Socio-economic mobility over the lifecourse and oral health in middle age.

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ABSTRACT

Socio-economic variation in health exists for a wide range of health outcomes, including oral health and oral health-related quality of life (OHRQoL). Less is known regarding how socio-economic trajectories may influence oral health and OHRQoL. This study examined whether social mobility is related to the number of teeth retained by age 50 years and OHRQoL measured at the same time using data from the Newcastle Thousand Families Study, a birth cohort established in 1947. Upwardly mobile women had greater tooth retention than those remaining socio-economically stable or those downwardly mobile. While promotion of a healthier lifestyle and continued improvements in oral hygiene throughout life appear to be the public health interventions most likely to improve oral health into middle age, there may be sub-groups of the population where different approaches in terms of public health interventions need to be focussed.

INTRODUCTION

Socio-economic variation in health exists for a wide range of health outcomes. Social mobility—the movement of an individual between socio-economic groups during their life—and the factors associated with such mobility have been previously suggested to play an important role in creating this variation (Townsend & Davidson, 1982; Fogelman et al, 1989; Karvonen et al, 1999).

The risk of poor oral health in adulthood has been linked to socio-economic status (and SES transitions) in childhood (Poulton et al, 2002), but there are also studies linking conditions in adulthood to oral disease and tooth loss (Pearce, Steele et al, 2004). Similarly, socio-economic conditions at different stages of life have also been shown to be associated with subjective perceptions of oral health and oral health-related quality of life (OHRQoL) in middle age (Mason et al, 2006). Such investigations may give an overall context for assessing oral disease risks and, in the case of subjective perceptions of oral health, identifying oral health promotion or treatment programmes which can target groups that cannot be identified using other methodologies.

While the relationship between socio-economic status and oral health at different stages of life has been previously investigated in cross-sectional studies, the effect of social mobility or socioeconomic trajectories on oral health have been less-well studied (Thomson et al, 2004; Peres et al, 2007). A New Zealand study reported a clear gradient of oral disease risk across socio-economic trajectory groups (Thomson et al, 2004), while a recent study from Brazil found that belonging to an upwardly mobile family between childhood and adolescence did not ameliorate disease risk, but it contributed to better dental care and self-care (Peres et al, 2007).

The aim of this study was to examine whether social mobility is related to the number of teeth retained by age 50 years and oral health-related quality of life measured at the same time.

MATERIALS AND METHODS

This study used data from the Newcastle Thousand Families Study, a birth cohort established in May and June 1947 when all 1142 babies born to mothers resident in the city of Newcastle upon Tyne in Northern England were recruited. Participants were members of the original cohort who contacted the study team in response to media publicity or were traced through the United Kingdom National Health Service Central Register. Between October 1996 and December 1998, self-completion questionnaires were sent out, and study members were invited to attend for clinical examination and to take part in further studies. Ethical approval was obtained from appropriate Local Research Ethics Committees. All participants gave their written informed consent.

The original Newcastle Thousand Families study assessment phase is described in detail elsewhere (Spence et al, 1954; Miller et al, 1960, 1974). Information on numerous characteristics (including parental socio-economic status) was recorded prospectively for all study members and abstracted from existing records. Social class at birth was derived from the UK Registrar General's Standard Occupational Classification (OPCS, 1990) based on paternal occupation at birth. Where the father was unemployed, the child was given a social class of V.

Data on adult health and lifestyle were collected by self-completion questionnaire at age 49-51 years (Lamont et al, 1998). Occupational details of the household's main wage earner at age 50 were coded to obtain a current measure of social class (OPCS, 1990). At age 50, retrospective information regarding occupational social class at age 25 was also collected, and the data were coded in the same way.

Social class was collapsed into three groups because of small numbers in some social classes: group 1 (assumed to be the most advantaged) consisted of those with an occupational social class of I or II; group 2 consisted of those recorded as social class III (both manual and non-manual); and group 3 (assumed to be the least advantaged) consisted of those classified as social class IV or V or who were

unemployed. Socio-economic mobility was defined as the change between these groups: “upwards” (defined as moving to a more advantaged social class), “no change” (remaining in the social class of origin), or “downwards” (moving to a more disadvantaged social class).

The presence of each tooth was recorded by one of two specifically trained research nurses during the clinical examination (Pearce, Steele et al, 2004). These data were then used to determine whether an individual had retained a “functional dentition” (21 or more natural teeth) at the time of the follow-up. Oral-health-related quality of life was measured using an Oral Health Impact Profile (OHIP) questionnaire (Slade & Spencer, 1994) completed at the same time (Mason et al, 2006). The OHIP captured information in seven conceptually formulated dimensions (functional limitation, physical pain, psychological discomfort, physical, psychological and social disability, and handicap) based on Locker’s theoretical model of oral health (Locker, 1988). The 49 questions in the OHIP ask how frequently individuals have experienced a specific impact during the preceding year. The responses, based on a Likert scale, were summed to give the total score (representing the overall burden of oral problems).

Our previous analyses of these data identified smoking and alcohol as significant predictors of tooth loss (Pearce et al, 2004) and smoking as a predictor of OHIP score in women (Mason et al, 2006). As each may also be associated with social mobility, they were both included as potential confounders in this analysis. Four cross-sectional categories of alcohol consumption at age 50 were derived (Power et al, 1998). Light drinking was defined as up to 5 units of alcohol per week for women (10 units for men), moderate drinking as up to 21 units for women and 28 units for men, and any more than that was defined as heavy drinking. The number of pack-years of cigarettes smoked (i.e. one pack year equals one pack of cigarettes smoked per day for one year) over each individuals lifetime was estimated from the study members’ self-reported smoking at ages 15, 25, 35 and 50 years.

Statistical analysis

In addition to combined analyses, data for men and women were also analysed separately, since lifecourse effects on both tooth loss and oral- health-related quality of life have previously been shown to differ for men and women in this cohort (Pearce, Steele, et al, 2004; Mason et al, 2006). The relationship between total OHIP score and social mobility was tested using Kruskal-Wallis tests. The relationship between socio-economic mobility and having retained a functional dentition was analysed using logistic regression. Odds ratios (OR) and 95% CI are reported using stable socio-economic status as the reference group. Logistic regression analyses were run both before and after adjusting for the effects of smoking (pack-years of cigarettes smoked, included as a continuous variable) and alcohol consumption (included as a categorical variable). The statistical software package Stata (version 10.0; StataCorp, College Station, TX, USA) was used for all analyses.

RESULTS

Of the original 1142 study members recruited in 1947, 832 (72%) were traced at age 50. Of these, 574 (69%) completed the health and lifestyle questionnaire and, of the 412 study members who attended the clinical examination, 337 (30% of the original cohort or 40% of those those traced) (141 men, 196 women) underwent the clinical dental examination. Of these, 281 fully completed the OHIP questionnaire. These samples have previously been shown to be representative of the original cohort, with the exception of gender (Pearce et al, 2004). Compared to the original cohort, women were over-represented in the current sample ($p<0.001$).

Only one male and two females had retained all 32 teeth to age 50. Fewer than one-third (29%) (58 women and 39 men) had failed to retain a “functional dentition” of 21 or more natural teeth, while 18 (5%) (10 women) were edentulous. There was a significant association between socio-economic mobility from birth to age 50 and having retained a functional dentition ($p=0.003$), although in sex-specific analyses this was restricted to females (Table 1). The significant associations were based on women who had been upwardly mobile being over twice as likely to have retained a functional

dentition than those who had remained stable in socio-economic terms. Adjusting for smoking and alcohol consumption made very little difference to the results and the significant association persisted. Individuals who had been downwardly mobile between the ages of 25 and 50 years also had a significantly lower likelihood of retaining a functional dentition at age 50 than those who had been upwardly mobile (p=0.04). Again, this was restricted to females (p=0.02) and it persisted in the adjusted model (p=0.005). Downwardly mobile females were also significantly less likely to retain a functional dentition than those socio-economically stable. For men, whilst some of the same general patterns were evident, they appeared to be inconsistent and the relationships were not found to be statistically significant.

There were no significant associations between social mobility and total OHIP score (Table 2).

DISCUSSION

This study suggests that women who have had an upwardly mobile social status throughout life have a significantly greater likelihood of retaining a functional dentition than women who either remain socio-economically stable or are downwardly mobile. No significant associations were seen for the men in this cohort.

The study members participating in this study did not differ significantly from the remainder of the original cohort with respect to any childhood characteristic other than gender, suggesting that there should not have been a bias in terms of social class of origin. In addition, the age-50 follow-up included some of those study members who had moved out of the study region, including those moving for economic reasons (18% of those who participated in the health assessment were resident outside of the Northern Region of England at that time). Furthermore, we have previously shown that the clinical dental status of those included in this study was similar to a national sample of approximately the same age (Pearce, Steele et al, 2004). Therefore, we can be reasonably confident that the participants included were representative of the whole cohort.

The literature concerning social mobility and oral health is relatively limited, although it is not a new concept. Beal & Dickson (1975) reported that dental attitudes and behaviour were most favourable in women (all mothers of five-year-old children) who were socio-economically upwardly mobile by marriage (moving from social class III to either I or II). A study of 26-year-olds from New Zealand reported a clear gradient of oral disease risk across socio-economic trajectory groups, in addition to the greater risk associated with disadvantaged SES at origin (Thomson et al, 2004). A recent study of adolescents in Pelotas (Brazil) found that belonging to an upwardly socio-economically mobile family between childhood and adolescence contributed to better self-care and dental care (Peres et al, 2007). However, it was not associated with better dental health, with greater dental caries experience being associated with being in poverty at some stage in life. Data from the Finnish Adolescent Health and Lifestyle Surveys show that upwardly mobile adolescents were significantly more likely to brush their teeth every day than their counterparts (Karvonen et al, 1999), although this did not include any other measures of dental care or measures of oral health status.

The previous studies have considered much younger populations than that considered in this study, although, in the case of the New Zealand study, it is likely that future socio-economic status will be fairly constant for their participants (Thomson et al, 2004). It may be that social mobility may work in different ways for cohorts born at different times, particularly as the nature of social mobility and its consequences changes over time.

Previous analyses of the oral health data from the Newcastle Thousand Families study have investigated lifecourse influences of both tooth loss (Pearce, Steele et al, 2004) and OHRQoL (Mason et al, 2006), but the potential impact of social mobility within this context has not been previously studied. People with 21 or more teeth are unlikely to require a denture and should be relatively free from dietary restriction; the choice of a “functional dentition” based on this threshold is justified on this basis as a reasonable oral health outcome measure in middle age. The restriction of the association between an upward socio-economic trajectory and retaining a functional dentition to women may both reflect and explain the previously reported association between adult socioeconomic status and tooth

retention which was also limited to the women in the study (Pearce, Steele et al, 2004). This cohort has experienced high levels of social mobility (particularly upward mobility), which means that the stable group primarily represents individuals who have remained in the less advantaged social classes (III, IV and V). It may be that upward social mobility is a way to distinguish between predictors of oral health status among women in the same socio-economic group at the point of assessment. However, the problems inherent in assigning a SES based on occupation to women should also be acknowledged, particularly when using the highest occupational social class in the household for many women in this cohort resulted in them being assigned the SES of their male partner (Tiffin et al, 2005). Nevertheless, this is still likely to represent a manifestation of social mobility and their current household SES.

We have previously reported an association between a downward socio-economic trajectory and poorer mental health in the men in this cohort, with no association being seen in the women (Tiffin et al, 2005). No associations were seen between socio-economic mobility and either tooth retention or OHIP score in men. It is possible that this (at least to some extent) reflects the lack of an association between adult socio-economic status and either tooth retention or OHIP score previously reported for the men in this cohort (Pearce, Steele, et al, 2004; Mason et al, 2006).

Social mobility has been previously linked to variations in a range of health outcomes. Although the mechanisms behind these associations are unclear, they are likely to involve greater exposure to adverse lifestyle factors (such as smoking, poor diet and excess alcohol consumption) and poor choices with respect to health care, including dental care. Social mobility itself has been linked to height, education and childhood IQ (Deary et al, 2005), all of which have also been linked to variations in risk of adverse health outcomes in later life. In terms of dental health, the previous research showing links between upward social mobility and improved dental care may reflect the link between education and both dental care and social mobility. Therefore, it is possible that both are influenced by a factor earlier in life rather than having a causal association.

While promotion of a healthier lifestyle and continued improvements in oral hygiene throughout life appear to be the public health interventions most likely to improve oral health into middle age, there may be sub-groups of the population where different approaches in terms of public health interventions need to be focussed.

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Table 1. Unadjusted odds ratios* (overall and by sex) of retaining a functional dentition by age 50 according to social mobility group

	All			Men			Women		
SES mobility group	**N**	**N retaining functional dentition (%)**	**OR (95% CI)**	**N**	**N retaining functional dentition (%)**	**OR (95% CI)**	**N**	**N retaining functional dentition (%)**	**OR (95% CI)**
Birth to 25 years									
Upward	145	109 (75)	1.38 (0.82-2.31)	59	44 (75)	1.00 (0.43-2.33)	86	65 (76)	1.65 (0.86-3.19)
Stable	144	99 (69)	1.00	55	41 (75)	1.00	89	58 (65)	1.00
Downward	40	24 (60)	0.68 (0.33-1.41)	24	14 (58)	0.48 (0.17-1.32)	16	10 (63)	0.89 (0.30-2.68)
25 to 50 years									
Upward	71	55 (77)	1.41 (0.75-2.65)	31	23 (74)	1.21 (0.48-3.05)	40	32 (80)	1.60 (0.67-3.84)
Stable	203	144 (71)	1.00	91	64 (70)	1.00	112	80 (71)	1.00
Downward	55	33 (60)	0.61 (0.33-1.14)	16	12 (75)	1.27 (0.37-4.28)	39	21 (54)	0.47 (0.22-0.99)

Birth to 50 years									
Upward	166	130 (78)	1.87 (1.11-3.18)	70	53 (76)	1.28 (0.56-2.94)	96	77 (80)	2.43 (1.22-4.86)
Stable	120	79 (66)	1.00	48	34 (71)	1.00	72	45 (63)	1.00
Downward	43	23 (53)	0.60 (0.29-1.21)	20	12 (60)	0.62 (0.21-1.84)	23	11 (48)	0.55 (0.21-1.42)

***Odds ratios, 95% CIs and p-values estimated using logistic regression.**

Table 2. Median (and inter-quartile ranges (IQR) total OHIP score, overall and by sex, according to social mobility

	All			Men			Women		
SES mobility group	**N**	**Median (IQR)**	**P-value***	**N**	**Median (IQR)**	**P-value***	**N**	**Median (IQR)**	**P-value***
Birth to 25 years			0.82			0.26			0.38
Upward	128	139 (122-166)		54	136 (118-163)		74	139 (123-168)	
Stable	117	136 (119-186)		44	129 (117-142)		73	145 (122-198)	
Downward	36	130 (121-166)		22	129 (118-146)		14	156 (126-178)	
25 to 50 years			0.98			0.64			0.90
Upward	59	136 (121-168)		26	130 (112-146)		33	148 (126-178)	
Stable	174	136 (122-168)		80	132 (119-162)		94	144 (124-179)	
Downward	48	141 (118-181)		14	134 (110-153)		34	144 (122-188)	
Birth to 50 years			0.67			0.93			0.31
Upward	144	138 (120-169)		61	132 (116-162)		83	144 (125-178)	
Stable	99	132 (122-164)		42	130 (120-152)		57	139 (122-174)	
Downward	38	144 (118-191)		17	126 (118-153)		21	160 (127-201)	

***P-values from Kruskal-Wallis tests**