The Relationship Between Physical Activity, Cognition, and Academic Outcomes in School-Aged Latino Children: A Scoping Review

Jean P. Marrero-Rivera, MS[1], Olivia O. Sobkowiak[1], Aimee Sgourakis,MLIS[2], Sharon E. Taverno Ross, PhD, FACSM[1]

[1] University of Pittsburgh, Department of Health and Human Development, [2] University of Pittsburgh, University Library System

University of Pittsburgh

INTRODUCTION

- Participation in physical activity is reported to have significant benefits on children's physical health and cognitive function (Hillman, Erickson, & Kramer, 2008)
  - Some cognitive constructs (i.e., episodic memory) remain understudied in their relation to physical activity
- The benefits of physical activity on the brain and cognition are largely attributed to two major mechanisms (Liegro et al., 2019):
  - Improved cerebral blood flow
  - Increases in circulating growth factors, neurotransmitters, and neurotrophins
- Less than 24% of U.S. children ages 6 through 17 engage in at least 60 minutes of physical activity per day (CDC, 2022)
  - Latino children reported to be less likely to meet the recommended physical activity guidelines (Salud America, 2016)
- A lack of physical activity throughout childhood is linked to:
  - Poorer health outcomes (McPhee et al., 2020)
  - Decreased cognitive development (Pinquart & Teubert, 2011)
  - Poorer academic outcomes (Basch, 2011).
- Future efforts should therefore focus on the disparity that Latino children face with aim in improving physical activity rates, for optimization of health, cognition, and academic outcomes

PURPOSE

The purpose of this scoping review is to investigate how physical activity affects 1.) various understudied constructs of cognition and 2.) academic outcomes in a Latino school-aged population.

Research Question: What is the relationship between physical activity, executive function, episodic memory, language skills, and academic outcomes in Latino youth, aged 6-17?

ARTICLE INCLUSION CRITERIA

- **Population:**
  - Latino school-aged children (6 to 17 years of age)
  - Studies with samples that were majority Latino (51%+)
  - If less than 51%, number and/or percentage of Latino population must have been reported in results
- **Intervention:**
  - All physical activity interventions were included
  - Studies without interventions were included if a physical activity- or exercise-related data was reported (e.g., device-based activity, self-reported activity)
- **Outcomes:**
  - Executive function (working memory, cognitive flexibility, and inhibitory control)
  - Episodic memory (learning and recall)
  - Language skills
  - Academic outcomes (academic achievement and academic performance)
- **Study Type:**
  - Inclusive of study types (randomized controlled trials, experimental studies, cross-sectional studies, cohort and longitudinal studies, and case-control studies)
  - Review papers may be used to identify additional original-research articles
  - Textbooks and protocol, method, dissertation, report, and guide papers were excluded

METHODS

Only published original-research articles were included in this scoping review

- **Search Strategy:**
  - Initial searches on Google Scholar and PubMed were performed to assess for relevant keywords
  - *Keywords: (e.g., Latino, Hispanic, youth, exercise, academic performance, academic achievement)*
  - A search string was created in collaboration with a librarian for use in four different databases (PubMed, PsycINFO, ERIC, and Web of Science)
- **Evidence Selection**:
  - All search results (n=372) were imported into *PICO Portal*
  - A dual, independent review was conducted to screen articles for initial inclusion
  - Articles that were initially included (n=33) will be fully reviewed by two reviewers in accordance with the article inclusion criteria
  - Disagreements in article selection for full-text review will be rectified with a designated judicator
- **Sample Search String:**

Argentinian or Argentinians or Bolivian or Bolivians or Brazilian or Brazilians or chicano or chicanos or Chileans or Colombian or Colombians or Cuban or Cubans or Dominican or Dominicans or Ecuadorians or Guatemalan or Guatemalans or hispanic or hispanics or Honduran or Hondurans or latin or latina or latinas or latino or latinos or latinx or mestizo or mestizos or mexican or mexicans or Nicaraguan or Nicaraguans or Panamanian or Panamanians or Paraguayan or Peruvians or Salvadoran* or Uruguayan or Venezuelan or Venezuelans AND ("physical activit*" OR "physical fitness" OR "weight training" OR "resistance training" OR "aerobic" OR exercis* OR "weight lifting") AND ("executive function*" OR "working memory" OR "cognitive flexibility" OR "inhibitory control" OR "episodic memory" OR (learning AND recall) OR "language skills" OR vocabulary OR academic) AND (Child OR children OR adolescent OR adolescence OR "school age" OR teen OR teenager OR tween OR youth)

- **Data Extraction and Analysis:**
  - Data from included articles will be extracted into Microsoft Excel to summarize:
    1.) Study type and aims
    2.) Purpose
    2.) Author, Year, and Title
    4.) Population Demographics and Characteristics
    5.) Intervention
    6.) Measures and Outcomes
    7.) Results
  - No data analysis will be conducted for this scoping review
- **Expected Outcomes:**
  - Summarize current state of physical activity, cognition, and academic outcomes in Latino school-aged children
  - Identify gaps in the literature
  - Upload to Open Science Framework upon completion
  - Groundwork for Milestone 2 project

REFERENCES

Basch, C. (2011). Physical activity and the achievement gap among urban minority youth. Journal of School Health, 81(10): 626-634. DOI: 10.1111/j.1746-1561.2011.00637.x.

Center for Disease Control and Prevention. (2022). Physical Activity Facts. Retrieved from https://www.cdc.gov/healthyschools/physicalactivity/facts.htm#:~:text=1%20Less%20than%20one-quarter%20%2824%25%29%20of%20children%206,days%20of%20the%20previous %20week.%209%20More%20items

Hillman, C., Erickson, K., and Kramer, A. (2008). Be smart, exercise your heart: Exercise effects on brain and cognition. Nature Reviews Neuroscience, 9(1): 58-65. doi: 10.1038/nrn2298.

Liegro, C., Schiera, B., Proia, P., and Liegro, I. (2019). Physical activity and brain health. Genes 10(9): 720. doi: 10.3390/genes10090720.

McPhee, P., Singh, S., and Morrison, K. (2020). Childhood obesity and cardiovascular disease risk: Working toward solutions. Canadian Journal of Cardiology, 36(9):1352-1361.

Pinquart, M. & Teubert, D. (2011). Academic, physical, and social functioning of children and adolescents with chronic physical illness: A meta-analysis. Journal of Pediatric Psychology 37(4): 376-389. doi:10.1093/jpepsy/jsr106.

Salud America! (2016, January). How to achieve healthier school environments for Latino kids. Retrieved from https://salud-america.org/wp content/uploads/2017/09/ HealthierSchoolsIssueBrief2016.pdf.