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**Long-term Exercise Training Prevents Anxious-depressive-like Behavior In Transgenic Alzheimer Rats**

Luodan Yang<sup>1</sup>, Chongyun Wu<sup>2</sup>, Yong Li<sup>1</sup>, Yan Dong<sup>1</sup>, Lorelei Donovan Tucker<sup>1</sup>, Baocheng Yang<sup>1</sup>, Xuemei Zong<sup>1</sup>, Quanguang Zhang<sup>1</sup>. <sup>1</sup>Augusta University, Augusta, GA. <sup>2</sup>South China Normal University, Guangzhou, China.

(No relationships reported)

**PURPOSE:** This study examined the effects of long-term treadmill exercise training on the anxious-depressive-like behavioral phenotype of transgenic Alzheimer rats in the early stage of Alzheimer's disease (AD) development and provided evidence that exercise alleviated fear-avoidance behavior deficits.

**METHODS:** 2-month-old Male TgF344-AD and wild-type (WT) rats were separated into WT (n = 9), AD (n = 8), and AD + treadmill exercise (Exe) groups (n = 12). Following 8 months of exercise, the passive avoidance test, Barnes maze task, novel object recognition test, and object location test were used to measure learning and memory function. The open field test, elevated plus maze, sucrose preference test, and forced swim test were conducted to measure anxious-depressive-like behavior of AD rats. Immunofluorescence staining, Western blot analysis, enzyme-linked immunosorbent assay (ELISA) analysis, and related assay kits were used to measure levels of inflammatory cytokines, oxidative stress, amyloid-beta production, and tau hyperphosphorylation.

**RESULTS:** Behavioral tests indicated that AD rats aged 12-months did not exhibit spatial learning and memory deficits, but did display anxious-depressive-like behaviors (open field, Center time:  $P = 0.008$ ; Center entries:  $P = 0.009$ ; Line crossings:  $P = 0.001$ ). Long-term exercise significantly prevented anxious-depressive-like behaviors in AD rats (Center time:  $P = 0.016$ ; Center entries:  $P = 0.004$ ; Line crossings:  $P = 0.033$ ). In addition, AD animals displayed enhanced A $\beta$  deposition ( $P < 0.001$ ), Tau hyperphosphorylation ( $P < 0.001$ ), microglial activation ( $P < 0.001$ ), inflammatory cytokine release ( $P < 0.05$ ), and oxidative damage ( $P < 0.05$ ) that was attenuated significantly after long-term exercise training ( $P < 0.05$ ).

**CONCLUSIONS:** Long-term exercise training ameliorated anxious-depressive-like behaviors and improved fear-avoidance behavior in transgenic AD rats, supporting exercise training as an effective strategy to prevent or reduce anxiety, depression and fear-avoidance behavior deficits in the early stages of AD pathogenesis.

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**The Effect Of Treadmill Desk Walking On Creative Thinking**

Rebecca R. Rogers, Daphne Schmid, Christopher G. Ballmann. *Samford University, Birmingham, AL.*

(No relationships reported)

**PURPOSE:** Most research on treadmill desks in the workplace report no significant change in productivity. However, most of these studies focused on cognitive performance measured by tests in attention, memory or reasoning. While aerobic exercise has been linked to producing a positive effect on creative potential, few studies have tested workplace creativity thinking. The purpose of this study was to examine the effect of treadmill desk walking on convergent and divergent creative thinking.

**METHODS:** Twelve (n=12) male and female college-age students were recruited and completed three tests of creative function: the verbal Guilford's Alternate Uses Task (VGAT) of divergent thinking, written Guilford's Alternative Uses Task (WGAT), and the Remote Associations Task (RAT) of convergent thinking. Participants completed all tests while seated at a traditional desk and while walking on a treadmill desk at 1.5 mph. Step length, stride length, and gait cycle were assessed by the OptoGait gait analysis system. A paired sample t-test was used to compare creative test scores and gait variables.

**RESULTS:** There were no significant differences between any test scores while seated and walking ( $p > 0.05$ ). There was no significant difference between baseline gait and divergent thinking (VGAT, WGAT) task gait in any variable ( $p > 0.05$ ). There was a significant increase in step length ( $p = 0.049$ ), stride length ( $p = 0.046$ ), and gait cycle ( $p = 0.039$ ) between the walking only condition and the treadmill desk walking during the RAT.

**CONCLUSIONS:** Results of this study suggest neither convergent nor divergent creative thinking are improved when walking on a treadmill desk. While gait patterns are not changed during divergent thinking, this study suggests gait during convergent thinking may be altered.

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**Acute But Not Chronic Aerobic Exercise Enhances Attention And The Neuroelectric Mismatch Negativity Among Fatigued Individuals**

Mitchel B. McRay<sup>1</sup>, Tim Puetz<sup>2</sup>, Patrick J. O'Connor, FACSM<sup>3</sup>, Rodney K. Dishman, FACSM<sup>3</sup>, Brett Clementz<sup>3</sup>, Nate Thom<sup>1</sup>. <sup>1</sup>Wheaton College, Wheaton, IL. <sup>2</sup>Department of Veterans Affairs, Washington D.C., DC. <sup>3</sup>University of Georgia, Athens, GA.

Email: mitchel.mcray@my.wheaton.edu

(No relationships reported)

**PURPOSE:** Symptoms of fatigue are a public health burden, comorbid with both cardiovascular disease and cancer. While exercise requires considerable energy expenditure, both acute and chronic aerobic exercise reduce feelings of fatigue. However, the brain mechanisms underlying this effect are not well-understood. To explore the neural mechanisms of this effect, we examined EEG correlates of attention before and after acute and chronic aerobic exercise. We hypothesized that the lo-intensity acute and chronic effects of exercise would produce increased attentiveness.

**METHODS:** In this pilot study, 13 students, ages 18-36, with elevated levels of fatigue, were randomly assigned to: lo-intensity, hi-intensity, and a no exercise control. Each participant was evaluated pre- and post-exercise three times (e.g., baseline, week 3, and post-intervention) during the 6-week study. At each session participants were outfitted with hi-density EEG and completed an auditory odd-ball task that resulted in a mismatch negativity (MMN). The MMN is an index of pre-attentive change detection, and its amplitude decreases with fatigue. EEG was analyzed via established guidelines including ICA algorithms for artifact-removal. To extract the MMN, the N1 was located in each recording and a difference wave was calculated by subtracting the electrocortical activity to the standards minus targets, in the 100ms after the N1 (120-220ms).

**RESULTS:** A repeated-measures, mixed model ANOVA (3 Group (lo-intensity, hi-intensity, control) x 2 Time (pre/post intervention) x 3 Week (baseline, week 3, post-intervention)) revealed a marginally significant interaction between Group, Time, and Week [ $F(4,16)=2.79$ ,  $p=0.06$ ,  $\eta^2=0.41$ ] such that the MMN was reduced after hi-intensity exercise at the final session. In addition, the 2-way interaction between Group and Time [ $F(2,8)=4.05$ ,  $p=0.06$ ,  $\eta^2=0.50$ ] revealed a marginally significant interaction such that the lo-intensity group showed an increased MMN amplitude post exercise, the hi-intensity group showed a decrease, and the control group showed no change. No other effects were significant (all  $p > 0.24$ ,  $\eta^2 < 0.29$ ).

**DISCUSSION:** Our data suggest that automatic pre-attentive change detection is only altered after lo-intensity acute aerobic exercise among our sample of fatigued individuals.

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**Fitness Related Differences And Neuroelectric Indices Of Arithmetic Approximation In College-aged Adults**

Oksana Ellison, Morgan S. Ham, Madison C. Chandler, Matthew B. Pontifex, Amanda L. McGowan. *Michigan State University, E. Lansing, MI.*

(No relationships reported)

As a growing body of literature supports a positive association between aerobic fitness and mathematics achievement, it has been suggested that individuals higher in aerobic fitness may use strategies, such as arithmetic approximation, that are more efficient during mathematical reasoning.

**PURPOSE:** To understand how individuals at extremes of the aerobic fitness spectrum differ on numerical approximation.

**METHODS:** A sample of higher- and lower-fit college-aged adults was recruited to participate in the study based on maximal oxygen consumption ( $VO_{2max}$ ). Participants performed a complex arithmetic approximation task presenting operands  $a + b$  and were instructed to indicate whether the sums were greater than or less than 100. Problems were equally distributed across conditions that varied in the extent to which the operands required arithmetic approximation: extra small split (i.e.,  $\pm 2\%$  or  $3\%$ ;  $63+39$ , medium split (i.e.,  $\pm 5\%$  or  $8\%$ ;  $69+26$ ), large split (i.e.,

± 10% or 15%; 48+62), and massive split (i.e., ± 50% or 55%; 64+86). To determine the extent to which arithmetic strategy differed between fitness groups, behavioral and neural indices of cognitive processing were assessed.

**RESULTS:** Numerical conditions requiring relatively lower levels of arithmetic approximation were not observed to differ between higher- and lower-fit participants whereas the numerical conditions requiring arithmetic approximation exhibited fitness-related differences.

**CONCLUSION:** These findings suggest that high-fit individuals may engage in more efficient mathematical reasoning strategies relative to their low-fit counterparts. Therefore, fitness-related differences in mathematics achievement may result from differences in strategy execution. Future research should examine the degree to which physical activity interventions designed to enhance aerobic fitness also result in shifts in arithmetic approximation strategy.

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**Pre-Competition Emotions In Cheerleading Sport: Differences Across Gender And Association With Final RESULTS**

claudia Dias Leite<sup>1</sup>, Ana Carolina V. Moraes<sup>2</sup>, Filipe M L Rezende<sup>2</sup>, Róbson C. Silva<sup>2</sup>, Isabela A. Ramos<sup>1</sup>. <sup>1</sup>Universidade Católica de Brasília and Centro Universitário UniProjeção, Brasília, Brazil. <sup>2</sup>Centro Universitário UniProjeção, Brasília, Brazil.

Email: ahbeuramos@gmail.com

(No relationships reported)

Although cheerleading's history is long until relatively recently it was not considered a sport. The evaluation is based on an assessment of strength, flexibility, and perfection of routine. Despite positive energy, charisma, and joy, during a competition, athletes can experience positive and negative emotions that could influence performance.

**PURPOSE:** to analyze pre-competition emotions in a final cheerleading university games participation, assessing differences between male and female cheerleaders and associating positive and negative emotions with the score obtained in the competition.

**METHODS:** From six universities 40 cheerleaders (n=22 male; n=18 female), mean age was 21.03 yr (SD 1.51), participated in the study, they competing at the National University Games in Bahia, Brazil. The teams were finalists in the first time of cheerleading participation in 67 editions of this competition. The twenty-two items of the Pre-Competitive Emotion Scale in the Portuguese language were selected from the original scale developed earlier (Jones et al., 2005). This scale has positive (e.g., happy, excited, enthusiastic) and negative (e.g., angry, sad, tense) emotions. Athletes were asked to rate how intense they were experiencing the emotions through self-evaluation 30min before the competition, on a scale in Likert format anchored by 1 (not at all) to 5 (very much so).

**RESULTS:** Cheerleaders athletes experienced positive emotions ( $3.82 \pm 0.69$ ) more intensely than negative emotions ( $1.94 \pm 0.44$ ). In gender comparison, the independent sample t-test showed a significant difference in negative emotions (m.  $1.78 \pm 0.36$  vs f.  $2.14 \pm 0.46$ ;  $p=0.009$ ) and a non-significant difference in positive emotions (m.  $3.91 \pm 0.64$  vs f.  $3.72 \pm 0.76$ ;  $p=0.42$ ). Pearson correlation also indicated a significant, weak, positive correlation ( $r=0.35$ ;  $p=0.02$ ) between positive emotions and final score, while the negative emotions demonstrated a non-significant correlation ( $r=-0.03$ ;  $p=0.81$ ).

**CONCLUSIONS:** Cheerleaders experienced both, positive and negative pre-competitive emotions. As well, female athletes experienced more intense negative emotions than male athletes, and the intensity of positive emotions was related to the final score. This information may be useful for training psychological aspects and emotional control.

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**The Mechanism Of Dance Training Regulating Emotion Of College Students: A FMRI Study**

Rou Wen<sup>1</sup>, Lijuan Hou<sup>2</sup>, Jilong Shi<sup>2</sup>, Jingjing Xue<sup>1</sup>, Mi Zhang<sup>2</sup>. <sup>1</sup>Beijing Dance Academy, Beijing, China. <sup>2</sup>Beijing Normal University, Beijing, China.

(No relationships reported)

**PURPOSE:** The purpose of the study is to evaluate the effect of dance training on emotion regulation of college students and explore the possible mechanism by using a magnetic resonance imaging (MRI) technique.

**METHODS:** 30 healthy college students were selected, 15 majored in classical Chinese dance (Dance Training group, DTG) and 15 (Control Group, CG) have no previously experience of regular training. MRI technique was used to observe the effect of dance training on the structure and function of emotion related brain areas. Siemens MAGNETOM Trio 3.0t MRI was selected and data analyzed by ALFF/FC with GRETNA.

**RESULTS:** Compared with CG, whole brain (1366±88ml), gray matter (674±49ml), white matter (488±39ml) was no significant difference with DTG ( $P>0.05$ ). The structural of left BA20 of DTG was increased significantly (voxels=142,  $t=5.91$ ). The structural of left anterior cingulate gyrus, right central cingulate gyrus and insula gray matter decreased significantly in DTG ( $P<0.05$ ). With the increase of training years, the structural volume of BA20 gray matter increased significantly (voxels=420,  $r=0.80$ ). In DTG the ALFF value and ReHo value in BA48 and BA23 were significantly increased ( $P<0.05$ ). The functional connections between the left insula and the right transverse temporal gyrus and the left superior temporal gyrus were enhanced ( $P<0.05$ ). Also right insula and the left amygdala, transverse temporal gyrus, superior temporal gyrus, middle temporal gyrus, inferior temporal gyrus and transverse temporal gyrus were significantly enhanced ( $P<0.05$ ).

**CONCLUSIONS:** The possible mechanism of dance training regulating emotion of college students may be relevant to the changes of structure, function and functional connections of emotion related brain areas. The effect of dance training on emotion regulation is highly related to the years of dance training (Supported by The Innovation ability promotion Plan Foundation of Beijing Municipal Education Commission No.TJSH20161005101).

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**2296** Board #215 May 28 2:00 PM - 3:30 PM

**Cognitive Response And Motor Speed Before And After A Sustained Endurance Run**

Patrick M. Davitt, FACSM. University of the Sciences, Philadelphia, PA.

Email: pdavitt@uscience.edu

(No relationships reported)

There has been some controversy regarding the effects of physically exhausting the human body through endurance exercise. When it comes to the fatigue of the muscular system and being "physically tired", there is a question of the mental fatigue that such sustained physical exercise can take on the body.

**PURPOSE:** To test the differences in quick thinking tasks and reaction time before and after a 3-hour treadmill run, in trained endurance males.

**METHODS:** 10 male endurance runners (32 + 6.0yr; 161.3 + 20.7 lb, 68 + 1.6 in; 14.7 + 6.6% body fat) ran for 3-hours on the treadmill (6.1 + 0.2 mph,  $57 \pm 0.9\%$   $VO_{2max}$ ) for 18.3 + 0.6 miles), on 3 separate occasions and performed a STROOP interference test, Reaction time test, and a 30 second finger-tapping test pre-run (PRE) and immediately after the treadmill run (POST).

**RESULTS:** There was a significant improvement in the cumulative time it took for successful responses in the STROOP test POST vs. PRE ( $24.36 \pm 0.68$  ;  $28.44 \pm 1.09$  sec;  $p<0.05$ ). There was a significantly slower average response time when responding to different word colors, vs. the same color for the word ( $p<0.05$ ). There was a significant improvement in reaction time POST vs. PRE ( $0.44 \pm 0.004$ ;  $0.48 \pm 0.006$  sec;  $p<0.05$ ). There was no significant difference between PRE and POST 3-hr run finger tapping score ( $209.1 \pm 4.6$ ;  $211.1 \pm 4.7$  taps;  $p=0.45$ ).

**CONCLUSIONS:** These results provide support to indicate that even after a fatiguing 3-hr treadmill run, at a moderate intensity, mental response time to cognitive tasks and the reaction time of trained, male endurance runners is not diminished, and is even significantly improved.