

Fit for life? Low cardiorespiratory fitness in adolescence is associated with a higher burden of future disability. Henriksson P et al.

Supplementary Materials

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Pontus Henriksson, Eric J Shiroma, Hanna Henriksson, Per Tynelius, Daniel Berglind, Marie Löf, I-Min Lee, Francisco B Ortega

Corresponding author: Pontus Henriksson, Department of Health, Medicine and Caring Sciences, Linköping University, Linköping 58183, Sweden.

Phone: 46-13281000; Email: pontus.henriksson@liu.se.

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PAF analysis

The population attributable fraction (PAF) of chronic disability associated with lack of cardiorespiratory fitness has not previously been assessed in youth. Hence, we used Cox proportional hazards regression models to estimate hazard ratios (HRs) with 95% confidence intervals (95% CIs). Men were followed until they were granted disability pension, died or emigrated or until the end of follow-up (December 31, 2012), whichever occurred first. Associations of cardiorespiratory fitness with later disability pension from all and specific causes were adjusted for conscription year, conscription center, age at conscription, childhood socioeconomic position and BMI. In addition, analyses with disability pension due to all and psychiatric causes were also adjusted for any mental hospitalization before conscription and for any psychiatric diagnosis at conscription. The PAF is a measure which estimates the proportion of cases that would not occur if the risk factor were reduced or eliminated. We calculated the later disability PAF under two scenarios: i) if unfit participants (deciles 1-2) were to become fit (i.e. deciles 3-10) and ii) if all participants (apart from those already in the highest decile of fitness) were to increase their fitness by 1 decile. To use the adjusted relative risks of fitness on later disability from the main analyses and due to the decile strata of fitness, we used the PAF equation¹ for adjusted relative risks with multiple strata as described in **Supplementary Table 1**. PAF estimates for lack of physical fitness are presented in **Supplementary Table 2**.

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REFERENCES

1. Benichou J. A review of adjusted estimators of attributable risk. *Stat Methods Med Res* 2001; 10(3): 195-216.
2. Lee IM, Shiroma EJ, Lobelo F, et al. Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *Lancet* 2012; 380(9838): 219-29.

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Supplementary Table 1. Equation for population attributable factor calculations

$$PAF = \frac{\sum Pd_i * RR_i - \sum Pd_j * RR_i}{\sum Pd_i * RR_j}$$

Equation 1. Equation for population attributable fraction using adjusted relative risks across multiple strata; where:

- Pd_i is the prevalence of lower fitness among those who later develop disability for fitness level i , current exposure
- Pd_j is the prevalence of lower fitness among those who alter develop disability for fitness level i , ideal or new level of exposure
- RR_i is the adjusted relative risk, RR_j is the adjusted relative risk at lower fitness level i .

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Supplementary Table 2. Population attributable fractions (95% confidence intervals) for later disability by cause associated with lower physical fitness.

Disability Cause	Population Attributable Fraction (%) ¹	
	If unfit become fit ^{2,3}	If all increase fitness by one decile ^{2, 4}
All-Cause	14.2 (13.8, 14.6)	10.2 (8.5, 11.7)
Psychiatric	14.9 (14.4, 15.5)	10.5 (8.2, 12.6)
Musculoskeletal	15.1 (14.3, 15.9)	11.3 (6.9, 14.9)
Injuries	8.9 (7.7, 10.0)	7.0 (2.8, 10.4)
Nervous System	14.4 (12.9, 15.9)	8.9 (2.5, 13.6)
Cardiovascular diseases	21.5 (19.7, 23.1)	16.2 (3.5, 24.3)
Tumours	7.7 (4.2, 10.7)	5.1 (-8.6, 12.9)

¹ Population attributable fraction is adjusted for conscription year, age, childhood socioeconomic position and BMI at conscription. Models with disability pension due to all or psychiatric causes were also adjusted for any mental hospitalization before conscription and for any psychiatric diagnosis at conscription.

² Fitness levels were categorized by deciles of cardiorespiratory fitness.

³ If unfit participants (i.e. deciles 1-2) were to become fit (i.e. deciles 3-10)

⁴ If all participants with a fitness level in deciles 1 to 9 were to increase their fitness by 1 decile