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# Associations between accelerometry-derived physical activity and cognitive function during breast cancer chemotherapy

Abstract
Background:
Cancer-related cognitive impairment (CRCI) is common among women with breast cancer, yet no pharmacologic prevention exists. Exercise may improve cognition after treatment but less is known about how physical activity (PA) during chemotherapy relates to cognitive outcomes.
Methods:
This secondary analysis included women with breast cancer undergoing chemotherapy (n=38). Step counts were assessed via Fitbit at the beginning of treatment (T1), during treatment (T1-T2), and at treatment completion (T2). Cognitive outcomes at T2 included objective neuropsychological tests and Functional Assessment of Cancer Therapy –Cognition (FACT-Cog). Linear regression and mixed effects models examined associations between step counts and cognitive outcomes, and group (e.g., PA maintainers vs. PA decliners) by time differences.
Results:
T1 step counts were not associated with most cognitive outcomes, although higher T1 steps were associated with faster Trails B completion time (β=−10008 ms, p=0.017). In contrast, maintaining higher step counts T1-T2 was associated with better working memory accuracy on the N-back n2 (β=1.24, p=0.03) and Spatial Working Memory two-dimensional (β=1.24, p=0.02) tasks. Participants with ≥5000 average steps/day showed faster Flanker reaction time (βs=-116.01 & -151.67, congruent and incongruent, both ps=0.02). A significant group by time interaction was observed for Spatial Working Memory two-dimensional accuracy (β=2.30, p=0.020), with more favorable trajectories among PA maintainers over T1-T2. No consistent associations were observed for subjective cognition, although several objective cognitive outcomes showed moderate effect sizes.
Conclusion:
In this secondary analysis of women undergoing chemotherapy, baseline step counts were associated with faster processing speed, whereas higher step counts during chemotherapy were associated with better working memory accuracy. Participants who maintained physical activity over T1-T2 showed more favorable working memory trajectories. Together, these findings highlight a potential time-sensitive exercise-cognition relationship and suggest that maintaining physical activity during chemotherapy may help preserve specific cognitive functions.

## Keywords

Physical Activity; Chemotherapy; Cognition; Breast Cancer

## Conflict of Interest & Ethical Approval

yes

## Abstract submitters declaration

yes

**Authors:** Dr SALERNO, Elizabeth (School of Kinesiology, University of Michigan); Ms JIA, Hui (School of Kinesiology, University of Michigan)

**Co-authors:** ANDRADE, Carolina (Division of Public Health Sciences, Department of Surgery, Washington University School of Medicine at St. Louis); MARX, Christine (Division of Public Health Sciences, Department of Surgery, Washington University School of Medicine at St. Louis; Alvin J. Siteman Cancer Center, Washington University School of Medicine at St. Louis); HARRISS, Courtney (Division of Public Health Sciences, Department of Surgery, Washington University School of Medicine at St. Louis); LUO, Jingqin (Division of Public Health Sciences, Department of Surgery, Washington University School of Medicine at St. Louis; Alvin J. Siteman Cancer Center, Washington University School of Medicine at St. Louis); PETERSON, Lindsay (Alvin J. Siteman Cancer Center Department of Medicine, Division of Medical Oncology, Washington University School of Medicine, St. Louis Washington University School of Medicine at St. Louis); KEPPER, Maura (School of Public Health, Washington University in St. Louis); DUNCAN, Ryan (Program in Physical Therapy, Washington University School of Medicine in St. Louis)

**Presenters:** Dr SALERNO, Elizabeth (School of Kinesiology, University of Michigan); Ms JIA, Hui (School of Kinesiology, University of Michigan)

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