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Literature Review Comparing Amount of Rest From Sleeping and Meditation

*Scientists compared results of Transcendental Meditation and closed-eye rest through a series of physiological experiments, often comparing Electroencephalogram (EEG) results. Their studies produced a variety of results including: higher cognitive ability, decrease of oxygen and heart rate as well as deeper sleep produced by practicing meditation. Most experiments agree that meditation provides a higher level of consciousness than sleep, therefore amount of rest received in meditation is less than that of eyes-closed rest.*

There has been extensive research regarding the effectiveness of Transcendental Meditation (TM) on the brain, specifically pertaining to its response on the sleep cycle.

Many experiments find that TM is fundamentally different than the rest one receives from sleep. Robert Keith Wallace conducted an experiment comparing TM and rest by measuring autonomic and EEG (a test that detects the electrical activity of the brain)variables.The TM sessions demonstrated lower breath rates, lower skin conductance levels and higher alpha anterior-posterior and frontal coherence. These results began within the first minute and were maintained throughout the whole ten minute period. TM practice appears to lead to a state very different from eyes-closed rest and result in a number of events in the central and autonomic nervous systems (Wallace).

Another experiment, conducted by R.R. Pagano, explored how TM affected cognitive ability as opposed to eyes-closed rest. He tested 362 high school students at three different schools, having each student practice TM for 20 minutes each day for 6 to 12 months then determining how the meditation affected their creative thinking, constructive thinking, state and trait anxiety, and intelligence in general. Results showed TM produced significant effects on all variables, results that equivalent napping time did not receive (Pagano). Barry D. Elson’s studies produced similar results. He had half of his subjects perform TM while the other half remained wakefully resting for 40 minutes. While some of those resting fell asleep during that time, all the meditators stayed awake and maintained a relatively stable state of alpha and theta EEG activity. They also experienced an increase in skin resistance and a decrease in respiratory rate. Thus the results show that TM produced a physiological effect very different from those experiencing eyes-closed rest (Elson). L. I. Mason found that even the professionalism of those practicing TM makes a difference on sleep. He found that long-term practitioners received deeper rest when sleeping than short-term practitioners or experimentals (Mason).

An experiment directed by Joel Younger tested practiced meditators in an attempt to replicate Wallace’s experiment in order to test his conclusion that TM does not have the EEG results and eye movement patterns common to sleep (Wallace)(Younger). Younger used well practiced meditators and using an EEG, compared their sleeping and meditating states. According to his experiments, most subjects spent their TM time in alpha activity or sleep. Half spent their time in clear, physiological sleep, while two subjects spent no time in sleep at all (Younger). They came to the conclusion that Wallace’s experiments were false and that sleep can happen while meditating.

P.B.C. Fenwick conducted two experiments to measure the amount of oxygen uptake and carbon dioxide production during TM. A drop in both variables, as had been found in previous studies, was confirmed. However he found this to be of little significance and only a result of the obvious muscle relaxation. On the other hand, EEG results showed the meditator’s level of consciousness to be on the onset of sleep. There were no results that showed that TM was actually any different than ‘onset’ sleep (Fenwick).

These scientists found conflicting results however many conclusions remain the same. All around the board, TM produces muscle relaxation, decreased oxygen intake and a slower heart rate (Wallace)(Elson). What’s interesting is that for the most part experiments concluded that cognitive function and sleep itself was improved by regular meditation (Mason)(Pagano). Overall, although seemingly very similar, it seems that meditation does not produce the same amount of rest that sleep provides.

Original Sources

I chose not to use these sources for various reasons. The first source, an experiment conducted by Ron Jevning, studied the differences in testosterone and cortisol concentration during Transcendental Meditation (TM) versus during sleep. Results found that cortisol levels dropped while testosterone levels stayed the same, showing that pituitary-adrenal activity is inhibited during TM (Jevning). I felt that although the study is comparing the two factors I’m comparing in my experiment, their purpose wasn’t closely enough aligned with mine to be useful to me. The second source, an experiment exploring how cyclic meditation (CM) affects sleep, was conducted by Sanjib Patra. The participants in the experiment took part in two sessions of CM one day and none the next day, then compared sleeping patterns from each night. The night after CM showed more slow-wave-sleep and a shorter REM state than the night with no CM, resulting a better, more restful sleep (Patra). This doesn’t pertain to my experiment because this shows the results of TM on sleep and its restfulness instead of comparing TM and a regular night’s sleep rest amount . The third source, conducted by Robert Keith Wallace, explored how TM affected oxygen consumption, heart rate, and skin resistance before, during and after the meditation. During meditation, heart rate and oxygen consumption decreased while skin resistance increased (Wallace). While this shows that the amount of rest may increase during TM, the experiment doesn’t compare TM to sleep so the results aren’t as applicable to my experiment.

Works Cited

Elson, Barry D. "Physiological Changes in Yoga Meditation." *Psychophysiology*. Wiley Online Library, 30 Jan. 2007. Web. 23 Nov. 2015.

Fenwick, P. B.C, S. Donaldson, and J. Bushman. "Metabolic and EEG Changes during Transcendental Meditation: An Explanation." *Biological Psychology* 5.2 (1977): 101-18. *Biological Psychology*. Science Direct, 2015. Web. 23 Nov. 2015.

Jevning, Ron. "Adrenocortical Activity during Meditation." *Hormones and Behavior* 10.1 (1978): 54-60. *Science Direct*. Web. 22 Nov. 2015.

Mason, L. I., Charles N. Alexander, and Frederick T. Travis. "Electrophysiological Correlates of Higher States of Consciousness During Sleep In Long-Term Practitioners of the Transcendental Meditation Program." *Consciousness-Based Education: A Foundation for Teaching and Learning in the Academic Disciplines* 1 (2010): 387-410. *Maharishi University of Management*. Web. 23 Nov. 2015.

Pagano, R., R. Rose, R. Stivers, and S. Warrenburg. "Sleep during Transcendental Meditation." *Science* 191.4224 (1976): 308-10. *Science*. Web. 22 Nov. 2015.

Patra, Sanjib, and Shirley Telles. "Positive Impact of Cyclic Meditation on Subsequent Sleep." *Medical Science* 15.7 (2009): n. pag. Print.

So, Kam-Tim. "Three Randomized Experiments on the Longitudinal Effects of the Transcendental Meditation Technique on Cognition." *Intelligence* 29.5 (2001): 419-40. *Science Direct*. Web. 22 Nov. 2015.

Travis, Frederick, and R. Keith Wallace. "Autonomic and EEG Patterns during Eyes-Closed Rest and Transcendental Meditation (TM) Practice: The Basis for a Neural Model of TM Practice." *Consciousness and Cognition* 8.3 (1999): 302-18. *Science Direct*. Web. 22 Nov. 2015.

Wallace, Robert Keith. "Physiological Effects of Transcendental Meditation." *Science*. AAAS, Mar. 1970. Web. 23 Nov. 2015.

Younger, Joel, Wayne Adriance, and Ralph J. Berger. "Sleep During Transcendental Meditation." *Perceptual and Motor Skills* 40.3 (1975): 953-54. *Amsciepub*. Web. 23 Nov. 2015.