The Effects Of Acute Exercise On Second Language Word Learning In Classroom

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Physical activity effects on cognition

- Observed in a wide age range
- For selective aspects of cognitive functions
- Both human and non-human animal studies

- Hillman, Erickson, & Kramer (2008)

Physical activity = aerobic exercise

- Why aerobic?

- Hillman, Erickson, & Kramer (2008)

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aerobic exercise associated with

- Changes in general activation patterns observed by brain imaging techniques
- Increases in CBV (cerebral blood volume)
- Increased levels of BDNF (brain derived neurotrophic factor)

learning and memory

- Hillman, Erickson, & Kramer (2008)

BDNF changes

- have been observed after short bouts of exercise (acute exercise)

- *BDNF (brain-derived neurotrophic factor)

- Hillman, Erickson, & Kramer (2008)

Effective types of exercise

- Chronic (long-term)
- Acute (short-term)
- Aerobic

- Which 2 of the above are crucial to the current study?

Need for research using stringent methods

- ▶ Lack of studies using true <u>experimental design</u> - Hillman, Erickson, & Kramer (2008)
- ▶ In experiments, other factors possibly influence results are controlled for
- ▶ Pre-test → treatment → post-test
- ▶ Experiments can directly prove **<u>causality</u>**

Can it be used in classroom to instantly boost learning?

- ▶ No studies tested the validity of its use in an academic classroom with a specific purpose of instantly boosting learning

Reasons for stress relief in classroom

- ▶ 1st year college/university students are going through big transitions
- ▶ From 45-50 min. class hour to 90 min.
- ▶ In an new environment

*Apologies:
There was an error in the next slide regarding the procedure, which is fixed now.   21/09/2016

Procedures (exercise condition) at 45 min into class

1. Aerobic exercise
2. Pre-test
3. Practice (individually)
4. Post-test

Procedures (baseline condition) at 45 min into class

1. Pre-test
2. Practice (individually)
3. Post-test

Vocabulary test

- ▶ L1 to L2 translation
- ▶ 例）行く　　__go__
- ▶ 取る　_____
- ▶ ～すべきだ　_____

experiment

- ▶ 260 university students (1st year)
- ▶ 9 classes
- ▶ Within subject design (same participants receive both conditions)
- ▶ Semi-randomized order

Randomizing sessions over classes and teachers

- ▶ Teacher A

| Class A	Class B
no ex.	ex.
ex.	no ex.

Test scores (N = 260)

- ▶ _Exercise condition_
- ▶ Before practices M = 1.05, SD = 1.60
- ▶ After practices M = 6.23, SD = 2.19
- ▶ _No exercise condition_
- ▶ Before practices M = 1.57, SD = 2.14
- ▶ After practices M = 6.16, SD = 2.37
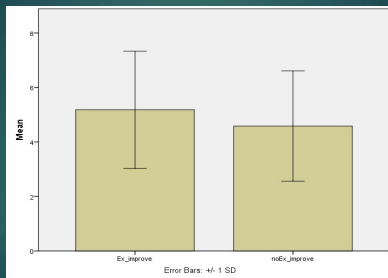
The main effects

- ▶ Exercise condition F (1, 260) = 3.162, p = .077 **significant?**
- ▶ Test F (1, 260) = 1997.373, p = .000 **significant**
- ▶ **Exercise conditions X tests** F **(1, 260) = 18.240, p = .000** **significant**

Interaction: exercise X

- ▶
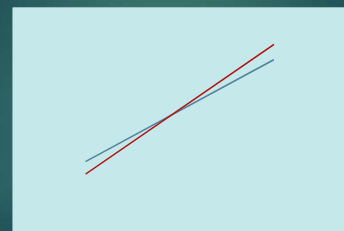
Comparison of improvements

►

Error Bars: +/- 1 SD

Effect size

► A small effect size ($d = 0.24$)
► as predicted by literature

Unexpected main effects

► <u>Test X class</u> F (3,306) =, p = .001
► Only the classes observed to be reluctant to do the exercise had a negative influence of the activity
► Further investigation needed to confirm

Conclusions

► The data suggested that exercise performed during an academic class instantly boosted immediate word learning (causality)