Working Title: Recommended MET Minutes Per Week to Offset Considerable Sitting Time

Primary Author Name: Ryan Bruellman

Potential Co Author(s) (enter none if not applicable): Jarrod Ellingson, Shandell Pahlen, Robin Corley, Sally Wadsworth, Chandra Reynolds

The United States Department of Health and Human Services currently recommends individuals get 150 minutes of moderate-intensity aerobic exercise or 75 minutes of vigorous-intensity aerobic exercise per week to maintain cardiovascular health and prevent obesity. Moderate and vigorous activity can best be measured using metabolic equivalent (MET) scores where values under three are considered light, values between three and six are considered moderate, and values over six are classified as vigorous. The major issue that is not considered in the current physical activity guidelines is whether sitting throughout the day counteracts the health benefits of the weekly physical activity in individuals performing at least the recommended amount each week.

The research in this study would look to ascertain if higher amounts of moderate to vigorous physical activity are supported for individuals being otherwise sedentary throughout most of their regular week. This study will use participant data from CATSLife ranging from reported sitting time to reported physical activity and measured biomarkers. The typical amount of time spent sitting throughout the week will be calculated from responses of participants to questions asking how much time they sit each day doing specific activities on both weekdays and weekends (i.e. working, watching TV, leisure, traveling, etc.). Total physical activity will be focused on moderate and vigorous as that is what the US Department of Health and Human Services focuses on for maintaining optimal health. Physical activity will be calculated in MET minutes per week for each participant using reported physical activity throughout a typical week. Participants reported the approximate number of hours they spend working out, playing pickup or organized sports, and performing other physical activity in a typical week. MET scores are determined given open-ended answer responses about their specific activities if they responded that they engage in one or more hours of physical activity in the aforementioned questions. We will also incorporate work/career MET scores for individuals with physically demanding vocations (i.e., construction workers, contractors, etc.)

An important component of this study will include bringing in biomarkers to determine the overall health and well-being of each participant. Based on previous literature, biomarkers such as plasma lipids, interleukin-6, interleukin-8, and C-reactive protein show distinct trends with increased sedentary behavior. We would expect to see higher levels of these inflammatory biomarkers in those that report more sedentary time. We also anticipate that individuals reporting at the recommended MET minutes per week but having high levels of sitting (i.e. over 8 hours a day on average) will have higher levels of the inflammatory biomarkers indicating further moderate or vigorous exercise is needed to counteract the harmful impacts of prolonged sitting. In addition to inflammatory markers, we will also investigate sitting and MET minutes compared to measured and calculated health indicators such as body mass index (BMI), waist to hip ratio, VO2 max, and others. Through the analysis, we expect to be able to ascertain an accurate depiction of recommended time to dedicate to physical activity given the average amount of sitting an individual does throughout a typical day.

Select related sources to use:

Chastin, S., McGregor, D., Palarea-Albaladejo, J., Diaz, K. M., Hagströmer, M., Hallal, P. C., van Hees, V. T., Hooker, S., Howard, V. J., Lee, I. M., von Rosen, P., Sabia, S., Shiroma, E. J., Yerramalla, M. S., & Dall, P. (2021). Joint association between accelerometry-measured daily combination of time spent in physical activity, sedentary behaviour and sleep and all-cause mortality: a pooled analysis of six prospective cohorts using compositional analysis. *British Journal of Sports Medicine, 55*(22), 1277–1285.

Dunstan, D. W., Dogra, S., Carter, S. E., & Owen, N. (2021). Sit Less and Move More for Cardiovascular Health: emerging insights and opportunities. *Nature Reviews Cardiology. 18*, 637-648.

Hamilton, M. T., Healy, G. N., Dunstan, D. W., Zderic, T. W., Owen, N. (2008). Too Little Exercise and Too Much Sitting: Inactivity Physiology and the Need for New Recommendations on Sedentary Behavior. *Current Cardiovascular Risk Reports, 2,* 292-298.

Hart, J. (2015). Excessive Sitting May Be as Harmful as Smoking. *Alternative and Complementary Therapies. 21*(2). 68-72

Howard, B. J., Hurtig-Wennlöf, A., Olsson, L. A., Nilsson, T. K., Dunstan, D. W., & Wennberg, P. (2016). Self-Reported Sitting Time, Physical Activity and Fibrinolytic and Other Novel Cardio-Metabolic Biomarkers in Active Swedish Seniors. *PloS one, 11*(9), e0163409.

Sample(s): CATSLife

Process Stage: Idea Formation

Start Date (YYYY-MO): 2022-02

Last Update (YYYY-MO): 2022-03