

Active Transportation and Cardiometabolic Health Among Adults: A Systematic Review

Elizabeth Ann Lorenzo, BSN¹

Jacob Szeszulski, MA²

Rebecca Lee, PhD¹

(1)College of Nursing and Health Innovation, Arizona State University, Phoenix, AZ, USA

(2)Arizona State University, Phoenix, AZ, USA

Purpose: Cardiometabolic syndrome (CMS) is a preventable health condition affecting 34% of the adult population in the U.S. (Moore, Chaudhary, & Akinyemiju, 2017). Participation in physical activity on a regular basis has been shown to effectively prevent, delay, and/or treat cardiometabolic syndrome (Centers for Disease Control and Prevention (CDC), 2015; U.S. Department of Health & Human Services, National Institutes of Health: National Heart Lung and Blood Institute, 2016); however, only 20% of adults met the 2008 physical activity guidelines in 2012 (CDC, 2014). Active transportation (AT) (walking or bicycling for any part of a commute to a destination) has the potential to provide a free or low cost, convenient, and sustainable intervention to increase physical activity for all members of a family. There have been numerous systematic and integrative reviews conducted to investigate the relationship between AT and health outcomes among adults (Furie & Desai, 2012; Saunders, Green, Petticrew, Steinbach, & Roberts, 2013; Wanner, Götschi, Martin-Diener, Kahlmeier, & Martin, 2012; Xu, Wen, & Rissel, 2013), which provide evidence of weak associations between the two. Furthermore, a causal link between AT use and improved health has not been established because current reviews of literature have been largely based on cross-sectional studies. The purpose of this study is to examine the existing literature for experimental, quasi-experimental, and single group designs, to determine the extent AT use can improve weight, blood pressure, high density lipoproteins, triglycerides, blood glucose, and/or waist circumference among adults.

Methods: Searches were conducted in November 2017 in four databases, CINAHL, PubMed, SSCI, and the Cochrane Library using multiple search strings, which varied depending on the database searched. This search resulted in 1,832 titles in English for active transportation studies, without date or country restrictions. Titles are currently being screened for duplicates, which will then be screened by title name for applicable studies. The full text of all selected records will be reviewed to determine eligibility for the review. Inclusion criteria includes only experimental, quasi-experimental, and single group designs, AT must be measured in healthy adults, and at least one health outcome (weight, blood pressure, high density lipoproteins, triglycerides, blood glucose, and/or waist circumference). Reference lists of the eligible studies will be hand searched for additional studies meeting inclusion criteria to be review, excluding duplicates. The search strategy will be duplicated, and any inconsistencies between investigators will be discussed, until consensus is reached. The final eligible studies will be evaluated for quality using the GRADE method, assessed for bias, reviewed and synthesized.

Results: It is hypothesized that adults participating in AT experimental and quasi-experimental studies will have improvements in the health outcomes under investigation. Findings will be completed and presented at STTI 2018.

Conclusion: Significant findings demonstrating AT as a means to improve health outcomes will inform future AT interventions to be developed and implemented to further investigate whether improvements in CMS risk factors from participation in AT continue to exist for samples of only women. Additional research will focus on informing health care providers, public health officials, educational systems, and employers to encourage and support AT use. This will provide evidence-based recommendations to present to policy makers to facilitate changes in the built environment that promote AT.

Title:

Active Transportation and Cardiometabolic Health Among Adults: A Systematic Review

Keywords:

cardiometabolic health, disease prevention and transportation methods

References:

Centers for Disease Control and Prevention. (2014). *State indicator report on physical activity*. (2016). Atlanta, GA: U.S. Department of Health and Human Services. Retrieved from http://www.cdc.gov/physicalactivity/downloads/pa_state_indicator_report_2014.pdf

Centers for Disease Control and Prevention. (2015). Division of nutrition, physical activity, and obesity. *The benefits of physical activity*. Retrieved from <http://www.cdc.gov/physicalactivity/basics/pa-health/>

Furie, G. L., & Desai, M. M. (2012). Active transportation and cardiovascular disease risk factors in US adults. *American Journal of Preventive Medicine*, 43(6), 621-628. doi:10.1016/j.amepre.2012.06.034

Moore, J. X., Chaudhary, N., & Akinyemiju, T. (2017). Metabolic syndrome prevalence by race/ethnicity and sex in the United States, National Health and Nutrition Examination Survey, 1988–2012. *Preventing Chronic Disease*, 14.

Saunders, L. E., Green, J. M., Petticrew, M. P., Steinbach, R., & Roberts, H. (2013). What are the health benefits of active travel? A systematic review of trials and cohort studies. *PLoS One*, 8(8), e69912.

U.S. Department of Health & Human Services, National Institutes of Health: National Heart Lung and Blood Institute. (2016). *Metabolic syndrome: How is metabolic syndrome diagnosed?* Retrieved from <https://www.nhlbi.nih.gov/health/health-topics/topics/ms/diagnosis>

Wanner, M., Götschi, T., Martin-Diener, E., Kahlmeier, S., & Martin, B. W. (2012). Active transport, physical activity, and body weight in adults: A systematic review. *American Journal of Preventive Medicine*, 42(5), 493-502. doi:10.1016/j.amepre.2012.01.030

Xu, H., Wen, L. M., & Rissel, C. (2013). The relationships between active transport to work or school and cardiovascular health or body weight: A systematic review. *Asia-Pacific Journal of Public Health*, 25(4), 298-315. doi:10.1177/1010539513482965

Abstract Summary:

This review of active transportation literature is being conducted to determine the presence or absence of a causal link with cardiometabolic outcomes. Findings will inform an active transportation intervention, to improve cardiometabolic health, inform best practice, and advocate for policy changes to enhance the health of communities.

Content Outline:

1. Background
 1. Cardiometabolic syndrome literature and statistics
 2. Physical activity as a way to treat cardiometabolic syndrome
 3. Active transportation as physical activity
 4. Gaps in the active transportation literature regarding a causal pathway between AT and improved cardiometabolic risk factors
2. Methods
 1. Databases searched

2. Keywords
3. Inclusion criteria
3. Results
 1. PRISMA flowchart
 2. Quality assessment
 3. Outcomes investigated in reviewed studies
 4. Total sample size, characteristics, geographic locations
4. Discussion
 1. Hypothesis supported or not supported
 2. Strengths of study
 3. Limitations of study
5. Conclusion
 1. Nursing and health practitioner implications
 2. Future directions for research
 3. Policy implications

First Primary Presenting Author

Primary Presenting Author

Elizabeth Ann Lorenzo, BSN
Arizona State University
College of Nursing and Health Innovation
Research Assistant
Phoenix AZ
USA

Professional Experience: May. 2016- Arizona State University present Nursing and Health Innovation Graduate Research Assistant Partnering for PA in Early Childhood: Sustainability via Active Garden Education (SAGE) project (U01 MD010667-01) Aug. 2014- Arizona State University May 2016 Graduate Research Assistant Worked with various nurse researchers on multiple studies on intervention implementation, systematic reviews, literature reviews, data collection, entry, analyses, developing data collection protocols, data analyses, and manuscript writing. 2011-2016 Member of the Pharmacovigilance Quality Team 2013-2014 Nurse Analyst Review medical records to verify and resolve Healthcare Liens, award injuries and surgeries per Settlement Agreements, and cure deficient cases. 2010-2011 Pharmacovigilance Nurse Analyst Analyze case reports, review medical records and extract information related to adverse events for a global pharmaceutical company to be submitted to the FDA. Compile adverse event reports for submission based on strict guidelines. 2003-2011 Operating Room and Cardiovascular Operating Room Nurse 2000-2003 Medical/Surgical and Telemetry Nurse
Author Summary: Elizabeth Lorenzo has been a registered nurse for 17 years. She is currently a doctoral student at the College of Nursing and Health Innovation at Arizona State University. Her research interests focus on health promotion, disease prevention, and the influence of active transportation use and walkability on cardiometabolic outcomes.

Second Author

Jacob Szeszulski, MA
Arizona State University
Research Assistant
Phoenix AZ
USA

Professional Experience: Jacob Szeszulski is a third year PhD student in the Exercise and Nutritional Science program at Arizona State University. Current project involvements include Sustainability via Active Garden Education and the Athletes for Life programs. Jacob has been previously involved in both research and private sector positions that aim to influence children's health. His long term goal is to create innovative, evidenced-based physical activity programs that promote change in the physical

activity behaviors of young children.

Author Summary: Jacob Szeszulski is a third year PhD student in the Exercise and Nutritional Science program at Arizona State University. Current project involvements include Sustainability via Active Garden Education and the Athletes for Life programs. Jacob has been previously involved in both research and private sector positions that aim to influence children's health. His long term goal is to create innovative, evidenced-based physical activity programs that promote change in the physical activity behaviors of young children.

Third Author

Rebecca Lee, PhD

Arizona State University

College of Nursing and Health Innovation

Professor

Phoenix AZ

USA

Professional Experience: Dr. Lee is a seasoned senior scientist with over 25 years of experience promoting physical activity and healthy eating. She has published over 125 peer reviewed manuscripts and been consistently Federally funded since 2004. In 2011-12 she served as a Fulbright Scholar to Mexico where she conducted research on policy and environmental factors associated with physical activity.

Author Summary: Dr. Rebecca E. Lee is a professor in the College of Nursing and Health Innovation at ASU. Dr. Lee, a community health psychologist, specializes in research with Hispanic and Latino communities in US and Mexico using innovative strategies to increase physical activity and promote healthy eating.