JAMA | Original Investigation

Association of Daily Step Count and Step Intensity With Mortality Among US Adults

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IMPORTANCE It is unclear whether the number of steps per day and the intensity of stepping are associated with lower mortality.

OBJECTIVE Describe the dose-response relationship between step count and intensity and mortality.

DESIGN, SETTING, AND PARTICIPANTS Representative sample of US adults aged at least 40 years in the National Health and Nutrition Examination Survey who wore an accelerometer for up to 7 days (from 2003-2006). Mortality was ascertained through December 2015.

EXPOSURES Accelerometer-measured number of steps per day and 3 step intensity measures (extended bout cadence, peak 30-minute cadence, and peak 1-minute cadence [steps/min]). Accelerometer data were based on measurements obtained during a 7-day period at baseline.

MAIN OUTCOMES AND MEASURES The primary outcome was all-cause mortality. Secondary outcomes were cardiovascular disease (CVD) and cancer mortality. Hazard ratios (HRs), mortality rates, and 95% CIs were estimated using cubic splines and quartile classifications adjusting for age; sex; race/ethnicity; education; diet; smoking status; body mass index; self-reported health; mobility limitations; and diagnoses of diabetes, stroke, heart disease, heart failure, cancer, chronic bronchitis, and emphysema.

RESULTS A total of 4840 participants (mean age, 56.8 years; 2435 [54%] women; 1732 [36%] individuals with obesity) wore accelerometers for a mean of 5.7 days for a mean of 14.4 hours per day. The mean number of steps per day was 9124. There were 1165 deaths over a mean 10.1 years of follow-up, including 406 CVD and 283 cancer deaths. The unadjusted incidence density for all-cause mortality was 76.7 per 1000 person-years (419 deaths) for the 655 individuals who took less than 4000 steps per day; 21.4 per 1000 person-years (488 deaths) for the 1727 individuals who took 4000 to 7999 steps per day; 6.9 per 1000 person-years (176 deaths) for the 1539 individuals who took 8000 to 11 999 steps per day; and 4.8 per 1000 person-years (82 deaths) for the 919 individuals who took at least 12 000 steps per day. Compared with taking 4000 steps per day, taking 8000 steps per day was associated with significantly lower all-cause mortality (HR, 0.49 [95% CI, 0.44-0.55]), as was taking 12 000 steps per day (HR, 0.35 [95% CI, 0.28-0.45]). Unadjusted incidence density for all-cause mortality by peak 30 cadence was 32.9 per 1000 person-years (406 deaths) for the 1080 individuals who took 18.5 to 56.0 steps per minute; 12.6 per 1000 person-years (207 deaths) for the 1153 individuals who took 56.1 to 69.2 steps per minute; 6.8 per 1000 person-years (124 deaths) for the 1074 individuals who took 69.3 to 82.8 steps per minute; and 5.3 per 1000 person-years (108 deaths) for the 1037 individuals who took 82.9 to 149.5 steps per minute. Greater step intensity was not significantly associated with lower mortality after adjustment for total steps per day (eg, highest vs lowest quartile of peak 30 cadence: HR, 0.90 [95% CI, 0.65-1.27]; *P* value for trend = .34).

CONCLUSIONS AND RELEVANCE Based on a representative sample of US adults, a greater number of daily steps was significantly associated with lower all-cause mortality. There was no significant association between step intensity and mortality after adjusting for total steps per day.

JAMA. 2020;323(12):1151-1160. doi:10.1001/jama.2020.1382