Putting it all together in one study .. from Denmark …

A Study of the Combined Effects of Physical Activity and Air Pollution on Mortality in Elderly Urban Residents: The Danish Diet, Cancer, and Health Cohort

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Background: Physical activity reduces, whereas exposure to air pollution increases, the risk of premature mortality. Physical activity amplifies respiratory uptake and deposition of air pollutants in the lung, which may augment acute harmful effects of air pollution during exercise.

Objectives: We aimed to examine whether benefits of physical activity on mortality are moderated by long-term exposure to high air pollution levels in an urban setting.

Methods: A total of 52,061 subjects (50–65 years of age) from the Danish Diet, Cancer, and Health cohort, living in Aarhus and Copenhagen, reported data on physical activity in 1993–1997 and were followed until 2010. High exposure to air pollution was defined as the upper 25th percentile of modeled nitrogen dioxide (NO_2) levels at residential addresses. We associated participation in sports, cycling, gardening, and walking with total and cause-specific mortality by Cox regression, and introduced NO_2 as an interaction term.

Results: In total, 5,534 subjects died: 2,864 from cancer, 1,285 from cardiovascular disease, 354 from respiratory disease, and 122 from diabetes. Significant inverse associations of participation in sports, cycling, and gardening with total, cardiovascular, and diabetes mortality were not modified by NO_2. Reductions in respiratory mortality associated with cycling and gardening were more pronounced among participants with moderate/low NO_2 [hazard ratio (HR) = 0.55; 95% CI: 0.42, 0.72 and 0.55; 95% CI: 0.41, 0.73, respectively] than with high NO_2 exposure (HR = 0.77; 95% CI: 0.54, 1.11 and HR = 0.81; 95% CI: 0.55, 1.18, *p*-interaction = 0.09 and 0.02, respectively).

Conclusions: In general, exposure to high levels of traffic-related air pollution did not modify associations, indicating beneficial effects of physical activity on mortality. These novel findings require replication in other study populations.

This study concludes that **sports, cycling and gardening are very good for reducing heart, lung and diabetes deaths**

from Denmark … Looking at low vs high traffic exposure

Cyclists in the most traffic polluted areas tended to have had higher total, cancer and heart related deaths than those who did not exercise

But tended to have lower respiratory and diabetes deaths

Table S1. Adjusted associations[a] of total and cause-specific mortality with cycling among 52,061 participants in Diet, Cancer and Health cohort, by intensity of cycling and different levels of NO_2.

Physical Activity	Low NO_2 (< 15.1 µg/m^3) HR (95% CI	Moderate NO_2 (15.1-23.9 µg/m^3) HR (95% CI	Very high NO_2 (≥ 23.9 µg/m^3) HR (95% CI	*p-value*[b]
Total mortality (*n* = 5,534)				
Does not cycle	1.00	1.26 (1.15, 1.39)	1.39 (1.22, 1.58)	
Cycles 0.5-4 h/week	0.87 (0.79, 0.95)	1.00 (0.91, 1.10)	1.10 (0.96, 1.26)	
Cycles >4 h/week	0.82 (0.72, 0.93)	1.02 (0.92, 1.14)	1.19 (1.01, 1.40)	*0.52*
Cancer mortality (*n* = 2,864)				
Does not cycle	1.00	1.22 (1.07, 1.39)	1.36 (1.13, 1.64)	
Cycles 0.5-4 h/week	0.97 (0.86, 1.10)	1.09 (0.96, 1.23)	1.19 (0.98, 1.45)	
Cycles >4 h/week	0.91 (0.76, 1.08)	1.14 (0.99, 1.33)	1.16 (0.92, 1.47)	*0.71*
Cardiovascular mortality (*n* = 1,285)				
Does not cycle	1.00	1.36 (1.13, 1.64)	1.78 (1.39, 2.29)	
Cycles 0.5-4 h/week	0.83 (0.68, 1.01)	1.09 (0.90, 1.31)	1.21 (0.91, 1.61)	
Cycles >4 h/week	0.73 (0.55, 0.96)	0.98 (0.78, 1.23)	1.38 (1.00, 1.91)	*0.78*
Respiratory mortality (*n* = 354)				
Does not cycle	1.00	1.02 (0.74, 1.40)	0.73 (0.45, 1.18)	
Cycles 0.5-2 h/week	0.56 (0.39, 0.81)	0.72 (0.51, 1.02)	0.48 (0.26, 0.89)	
Cycles >4 h/week	0.49 (0.28, 0.85)	0.57 (0.37, 0.88)	0.57 (0.29, 1.12)	*0.78*
Diabetes mortality (*n* = 122)				
Does not cycle	1.00	1.36 (0.79, 2.37)	1.20 (0.56, 2.53)	
Cycles 0.5-2 h/week	0.69 (0.35, 1.34)	0.86 (0.46, 1.61)	0.69 (0.25, 1.84)	
Cycles >4 h/week	0.55 (0.21, 1.47)	0.75 (0.36, 1.56)	0.56 (0.16, 1.91)	*0.98*

HR hazard ratio; CI confidence interval.

[a]Adjusted for NO_2, gender, calendar year, and mutually for other three physical activities, occupational physical activity, smoking status, smoking intensity, smoking duration, alcohol intake, environmental tobacco smoke, education, fruit and vegetable intake, fat intake, risk occupation, mean income in municipality, and stratified by marital status. [b]*p*-value for interaction.