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Editorial

Public Health Implications of the Dose–Response Association Between Physical Activity and Cardiometabolic Health in Young Adults



Physical activity has numerous benefits across the lifespan, arguably none more important than its positive influence on cardiometabolic health [1]. A population with a relative paucity of conducted physical activity surveillance research is in young adults, defined here as the age group between 20 and 29 years. Young adults are a population characterized by life transitions that may either be beneficial or adversely affect health behaviors. These transitions include entering and graduating from institutions of higher education, relocation, entering the workforce, independent living, and possibly marriage and starting a family [2]. Modes of physical activity that were once regularly participated in during childhood and adolescence may partially or completely dissipate during the transition to young adulthood [3]. The development of new social circles, changes within the built environment, and varying work schedules may influence young adult physical activity interests and opportunities [4]. Because of physical activity's link to cardiometabolic health observed in both pediatric and older adult populations [5,6], examining the dose–response relationship between physical activity and cardiometabolic health is needed in young adults, as behaviors during this life stage may track into older adulthood where it can affect morbidity and mortality [7].

In the current issue of the Journal, Frank et al. [8] examined the dose–response relationship between physical activity (self-report and accelerometer) and salient cardiometabolic health measures including systolic and diastolic blood pressure, high-density lipoprotein (HDL) and total cholesterol, and body mass index (BMI) in young adults using data from the 2003–2016 National Health and Nutrition Examination Survey. In young adult females, every 150 minutes of weekly physical activity was associated with lower diastolic blood pressure, higher HDL cholesterol, lower total cholesterol, and lower BMI, with all associations showing a linear dose–response relationship. In young adult males, every 150 minutes of weekly physical activity was associated with higher HDL cholesterol and lower total

cholesterol. Interestingly, the dose–response relationship between physical activity and BMI was nonlinear in males, as after 100 minutes of weekly physical activity, it was found that the association between physical activity and BMI was positive in form (i.e., higher weekly physical activity associating with higher BMI). The magnitude of the dose–response relationships tended to be stronger in females compared with males. This well-communicated study supports sex-specific dose–response relationships between physical activity and specific cardiometabolic health measures in young adults. The rigor of the analysis is evident by the use of cubic splines with knots placed at the 5th, 50th, and 95th percentiles of physical activity, which identified changes in the form of the dose–response relationships at these parts of the physical activity distribution, in addition to the statistical control for potential confounding factors such as age, race/ethnicity, federal poverty level, health insurance status, education level, seasonality, and survey year.

An ongoing challenge for public health researchers and practitioners is to derive and deliver theory-driven interventions and understandable public health messaging for the promotion of physical activity. Physical activity programming and messaging for the pediatric and general adult population have been established, but programming and messaging specifically for young adults is lacking. In young adults, some of the positive socioenvironmental facilitators of physical activity participation such as parents and/or peers may not be as available, as they once were during childhood and adolescence because of changing life circumstances [2,3]. The opportunities for physical activity that was once a regular part of an individual's school schedule such as physical education and after-school sports are no longer available as adolescents track into young adulthood. However, transitioning to young adulthood does present other opportunities to accumulate the recommended 150 minutes of moderate (or 75 minutes of vigorous) weekly physical activity. These opportunities are potential targets for intervention. Targets

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include but are not limited to active transportation, worksite exercise programming, and weekend physical activity participation. Using observational research, some evidence suggests that engagement of these targets associates with higher physical activity levels and lower cardiometabolic risk in adults [9–11]. Importantly, as shown in the study by Frank et al. [8], these targets for physical activity promotion may need to be tailored to an individual's sex if desired endpoints are improvements in cardiometabolic health measures. Males may need to achieve a higher volume of physical activity by increasing duration and/or intensity to achieve similar cardiometabolic health benefits seen in females. The interpretation of BMI in young adult males may also need to be reconsidered because of its inability to distinguish between fat mass and fat-free mass and the positive dose–response relationship between higher levels of physical activity and BMI, as shown in the study by Frank et al. [8].

Despite the important role that physical activity has on achieving and maintaining health during young adulthood, physical activity remains “one piece of the puzzle” for the achievement of cardiometabolic health. Other important behaviors such as diet, sleep quality, alcohol, and tobacco consumption may also have notable dose–response relationships with specific cardiometabolic health measures [12–14]. Indeed, engagement in risk behaviors such as smoking and excessive alcohol consumption may partially account for the observed differences between young adult males and females in the strength and form of the dose–response relationship between physical activity and cardiometabolic health [12–14]. Consideration of multiple health and risk behaviors together may be needed to improve and maintain cardiometabolic health in young adults. Given the current novel coronavirus (2019-nCoV) pandemic, cardiometabolic health maintenance is important now more than ever for every age group. Young adults are not immune to novel respiratory pestilence, and those who are at higher cardiometabolic risk may also be at higher risk for more severe respiratory complications because of an exaggerated inflammatory response and impaired pulmonary ventilation [15]. Fortunately, health is influenced as much by what we do than what we are. For already higher risk young adults, adoption at least 150 minutes of physical activity per week of at least moderate intensity or 75 minutes of physical activity per week of vigorous intensity may facilitate a path to health during this important life transition stage.

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