Thomas, & Gallaher, 1981; Janowiak & Hackman, 1994; Shapiro, Schwartz, & Bonner, 1998). In a classic study, 154 New York Telephone employees self-selected for stress learned either one of two types of meditation or a progressive relaxation technique or served as a control group. At 5.5 months, all three treatment groups showed improvement in self-reported symptoms of stress, but only the meditation groups showed significantly more reduced symptoms than the control group (Carrington et. al, 1980).

Other meditation researchers have focused on the role of meditation on cognitive performance. When participants regularly meditate before studying and examinations, academic scores tend to improve (Fiebert & Mead, 1981; Hall, 1999). Another important body of research has had to do with the effects of meditation at improving attention regulation, or concentration. Several studies on meditators have determined that meditators score significantly higher on tests of attention than non-meditators (Rani & Rao, 1996; Rani & Rao, 2000; Redfering & Bowman, 1981). Valentine and Sweet (1999) compared 19 meditators at a Buddhist Center to 24 controls. The meditators were classified as either long-term (more than 24 months of meditation experience) or short-term (less than 24 months) meditators. When the meditator groups and the control group were given the Wilkins' Counting Test, a test of sustained attention in which participants must count the number of random-interval auditory beeps they hear in a series, the meditators all scored significantly higher on the test than nonmeditators. Furthermore, the long-term meditators also scored significantly higher than the short-term meditators.

Sabel (1980) conducted a study with the intent of determining the extent of any immediate gains in concentration that could be gained following a single meditation exercise. In addition, he measured whether concentration increased with the regular practice of meditation. The experiment used practitioners of TM who were randomly assigned to a treatment or control group, and both were pre-tested and post-tested. Sabel found no

statistically significant increase in concentration. However, his findings may be due to a flawed design. The participants came into the study with a large variety of experience at meditation, ranging from a few days to 99 months, yet no statistical analyses were done to compare possible increases of novice meditators to that of experienced meditators. Also, while the treatment group meditated, the control group was asked to read from a text for the same period of time. The test, however, involved scanning lines of random letters for particular symbols and crossing them out. It can be presumed that the reading task of the control group would prepare the participants for a test involving reading and could possibly skew the results in a comparison of the benefits obtained by meditation.

While the simplicity of Sabel's design is admirable, the methodology inadequately controlled for important variables such as the effects of regular practice. As Shapiro and Walsh (2003) have suggested that to ensure rigorous research is conducted the, "frequency and duration of meditation practice must be recorded... to determine if greater meditation induces greater effects and if so, is the relationship linear, curvilinear, or some other more intricate pattern (p. 94)." The current study monitored changes in concentration over the course of a 6-week practice of meditation by novice meditators. This study intended to study the effects of meditation on attention regulation, or concentration, by testing participants who meditated once a day compared to a control group on the Stroop Color and Word test before beginning the course of meditation and immediately afterward. It was hypothesized that the participants who meditated once a day would show significant increases in scores on measures of concentration at the end of the course of meditation and it is further hypothesized that they would score significantly higher than the control group at final testing.

METHOD

Participants were 32 undergraduate psychology students who received extra credit in General Psychology for their participation. Their age ranged from 18 to 21 years, 27 were female, 5 were male, and 98% were Caucasian. All participants indicated that English was their first language and that they possessed no documented reading disabilities. One participant had previous meditation experience and another dropped out of the testing midway, and data collected for both were left out of the final calculations. All included participants had no meditation experience prior to this experiment.

Participants were randomly assigned to either a meditation group, or the control condition: a quiet sitting group. Meditators were asked to meditate once a day for 20 minutes for 6 weeks, while those in the control group were asked to simply sit quietly for 20 minutes a day. The meditation group contained 20 participants, and the control group contained 10. The meditation group was oversampled as higher dropout rate was expected in this condition. However, the dropout rate was not different among the two groups. The meditation group was instructed in a basic meditation based on Herbert Benson's Relaxation Response method (Benson, 1975). For a mantra, meditators were instructed to repeat the word "in" on the inhale, and "out" on the exhale as they attended to their breathing. Basic advice such as not to meditate before or after eating or to attempt to set a schedule was given as well. They were further instructed to meditate for two periods of 10 minutes for the first few days as an easy transition into meditating 20 minutes at a time. Participants in the control group were instructed to not meditate for the six weeks, and all participants were given a notebook to record their meditation or sitting sessions.

Before beginning the 6 weeks of meditation, all participants were measured on the Stroop Color and Word Test as a measure of concentration. The Stroop test measures cognitive flexibility and attention-regulation capacity as it involves a color word that is written in a color other than the one indicated by the word (e.g. "Blue" written in green ink) where the participant has to indicate the color of the word, and not the word itself. The participant is given a column of words and 45 seconds to read as many words correctly as possible. Studies have shown that the tendency is for participants to name the word, rather than the color, yielding a smaller number of items correctly identified as compared to scores on similar columns of color words in black ink or colored X's. It is thought that the automatic response of reading the word interferes with the consciously-controlled behavior of identifying the color, and that "in the adult with normal reading skills, the Stroop stimuli involve, at a basic level, the ability of the individual to sort information from his or her environment and to selectively react to this information" (Golden & Freshwater, 2002). Thus, this test provides a good measure of the ability to concentrate or regulate attention. As such, all participants were measured on this prior to beginning the course of either meditation or quiet sitting to provide a baseline against when the participants were measured again at the conclusion of the 6 weeks in order to measure any possible gains in the ability to regulate attention due to the experimental treatment as well as control for practice effects.

RESULTS

For this sample, Stroop scores from both time 1 and time 2 ranged from -19 to 52 with a mean score of 12.57 and a *SD* of 15.10. As shown in Table 1, as expected, the control group did not differ from the meditation group at time 1. Also, as hypothesized, the meditation group showed significant improvement between time 1 and time 2 using a paired *t*-test [$t(-3.84)$, $p = .001$]. However, although the meditation group did score higher than the control group at time 2, the difference was not significant and the second hypothesis was not supported.

Table 1

Mean Stroop scores ^a for the meditation and control groups at time 1 and time 2		
	Time 1	Time 2 (6 weeks later)
Control group (n=10)	10.70 ^b	11.00 ^b
Meditation group (n=20)	9.20	17.65 ^c

^a Stroop scores represent an “interference” score derived from subtracting raw scores from predicted scores based on age and education

^b The control group and the meditation group did not differ significantly at time 1 or time 2.

^c The meditation group showed a significant improvement between time 1 and time 2.

DISCUSSION

Although both hypotheses were not supported, the results suggest that the course of meditation did in some way improve concentration since there was a significant improvement in scores for the meditation group, and not for the control group. This may lend some credence to Rani and Rao's (2000) assertion that the essential element in all meditation is the retraining of attention. If both hypotheses had been supported, though, the results would be more robust and it could be more firmly stated that the course of meditation improved concentration. Without support for the second hypothesis, that it is difficult to say that the meditation was the cause of the increase in Stroop scores without further research.

The most important concern for further research on this topic is that it should involve larger samples. The lack of a significant difference between the meditation and control groups at time 2 is most likely influenced by the small sample size. Another possibility may be to use a more sensitive measure. Much research on attention has been geared at diagnosing dysfunction. The measure that would be needed for a study such as this would have to be geared toward finding improvements in already healthy adults, which is much more difficult to measure than the deficits of, for instance, children or adults suffering from ADHD. In light of this lack, I used the Stroop based on the large body of previous research on the measure. However, a better measure of adult attention may be an option.

In addition it could be extremely beneficial to the field of meditation research to have multiple testing along several time intervals, perhaps for a longer period of time. An extended design lasting up to 12 weeks with testing every two weeks could yield more detailed information, particularly at what specific point benefits in the ability to regulate one's attention are seen in the practice of meditation. As Shapiro and Walsh (2003) have indicated, such rigorous data collection is still needed within the field. Finally, this study cannot confirm that participants' meditated as often or regularly as their journals indicated. Future research could employ regular reminders such as beepers so that participants would be more likely to comply. Overall, the current research adds to the growing body of empirical research on the benefits of meditation.

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