

Age-related trends in physical activity and sleep across the U.S. urban-rural continuum: Evidence from the National Wellbeing Survey, 2021-2023

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Background: It is well established that physical activity and sleep duration decrease as age increases, conferring several deleterious non-communicable health outcomes, including overweight/obesity and Type 2 diabetes. Despite a growing body of evidence on differences in health behaviors by urban-rural geographic residence, there is limited evidence on how the intersection of age and urban-rural status is associated with physical activity and sleep. The purpose of this study was to investigate age-related trends in physical activity and sleep among U.S. adults across the urban-rural continuum.



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Methods: We analyzed pooled, annual data from three waves of the National Wellbeing Survey (2021-2023), a population-based cross-sectional survey of U.S. adults (18-64 years). Participants reported number of days engaging in ≥ 30 min of moderate physical activity (MPA) and vigorous physical activity (VPA), and sleep duration. Rural-Urban Continuum Codes (RUCC) classified participants into three metropolitan and six non-metropolitan categories (1-9 categorical variable). We used weighted linear regression to compute main effect and interaction models (age x RUCC) with behaviors as outcomes, adjusting for sex, race/ethnicity, and household income. Post-hoc marginal predicted probabilities and two-way contour plots were also constructed. **Results:** The final sample included 18,763 participants (41 \pm 14 years, 50% female). Participants engaged in MPA on 3.2 \pm 1.3 days/week, VPA on 2.6 \pm 1.3 days/week and slept 7.0 \pm 1.8 hours/day. Main effects revealed negative associations between age and MPA (coef= -0.003, 95%CI:-0.005,-0.001), VPA (coef= -0.011, 95%CI:-0.013,- 0.001), and sleep (coef = - 0.025, 95% CI:-0.020,-0.012). Interactions between urban-rural status and age were found for both MPA (coef= -0.002, 95% CI:-0.002,-0.001) and VPA (coef= -0.001, 95%CI:-0.002,-0.001), wherein older adults in rural areas engaged in significantly less MPA and VPA, compared to adults in more urbanized areas. **Conclusion:** Older adults living in rural areas may be at greatest risk for age-related declines in physical activity underscoring the need for context-specific behavioral interventions among this population.