Dose–response association of physical activity with acute myocardial infarction: Do amount and intensity matter?

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Preventive Medicine 2013;57:567-72.

Background

- Physical inactivity has long been recognized as an independent risk factor for coronary heart disease (CHD).

- Current public health recommendations for PA state that all individuals should accumulate 30 min or more of moderate-intensity PA on five days each week or 20 min of vigorous-intensity PA on three days each week.

(Bijnen et al., 1994; Fletcher et al., 1992)

Background

- Nevertheless, debate is ongoing about the amount and intensity of PA needed to reduce the risk of CHD.

  - Q1: How much activity do we need to practice to obtain the beneficial effects of PA?

  - Q2: What kind of activity do we need to practice to obtain these benefits?

Aims

- To analyze the dose–response association between leisure time PA practice and acute myocardial infarction (MI), considering
  - not only the amount of total PA practice;
  - but also the amount of PA practice at different levels of intensity.

- To determine whether these associations were modified by age.

Design

- A population-based age- and sex- matched case–control study.
- Cases: first acute MI patients aged 25 to 74 years admitted to coronary care units in the participating hospitals.
- Controls: age- (±2 years) and sex-matched controls randomly selected from population-based surveys.

Physical activity assessment

- Minnesota Leisure Time Physical Activity Questionnaire:
  - Energy expenditure in light intensity PA
  - Energy expenditure in moderate intensity PA
  - Energy expenditure in high intensity PA
  - Total energy expenditure in PA

Statistical analysis

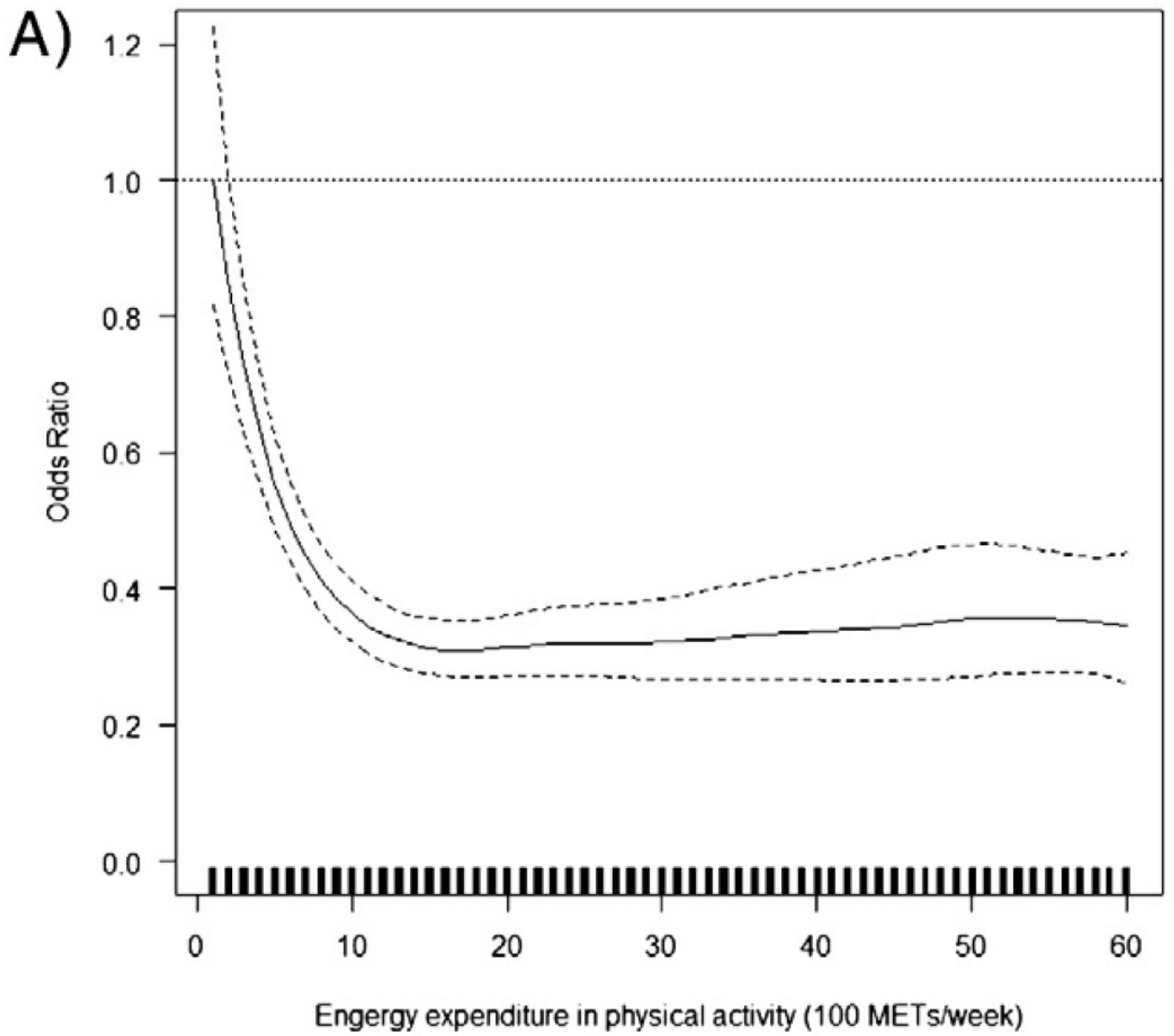
- Conditional logistic regression.

- Non-parametric generalized additive models (smoothing splines): to analyze departure from linear dose-response association.

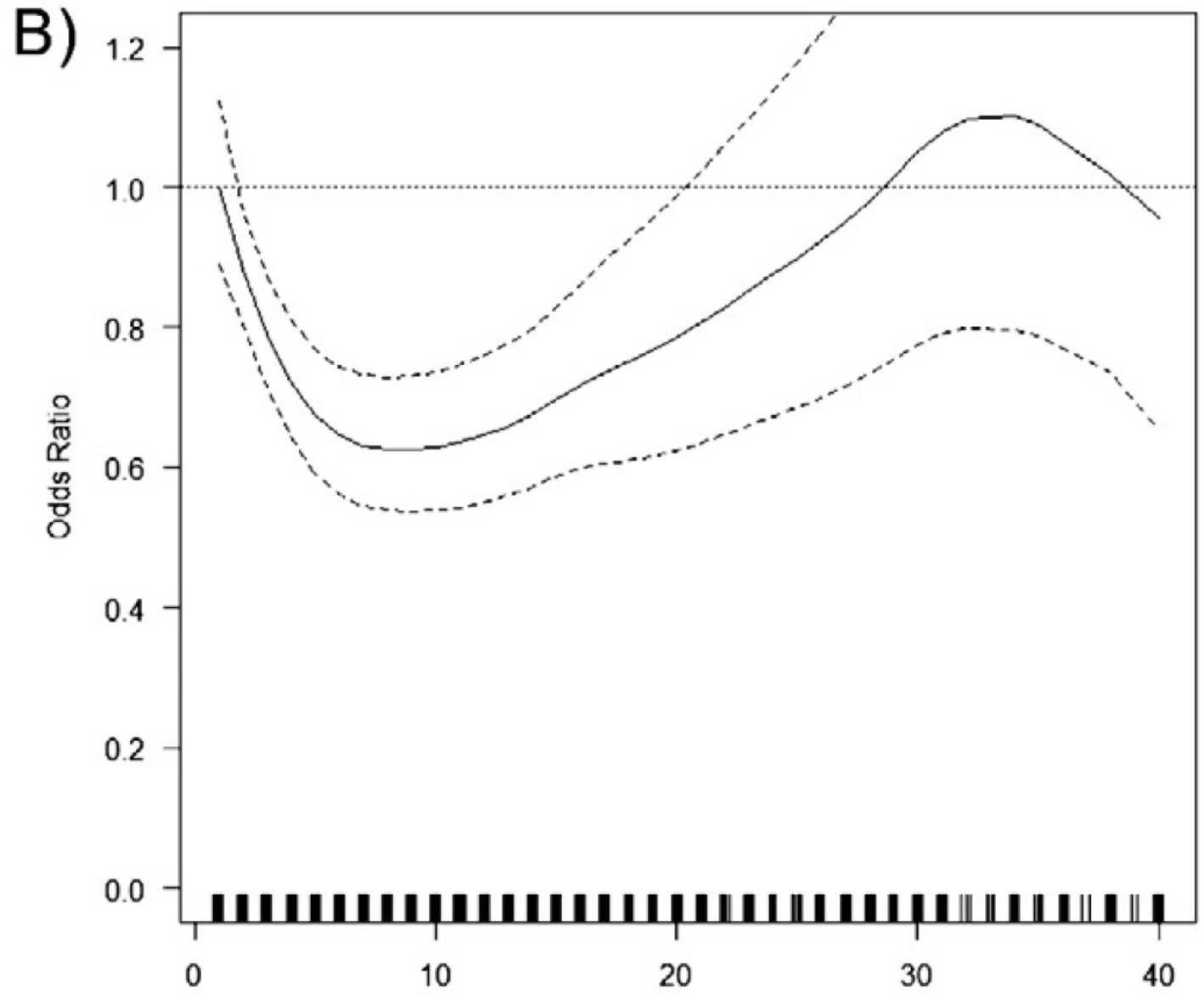
Results

	Cases n = 1339	Controls n = 1339	p-value
Age (years)[b]	61.1 (10.7)	61.0 (10.5)	0.735
Women, n (%)	302 (22.6)	302 (22.6)	1.000
Smoking, n (%)	565 (44.9)	298 (22.6)	<0.001
Hypertension, n (%)	709 (54.3)	426 (31.8)	<0.001
Dyslipidemia, n (%)	681 (53.7)	412 (30.8)	<0.001
Diabetes, n (%)	360 (27.9)	225 (16.8)	<0.001
Total EEPA[a] (MET·min/week)[c]	1242 (311; 2757)	1745 (868; 3220)	<0.001
EE Light PA[a] (MET·min/week)[c]	432 (0; 1470)	607 (98; 1380)	<0.001
EE Moderate PA[a] (MET·min/week)[c]	0 (0; 645)	343 (4; 1316)	<0.001
EE High PA[a] (MET·min/week)[c]	56 (0; 189)	112 (0; 308)	<0.001

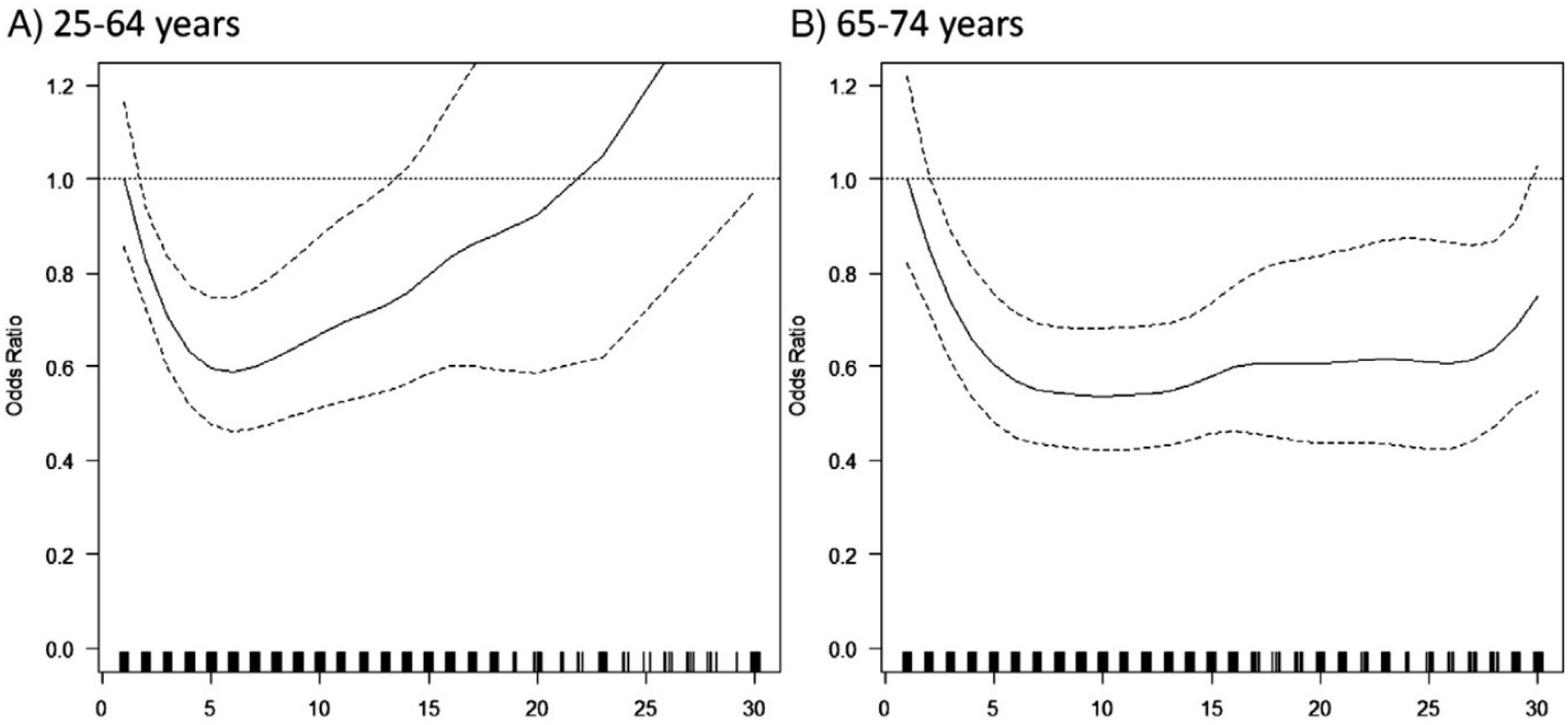
Total PA and MI odds



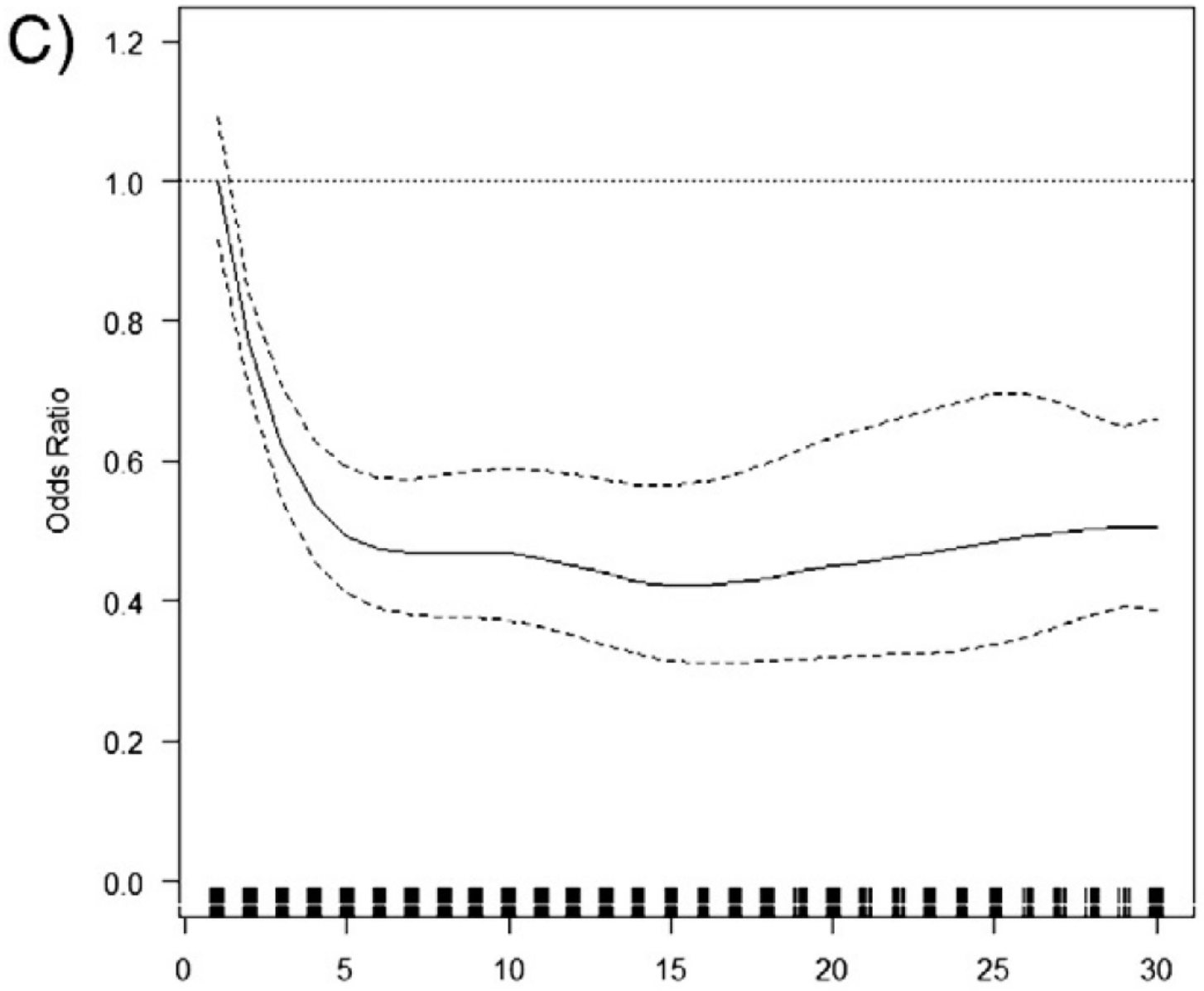
Light intensity PA and MI odds



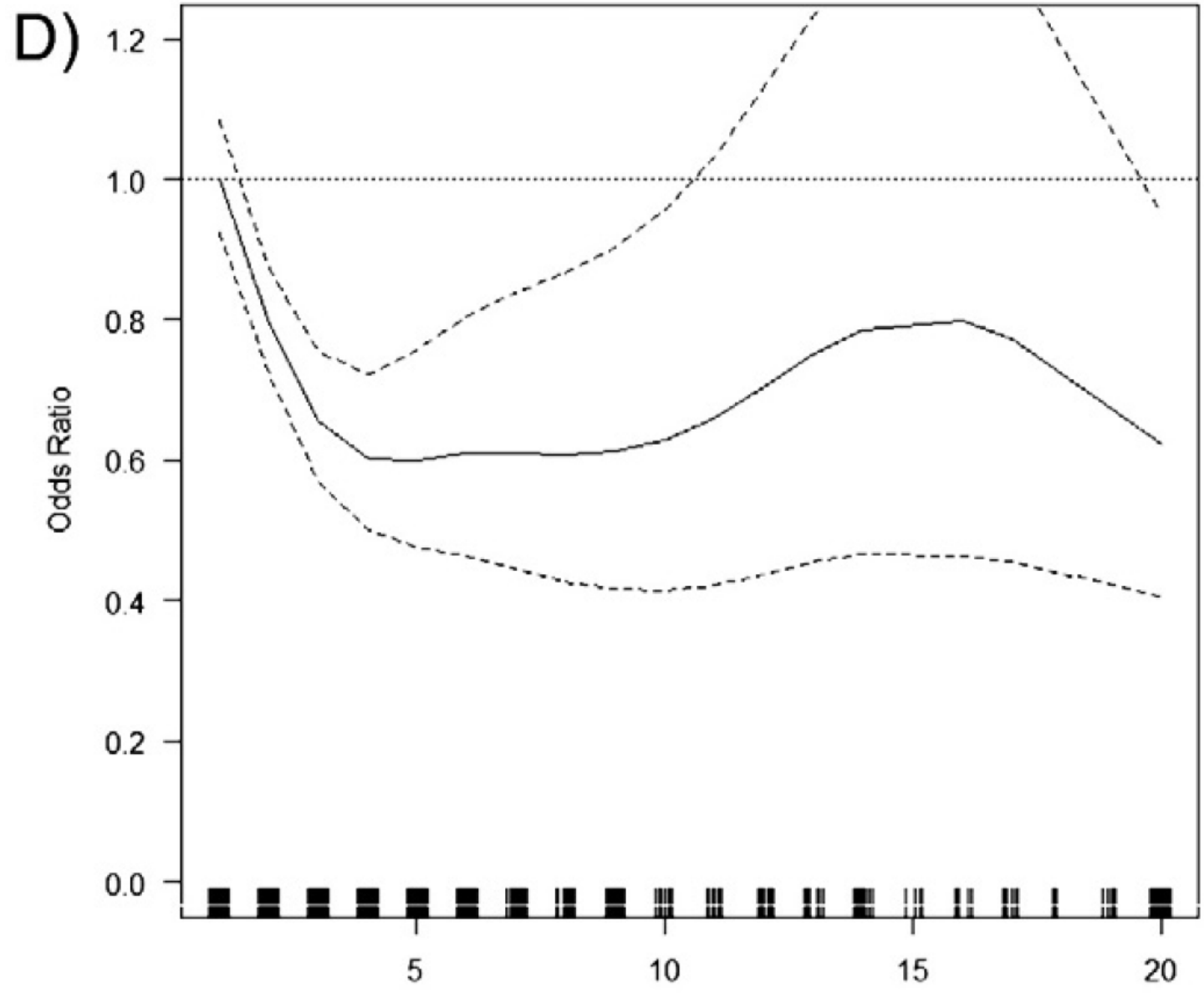
Light intensity PA and MI odds in different ages



Moderate intensity PA and MI odds



High intensity PA and MI odds



Conclusions

- We defined the dose-response relationship between PA and MI, finding:
  - lower MI probabilities at low PA doses, 500 Kcal/week;
  - with lowest MI odds around 1500 Kcal/week;
  - and a plateau thereafter.

- Light intensity PA is associated with lower MI odds in subjects older than 65 y. but not in younger individuals.

- Most of the population could achieve this PA practice level by walking (4-5 km/h) at least 140 min/week which could reduce the odds of MI by 40-60%.

- Thanks to all the Heracles investigators for this award.

- Thanks to Gendiag for their support to this Heracles initiative.