

Editorial

**Effects of Exercise on Cognition across the Lifespan**

Lisa Vogelgesang, Damien Moore, Paul D. Loprinzi \*

Exercise & Memory Laboratory, Department of Health, Exercise Science and Recreation Management, The University of Mississippi, University, MS 38677, USA; E-Mails: [lmvogelg@go.olemiss.edu](mailto:lmvogelg@go.olemiss.edu); [dcmoore3@go.olemiss.edu](mailto:dcmoore3@go.olemiss.edu); [pdloprin@olemiss.edu](mailto:pdloprin@olemiss.edu)

\* **Correspondence:** Paul D. Loprinzi; E-Mail: [pdloprin@olemiss.edu](mailto:pdloprin@olemiss.edu)

**Academic Editor:** Paul D. Loprinzi

**Special Issue:** [Research of Exercise and Cognitive Function](#)

*OBM Integrative and Complementary Medicine*  
2020, volume 5, issue 2  
[doi:10.21926/obm.icm.2002020](https://doi.org/10.21926/obm.icm.2002020)

**Received:** April 12, 2020  
**Accepted:** April 14, 2020  
**Published:** April 15, 2020

Acute exercise is associated with improvements in cognition across varying age groups [4, 6]. Cognitive function is of critical importance in everyday life during all life stages. Therefore, it is worthwhile to identify factors that enhance cognition. The present Special Issue in *OBM Integrative and Complementary Medicine* published 11 articles related to the effects of exercise on cognitive function (Table 1). These studies assessed a variety of cognitive outcomes, including, for example, cognitive decline, episodic and semantic memory, various aspects of forgetting, and auditory and visual memory. Several populations were studied, such as elderly individuals [2-4], young adults [1, 5, 11], and children and adolescents [6]. Moreover, the applied exercise protocols varied, including, for example, single bouts of moderate exercise [7, 11], chronic exercise training [4], and meditation [9].

This collective body of work revealed several interesting findings. For example, several papers published in this Special Issue provided insight into age as a potential factor influencing the exercise-cognition relationship. As an example, James et al. [4] demonstrated that chronic exercise may reduce cognitive decline in elderly individuals. Findings by Oberste et al. [5] suggest that a single bout of exercise enhances cognitive flexibility in healthy young adults. Other related



© 2020 by the author. This is an open access article distributed under the conditions of the [Creative Commons by Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium or format, provided the original work is correctly cited.

research has also shown improvements in episodic and semantic memory [7] as well as potential effects of exercise on directed forgetting [11] in young adults. Relatedly, Williams et al. [6] provided evidence for positive effects of exercise on cognitive functioning in children and adolescents. Moreover, Williams et al. [6] observed that moderate intensity exercise of about 30 min had positive effects on cognitive function in children, while 10-30 min of moderate to high intensity exercise appeared to be most beneficial for adolescents. Their data also suggest that beneficial effects last for about 45 min post exercise and may be more pronounced in individuals with higher physical fitness levels. Recently, Lineweaver et al. [1] suggested that gender may influence the effect of exercise on cognition. Lastly, this Special Issue also included several papers that provide recommendations for future research, such as measuring and reporting exercise intensities and durations in studies in more detail [6], as well as evaluating whether the beneficial effects of exercise in relatively healthy samples also has similar effects among clinical patients.

**Table 1** Summary of published papers in this Special Issue.

Reference	Purpose	Population	Study Design	Exercise Protocol	Cognition	Main Results
[1] Lineweaver et al. (2020)	To examine the role of gender, effects of athletic participation, and exercise on working memory.	College students	Cross-sectional	N/A	Auditory and visual working memory	Illustrated that the relationship between athletic participation, exercise and working memory depends on gender.
[2] Koon et al. (2019)	To examine the effect of task complexity and social engagement on cognitive functioning among active, older adults.	Elderly	Cross-sectional	N/A	Executive function	Illustrated that engagement in physical activities that involve higher complexity or higher levels of social engagement is not associated with improved executive function outcomes.
[3] Deschamps (2019)	To highlight the interconnection of movement and cognition.	Elderly	Systematic review	N/A	Cognitive-motor functioning	Illustrated the benefits of a multidimensional approach of individual cognitive-motor functioning, as well as physical-cognitive dual-task training among elderly.
[4] James et al. (2019)	To examine the effects of physical exercise, mental exercise, and other anti-neuroinflammatory interventions on five patients with varying levels of cognitive impairment.	Elderly	Case series	At least 30 min of aerobic exercise, 5 days per week (self-guided)	Cognitive skills, brain connectivity, and daily functioning in five patients with varying levels of cognitive decline	The data supported the idea that the use of a multi-component approach can slow cognitive decline. fMRI analyses revealed changes in brain connectivity and efficiency.

[5] Oberste et al. (2019)	To assess current evidence on whether or not a single bout of aerobic exercise improves set shifting in young adults.	Healthy young adults	Systematic review and meta-analysis	N/A	Cognitive flexibility (set shifting)	The data supported the idea that improved set shifting may be a result of physiological and/or psychological adaptations to exercise.
[6] Williams et al. (2019)	To illustrate factors affecting the exercise-cognition relationship, such participant characteristics and timing of cognitive effects	Children and adolescents	Systematic review	N/A	Cognitive function	Illustrated that moderate intensity exercise of approximately 30 min had positive effects across cognitive domains in children. Moderate-to-high intensity exercise of 10-30 min appears most beneficial in adolescents. Data also suggests that beneficial effects last for approximately 45 min post-exercise and, possibly, may be more pronounced in individuals with higher physical fitness levels.
[7] Day et al. (2019)	To evaluate the effects of acute moderate-intensity exercise on autobiographical episodic and semantic memory.	College students	RCT	15 min moderate intensity aerobic exercise at 70% HRR	Episodic and Semantic memory	The findings provided some suggestive evidence of increased recall of semantic memories after exercise. However, these findings were not statistically significant.
[8] Loprinzi (2019)	To examine effects of aquatic exercise on cognitive function.	Multiple populations	Systematic review	N/A	Cognitive function	Illustrated beneficial cognitive effects from aquatic exercise.
[9] Davis et al.	To examine the effects of	N/A	Comparative	Daily planned	Cognitive function	The findings supported the idea that

---

(2019)	meditation on Heart Rate Variability (HRV) and the Coherence Ratio.		analysis	meditations as well as global panned meditations		meditative states might be beneficial to cognition.
[10] Loprinzi et al. (2019)	To evaluate contextual factors and specific techniques that influence learning, memory, and retention.	N/A	Systematic review	N/A	Learning, memory, and retention	Emphasized that applying techniques studied in laboratory environments in practical settings benefits educational achievements, cognition, and personal development.
[11] Ferguson et al. (2018)	To evaluate the effects of selective directed forgetting (SDF) and directed forgetting (DF) on subsequent memoirs retrieval and investigate whether acute exercise can facilitate the effects of SDF.	College students	RCT	15 min bout of moderate intensity treadmill exercise	Selective directed forgetting, directed forgetting, subsequent memory retrieval	Illustrated a DF effect but not SDF. Moreover, data suggested no effect of acute exercise in facilitating SDF.

---

## Author Contributions

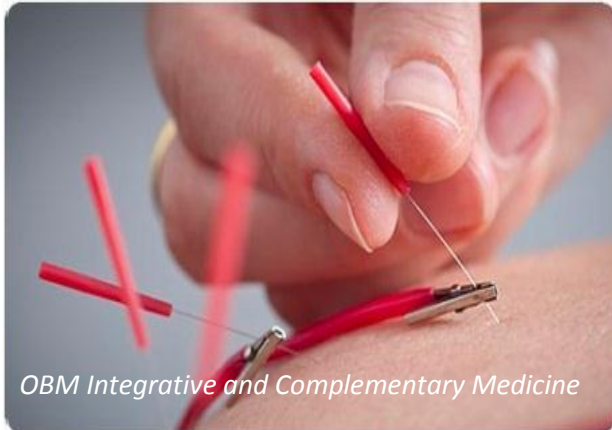
Author L.V. prepared the initial draft of the manuscript. Author D.M. provided intellectual feedback on multiple drafts of the manuscript. Author P.L. conceptualized the structural outline of the paper and provided feedback on the manuscript.

## Competing Interests

The authors declare no conflict of interest.

## References

1. Lineweaver TT, Kercood S, Morgan EB, Rampone SL, Frank CC, McLuckie SA, et al. Working memory in collegiate athletes and non-athletes: A comparison of team-sports athletes, solo-sports athletes, frequent exercisers and infrequent exercisers. *OBM Integr Complement Med.* 2020; 5: 14.
2. Koon L, Brustad R, Stellino MB. Social engagement and task complexity: Physical activity characteristics and executive function among older adults. *OBM Integr Complement Med.* 2019; 4: 18.
3. Deschamps T. Shedding light on a new psychology of movement and exercise. *OBM Integr Complement Med.* 2019; 4: 8.
4. James R, Moore AL, Carpenter DM II, Miller TM, Ledbetter C. Feasibility of a functional medicine approach to slowing clinical cognitive decline in patients over age 55: A multiple case study report. *OBM Integr Complement Med.* 2019; 4: 34.
5. Oberste M, Sharma S, Zimmer P. Does a single bout of aerobic exercise improve set shifting in healthy young adults? A systematic review and meta-analysis. *OBM Integr Complement Med.* 2019; 4: 20.
6. Williams RA, Hatch L, Cooper SB. A review of factors affecting the acute exercise-cognition relationship in children and adolescents. *OBM Integr Complement Med.* 2019; 4: 24.
7. Day S, Loprinzi PD. Effect of acute moderate-intensity exercise on autobiographical episodic memory and semantic memory. *OBM Integr Complement Med.* 2019; 4: 12.
8. Loprinzi PD. The effects of aquatic exercise on cognitive function: Systematic review. *OBM Integr Complement Med.* 2019; 4: 9.
9. Davis JJJ, Schübeler F, Kozma R. Psychophysiological coherence in community dynamics – A comparative analysis between meditation and other activities. *OBM Integr Complement Med.* 2019; 4: 24.
10. Loprinzi PD, Frith E, Harris F. A brief primer on learning and memory-based strategies to enhance memory function. *OBM Integr Complement Med.* 2019; 4: 9.
11. Ferguson L, Cantrelle J, Loprinzi P. Experimental effects of exercise on forgetting. *OBM Integr Complement Med.* 2018; 3: 034.



Enjoy *OBM Integrative and Complementary Medicine* by:

1. [Submitting a manuscript](#)
2. [Joining in volunteer reviewer bank](#)
3. [Joining Editorial Board](#)
4. [Guest editing a special issue](#)

For more details, please visit:

<http://www.lidsen.com/journals/icm>