



Mid Atlantic Regional Chapter of the American College of Sports Medicine

Annual Scientific Meeting, November 5th - 6th, 2021
Conference Proceedings
International Journal of Exercise Science, Issue 9, Volume 10



Effect of Chronotype on Non-Exercise Physical Activity Patterns and Metabolic Insulin Sensitivity

Tristan J. Ragland¹, Jaclyn K. Dosik¹, Mary-Margaret E. Remchak¹, Emily M. Heiston^{2,3}, Udeyvir Cheema² and Steven K. Malin, FACSM^{1,2}. ¹Rutgers University, New Brunswick, NJ 08901; ²University of Virginia, Charlottesville, VA 22904; ³Virginia Commonwealth University, Richmond, VA

Late chronotype is associated with insulin resistance, obesity and metabolic syndrome (MetS). While people are encouraged to engage in physical activity (PA), it is unclear if late chronotypes with MetS are more sedentary and/or engage in less PA than early chronotypes. **PURPOSE:** To determine if adults classified as late chronotype differ in PA and sedentary behavior compared with early chronotype in relation to insulin sensitivity. **METHODS:** In this cross-sectional study, participants completed a Morning-Evening Questionnaire (MEQ) to determine early (n=14, 13F, MEQ=63.4±4.8, age=53.6±4.2y, BMI=36.8±5.7kg/m²) or late (n=14, 11F, MEQ=46.4±5.3, age=54.8±8.9y, BMI=37.3±5.5kg/m²) chronotype classification. Sedentary behavior, % light PA (LPA), and % moderate-to-vigorous (MVPA) were determined by 7-d tri-axial hip-worn accelerometry. A 2-hr hyperinsulinemic-euglycemic clamp (40mU/m²/min, 90 mg/dl) with indirect calorimetry was used to assess metabolic insulin sensitivity (glucose infusion rate) and substrate metabolism, respectively. Blood lactate (non-oxidative carbohydrate metabolism), VO_{2peak} (aerobic fitness) and body mass index (BMI) were also measured. **RESULTS:** There was no difference in age (53.6±4.2 vs. 54.8±8.9y, *P*=0.67), BMI (36.8±5.7 vs. 37.3±5.5 kg/m², *P*=0.84), ATP III score (3.4±.2 vs. 3.6±.2 a.u., *P*=0.46), or VO_{2peak} (22.1±3.3 vs. 20.7±3.5 ml/kg/min, *P*=0.29) between groups. However, early chronotype had lower fasting lactate levels (0.71±0.06 vs. 0.87±0.05 mM, *P*<0.05) as well as higher metabolic insulin sensitivity (3.1±0.4 vs. 2.1±0.3 mg/kg/min, *P*=0.06). Sedentary time (74.1±0.02 vs. 74.7±0.02% *P*=0.82), LPA (21.1±0.01 vs. 19.6±0.01%, *P*=0.45), and MVPA (4.9±0.01 vs. 4.2±0.01%, *P*=0.39) were similar across the day between groups. Interestingly, early chronotypes performed more LPA in the morning than late chronotypes (6–10am: 73±0.03 vs. 62.9±0.04%, *P*<0.05), with no differences noted in the afternoon (3–7 pm: 19.9±0.01 vs 18.5±0.02%, *P*=0.44). **CONCLUSIONS:** Early chronotypes perform more LPA in the morning and have favorable metabolic health compared with late chronotype. Additional work is warranted to understand how to improve PA patterns for maximizing well-being in late chronotypes.

Funding: NIH RO1-HL130296