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The effects of Running on Arithmetic Problem solving

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Abstract

In this work, we propose to examine the effects of physical activity on academic performance as physical activity is shown to improve mood, energy levels, confidence, and memory retention. We propose to recruit a sample of 200 psychology students from Portland State University. Each student will be asked to take an arithmetic problem-solving test then asked to study the material for three weeks. Of the 200 students, 100 will be randomly assigned to a physical activity condition, in which they will be asked to run 30 minutes prior to studying, three times per week. After three weeks. students will be asked to take a timed arithmetic problem-solving test. The hypothesis is that physical activity prior to studying for tests will offer statistically significant improved results in the scores. Results from this study may have implications regarding academic performance and the ability to achieve higher class standing in relation to physical activity and the performing-enhancing benefits.

Literature Review

Prior researchers have long found a positive relation between physical activity and academic performance (e.g., Rasberry et.al. (2011; see Shephard et al., 1984; So, 2012).

One gap identified is that most of the research on physical activity interventions for academic performance reviewed was among school aged children and adolescents, although researchers have drawn on such work to argue for the potential benefits of physical activity programs for not only academic success in higher education but also for developing more physically active lifestyles over the long run (see Casebolt et al., 2017).

This is an important research gap as transitioning to higher education is a significant life event and has been identified as a risk period for less healthy behaviors, such as decreased sport participation and less healthy diet (see Deforche et al., 2015).

Purpose, Hypotheses and Proposed Methodology

Purpose and Hypothesis

The purpose of this work is to propose a physical activity intervention to examine its impact on students' academic performance in a higher education context.

Hypothesis: Students in the cardiovascular physical activity intervention group will demonstrate higher academic performance than those in the control group.

Participants and Procedures

Participants consist of 200 psychology students from Portland State University, obtained by stratified random sampling, accounting for demographic characteristics.

Each student will be asked to take an arithmetic problem-solving speed test for initial scoring. 100 will be assigned to a physical activity condition, in which they will be asked to run 30 minutes before studying. All students will be asked to take a timed arithmetic problem-solving test after the three weeks for final scores.

Analytic Strategy

To test the hypothesized intervention effect, we propose to use an ANCOVA model, controlling for academic performance at baseline (Bodner & Bliese, 2018).

The independent variable will be the two-level intervention condition variable (0 = control group; 1 = intervention condition).

The dependent variable will be the post-test measure of academic success using the participant's scores on an arithmetic problem-solving test.

Pretest scores on the arithmetic problem-solving test will be entered as a control variable.

Expected Results

To support our hypothesis, we expect a positive intervention effect on academic performance, evidenced by a statistically significant effect of the intervention condition on post-test arithmetic problem-solving test scores, controlling for pretest arithmetic problem-solving test scores.

Discussion

The proposed study would provide empirical evidence and advance the literature on physical activity interventions for positive outcomes among students in higher educational settings.

Beyond the potential to demonstrate enhanced academic performance on a single arithmetic problem-solving test, we believe that such a study could also be used as a starting point to examine other aspects of student success and long-term well-being.

For example, longitudinal studies could follow students over time and examine the impact of physical activity during college on the attainment of educational and vocational goals, continued long-term physically active lifestyle behaviors, and general health and wellbeing outcomes.

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