

Adverse childhood experiences, population attributable risk and incremental risk of coronary heart disease: a 13 years follow-up of the Whitehall II cohort study

Background

Adverse childhood experiences (ACEs), such as parental divorce, parental mental illness, parental separation, have been increasingly recognised as an upstream potential causal factor of development and premature mortality of coronary heart disease (CHD). No studies, however, have investigated attributable risk for incident CHD by each and all types of ACEs, and associations between combinations of ACEs and incident CHD.

Methods

Among 5149 participants aged 35 to 55 at entry (1985-1988) to the Whitehall II cohort study with follow-up of 12.9 years, we examined; (i) associations between ACEs and incident CHD; (ii) what extent removal of each and all ACEs could eliminate incident CHD; and (iii) incremental risk of CHD in the association with ACEs combinations. Cox proportional hazard regression was applied to estimate hazard ratios and 95% confidence intervals. After identifying a model, we computed the average marginal effects, and hazard ratios and 95% confidence intervals for each ACEs combination. Incident CHD was identified through the Hospital Episode Statistics (HES) from Phase 5 (1997-1999) when ACEs were measured, to Phase 11 (2012-2013).

Results

In the study sample, 65.6% had at least one ACE. After adjusting for sex, age, ethnicity, and childhood socioeconomic status, none of ACEs ('parental attachment', 'financial hardship', 'parental punishment', 'parental dysfunction', 'early-life parental separation', 'orphanage', 'hospitalisation') had statistically significant associations with incident CHD. All types of ACEs were attributed to approximately 13% of incident CHD, on average 1.9% by each ACE. Estimated hazards of CHD are more likely to depend on ACEs combinations than counts of ACEs. For instance, those who experienced three ACEs (financial hardships, early-life parental separation, and hospitalisation) had 1.52 times higher hazard (95%CI: 1.10 to 2.12), while those who had four ACEs (poor parental attachment, financial hardships, parental harsh punishment, and early-life parental separation) had 1.31 times higher hazard (95%CI: 1.03 to 1.67), than those did not have ACEs.

Conclusions

The findings of this study show that there is incremental risk of CHD in ACEs combinations. As the ACEs are more likely to co-occur, even if an individual ACE had no associations with increased risk

of CHD, it is crucial to intervene in ACEs holistically. By taking away all types of ACEs, we estimated that 13% probability of developing CHD could be eliminated. This finding can be scientific evidence for early childhood framework for intervention to reduce health inequalities over life course, which are originated in early life.

Key words

Adverse childhood experiences; incident coronary heart disease; population attributable risks; electronic health records; selection bias