Walking or Biking to Work Improves Physical Fitness and Cardiovascular Risk Profile

Gordon-Larsen P, Boone-Heinonen J, Sidney S, et al. Active commuting and cardiovascular disease risk: the CARDIA study. Arch Intern Med 2009;169:1216–23.

Study Overview

Objective. To determine whether active commuting (walking or biking to work) is associated with physical fitness and cardiovascular disease risk factors.

Design. Cross-sectional observational population-based study.

Setting and participants. Participants were part of the Coronary Artery Risk Development in Young Adults (CARDIA) study. 5115 subjects in 4 U.S. cities were originally enrolled in 1985–6. At the 20-year examination, 3549 subjects were remaining in the cohort (72% study retention rate). Subjects not working outside the home, those for whom work or covariate data were missing, pregnant women, and a transgendered individual were excluded from the current analysis. The final study sample included 2364 subjects. The mean age of subjects was 45 years. Active commuting—the main exposure—was defined as any walking or biking on the trip between home and place of work, as reported by study subjects. The major confounding variable, subjects' participation in vigorous and moderate physical activities other than their commute to work, was assessed via interview and via an accelerometer worn during nearly all daily activities. Other confounding variables included sociodemographic characteristics (eg, age, race, income) and behavioral characteristics (eg, smoking and alcohol consumption). Associations between active commuting and the study outcomes were assessed using multivariate regression to control for measured confounders, stratified by gender.

Main outcome measures. Physical fitness was assessed using a modified Balke protocol graded exercise test in which subjects were encouraged to exercise until exhaustion. Longer treadmill exercise duration indicated greater physical fitness. Other outcome measures were body mass index (BMI), obesity, and risk factors for cardiovascular disease: blood pressure, and fasting cholesterol, glucose, and insulin levels. All outcomes were assessed by study staff.

Main results. 16.7% of study subjects engaged in active commuting (median, 20 minutes per trip among men and 17 minutes among women). Compared with nonactive commuters, active commuters engaged in greater noncommuting physical activity, had higher educational attainment, and drank more alcohol. Other subject-level covariates were evenly distributed between active and nonactive commuters. After controlling for confounders, treadmill exercise duration was higher among active commuters than nonactive commuters (adjusted effect size, 50 seconds [95% confidence interval {CI}, 31–69 among men; 29 seconds [95% CI, 12–46 among women]). Male active commuters had lower mean BMI (adjusted OR, 0.95 [95% CI, 0.92–0.97]) and a lower rate of obesity (adjusted OR, 0.50, [95% CI, 0.33–0.76]) than male nonactive commuters. Also among male subjects, 3 cardiovascular risk factors were more favorable among active commuters than among nonactive commuters: lower triglyceride levels (adjusted OR, 0.88 [95% CI, 0.80–0.98]), lower mean diastolic blood pressure (adjusted difference, 1.67 mm Hg [95% CI, 0.15–3.20]), and lower fasting insulin levels (adjusted OR, 0.86 [95% CI, 0.78–0.93]). There were no differences between active and nonactive commuters on other cardiovascular risk factors among males, and no differences in BMI, obesity rates, or any cardiovascular risk factor among women.

Conclusion. Walking or biking to work is associated with greater physical fitness among both men and women. Active commuting was also associated with lower obesity rates and more favorable cardiovascular risk factor profile among men. Strategies to enable and encourage active commuting may constitute effective interventions to reduce obesity and improve cardiovascular disease risk.

Commentary

Walking, a common and accessible means of exercise among adults, has been promoted to increase physical fitness and avoid weight gain [1]. While the relationship between leisure-time walking, adiposity, and cardiovascular risk factors has been extensively studied [2,3], the impact of active commuting has been less well-described, with the major source of evidence being studies conducted in Scandinavian countries

[4]. Because commuting patterns and cardiovascular disease rates differ between the United States and Scandinavian countries, confirmation of these findings in the United States would help shape domestic health counseling practices and other social interventions.

The current investigation by Gordon-Larsen and colleagues presents results from a cross-sectional observational study of a population-based cohort in 4 U.S. cities investigating the associations between active commuting, physical fitness, obesity, and cardiovascular risk factors. After controlling for confounders including leisure-time physical activity, male and female subjects who were active commuters had greater physical fitness than nonactive commuters. In addition, male active commuters had lower rates of obesity and more favorable cardiovascular risk profiles than male nonactive commuters. Female active commuters did not appear to enjoy the same effects of active commuting on obesity and cardiovascular risk factors.

This study has limitations. First, as an observational study, causal relationships between active commuting and the outcomes of interest cannot be inferred. Second, no statistical adjustment for multiple comparisons was performed, increasing the probability that some statistically significant findings were solely due to chance. Third, missing data may bias the study results. The study cohort lost 28% of its members over time, and among those not lost, individual data elements resulted in the exclusion of approximately 20% of the remaining sample. The relationship between active commuting and the outcomes of interest may be different among these missing cohort members. Fourth, we cannot be certain that the observed differences in cardiovascular risk factors associated with active commuting have the same implications for cardiovascular outcomes (eg, cardiovascular mortality) as cardiovascular risk factor differences due to other interventions (eg, pharmacologic therapy). Finally, the authors did not investigate whether exercise in the form of active commuting differed from leisure-time exercise in its "dose–response" effectiveness on the outcomes of interest. Determining whether active commuting has a different level of effectiveness than leisure-time exercise (which may be less evenly scheduled) would inform debates over the most optimal "dosing regimen" of exercise.

Applications for Clinical Practice

The findings of this study suggest that active commuting may increase physical fitness and, among men, decrease obesity and improve cardiovascular risk factors. Counseling, social engineering, and other mechanisms to encourage this form of exercise may constitute effective means of improving cardiovascular health.

—Review by Mark W. Friedberg, MD, MPP

References

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