

Are Race and Ethnicity Associated with How Hard the Heart Works during Submaximal Exercise? An NHANES Study

KIESE MPONGO, & JAYSON GIFFORD

BYU Cardiovascular Lab; Exercise Science; Brigham Young University; Provo, UT

Category: Undergraduate

Advisor / Mentor: Gifford, Jayson (jaysongifford@byu.edu)

ABSTRACT

Previous studies have indicated racial/ethnic differences in the vasodilator and blood pressure responses to exercise, but the extent to which race/ethnicity impacts how hard the heart works (*i.e.*, rate pressure product, RPP) during a given submaximal exercise is unknown. **PURPOSE:** Determine the impact of race/ethnicity on the work of the heart (*i.e.*, RPP) during submaximal exercise. **METHODS:** Exercise data from the 2003-2004 NHANES cohort were examined. Specifically, 189 Black Americans (51% female), 181 Mexican Americans (53% female) and 370 (56% female) White Americans completed two, 3-minute stages of submaximal treadmill exercise. Blood pressure, heart rate and rating of perceived exercise were measured during the 3rd minute of each stage. Exercise power was calculated based upon treadmill speed and grade and body mass. One-way ANOVA was performed to determine if racial differences existed at each stage. Subsequently, ANCOVA co-varying for several confounding variables was performed. **RESULTS:** When exercising at approximately 50 Watts and approximately at 100 Watts, RPP's were significantly different between all race/ethnic groups measured ($P < 0.05$). Specifically, at ~50 Watts, Black Americans averaged a RPP of 20486 ± 4445 mmHg x bpm, White Americans averaged a RPP of 19138 ± 4077 mmHg x bpm, and Mexican Americans averaged 18015 ± 4480 mmHg x bpm. When exercising at approximately 100 watts, Black Americans averaged a RPP of 26268 ± 6289 mmHg x bpm, White Americans averaged a RPP of 24814 ± 5271 mmHg x bpm, and Mexican Americans averaged 23114 ± 5800 mmHg x bpm. The RPP was primarily driven by differences in systolic blood pressure, which was greatest among the Black Americans ($P < 0.05$). When controlling for factors such as biological sex, age, weight, power output, baseline physical activity, and estimated $\dot{V}O_{2Max}$, Black Americans showed a greater blood pressure response and RPP response during submaximal exercise compared to White and Mexican Americans ($P < 0.05$). **CONCLUSIONS:** Race/ethnicity is related to RPP during submaximal exercise, with Black Americans showing the greatest and Mexican Americans showing the least work of the heart during submaximal exercise. Further studies are needed to determine what implications racial/ethnic differences have for cardiovascular health and physical function.