



Life course social roles and women's health in mid-life: causation or selection?

Anne McMunn, Mel Bartley, Rebecca Hardy and Diana Kuh

J. Epidemiol. Community Health 2006;60:484-489
doi:10.1136/jech.2005.042473

Updated information and services can be found at:
<http://jech.bmj.com/cgi/content/full/60/6/484>

These include:

References

This article cites 27 articles, 7 of which can be accessed free at:
<http://jech.bmj.com/cgi/content/full/60/6/484#BIBL>

Rapid responses

You can respond to this article at:
<http://jech.bmj.com/cgi/eletter-submit/60/6/484>

Email alerting service

Receive free email alerts when new articles cite this article - sign up in the box at the top right corner of the article

Topic collections

Articles on similar topics can be found in the following collections

[Sociology](#) (346 articles)

[Other Obstetrics and Gynecology](#) (526 articles)

[Socioeconomic Determinants of Health](#) (862 articles)

Notes

To order reprints of this article go to:
<http://www.bmjournals.com/cgi/reprintform>

To subscribe to *Journal of Epidemiology and Community Health* go to:
<http://www.bmjournals.com/subscriptions/>

RESEARCH REPORT

Life course social roles and women's health in mid-life: causation or selection?

Anne McMunn, Mel Bartley, Rebecca Hardy, Diana Kuh

J Epidemiol Community Health 2006;**60**:484–489. doi: 10.1136/jech.2005.042473

See end of article for authors' affiliations

Correspondence to:
Dr A McMunn,
Department of
Epidemiology and Public
Health, University College
London, 1–19 Torrington
Place, London WC1E 6BT,
UK; a.mcmunn@ucl.ac.uk

Accepted for publication
7 December 2005

Study objective: To investigate whether relations between social roles and health are explained by health selection into employment and parenthood by examining the influence of early health on relations between long term social role histories and health in mid-life.

Design: Prospective, population based, birth cohort study.

Participants and setting: Women from a national British cohort born in 1946, including 1171 women with a valid measure of self reported health at age 54 and valid work and family role measures at ages 26, 36, 43, and 53, as well as 1433 women with a valid body mass index (BMI) measure at age 53 and valid work and family role measures at ages 26, 36, 43, and 53.

Outcome measures: Self reported health at age 54 and obesity at age 53, taken from objective height and weight measures conducted by a survey nurse during face to face interviews in respondents' homes.

Main results: Women who occupied multiple roles over the long term reported relatively good health at age 54 and this was not explained by early health. Women with weak long term ties to the labour market were more likely to be obese at age 53. Examination of body mass index (BMI) from age 15 showed that long term homemakers were larger than other women from age 26, but their mean BMI increased significantly more with age than that of other women.

Conclusions: Relations between social roles and health were generally not explained by health selection into employment and parenthood, although some health selection may occur for obesity.

Research into relations between social roles and women's health has fairly consistently shown that women who occupy multiple roles tend to be healthier than those who enact fewer roles.^{1–16} However, most work in this field has been cross sectional in nature so that it has been impossible to determine the direction of these relations. Does this body of work provide evidence for a causative relation between multiple role occupation and good health, or are women with good health more likely to occupy multiple roles? This question of selection has plagued research on women's health for decades.

As positions in the social structure that are based on enduring relations with other people,^{17–20} social roles provide both a sense of identity and behavioural guidance. Thoits²⁰ has used the concept of role identity as a determinant of mental health. In addition, poor quality roles may ultimately influence physical health, either directly through the immune and neuroendocrine systems,^{21–23} or indirectly through coping behaviours such as smoking, excessive alcohol, drug, or food consumption.^{24–26} Alternatively, it is possible that health determines the social roles that people occupy. Some cross sectional studies have attempted to address the issue of causal direction by taking account of the presence of chronic illness when analysing relations between roles and reported health. Bartley and colleagues³ found that adjustment for longstanding illness somewhat attenuated the relation between women's employment status and the number of symptoms reported in the past month. However, Macran and colleagues¹² found that full time homemakers were more likely to report poor health independent of limiting longstanding illness. Results from a study of relations between roles and health in the Netherlands suggested that the positive relation seen between paid employment and health as well as that between parenthood and health was partly the result of health selection; women who participated in the labour force or who had had children were less likely to have

a limiting longstanding illness than non-employed or childless women.⁵

The few longitudinal studies to have examined social roles at baseline and later health have been limited in two ways in their ability to answer the question of selection. Firstly, few longitudinal studies have included measures of health earlier in the life course and so have been unable to investigate the influence of health prior to social role occupation. For example, a two year follow up study of the relation between social role occupancy and health status in Canada included no measure of prior health status.⁷ Also, studies that have examined relations between roles and mortality have lacked measures of prior health.^{27–29} Secondly, previous longitudinal studies of roles and health have relied on social role measures at one or, at most, two points in time. For example, Janzen and Muhajarine⁷ examined the interaction between age and social roles, hypothesising that role effects would be stronger for older women, presumably because they had spent more time exposed to their particular roles. They found no interaction effect, but only had one measure of social roles (and age) for each respondent. Hope and colleagues investigated whether psychological distress at age 23 explained the increased psychological distress of lone mothers at age 33, and found that it only had a modest impact.⁶ In their 15 year follow up study of social roles and mortality, Hibbard and Pope found that non-employed women had a 70% greater chance of death than employed women after adjusting for self reported health two years before baseline, but their study also relied on a single social role measure from one point in time.¹¹ The only study to include social role measures at more than one point over the life course examined whether psychological distress at age 23 explained marital transitions between ages 23 and 33.³⁰ The study found that the increased psychological distress of divorced men and women involved both selection and causation. In addition, most of the studies in this field have

used self reported general health to measure physical health. This study is able to examine relations between long term role histories and both self reported health and obesity in mid-life using data on women from the Medical Research Council (MRC) national study of health and development (NSHD), a longitudinal cohort study of British men and women born in 1946 and followed up throughout life. Self reported health, body mass index (BMI), and mental health in adolescence and early adulthood are then included to investigate whether relations between adult role histories and health in mid-life are explained by health selection.

METHODS

Sample

The MRC NSHD originated as a study of 5362 people who were born in Great Britain during the first week of March in 1946.³¹⁻³² Of these, 2547 were girls. In adulthood, data have been collected in face to face interviews at ages 26, 36, 43, and 53, with postal follow ups between some waves. By age 53, 7.7% of the original cohort had died, 10.3% had emigrated, and 12.1% had permanently refused, resulting in an eligible sample of 1781 women. Altogether 87.8% (n = 1563) of this eligible female sample was interviewed by a survey nurse at age 53. Wadsworth and colleagues³³ compared the weighted cohort sample responding at ages 43 and 53 with data from the 1991 British census. They found that full time employed and widowed women were over-represented while never married, separated, and divorced women were under-represented at both years. The NSHD received ethical approval from multicentre and local research ethics committees across the UK. Informed consent was obtained from all participants.

Measures

Health outcomes in mid-life

Health in mid-life was examined using self reported health at age 54 and obesity at age 53. Obesity was chosen as a measure of physical health partly because of the social meaning it has for women and girls in particular. The inverse gradient between adult obesity and social position (in both childhood and adulthood) in industrialised countries is more consistent for women than for men.³⁴⁻³⁷ Several studies have found that obesity is predictive of education, earnings, and social mobility for women but not for men, and also that obese women are less likely to marry than women who are not overweight, while the same is not true for men.³⁸⁻⁴⁰ Obesity was also chosen because it is possible to hypothesise psychosocial pathways in which long term occupation of particular roles leads to dissatisfaction, frustration, or stress,

then to unhealthy eating habits (and/or inactivity) as a coping mechanism, and eventually to obesity.

Height and weight were measured during face to face interviews in respondents' homes. One height measurement was taken using portable stadiometers with shoes removed, the cohort member stretching to their maximum height, and their head positioned in the Frankfort plane. The reading was recorded to the nearest 0.5 centimetre. Weight was measured using a scale and asking cohort members to remove their shoes and heavy clothing. In accordance with the World Health Organisation international standards for adult obesity,⁴¹ women with a BMI of 30 or more were considered to be obese (25% of women at age 53, which is typical for English women at this age⁴²).

Self reported health at age 54 was collected as part of a women's health series of postal questionnaires that were sent to women in the cohort every year between ages 47 and 54. The self reported health question was included in the eighth year of this series, and so valid responses were fewer than for obesity at age 53. Response categories for self reported health were excellent, good, fair, and poor. For analysis, women who reported fair or poor health were categorised as having poor reported health (nearly a third at age 54).

Social role histories

Information about women's work, marriage, and parental status collected at ages 26, 36, 43, and 53 was used to create a social role history variable with six categories. Women who held all three of the main social roles of employee, spouse, and mother over the long term were designated as the reference category. Women in this Multiple roles (n = 555) group were married once and remained married at age 53, had children, and had relatively strong long term ties to the labour market. Women in this group were employed at three or four of the four ages of data collection, with about half entering the labour market after age 26. Three categories of role histories were defined by the absence of one of the main roles of employee, spouse, or mother over the long term. Childless women (n = 162) did not have children. Homemakers (n = 151) were full time homemakers at three or four of the four ages of data collection. Lone mothers (n = 254) were never or previously married mothers (mostly the latter). Finally, two role history categories were not defined by the absence of a main role, but made up substantial groups in their own right. These were Remarried mothers (n = 185) and Intermittent employed married mothers (n = 150) who were married once and had children, but whose labour market ties were weaker than those of Multiple roles women and stronger than those of Homemakers. The Homemaker group excludes 30 lone

Table 1 Social role history groups

Multiple roles	Women married once and still married at age 53. Mothers, with relatively strong ties to the labour market. About half of the women in this group entered the labour market after age 26.
Childless	Did not have children. A little under half were unmarried. Strong ties to the labour market.
Homemakers	Full time homemakers at three or four of the four ages of data collection. Married mothers.
Lone mothers	Most were lone mothers as the result of a divorce or separation. Only seven were never married and even fewer were widows. Two thirds had relatively strong ties to the labour market. The remaining third were equally split between the Homemaker employment pattern and that of Intermittent employed married mothers.
Remarried mothers	Lone mothers who remarried by the age of 53. Employment patterns nearly identical to that of Lone mothers.
Intermittent employed married mothers	Family roles same as Multiple roles group. Employed two of the four ages of data collection, so labour market ties not as strong as Multiple role women and not as weak as Homemakers.

Table 2 Odds ratios for the associations of role histories, early health, and childhood social class with self reported health at age 54

NSHD 1946 birth cohort women	n = 1171	Unadjusted		Adjusted for early self reported health		Adjusted for early mental health		Adjusted for early self reported health + early mental health		Adjusted for early self reported health + early mental health + childhood social class	
		OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Role histories											
Multiple roles	453	1.00		1.00		1.00		1.00		1.00	
Childless	141	1.57	1.05, 2.35	1.58	1.06, 2.37	1.60	1.06, 2.41	1.59	1.05, 2.40	1.58	1.05, 2.40
Homemakers	117	2.00	1.31, 3.05	1.95	1.28, 2.99	2.09	1.36, 3.21	2.04	1.32, 3.15	2.02	1.31, 3.12
Lone mothers	184	1.59	1.10, 2.29	1.52	1.05, 2.19	1.58	1.09, 2.29	1.52	1.05, 2.21	1.49	1.02, 2.17
Remarried mothers	151	1.37	0.92, 2.05	1.33	0.89, 1.99	1.25	0.84, 1.88	1.23	0.82, 1.84	1.20	0.80, 1.81
Intermittent employed married mothers	125	1.51	0.99, 2.30	1.48	0.96, 2.26	1.61	1.05, 2.47	1.56	1.01, 2.41	1.57	1.02, 2.43
p value		0.01		0.02		0.007		0.01		0.02	
Self reported health at age 26											
Reports good health at age 26	967	1.00		1.00				1.00		1.00	
Reports fair or poor health at age 26	114	2.00	1.35, 2.96	1.96	1.32, 2.92			1.61	1.07, 2.43	1.59	1.05, 2.40
Missing	90	1.46	0.94, 2.29	1.37	0.88, 2.15			1.43	0.85, 2.40	1.41	0.84, 2.37
p value		0.001		0.002				0.04		0.05	
Mental health between ages 15 and 32											
No episodes	640	1.00				1.00		1.00		1.00	
Minor	448	1.75	1.35, 2.27			1.77	1.36, 2.31	1.77	1.35, 2.31	1.76	1.35, 2.31
Major	65	3.77	2.24, 6.36			3.92	2.32, 6.65	3.57	2.08, 6.10	3.58	2.09, 6.13
Missing	18	2.28	0.89, 5.89			2.40	0.92, 6.25	1.79	0.62, 5.19	1.66	0.54, 5.09
p value		<0.001				<0.001		<0.001		<0.001	

mothers and four childless women who followed the Homemaker employment pattern, but were included in the Childless and Lone mother groups. Twenty five remarried mothers who followed the Homemaker employment pattern were included in the Homemaker group rather than among Remarried mothers. Women who were unemployed at one or two ages were categorised into role history groups based on their employment status at the alternative two or three ages of data collection, while women who were unemployed at three or four of the four ages of data collection (n = 73) were excluded from analysis. Table 1 provides a brief description of the role history groups for easier reference.

Many,^{3 5 12 43} but not all,² cross sectional studies of social roles and health have found that women who were employed part time had better reported health than women employed full time. Preliminary analysis in this dataset showed no relation between a longitudinal measure of full time compared with part time employment and self reported health at age 54 or obesity at age 53. As a result, full time and part time employment were treated equally as employed at each age of data collection.

Prior health, temperament, and childhood social class

A measure of self reported health was collected at age 26 that was identical to that asked at age 54. Women who reported fair or poor health (12% at age 26) were categorised to having poor reported health for analysis purposes. A summary

measure of mental health episodes between ages 15 and 32 was used to examine early mental health. This measure distinguished between those with a major mental health episode (defined as being admitted to a psychiatric hospital, being in outpatient psychiatric care after the age of 15, having four or more episodes of illness covering more than a year between ages 15 and 32, or having illness for more than one year's duration between the ages of 15 and 32), and those who reported experiencing minor mental illnesses, as well as those who reported no such illnesses between these ages. As neuroticism is known to be associated with marital quality^{44 45} and divorce^{46 47} as well as perceptions of poor health,⁴⁸ personality type is another factor that might explain relations between roles and self reported health. A neuroticism scale (range 0–12) from the Maudsley personality inventory,⁴⁹ collected at age 26, was also examined.

Obesity was rare at early ages (2% at age 26, 7% at age 36, 13% at age 43, and negligible at age 15), so mean BMI at ages 15, 26, 36, and 43, rather than obesity, was used to investigate whether relations between role histories and obesity at age 53 could be explained by selection into particular role history groups according to prior body mass. At ages 15, 36, and 43, height and weight were measured in the same way as has been described for age 53. At age 26, BMI was calculated from self reported height and weight.

Childhood social class influences both adult work roles,^{50–55} and adult health.^{31 40 56–58} Therefore, the confounding effect of childhood social class on relations between role histories and

Table 3 Proportion obese at age 53 by role histories

Role histories	n = 1433	% Obese at age 53
Multiple roles	547	23
Childless	159	25
Homemakers	149	38
Lone mothers	247	24
Remarried mothers	183	24
Intermittent employed married mothers	148	32

$\chi^2 = 19.53, p = 0.003.$

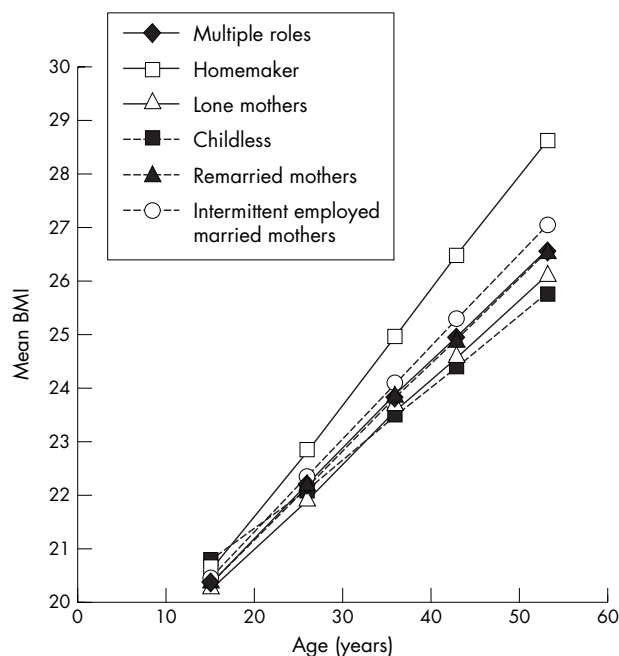


Figure 1 Predicted mean BMI from age 15 to age 53 for each role history group from models (fitted using generalised estimating equations) including role history by age interactions among women in the NSHD 1946 birth cohort.

health was investigated. Childhood social class was measured using the registrar general's social class of respondents' father's occupation when cohort women were 11 years old, categorised into four groups: classes I and II combined, III non-manual, III manual, and classes IV and V combined. If father's occupation at age 11 was unknown, similar measures at age 16 or 4 years were used.

Analytical techniques

The sample used for analysis of obesity in mid-life includes all women with a valid social role history and a valid BMI measure at age 53 ($n = 1433$). The sample size is reduced for models including measures of BMI at earlier ages. The sample used for analysis of self reported health in mid-life includes all women with a valid social role history and a valid measure of self reported health at age 54 ($n = 1171$).

A series of logistic regression models tested relations between role histories and both self reported health at age 54 and obesity at age 53, first unadjusted, then adjusted for prior health measures, and, finally, adjusted for both prior health and childhood social class. To investigate the effects of

role histories on BMI across adult life, first, F tests were conducted to test whether mean BMI at each age (15, 26, 36, 43, and 53) varied by role history group. Next, generalised estimating equations were used to take account of the correlation among the repeated measures of BMI for a given subject.³⁹ We then tested whether the effect of roles on BMI changed over time by adding role by age interaction terms for each of the social role history categories.

RESULTS

Social role histories and self reported health at age 54

In the unadjusted model (table 2), women in each of the groups lacking one of the main roles of employee, spouse, or mother were significantly more likely to report poor health than women in the Multiple roles group. Long term Homemakers were most at risk of reporting poor health followed by Lone mothers and Childless women. Neither self reported health at age 26 nor mental health between ages 15 and 32 were associated with role histories (self reported health: $p = 0.3$, mental health: $p = 0.7$). Table 2 shows that, although both self reported health at age 26 and early mental health were significantly associated with self reported health at age 54, their inclusion influenced relations between role histories and self reported health at age 54 very little. Table 2 also shows that these relations were not confounded by childhood social class.

Neuroticism was also significantly associated with reporting poor health at age 54 ($p < 0.001$), but not with role histories ($p = 0.8$) and did not influence relations between role histories and self reported health at age 54 (not shown).

Social role histories and obesity at age 53

Table 3 shows that there was significant variation in obesity at age 53 by social role histories. Women with weaker ties to the labour market over the long term were more likely to be obese at age 53 than those with stronger labour market ties. Homemakers were the most likely to be obese (38%) and women who occupied Multiple roles were the least likely (23%).

There was significant role history variation in mean BMI at ages 26, 36, and 53 (age 26: $p = 0.03$, age 36: $p = 0.03$, age 53: $p = 0.001$). Homemakers had the highest mean BMI at these ages (not shown). In models with BMI as a repeated outcome, BMI was modelled to increase linearly with age, and there was a significant age by Homemaker interaction ($p = 0.01$). The mean BMI of long term Homemakers increased significantly faster with age than it did for women in the Multiple roles group (fig 1).

Table 4 shows that inclusion of BMI at age 26 reduced the odds of being obese at age 53 for Homemakers compared with the Multiple roles group slightly, but did not explain differences between women in the two groups. Findings were

Table 4 Odds ratios for the associations of role histories, early BMI, and childhood social class with obesity at age 53

NSHD 1946 birth cohort women	n = 1276	Unadjusted		Adjusted for BMI at age 26		Adjusted for BMI at age 26 + childhood social class	
		OR	95% CI	OR	95% CI	OR	95% CI
Role histories							
Multiple roles	507	1.00		1.00		1.00	
Childless	137	1.14	0.73, 1.77	1.21	0.72, 2.03	1.23	0.73, 2.08
Homemaker	129	2.25	1.50, 3.40	2.01	1.24, 3.27	2.00	1.23, 3.27
Lone mothers	210	0.97	0.66, 1.43	1.15	0.73, 1.79	1.13	0.72, 1.76
Remarried mothers	164	1.04	0.68, 1.58	1.21	0.75, 1.95	1.19	0.74, 1.93
Intermittent employed married mothers	129	1.55	1.01, 2.38	1.81	1.10, 2.98	1.79	1.09, 2.96
p value		0.002		0.05		0.05	
BMI age 26	1276	1.60	1.50, 1.70	1.59	1.50, 1.70	1.59	1.49, 1.70
p value		<0.001		<0.001		<0.001	

Table 5 Odds ratios for the associations of role histories, early mental health, and childhood social class with obesity at age 53

NSHD 1946 birth cohort women	n = 1433	Unadjusted		Adjusted for early mental health		Adjusted for early mental health + childhood social class	
		OR	95% CI	OR	95% CI	OR	95% CI
Role histories							
Multiple roles	547	1.00		1.00		1.00	
Childless	159	1.16	0.77, 1.75	1.15	0.76, 1.73	1.17	0.77, 1.78
Homemaker	149	2.14	1.45, 3.14	2.17	1.47, 3.19	2.12	1.43, 3.13
Lone mothers	247	1.08	0.76, 1.54	1.07	0.75, 1.52	1.04	0.73, 1.49
Remarried mothers	183	1.06	0.71, 1.57	1.01	0.68, 1.50	0.98	0.65, 1.46
Intermittent employed married mothers	148	1.60	1.08, 2.39	1.63	1.09, 2.44	1.62	1.08, 2.43
p value		0.002		0.001		0.002	
Mental health between ages 15 and 32							
No episodes	792	1.00		1.00		1.00	
Minor episode(s)	535	1.29	1.01, 1.66	1.34	1.04, 1.73	1.36	1.05, 1.75
Major episode(s)	83	1.49	0.91, 2.43	1.54	0.94, 2.54	1.56	0.95, 2.57
Missing	23	0.91	0.33, 2.47	0.91	0.33, 2.50	0.74	0.25, 2.15
p value		0.02		0.01		0.05	

similar adjusting for BMI at 15 (not shown). Childhood social class did not influence these relations (table 4).

Nearly a third (32%) of women who had had a major episode, and 29% of those who had had a minor mental health episode between ages 15 and 32 were obese at age 53, compared with under a quarter of women who had had no episode. Early mental health episodes were not significantly associated with role histories (not shown) and did not explain the increased likelihood of being obese at 53 of Homemakers (table 5).

DISCUSSION

Our findings suggest that relations between social roles and health are generally not explained by health selection into employment and parenthood, although some health selection may occur for obesity. Using role information from four points between ages 26 and 53, this study showed that women who occupied multiple roles over the long term reported relatively good health at age 54—a relation that corresponds with previous cross sectional results^{1–3 5 8–16}—and this was not explained by early health. Early self reported health, early mental health and neuroticism each significantly predicted reported poor health at age 54, but none of these factors were significantly associated with role histories and none explained the higher risk of reporting poor health at age 54 among women who did not occupy multiple roles over the long term. Also, childhood social class did not influence relations between role histories and health.

What this paper adds

- Cross sectional studies have fairly consistently shown that women who occupy the multiple roles of employee, partner, and mother tend to be healthier than women who enact fewer roles. Because of the cross sectional nature of previous work, it has been impossible to determine the direction of this relation. Is multiple role occupation good for women's health or are healthy women more likely to occupy multiple roles?
- Investigation among women in a large, national prospective birth cohort has shown that the relatively better health of women who occupied multiple roles over the long term was generally not explained by health selection into employment or parenthood.

In addition, this study has shown an increased likelihood of obesity in mid-life among women with weak long term ties to the labour market compared with women who occupied multiple roles. Examination of BMI from age 15 showed that long term homemakers had a higher mean BMI from age 26, showing some degree of selection out of the labour market in relation to women's body weight. However, homemakers' mean BMI increased significantly more with age than that of women with stronger ties to the labour market, and BMI at age 26 did not account for homemakers' increased likelihood of being obese at age 53, supporting a causation hypothesis alongside any initial selection effect. Recent work in a younger cohort has shown persistent obesity to be associated with never having been gainfully employed, as well as not having a current partner, among women, but not among men.⁶⁰

The fact that this study is limited to women and has been conducted within a specific cohort of women must be taken into account when considering its generalisability. The social environment in which this particular cohort of women formed their families and began employment was highly structured and traditional. British women born in the 1940s had remarkably similar age at marriage patterns, which were the youngest ever recorded since civil registration began. Over the 20th century, the frequency of marriage reached its height in 1960s Britain.⁶¹ In light of this the measure of self reported health at age 26 may not be early enough to pre-date the establishment of family roles in this cohort of women.^{61 62} (Most women in this cohort became employed after age 26, A McMunn, unpublished PhD thesis, May 2004). However, our findings showed that neither self reported health at age 26 nor mental health between ages 15 and 32 were associated with social roles histories between ages 26 and 53. The extent to which the results shown here are sex and generation specific given the rapid diversification of social roles in more recent cohorts is an area for future investigation.

In summary, our results suggest that good health is more likely to be the result, rather than the cause, of multiple role occupation. The tendency of studies to focus on role occupancy rather than on the context and quality of particular role situations has been a criticism of research into social roles and health.^{7 63} Having established that lifetime social roles are associated with later health among women in this cohort, and that this relation cannot be dismissed as being the result of health selection, research currently underway in this same dataset turns to the question of "why?". The next step is to better understand what it is about particular work and family roles that influences people's health.

Authors' affiliations

A McMunn, Department of Epidemiology and Public Health, University College London, UK

M Bartley, International Centre for Health and Society; Department of Epidemiology and Public Health, University College London

R Hardy, D Kuh, MRC National Survey of Health and Development, London, UK

Funding: The national survey of health and development is funded by the Medical Research Council, United Kingdom (MRCUK). Professor Bartley's work is supported by ESRC Research Priority Network no L32653061 Human Capability and Resilience and ESRC Project Grant no RES 000 23 0588 Late Life Work and Retirement.

Competing interests: none.

REFERENCES

- Arber S. Class, paid employment and family roles: making sense of structural disadvantage, gender and health status. *Soc Sci Med* 1991;**32**:425–36.
- Arber S. Comparing inequalities in women's and men's health: Britain in the 1990s. *Soc Sci Med* 1997;**44**:773–87.
- Bartley M, Popay J, Plewis I. Domestic conditions, paid employment and women's experience of ill health. *Sociology of Health and Illness* 1992;**14**:313–43.
- Bartley M, Sacker A, Firth D, et al. Social position, social roles and women's health in England: changing relationships 1984–1993. *Soc Sci Med* 1999;**48**:99–115.
- Fokkema T. Combining a job and children: contrasting the health of married and divorced women in the Netherlands? *Soc Sci Med* 2002;**54**:741–52.
- Hope S, Power C, Rodgers B. Does financial hardship account for elevated psychological distress in lone mothers? *Soc Sci Med* 1999;**49**:1637–49.
- Janzen BL, Muhajarine N. Social role occupancy, gender, income adequacy, life stage and health: a longitudinal study of employed Canadian men and women. *Soc Sci Med* 2003;**57**:1491–503.
- Lahelma E, Arber S, Kivela K, et al. Multiple roles and health among British and Finnish women: the influence of socioeconomic circumstances. *Soc Sci Med* 2002;**54**:727–40.
- Barnett R, Hyde J. Women, men, work and family. An expansionist theory. *Am Psychol* 2001;**56**:781–96.
- Feld S. Feelings of adjustment. In: Nye FI, Hoffman LW, eds. *The employed mother in America*. Chicago: Rand McNally, 1963:331–52.
- Hibbard J, Pope C. Effects of domestic and occupational roles on morbidity and mortality. *Soc Sci Med* 1991;**32**:805.
- Macran S, Clarke L, Sloggett A, et al. Women's socio-economic status and self-assessed health: identifying some disadvantaged groups. *Sociology of Health and Illness* 1994;**16**:182–208.
- Repetti RL. Multiple roles. In Blechman EA, Brownell KD, eds. *Behavioral medicine and women: a comprehensive handbook*. New York: The Guildford Press, 1998:162–8.
- Repetti RL, Matthews K, Waldron I. Employment and women's health. *Am Psychol* 1989;**44**:1394–401.
- Verbrugge L. Multiple roles and physical health of women and men. *J Health Soc Behav* 1983;**24**:16–30.
- Waldron I, Weiss CC, Hughes. Interacting effects of multiple roles on women's health. *J Health Soc Behav* 1998;**39**:216–36.
- McCall G, Simmons R. *Identities and interactions*. New York: Free Press, 1966.
- Stryker S. *Symbolic interactionism: a social structural version*. Menlo Park, CA: Benjamin-Cummings, 1980.
- Stryker S, Serpe RT. Commitment, identity salience, and role behavior. In: Ickes W, Knowles ES, eds. *Personality, roles and social behavior*. New York: Springer-Verlag, 1982.
- Thoits PA. On merging identity theory and stress research. *Soc Psychol Q* 1991;**54**:101–12.
- Brunner E. The social and biological basis of cardiovascular disease in office workers. In: Brunner E, Blane D, Wilkinson RG, eds. *Health and social organisation*. London: Routledge, 1996.
- Seeman TE, McEwen BS, Rowe JW, et al. Allostatic load as a marker of cumulative biological risk: MacArthur studies of successful aging. *Proc Natl Acad Sci U S A* 2001;**98**:4770–5.
- Soufer R, Bremner JD, Arrighi JA, et al. Cerebral cortical hyperactivation in response to mental stress in patients with coronary artery disease. *Proc Natl Acad Sci U S A* 1998;**95**:6454–5.
- Cameron D, Jones IG. An epidemiological and sociological analysis of the use of alcohol, tobacco and other drugs of solace. *Community Med* 1985;**7**:18–29.
- Marsh A, McKay S. *Poor smokers*. London: Policy Studies Institute, 1994.
- Graham H. *When life's a drag: women, smoking and disadvantage*. London: HMSO, 1993.
- Martikainen P. Women's employment, marriage, motherhood and mortality: a test of the multiple role and role accumulation hypotheses. *Soc Sci Med* 1995;**40**:199–212.
- Moser KA, Pugh HS, Goldblatt PO. Inequalities in women's health in England and Wales: mortality among married women according to social circumstances, employment characteristics and life-cycle stage. *Genus* 1990;**XLVI**:71–84.
- Weatherall R, Joshi H, Macran S. Double burden or double blessing? employment, motherhood and mortality in the longitudinal study of England and Wales. *Soc Sci Med* 1994;**38**:285–97.
- Hope S, Power C, Rodgers B. Marital status transitions and psychological distress: longitudinal evidence from a national population sample. *Psychol Med* 1999;**29**:381–9.
- Wadsworth MEJ. *The imprint of time: childhood, history and adult life*. Oxford: Oxford University Press, 1991.
- Joint Committee of the Royal College of Obstetricians and Gynaecologists and the Population Investigation Committee. *Maternity in Great Britain*. Oxford: Oxford University Press, 1948.
- Wadsworth MEJ, Butterworth SL, Hardy RJ, et al. The life course prospective design: an example of benefits and problems associated with study longevity. *Soc Sci Med* 2003;**57**:2193–205.
- Erens B, Primatesta P, eds. *Health survey for England 1998: cardiovascular disease*. London: HMSO, 1999.
- Hirani V, Brookes M, McMunn A, et al. Anthropometry. In: Shaw A, McMunn A, Field J, eds. *The Scottish health survey 1998*. Edinburgh: Scottish Executive Department of Health, 2000.
- Prescott-Clarke P, Primatesta P, eds. *Health survey for England 1996*. London: HMSO, 1998.
- Sobal J, Stunkard AJ. Socioeconomic status and obesity: a review of the literature. *Psychol Bull* 1989;**105**:260–75.
- Gortmaker SL, Must A, Perrin JM, et al. Social and economic consequences of overweight in adolescence and young adulthood. *N Engl J Med* 1993;**329**:1008–12.
- Sargent JD, Blanchflower DG. Obesity and stature in adolescence and adolescence in young adulthood. Analysis of a British birth cohort. *Arch Pediatr Adolesc Med* 1994;**148**:681–7.
- Parsons TJ, Power C, Logan S, et al. Childhood predictors of adult obesity: a systematic review. *Int J Obes* 1999;**23**:S1–107.
- World Health Organisation. *Measuring obesity: classification and description of anthropometric data*. Copenhagen: WHO Regional Office for Europe, Nutrition Unit, 1988.
- Boreham R, Erens B, Falaschetti E, et al. Risk factors for cardiovascular disease. In: Erens B, Primatesta P, eds. *Health survey for England 1998: cardiovascular disease*. London: HMSO, 1999:122.
- Macran S, Clarke L, Joshi H. Women's health: dimensions and differentials. *Soc Sci Med* 1996;**42**:1203–16.
- Kinnunen U, Rulkkinen L. Childhood socio-emotional characteristics as antecedents of marital stability and quality. *Eur Psychol* 2003;**8**:223–37.
- Russell R, Wells P. Predictors of happiness in married couples. *Pers Individ Diff* 1994;**17**:313–21.
- Tucker JS, Kressin NR, Spiro A, et al. Intrapersonal characteristics and the timing of divorce: a prospective investigation. *Journal of Social and Personal Relationships* 1998;**15**:211–25.
- Cramer D. Personality and marital dissolution. *Pers Individ Diff* 1993;**14**:605–7.
- Goodwin R, Engstrom G. Personality and the perception of health in the general population. *Psychol Med* 2002;**32**:325–32.
- Eysenck HJ. A short questionnaire for the treatment of two dimensions of personality. *J Appl Psychiatry* 1958;**43**:14–17.
- Bynner J, Joshi H, Tsatsas M. *Obstacles and opportunities on the route to adulthood: evidence from rural and urban Britain*. London: Smith Institute, 2000.
- Bynner J, Elias P, McKnight A, et al. *Young people in transition: changing pathways to employment and independence*. York: Joseph Rowntree Foundation, 2002.
- Joshi H, Hinde PRA. Employment after child-bearing in post-war Britain: cohort study evidence on contrasts within and across generations. *Eur Sociol Rev* 1993;**9**:203–27.
- Joshi H, Paci P. Life in the labour market. In: Bynner J, Ferri E, Shepherd P, eds. *Twenty-something in the 1990s: getting on, getting by, getting nowhere*. Aldershot: Ashgate, 1997.
- Joshi H, Paci P. *Unequal pay for women and men: evidence from the British birth cohort studies*. Cambridge, MA: MIT Press, 1998.
- Makepeace GH, Paci P, Joshi H, et al. How unequally has equal pay progressed since the 1970s? : a study of two British cohorts. *J Hum Resour* 1999;**34**:534–56.
- Hardy R, Wadsworth M, Kuh D. The influence of childhood weight and socioeconomic status on change in adult body mass index in a British national birth cohort. *Int J Obes* 2000;**24**:725–34.
- Power C, Hertzman M. Social and biological pathways linking early life and adult disease. In: Marmot MG, Wadsworth MEJ, eds. *Fetal and early childhood environment: long-term health implications*. London: Royal Society of Medicine Press, 1997:210–21.
- Wadsworth MEJ. Changing social factors and their long-term implications for health. In: Marmot MG, Wadsworth MEJ, eds. *Fetal and early childhood environment: long-term health implications*. London: Royal Society of Medicine Press, 1997:198–209.
- Liang K-Y, Zeger SL. Longitudinal data analysis using generalised linear models. *Biometrika* 1986;**73**:13–22.
- Viner RM, Cole TJ. Adult socioeconomic, educational, social, and psychological outcomes of childhood obesity: a national birth cohort study. *BMJ* 2005;doi: 10.1136/bmj.38453.422049.EO.
- Kiernan KE, Diamond I. The age at which childbearing starts—a longitudinal study. *Popul Stud* 1983;**37**:363–80.
- Kiernan KE, Eldridge SM. Age at marriage: inter and intra cohort variation. *British Journal of Sociology* 1987;**38**:44–65.
- Hibbard J, Pope CR. The quality of social roles as predictors of morbidity and mortality. *Soc Sci Med* 1993;**32**:805.