

### EXERCISE ACUTELY IMPROVES COGNITION IN HEALTHY OLDER ADULTS: THE ROLE OF AROUSAL

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Previous researchers have reported that aerobic exercise improves cognition in older adults; however, few researchers have examined the role of arousal on improvements in cognition after exercise. The purpose of this study was to understand how changes in arousal acutely affect changes in cognitive performance after a single session of light compared to moderate intensity aerobic exercise. Cognitively normal older adults (N = 34) were enrolled in a randomized controlled trial where they were asked to complete the N-back task with faces, a cognitive task used to test working memory, in an fMRI scanner. On separate days, the task was completed before and 15 to 20 minutes after light and moderate intensity exercise. An intervention was also completed, but our question focuses on the acute effects of exercise rather than training. Arousal was measured before and after exercise through a questionnaire and a direct measure of physiological activation of the sympathetic nervous system with galvanic skin response (GSR). On average, resting GSRs decreased from pre- to post-exercise scan; however, the change was not statistically significant. The decrease in arousal after light exercise indicated that older adults had decreased sympathetic activity after both light and moderate intensity exercise. By contrast, N-back task performance improved most after moderate compared to light intensity exercise. Together, evidence that sympathetic activity tended to decrease generally for both intensities, whereas cognitive improvements were more specific, suggests that changes in arousal at rest were not a critical factor connecting exercise and improved working memory in this study.

### INVESTIGATING THE ROLE OF AHR IN MEDIATING SEX DIFFERENCES OF AGING MACROPHAGES

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“Inflamm-aging” describes a state of chronic low-grade inflammation which occurs with age in the absence of infection. This process is related to many chronic age-related diseases. Aryl hydrocarbon receptor (Ahr), is a transcription factor that is thought to decrease inflammation, and decrease of Ahr with aging only in females was previously observed in a macrophage RNA-seq with aging. Based on this, I hypothesized that 1) Ahr expression will decrease with age in female cells; and 2) phagocytic activity and Ahr expression in macrophages will increase when exposed to estrogens (E2). To test these hypotheses, Ahr signaling was quantified by RT-qPCR in aging male and female mice BMDMs, and in macrophages that were treated with E2. I also performed a phagocytosis assay on macrophages treated with E2. I found a significant downregulation of Ahr in old female BMDMs. Ahrr (Ahr Repressor) was significantly downregulated in

both old female and males with aging. Arnt (Ahr Nuclear Translocator) did not significantly change with aging. The qPCR performed on the E2 treated cells showed no significant trend for Ahr regulation. Finally, the phagocytosis assay revealed an overall increase in phagocytosis activity in cells treated with estrogen. Our hypotheses were supported by data showing a decrease in Ahr expression with age and increase in phagocytosis activity in estrogen treated cells. The RT-qPCR results for the E2 treated cells did not support our hypothesis, but could stem from a relatively short exposure time for estrogen.

### PRIVACY AND SECURITY FOR TELEHEALTH DEVICES

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In this research, we study the privacy and security capabilities provided by telehealth devices. Our aim is to evaluate how vulnerable these popular devices are in the presence of malicious cyber attackers. As older adults increasingly rely on telehealth devices, it is crucial that cybersecurity aspects of these devices are clearly communicated to them. Moreover, older adults frequently lack the technical expertise to evaluate the security and privacy capabilities of the devices. The lack of control over telehealth devices is a major concern for older adults. Older adults view certain limitations within these devices as decreasing their privacy and security. These limitations include the lack of control over accepting calls, taking screenshots, and assigning access privileges. For large scale adaptation of telehealth devices by older adults, it is crucial that these devices not only satisfy their intended purpose but also exhibit user friendly features and strong security and privacy capabilities. Modeling cyber threats against telehealth devices is not studied sufficiently. Malicious actors may compromise telehealth devices and create further threats to security and privacy of the users. In this research, we studied the cyber threats against telehealth devices. We built a threat model that ranks cyber threats based on their impact. We investigated how the operating system of popular devices supports access control. We found that none of the current technologies support location-based access control. We claim that this represents a major limitation and that supporting location-based access control is necessary to ensure users' privacy in their own home.

### WALKING AWAY FROM LONELINESS: THE MEDIATING ROLE OF SOCIAL ISOLATION

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This study examines the relationship between physical activity (PA) and loneliness among older adults. Participation in walking enables individuals to come into contact with other people, thus social isolation may mediate the relationship between walking and loneliness. The study uses participants from the Leave Behind Questionnaire of the 2016 data wave of the Health and Retirement Study with a sample size of 6,157. The dependent variable, loneliness, is measured using the 11-item UCLA Loneliness Scale and