

Abstract

Research suggests that exercise can improve memory ability (Labban & Etnier, 2011; Martins et al., 2013; Shih, 2017; Standage, 2010) and decrease anxiety (Blacklock et al., 2010; Knapens et al., 2009). The current study hypothesized that an exercise condition will recall more vocabulary words and have greater reductions in state anxiety compared to the sedentary control condition. Participants were randomly divided into either a sedentary control group, or an exercise group. Both groups took the State-Trait Anxiety Inventory questionnaire (STAI-AD). Both groups were then given ten minutes to learn 15 vocabulary words while either sitting in a chair or walking on a treadmill at 3mph, followed by a 20-minute consolidation period. Participants were asked to recall as many words as they could remember from their task, and took the STAI-AD a second time. Paired t-tests were performed for analyzing the reduction in state anxiety and amount of words recalled in both conditions. The pilot results showed the exercise group (n=4) did not remember more vocabulary words compared to the control group (n=2; $t = 0.4078$, $p\text{-value} = 0.749$). The exercise group did show greater reductions in state anxiety compared to the control group ($t = 1.1847$, $p\text{-value} = 0.4298$). However, both analyses returned statistically insignificant results due to small sample sizes. Further data will be collected to obtain statistical significance and retest the hypothesis.

Background

Exercise has shown to be an effective means for improving cognition and mood, including long term memory (Shih, 2017) short term memory (Martins et al., 2013) and anxiety (Knapen et al., 2009). Most research has centered around moderate to vigorous exercise (Martins et al., 2013; Shih, 2017) with less attention paid to light exercise, specifically walking. Previous research found that a walking group recalled more words from a word-matching task than a group performing no exercise (Brandon et al., in press). The current research aim is to investigate whether one session of brief, light exercise in the form of walking can show significant improvements in memory recall of vocabulary words and reduction in state anxiety levels, compared to a control group with no exercise.

Methods and Materials

Participants- Six undergraduate students enrolled in MSU-Billings psychology courses
Materials- Demographic questionnaire, State-Trait Anxiety Inventory (STAI-AD, online), 15 flashcards with neutral vocabulary words, 20-minute comedy video, treadmill
Procedure- Participants were randomly separated into a sedentary (control) or exercise group. Each session tested two participants at the same time in the same condition. Both groups completed demographic questionnaires and the STAI-AD questionnaire. Both groups were then given 15 flashcards containing vocabulary words and their definitions and 10 minutes to look over them. The control group sat in a chair for the entire 10 minutes, and the exercise group walked on a treadmill at 3mph for the entire 10 minutes. Both groups then watched a 20-minute video to act as a memory consolidation period. Both groups were then given two minutes to write down as many words as they could recall from their respective tasks, and then took the STAI-AD questionnaire again.

Results

The exercise group (n=4) did not recall more words than the control group (n=2), but results are statistically insignificant. $t = 0.4078$, $df = 1.0892$, $p\text{-value} = 0.749$, group 1 mean= 12.00, group 2 mean= 10.75

The exercise group (n=4) recorded a greater reduction in anxiety levels than the control group (n=2), but results are statistically insignificant. $t = 1.1847$, $df = 1.1187$, $p\text{-value} = 0.4298$, group 1 mean= 6.00, group 2 mean= -3.75

State Anxiety Reduction



Chart 2. The amount of state anxiety reduction throughout the session for the control group (1, increased 6 points) compared to the exercise group (2, decreased 3.75 points).

Number of Words Recalled

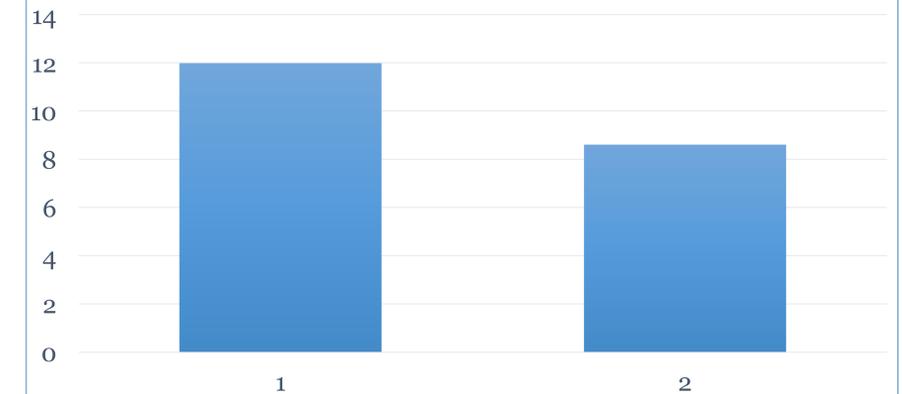


Chart 2. The average number of words recalled by the control group (1, 12 words) compared to the exercise group (2, 8.6 words).

Discussion

- Vocabulary recall results did not indicate a significant increase in words recalled in either condition. The pilot data was trending toward the control condition recalling more words than the exercise condition.
- Anxiety levels were trending toward having a marginal increase over the course of the session, however the groups numbers were uneven and the control group contained a major outlier in which could influence the trend. Levels could have decreased due to familiarity with the questionnaire.
- Total sample size was very small (n=6) and group sizes were different (control=2, exercise=4) which could account for the insignificant data.
- Anxiety reductions could be due to comfort level increasing throughout the session and not the exercise itself.
- The exercise could interfere with the participant's concentration on the vocabulary words, which gives the stationary group an advantage on focusing on the words.

Conclusions

- Pilot results suggest that walking at 3mph may not help one remember vocabulary words compared to learning them in a stationary manner, and may actually be detrimental to remembering them.
- Pilot results suggest that walking at 3mph may not help reduce state anxiety levels throughout a single session compared to sitting sedentary.
- Statistical analysis indicated that more data is needed to confirm the results, which will be conducted through follow-up research in the coming months.

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