

The Effects of Meditation Training on Postworkout Anxiety, Mood State, And Heart Rate Recovery of US High School Swimmers

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The purpose of this study was to investigate the effects of a mental warm down on the post-workout recovery of high school swimmers. Specifically, the meditation was used during the post-workout session to affect post-workout heart rate, mood states, and state anxiety. The POMS, CSAI-2, and heart rate measurements were used to evaluate psychological and physiological changes as a result of the treatment during the post-workout session.

Research Method

The research design for this study was a pretest-posttest nonequivalent control group. Mood states, anxiety, and heart rate measures served as the dependent variables. The statistical analyses included multiple 2 x 4 factorial ANOVA's with repeated measures on the last factor. Difference scores were calculated by subtracting the pretest scores in the first week from the corresponding measures in each of the following four weeks. The hypotheses of this study were that the breathing meditation as a mental warm down would lower the POMS global mood score, decrease cognitive and somatic anxiety, and facilitate acute and long-term heart rate recovery. A search of the related literature revealed that no data existed to determine or measure the effectiveness of breathing meditation on the post-workout mood states, anxiety, or heart rate recovery for the swimmers.

Seventy male and female swimmers from Hunter High School and Murray High School in Salt Lake City, Utah participated as subjects in this investigation. These subjects were volunteers and totaled 30 in the experimental group and 40 in the control group. They ranged in age from 14 to 17. These two high schools were selected because of their strong swimming programs and were led by two of the best swimming coaches in the state. Both schools have similar socioeconomic levels of students, and showed a willingness to participate in the proposed investigation. Both the experimental group and the control group were administered the POMS and CSAI-2 tests at the end of each week for 5 weeks. The recovery heart rate was measured for the 5 weeks of the study, 5 days per week, and 9 times per day: After Waking Up in the Morning, Before Morning Workout, During Morning, Workout, After Morning workout, Before Afternoon Workout, During Afternoon Workout, After Afternoon Workout, After Afternoon Treatment/Rest, Before Bedtime at night.

A baseline measure was taken in the first week of the experiment to establish mood states, anxiety, and heart rate information. The psychological response inventories (POMS and CSAI-2) were given at

weeks end and described how the athlete felt "during the week including today." Heart rate was used to monitor recovery. The data were used to determine if mood states, anxiety, and heart rate changed over time and to determine if there were differences between the control group and the experimental group. To determine the effectiveness of breathing meditation on global mood state, cognitive and somatic anxiety, and recovery heart rate, multiple factorial ANOVA's with repeated measures (multivariate) on the last factor were used.

Findings and Conclusions

The findings of the investigation indicated that breathing meditation as a mental warm down method can facilitate heart rate recovery not only after the treatment ($F = 20.03$, $p < .001$), but also lasted until till the next morning ($F = 12.97$, $p = .001$). The experimental group also demonstrated a lower a global mood state ($F = 7.35$, $p = .009$), and decreased cognitive anxiety ($F = 12.33$, $p = .001$) compared to the control group. The findings of this study were:

1. The recovery heart rate of the experimental group was statistically decreased not only after the treatment but also at the wake-up relative to the control group.
2. The global POMS Score of the experimental group was significantly lower than the control group.
3. In the POMS sub-scales, the experimental group demonstrated significantly lower scores than the control group in fatigue, depression, and anger; but there were no significant differences on vigor, tension, and confusion between the two groups.
4. Cognitive anxiety in the experimental group was significantly decreased compared to the control group.
5. There were no significant differences in somatic anxiety between the experimental group and control group (with low power = .53).

Based upon the statistical analyses, the following conclusions appear warranted:

The meditation training as a mental warm down combined with a physical warm down are more effective to facilitate acute and long-term heart rate recovery, lower mood disturbance scores, decrease cognitive anxiety compared to just taking a rest after vigorous training and during the recovery period.

Recommendations

1. Future studies examining the effectiveness of meditation on post-workout mood states, anxiety, and heart rate recovery over time should utilize the entire swimming season to determine how these changes differ in the long-term.
2. Research examining mental warm down should employ other sports to further distinguish psychological and physiological responses between individual and team sport athletes.

3. When research examining the physiological response, the resting heart rate should be taken for 30-s. However, when taking heart rate during training or right after workout, it should be taken for 10-s instead of 30-s because the rate changes so rapidly.

4. Other scientific physiological and psychological measurements should also be used to monitor the effects of the treatment.

5. Future research should not only consider the variation of the techniques for mental warm down, but also explain the effects the effect of cognitive strategies for lowering the somatic anxiety.

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