Supplemental methods:

We used a SAS program developed by the National Cancer Institute (NCI) to import and analyze NHANES PA monitor data[30]. Non-wear was defined by an interval of at least 60 consecutive minutes of zero activity intensity counts, with allowance for 1–2 min of counts between 0 and 100. The non-wear time definition included sleep time. Wear time during waking hours was determined by subtracting non-wear time from 24 hours. A valid day was defined as having 10 or more hours of monitor wear. Data for participants with four or more valid days are included in the current analyses.

Definitions of PA intensity: Activities such as sitting and working at a desk or driving an automobile barely raise the energy expenditure above the basal metabolic rate and hence are sedentary (Table 1). Counts recorded during sedentary activities are typically below 100 /min[31]. Hence, sedentary activity was defined as counts < 100/min during detected wear time. A NCI/NCHS publication used weighted averages from four studies[32-35] to define moderate PA as 2020 to 5999 counts/min and vigorous PA as counts ≥ 6000/min[19]. Some authors have considered activities with accelerometer counts between 100 and 500/ min as sedentary[36]. Therefore, time spent at < 2,020 activity counts/min was further categorized into low (100-499 counts/min) and light (500-2,019 activity counts/min) intensity activities. PA intensity duration for each activity was normalized to per 60 min by the following formula (total activity duration recorded per day/total wear time per day) X 60.

Model diagnostics: The proportional hazards assumptions for the Cox regression was evaluated by comparing Cox regression coefficients for the first 18 months to Cox regressions after 18 months in a time dependent analysis. Linearity of the association of the log HRs with the respective activity levels was tested using natural cubic splines with three knots. Time dependent Cox regression analyses confirmed that the overall inverse association of mortality with light activity persisted when the hazard ratio for light activity was estimated based on the later portion of the follow-up period starting 18 months after the activity assessment.

Additional diagnostic analyses tested for the presence of pairwise interactions between the different activity levels.

Theoretical estimation of energy expenditure associated with trade-off of sedentary activities duration with equal amount of light activities duration: The mean weight of the study population was 81.1±15.9 kg. Hence, we examined the energy expenditure for a person weighing 80 kg. Assuming 16 hrs/ day of awake time, we calculated the weekly energy expenditure for a person weighing 80 kg for trade-off of 1 to 5 min/ hr of sedentary activity at 1.2 METs with low intensity activities at 1.4 METs and light intensity activities at 2.5 METs. Additional kcal/week was calculated as the difference in energy expenditure between sedentary activity and light activity using the equation Kcal/ week = (METs/hr) x weight in kg X weekly duration of the physical activity[37]. These results are presented in supplemental Figure 1.

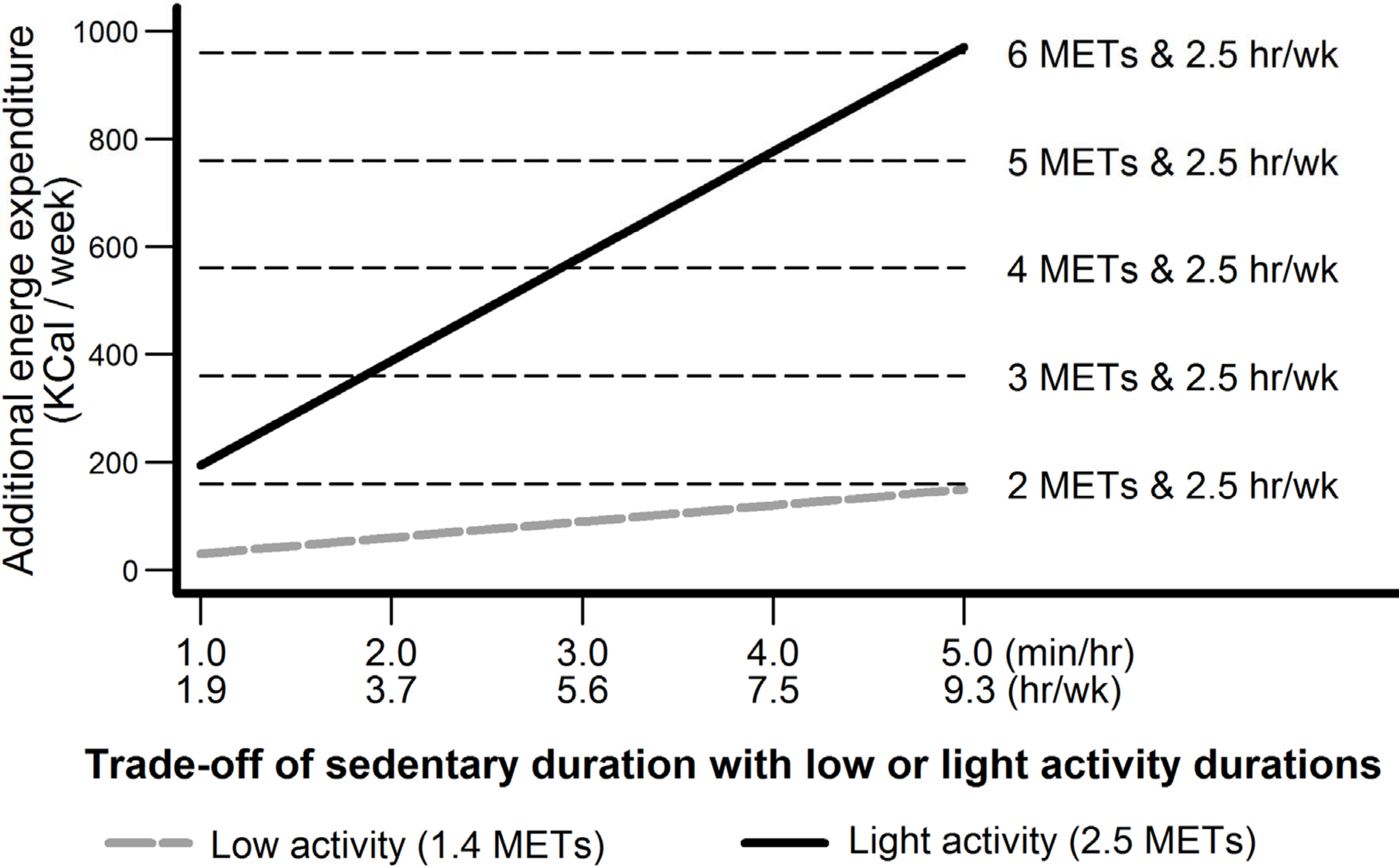
Supplement Table 1. Hazard ratios* of death per 2 min/hr trade-off of lower level activity with higher level activity in extended models with additional covariates adjustment ***

Entire population	↑ 2 min/hr of low activity duration	↑ 2 min/hr of light activity duration	↑ 2 min/hr of MV activity duration
↓2 min/hr of sedentary duration	1.06 (0.89, 1.27), p=0.49	0.71 (0.52, 0.97), p=0.04	0.84 (0.43, 1.67) , p=0.61
↓2 min/hr of low activity duration		0.67 (0.42, 1.07), p=0.09	0.80 (0.41, 1.54) , p=0.48
↓2 min/ hr of light activity duration			1.19 (0.52, 2.76) , p=0.66
CKD subgroup			
↓2 min/hr of sedentary duration	1.31 (0.99, 1.75), p=0.06	0.57 (0.35, 0.95), p=0.03	0.40 (0.07, 2.36) , p=0.29
↓2 min/hr of low activity duration		0.44 (0.21, 0.90), p=0.03	0.30 (0.05, 1.80) , p=0.17
↓2 min/ hr of light activity duration			0.69 (0.08, 5.70) , p=0.72

*in Cox regression models taking survey design into account
** mortality risk associated with each 2 min/hr less in a lower activity duration with a corresponding 2 min/hr more in a higher activity duration while controlling for the other two activity durations
***adjusted for age, gender, race, education, smoke, alcohol use, lung disease, mobility limitations, history of congestive heart failure, coronary heart disease, stroke, diabetes, hypertension, cancer, waist (missing in 118 in entire cohort and 16 in CKD subgroup), serum high sensitivity C-reactive protein (missing 2 in the entire cohort) and urine albumin to creatinine ratio (missing in 32 in entire cohort and 10 in CKD subgroup).

Supplemental Figure legend

Supplemental Figure 1 Theoretical estimation of energy expenditure with trade-off of sedentary duration with equal amount of low or light activity durations



Hrs/week are calculated as ((min/hr) x 16 x 7)) / 60 assuming 16 awake hrs/day
Horizontal dotted lines represent the additional energe expenditure (Kcal/week) spent by 2.5 hr/week of MVPA at various MET levels, respectively