

share features of the training task. Learning trials of the Hopkins Verbal Learning Test-Revised (HVLT-R) and Brief Visuospatial Memory Test-Revised (BVRT-R) recruit similar cognitive abilities and have overlapping neural correlates with the UFOV task and speed-of-processing/working memory tasks and therefore could serve as potential moderators. Exploring moderating factors of cognitive training gains may boost the efficacy of interventions, improve rigor in the cognitive training literature, and eventually help provide tailored treatment recommendations. This study explored the association between the HVLT-R and BVRT-R learning and the UFOV task, and assessed the moderation of HVLT-R and BVRT-R learning on UFOV improvement after a 3-month speed-of-processing/attention and working memory cognitive training intervention in cognitively healthy older adults.

**Participants and Methods:** 75 healthy older adults (M age = 71.11, SD = 4.61) were recruited as part of a larger clinical trial through the Universities of Florida and Arizona. Participants were randomized into a cognitive training (n=36) or education control (n=39) group and underwent a 40-hour, 12-week intervention. Cognitive training intervention consisted of practicing 4 attention/speed-of-processing (including the UFOV task) and 4 working memory tasks. Education control intervention consisted of watching 40-minute educational videos. The HVLT-R and BVRT-R were administered at the pre-intervention timepoint as part of a larger neurocognitive battery. The learning ratio was calculated as: trial 3 total - trial 1 total/12 - trial 1 total. UFOV performance was measured at pre- and post-intervention time points via the POSIT Brain HQ Double Decision Assessment. Multiple linear regressions predicted baseline Double Decision performance from HVLT-R and BVRT-R learning ratios controlling for study site, age, sex, and education. A repeated measures moderation analysis assessed the moderation of HVLT-R and BVRT-R learning ratio on Double Decision change from pre- to post-intervention for cognitive training and education control groups. **Results:** Baseline Double Decision performance significantly associated with BVRT-R learning ratio ( $\beta = -.303$ ,  $p = .008$ ), but not HVLT-R learning ratio ( $\beta = -.142$ ,  $p = .238$ ). BVRT-R learning ratio moderated gains in Double Decision performance ( $p < .01$ ); for each unit increase in BVRT-R learning ratio, there was a .6173 unit decrease in training gains. The HVLT-R learning

ratio did not moderate gains in Double Decision performance ( $p > .05$ ). There were no significant moderations in the education control group.

**Conclusions:** Better visuospatial learning was associated with faster Double Decision performance at baseline. Those with poorer visuospatial learning improved most on the Double Decision task after training, suggesting that healthy older adults who perform below expectations may show the greatest training gains. Future cognitive training research studying visual speed-of-processing interventions should account for differing levels of visuospatial learning at baseline, as this could impact the magnitude of training outcomes.

**Categories:** Cognitive Intervention/Rehabilitation  
**Keyword 1:** aging (normal)

**Keyword 2:** learning

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## 79 The Effects of Mobile Based Resonant Frequency Breathing on Cognitive Performance in Healthy Young Adults with Elevated Stress

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**Objective:** Finding effective, innovative, and accessible methods of coping with and mitigating stress has been increasingly relevant in the midst of the COVID-19 pandemic. To do so, it is important to understand the impact of acute stress responses on cognition, behavior, and emotional functioning. The young adult population in particular has been known to show higher levels of stress. Studies have shown that deep breathing interventions are associated with improved affect, decreased stress levels, and improved cognitive functioning. The autonomic nervous system, particularly the functioning of

the vagus nerve, has been thought to be a key mechanism in the effect of breathing on stress and mood. Most studies to date investigating the efficacy of breathing practices in stress reduction and mood improvement have lacked appropriate methodology, including adequate control groups, randomization, and cross-sectional designs. This single-blind, randomized, waitlist-controlled study investigated the feasibility of using a mobile application to train in resonance frequency breathing and its efficacy in reducing stress and improving cognitive functioning in a non-clinical sample of young adults with elevated stress.

**Participants and Methods:** 80 healthy young adults with elevated stress levels were recruited from the NY/NJ community and the Queens College undergraduate research subject pool. Inclusion criteria: ages 18-29, Perceived Stress Scale score >13. Exclusion criteria: regular (at least 3 times per week) practice of any form of meditation, yoga, or breathing exercise; severe medical or psychiatric disorder; active suicidal ideation; drug or alcohol abuse within the past year; use of medication with a known negative impact on cognition or autonomic nervous system (ANS) arousal. Participants were randomized to a waitlist control group or breathing group. Participants in the breathing group were instructed to complete 10-minute breathing sessions using the free mobile application "The Breathing App" twice a day for five days per week for four weeks. Cognitive assessments were administered over the phone (pre and post-treatment) and self-report measures were completed online due to quarantine restrictions.

**Results:** There were no significant main effects of group across any of the neuropsychological variables, including verbal memory, letter fluency, category fluency, cognitive flexibility, processing speed, basic attention span, and working memory. This indicated that breathing training did not significantly impact neuropsychological performance. Mediation analysis also demonstrated that breathing training did not indirectly lead to improvement in basic attention, processing speed, working memory, set-shifting, verbal fluency, category fluency, or cognitive flexibility, through its effects on stress reduction.

**Conclusions:** These results do not support literature suggesting that breathing at resonance frequency is associated with improved cognitive functioning such as greater cognitive flexibility, improved decision-making, stronger response

inhibition, faster processing speed, and increased working memory. Future study designs should consider implementing active control groups (e.g., mindfulness meditation) and differential dosages of the breathing treatment.

**Categories:** Cognitive Intervention/Rehabilitation

**Keyword 1:** teleneuropsychology

**Keyword 2:** treatment outcome

**Keyword 3:** chronic stress

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## 80 Looking Beyond Visual Functioning in the Rehabilitation of Visual Complaints in People with Multiple Sclerosis: Integrating Low Vision and Neuropsychological Rehabilitation

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**Objective:** The objective of the present study is to expand our understanding of visual complaints in people with multiple sclerosis (MS) with the aim of exploring potential rehabilitation approaches for treating visual complaints. Visual complaints are increasingly recognized as a core manifestation of MS. Up to 90% of people with MS report all kinds of visual complaints, such as blurry vision, double vision, being blinded by bright light, a reduced visual field and having trouble with depth perception. Since intact vision is quintessential to many activities of daily life, such as reading or car driving, these complaints affect independent participation to a great extent. The complaints cannot be fully explained by optical neuritis (a common symptom of MS) or other treatable visual or ophthalmological disorders. Moreover, there are no rehabilitation programs available for visual