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Review Paper

After 50 years and 200 papers, what can the Midspan cohort studies tell us about our mortality?

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ABSTRACT

Objective: To distil the main findings from published papers on mortality in three cohorts involving over 27,000 adults, recruited in Scotland between 1965 and 1976 and followed up ever since.

Method: We read and summarized 48 peer-reviewed papers about all-cause and cause-specific mortality in these cohorts, published between 1978 and 2013.

Results: Mortality rates were substantially higher among cigarette smokers in all social classes and both genders. Exposure to second-hand smoke was also damaging. Exposure to higher levels of black smoke pollution was associated with higher mortality. After smoking, diminished lung function was the risk factor most strongly related to higher mortality, even among never-smokers. On average, female mortality rates were much lower than male but the same risk factors were predictors of mortality.

Mortality rates were highest among men whose paternal, own first and most recent jobs were manual. Specific causes of death were associated with different life stages. Upward and downward social mobility conferred intermediate mortality rates. Low childhood cognitive ability was strongly associated with low social class in adulthood and higher mortality before age 65 years. There was no evidence that daily stress contributed to higher mortality among people in lower social positions.

Men in manual occupations with fathers in manual occupations, who smoked and drank >14 units of alcohol a week had cardiovascular disease mortality rates 4.5 times higher than non-manual men with non-manual fathers, who neither smoked nor drank >14 units. Men who were obese and drank >14 units of alcohol per day had a mortality rate due to liver disease 19 times that of normal or underweight non-drinkers. Among women who never smoked, mortality rates were highest in severely obese women in the lowest occupational classes.

Conclusion: These studies highlight the cumulative effect of adverse exposures throughout life, the complex interplay between social circumstances, culture and individual capabilities, and the damaging effects of smoking, air pollution, alcohol and obesity.

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Some key findings from the studies.

1989 Never-smokers had higher mortality rates from lung cancer and cardiovascular disease if they lived with a smoker.
1996 Lung function was inversely associated with all-cause mortality risk in both smokers and never-smokers.
1998 There was a cumulative effect on mortality from factors associated with social position throughout life.
2003 Lower cognitive ability scores in childhood predicted lower social position in adulthood and higher mortality rates.
2006 When smoking and pre-existing disease were adjusted for, being overweight was associated with important increases in all-cause and cardiovascular disease mortality.
2009 Smoking itself was a greater source of health inequality than social position and nullified women's survival advantage over men.
2010 Compared with normal or underweight non-drinkers, men drinking more than 14 units of alcohol a week were three times more likely to die from liver disease if their weight was normal but 19 times if they were obese.
2011 Women who had never smoked and were not obese had the lowest mortality rates, regardless of their social position.

Introduction

Between 1965 and 1976, the medical epidemiologist Victor Hawthorne (1921–2014) and his colleagues recruited three cohorts of mainly middle-aged people living in west and central Scotland: the Main & Tiree Study (1965–68), the Collaborative Study (1970–73) and the Renfrew & Paisley Study (1972–76). A fourth cohort was established in 1996 with offspring of married couples in the Renfrew & Paisley Study. Collectively, they are known as the Midspan studies.

Whilst the first two cohorts were mainly men recruited from workplaces, the Renfrew & Paisley cohort included about 78% of all the 45–64 year olds in an area with high levels of socio-economic deprivation. It was also the first in the United Kingdom to include large numbers of middle-aged women.

The initial aim of the Midspan studies was to improve understanding of cardiorespiratory risks and diseases in the population. By linking data from the participants with details of their subsequent deaths, hospitalisations, cancer registrations and other datasets, they have provided a unique source of information about the health of people living in this part of Scotland. By combining and comparing data from these and other cohorts such as the Whitehall study, further useful findings have been generated.

Since 1965, results from the Midspan studies have been published in around 200 papers in 78 biomedical journals. A full listing is provided on the Midspan website at: www.gla.ac.uk/midspan. With so many publications, scattered over time and journal space, it is difficult to form a coherent picture of what has been learnt. The present paper distils the findings from 48 papers that focused on all-cause and cause-specific mortality in the first three cohorts. Our aim is to highlight what they have revealed about patterns of mortality and the possible underlying causes and contributors and to consider their relevance for improving health and reducing health inequalities.

Methods

The cohorts

A summary of the cohorts is given in Table 1. More details are available on the Midspan website and in an earlier paper.[1] Most of the studies reviewed here used data from the Collaborative and Renfrew & Paisley studies.

Information at recruitment

At recruitment, participants completed a questionnaire, underwent various measurements and tests and gave a blood sample. Full details are provided on the Midspan website. Around half the participants were rescreened after one to seven years but these data have been little used in the publications we reviewed.

Table 1 – The Midspan cohorts.

Cohort	Recruited	Sampling frame	Location	Number	Age (y)
Main	1965–67	13 Factories	Central Scotland	3930 3411 m 519 f	15–70
Tiree	1967–68	General population	Isle of Tiree & Glasgow	762 336 m 426 f	14–92
Collaborative	1970–73	27 Workplaces	Glasgow Clydebank Grangemouth	7028 6022 m 1006 f	21–75
Renfrew and Paisley	1972–76	General population (78% response)	To the west of Glasgow	15,402 7049 m 8353 f	45–64