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# Indicators of socioeconomic status for adolescents: the WHO Health Behaviour in School-aged Children Survey

Candace E. Currie, Rob A. Elton<sup>1</sup>, Joanna Todd and Stephen Platt

## Abstract

Many indicators of socioeconomic status used for adults are inappropriate for use in research on adolescents. In a school-based survey of 4079 Scottish schoolchildren using a self-completion questionnaire, over 20% of 11–15 year olds were unable to provide a substantive response on father's occupation. In contrast, indicators derived to construct a family affluence scale, which included car ownership, telephone ownership and the child having their own unshared bedroom, resulted in a 98% response rate; and 92% of children responded to a question on their weekly spending money. The intercorrelations between the conventional indicator of father's occupation and each family affluence and spending money were examined, and their associations with a range of health indicators and health behaviour measures compared. Father's occupational status and family affluence were moderately correlated and showed broadly similar patterns of association with the selected health measures although there were also some distinct differences. Child's spending money was only weakly correlated with father's occupation and showed rather different patterns of association with health measures. A case is made for the use of multiple indicators of socioeconomic status in adolescent health surveys, and it is argued that that the family affluence scale pro-

vides a useful and easily applied additional indicator to father's occupation or an alternative measure of socioeconomic background where occupational data are unavailable.

## Introduction

Socioeconomic inequalities are understood to be of key importance to the patterning of health and health behaviours in the adult population and among children in the UK (Blaxter, 1990; Woodroffe *et al.*, 1993; MacIntyre, 1994), and are again the focus of much debate as they appear to be widening (Davey Smith and Morris, 1994; Judge, 1995). In contrast, it has been argued that adolescence is a stage in the life cycle where there may be relative resilience to the influences of social deprivation and affluence in terms of health outcomes (West *et al.*, 1990), and patterns of health behaviours may be more strongly influenced by other personal and social factors such as psychological traits and peer relationships. However, the choice of appropriate health outcomes and health behaviours for this age group is somewhat problematic. It has been argued by West *et al.* (1990), for example, that the use of the three major health indicators—mortality, chronic illness and self-reported health—as defined by the General Household Survey (OPCS, 1982) is inappropriate for adolescents. Consequently, in their study they broadened the range of health indicators to include illnesses and symptoms, such as colds, flu and headaches, and accidents.

The measurement of socioeconomic status (SES) among adolescents also presents difficulties. It is omitted from some important surveys of young

Research Unit in Health and Behavioural Change, and  
<sup>1</sup>Medical Statistics Unit, Medical School, University of  
Edinburgh, Teviot Place, Edinburgh EH8 9AG, UK

people, e.g. the OPCS smoking surveys of school-children (Thomas *et al.*, 1993). Yet if government smoking reduction targets are to be met it is crucial to address socioeconomic differentials in smoking prevalence (Department of Health, 1992; Scottish Office, 1992). As is the case for married women, adolescents and younger children are conventionally classified according to the status of the head of household measured in terms of income, final level of education and occupation (Bartley *et al.*, 1995). However, there are a number of conceptual and methodological problems with such a classification and this paper sets out to demonstrate that, consequently, other measures of adolescent SES, in addition to occupationally based ones, need to be developed.

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### **Occupational and non-occupational measures of SES in health research**

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Occupational class as measured most commonly in the UK by the Registrar General Social Classification (RGSC) scheme (OPCS, 1990) has been used widely in research into health inequalities over many years. However, in the recent ESRC Review of OPCS Social Classifications (Rose, 1995) a number of problems in using occupation-based measures for health research have been highlighted. Crucially, the question of what exactly the RGSC is measuring and the interpretation of health patterns revealed by it has been posed and the problem of non-coverage of the proportion of the population not in paid employment and therefore moving out of the scope of the RGSC has been raised.

Despite the problems of RGSC, and indeed other occupationally based measures, the ESRC Review (Rose, 1995) asserts that there has been little research in the UK into alternative non-occupational classification. It was considered that consumption based measures, such as housing tenure and access to motor vehicles, were of importance and could play a role. Their transient nature, however, would need to be acknowledged. In this respect though it could be argued that they are not unlike occupational classifications such as the

RGSC which are revised every 10 years to take account of changes in jobs. The report goes on to state that consumption-based measures should be seen as adding to rather than supplanting the more traditional occupationally based measures. This is in agreement with Townsend (1990) who asserts that although occupation is still considered to be a valuable indicator of social position in analysing trends in health, it is nevertheless the case that in certain circumstances it is not desirable or practical that it is the exclusive measure of SES.

Education and income are two other commonly used SES indicators in epidemiological studies, and there are many areas of overlap between these two measures and occupational status as discussed in the comprehensive review of Liberatos *et al.* (1988). Occupation, education and income are distinct but related concepts measuring multiple aspects of social class, there being both independence and interdependence among the measures. Of the three, occupational data are most difficult to obtain and it is contended that a relatively large number of questions—up to seven—are needed to code occupations appropriately (Liberatos *et al.*, 1988). Abramson *et al.* (1982), working in Israel, found that correlations between the three measures were weak, but that patterns of association with health and health behaviour measures exhibited by occupational class, education and income were broadly similar. They concluded that if a single measure is to be used in the study of health inequalities, for all practical purposes there may be little to choose between these major indicators. However, they also proposed that the fairly low correlations between the indicators suggested considerable gains from using more than one measure in order to:

- Increase the chance that an association between social class and health be detected.
- Permit appraisal of independent effects and important interactions between indicators.
- Increase overall explanatory or predictive power of the model.

They concluded that the final choice of indicators should be determined by practical considerations

and by the conceptual framework with respect to the social class relationships of the health characteristics under study.

It is clear that selecting a social class measure for the study of health inequalities should not be undertaken without careful consideration. Liberatos *et al.* (1988) go beyond Abramson *et al.*'s (1982) requirement to consider conceptual and practical issues to include such criteria as applicability, time relevance, reliability and validity, whether multiple or single indicators should be used, discrete versus quantitative measures, simplicity (practicality), and comparability with other studies.

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### Measuring SES of adolescents

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There has been very little research or detailed discussion into the assignment of social class to children and adolescents. In any such discussion two critical issues need to be addressed—conceptually the main consideration is whose characteristics—the child's, their father and/or mother or the family/household—should be used to assign SES to children and adolescents. Practically, an important issue is how to gather information on SES from children and adolescents themselves. Historically children are classified according to the occupation of the head of household in most official statistics on child health in the UK (Woodroffe *et al.*, 1993) and in many other research studies (West, 1997), although the problems outlined above for adults persist—in particular the issue of how to categorize the 'unoccupied' (West, 1997). This classification problem is even more important in relation to children's health since the unemployed, chronically sick and lone parent families with no paid work are excluded from occupational social class, and four-fifths of children in households whose 'head' is unemployed are in poverty (Woodroffe *et al.*, 1993).

In routinely collected statistics on child health, parental occupation information is collected from parents themselves (Woodroffe *et al.*, 1993). In research where the method is self-report survey of young people, collecting data on parental occupa-

tion may be problematic as outlined below. It was this problem in particular which provided the impetus for the development of supplementary indicators to parental occupation in the World Health Organization (WHO) Health Behaviour in School-aged Children (HBSC) Survey, which is described below. In the process of solving the practical problem of collecting information on children's SES, the conceptual issue of assigning SES to children was also addressed.

The WHO HBSC survey has the overall aim of increasing understanding of health behaviours, lifestyles and their context in young people in Europe (Aaro *et al.*, 1986; Currie and Todd, 1992, 1993; Currie *et al.*, 1993, 1995; Wold and Smith, 1993). In the surveys data are collected on health indicators and health behaviours of school-aged children, and on a wide range of social factors including family relationships, peer relationships, the school environment and socioeconomic background. The survey is conducted at regular intervals and since 1985/86 has been on a 4-year cycle. The SES indicators used in the 1982/83 and 1985/86 HBSC surveys were father's and mother's occupational class. These were coded from open-ended responses to questions asking for job descriptions. In the 1986 Scottish HBSC survey over 20% of responses to these questions could not be coded to give occupational categories (Currie, unpublished data). An analysis of these non-codable responses and children's own comments in pilot stages of survey item development revealed a number of problems. One was the issue of the validity of responses given by school-age children; they may not know their parents' occupations or they may not be able to describe them accurately or in sufficient detail for classificatory purposes. In coding occupational class, there is no satisfactory way of differentiating between the social status of parents who may be students, housepersons, actively seeking work or retired. Where one parent, more commonly father, is not living at home, the economic and social status of the household will then vary according to how much this parent contributes to the finances of the family. In reconstituted families it is not obvious whose occupa-

tional status is most relevant, e.g. if the father has left, whether it is his or the mother's. Further complications arise depending on whether the remaining parent stays single or remarries. The difficulty of assigning SES is highlighted where the method is survey with self-completion questionnaire and the complications of individual family arrangements cannot be satisfactorily probed. It also has to be acknowledged that even if further probing were possible there would remain a small but significant proportion of young people who would be unclassifiable for various reasons including real ignorance of their parents occupation, real inability to describe the occupation or their parents being economically inactive.

In preparing for the 1990 Scottish HBSC survey therefore it was decided that in order to classify a greater proportion of the sample in terms of SES additional, non-occupationally based indicators should be developed (Currie, unpublished). Various factors and limitations were considered:

- It was not possible to probe further with added questions about parental occupations as it was already considered to be a highly sensitive area of the questionnaire by some education authorities.
- The other commonly used indicators of parental SES, education and income, would be as difficult as occupation to gain information on, if not more so.
- Conceptually it was of interest to gather information not only on the family but on the individual.
- Questions should be simple to answer, non-intrusive and non-sensitive.
- Where possible indicators from existing studies should be applied to increase chances of reliability and validity.
- Multiple rather than single indicators should be sought.
- The indicators should be relevant to the time period under study and to the Scottish context.
- There should be the potential to extend the use of the indicators to other European countries in future surveys.

At the time of developing the indicators the authors were unaware of the work of Liberatos *et al.*

(1988) but it is clear that many of the above criteria mirror those set out by their paper on the measurement of social class in epidemiology.

In sum, the aim of this developmental work was not to discard the parental occupation measures but rather to add to the range of measures for use with children and adolescents where self-administered survey methods are being used. This paper sets out to examine how selected non-occupationally based measures compared to the SES indicator of father's occupation in terms of correlations with father's occupation, missing data generated, and their association with measures of adolescent health and health behaviour.

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## Methods

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The Scottish survey reported here formed part of the larger, mainly European, HBSC study, which is co-ordinated by the WHO. It was based on the sample selection methods and data collection methods outlined in the HBSC study protocol (Aaro and Wold, 1989; Currie and Todd, 1993).

### Sample selection

The sample was drawn from the Scottish population of schoolchildren at the ages of 11, 13 and 15 years (i.e. classes Primary 7, Secondary 2 and Secondary 4). A stratified systematic cluster sample of classes was drawn for each of the three school years from the class lists of 11 of the 12 Regional Educational Departments in Scotland and from Scottish independent schools. One small region declined the invitation to participate in the survey.

The primary sampling unit was the school class. Actual class sizes were not recorded in all regions but an average class size of 25 was estimated on the basis of available information. To ensure the minimum required sample of 1200 in each school year, every 40th class was selected from the class lists giving a total of 234 classes. Unstreamed, mixed ability form classes were surveyed in order to achieve a representative sample of pupils.

### Selection of non-occupational SES indicators

Following the criteria laid out in the Introduction, it was considered that although desirable, collecting

information from 11- to 15-year-old schoolchildren about their parents' educational attainment or their income was not feasible. For the purposes of this stage of the development of indicators for the HBSC survey, using the distinction drawn by Townsend (1987) between material and social deprivation, it was decided to tackle the more straightforward issue of material affluence/deprivation. Future developmental work for the HBSC study will focus on indicators of social dimensions of SES.

The most obvious corollary of income is expenditure and so two indicators of consumption were selected. These were household telephone ownership and car ownership which Townsend (1987) classifies as measures of deprivation of home facilities. Telephone ownership is known to vary according to social class in Scotland, there being under-representation of telephone ownership among the lower occupational groups (Robertson and Uitenbroek, 1992). Car ownership is a component of the deprivation index developed by Carstairs and Morris (1991) in the Scottish context but used widely in health inequalities research in the UK. Another dimension of material deprivation classified by Townsend (1987) as housing deprivation is overcrowding which is also a component of the Carstairs and Morris deprivation index.

From a practical point of view, asking 11- to 15-year-old schoolchildren to report on the number of telephones in their home and the number of cars their family has is straightforward. Asking them to count the number of rooms in their home excluding kitchen and bathroom is a more complex and time-consuming task. Therefore as a proxy to overcrowding, bedroom sharing was used.

Conceptually, these three variables measure household characteristics so they complement the SES indicator of father's occupation which is an individual measure. As measures of material wealth, they complement occupational class which also more directly denotes education, social position and culture (Blaxter, 1990). As a measure of children's own SES, their own personal 'income' was selected. This comprised both money earned and money given that children were free to spend

as they liked each week. From a practical perspective it was predicted that children would find this question simple to answer.

It was planned to explore the household affluence measures, phone, car and bedroom individually, and as a summary 'wealth' variable following the model of Durkin *et al.* (1994) in their analysis of measures of SES for child health in developing countries.

### Data collection

The data were gathered anonymously through a self-completion questionnaire which consisted largely of pre-coded questions, exceptionally there were open-ended questions on father's and mother's occupation where respondents were asked to describe their parents' jobs. The main areas covered in the questionnaire were health (self-rated health, self-rated fitness and experience of symptoms), health behaviours (smoking, alcohol use, physical activity, sedentary leisure activity, eating habits and toothbrushing), social relationships and demographic characteristics.

The questionnaire was administered between March and June, 1990. Teachers administered the survey in the classroom under examination conditions, i.e. no conferring. Children completed the questionnaires independently during a single school period (approximately 40 min) with the supervising teacher instructed to respond only to children's queries about procedure. All pupils were provided with individual envelopes in which to seal their questionnaires after completion.

### Data analysis

In addition to the socioeconomic indicators discussed above, analysis was performed on selected measures of health and health behaviour. The measures were coded as follows.

#### *Socioeconomic indicators*

- *Father's occupation (OCC)*. Based on children's own descriptions the standard Registrar General occupational categories were applied: I, professional; II, managerial; IIIN, clerical; IIIM, skilled manual; IV, semi-skilled manual; V, unskilled

manual (OPCS, 1990). Categories unemployed, houseperson, student, not at home/dead, don't know and unclassifiable were also used, as required. For the analysis presented in Table V, Groups I to V were coded from 6 to 1 to simplify interpretation of relationships with the other socioeconomic indicators used, for which a high score indicates higher status.

- *Number of telephones in household (PHONE)*. Coded as 0,1 or 2+.
- *Number of cars in family (CAR)*. Coded as 0, 1 or 2+.
- *Having own unshared bedroom (OWNROOM)*. Coded as 0 (no) or yes (1).
- *Spending money (MONEY)*. Weekly spending money (£s), comprising pocket money and money earned, was used as a direct measure of children's own economic status.

#### *Health and health behaviour measures*

- *Self-rated health*. Very healthy/quite healthy/not very healthy coded on an ordinal scale from three (very healthy) to one (not very healthy).
- *Self-rated fitness*. Very fit/quite fit/not very fit/very unfit coded on an ordinal scale from four (very fit) to one (very unfit).
- *Frequency of selected health behaviours*. Smoking; consumption of beer and wine; vigorous physical exercise; use of television; consumption of fruit; and consumption of chips. Behaviours were coded on four- or five-point ordinal scales—the lowest value indicating infrequent behaviour (rarely/never), the highest indicating daily or more frequent behaviour.

#### **Statistical analysis**

The data were analysed with the statistical package SPSSX. Bivariate associations between variables were tested by  $\chi^2$  tests with Yates' correction, Wilcoxon rank sum tests or Spearman rank correlations depending on whether they were binary or ordinal. Multiple regression was used to test whether individual variables were independently

predictive of outcomes. Logistic regression was used for binary outcomes and multiple linear regression or ordinal logistic regression was used for ordinal outcomes. Findings from logistic analyses were very similar in terms of significance to those derived from multiple linear regression. This suggests that the large sample sizes justified the use of linear regression for ordinal responses.

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## **Results**

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Out of the sample of 234 classes, 200 classes (85%), in total 4079 pupils, completed and returned questionnaires. Pupil response rates are estimated (on the basis of average class sizes of 25) as 82%. Table I shows the sample characteristics by age and sex.

The numbers and percentages of children in each age group categorized according to the various socioeconomic (SES) indicators are reported in Table II. Substantial numbers of children were unable to provide sufficient information on their father's occupation (OCC) to allow accurate classification. This was a particular problem among the younger children, of whom nearly one-quarter (22%) provided no substantive response. Overall, 8.1% of children reported that they did not know their father's occupation, 8.6% gave insufficient details to permit classification, 2.8% said their father was unemployed and 1.8% responded that their father was not living at home. Almost all children were able to report on the number of phones and cars in their households, and whether or not they had their own bedroom. Older children were more likely to have their own bedroom—79% of 15 year olds compared to 72% of 11 year olds—but OCC, CAR and PHONE showed little association with age (Table II). Spending money was strongly associated with age and the percentage of missing data on this questions was also greater among younger children (Table II).

The associations between OCC and other socioeconomic indicators are shown in Table III. PHONE, CAR and OWNROOM showed substan-

**Table I.** *Sample characteristics: age and sex*

Class	Total pupils ( <i>n</i> )	Mean age (years)	Boys ( <i>n</i> )	Girls ( <i>n</i> )
Primary 7	1353	11.6	656	697
Secondary 2	1314	13.6	631	683
Secondary 4	1412	15.6	653	759
Total	4079		1940	2139

**Table II.** *Number (%) of children categorized according to SES indicator by age group*

SES indicator	Category	Age 11 ( <i>N</i> = 1353)	Age 13 ( <i>N</i> = 1314)	Age 15 ( <i>N</i> = 1412)
OCC (father's occupational class)	I	121 (9)	151 (11)	144 (10)
	II	336 (25)	349 (27)	449 (32)
	III non-manual	99 (7)	90 (7)	83 (6)
	III manual	340 (25)	338 (26)	359 (25)
	IV	83 (6)	92 (7)	91 (6)
	V	8 (1)	14 (1)	18 (1)
	houseperson	4 (<1)	3 (<1)	6 (<1)
	student	2 (<1)	4 (<1)	2 (<1)
	unemployed	39 (<1)	43 (3)	34 (2)
	not at home	16 (1)	30 (2)	29 (2)
	don't know	141 (10)	96 (7)	95 (7)
	unclassifiable	158 (12)	93 (7)	97 (7)
	missing	6 (<1)	11 (1)	5 (<1)
PHONE (number of phones)	0	127 (9)	113 (9)	113 (8)
	1	522 (39)	520 (40)	538 (38)
	2+	684 (51)	671 (51)	751 (53)
	missing	20 (1)	10 (1)	10 (1)
CAR (number of cars)	0	222 (16)	222 (16)	203 (14)
	1	627 (46)	638 (49)	670 (47)
	2+	484 (36)	445 (34)	532 (38)
	missing	20 (1)	9 (1)	7 (0)
OWNROOM (own bedroom)	no	356 (26)	327 (25)	281 (20)
	yes	969 (72)	974 (75)	1121 (79)
	missing	28 (2)	13 (1)	10 (1)
MONEY (weekly spending money)	<£2	536 (40)	170 (13)	60 (4)
	£2 < £4	403 (30)	356 (27)	198 (14)
	£4 < £10	208 (15)	474 (36)	552 (39)
	£10+	60 (4)	197 (15)	532 (38)
	missing	146 (11)	117 (9)	70 (5)

tial positive correlations with OCC (rank correlations of 0.22, 0.41 and 0.19, respectively, all  $P < 0.001$ ). Children whose OCC could not be classified, the 'Other' category in Table III (predominantly those who failed to give a meaningful

response), tended to resemble those of lower social class. This can be seen when the percentages for the 'Other' group are compared to those for OCC groups IV and V versus those in OCC groups I and II. Amounts of spending money available to

**Table III.** Relationships between father's occupation (OCC) and other socioeconomic indicators (column percentages in parentheses)

		OCC						
		I	II	IIIN	IIIM	IV	V	other
PHONE	0	3 (1)	20 (2)	9 (3)	105 (10)	35 (13)	6 (15)	175 (20)
	1	110 (26)	400 (35)	123 (45)	438 (42)	109 (41)	23 (57)	377 (42)
	2+	303 (73)	711 (63)	140 (51)	492 (47)	120 (45)	11 (27)	329 (36)
CAR	0	9 (2)	34 (3)	24 (9)	177 (17)	71 (27)	18 (45)	314 (36)
	1	141 (34)	449 (40)	165 (60)	614 (59)	156 (59)	17 (42)	393 (44)
	2+	266 (63)	649 (57)	83 (30)	244 (24)	38 (14)	5 (12)	176 (20)
OWNROOM	no	38 (9)	190 (17)	78 (29)	321 (31)	80 (30)	18 (45)	239 (28)
	yes	377 (91)	944 (83)	193 (71)	714 (69)	186 (70)	22 (55)	628 (72)
MONEY	<£2	117 (30)	226 (21)	56 (22)	145 (15)	44 (18)	4 (11)	174 (22)
	£2 < £4	108 (28)	281 (26)	64 (25)	239 (25)	49 (20)	9 (24)	207 (26)
	£4 < £10	108 (28)	354 (33)	81 (32)	348 (36)	94 (39)	17 (46)	232 (29)
	£10+	56 (14)	207 (19)	53 (21)	237 (24)	54 (22)	7 (19)	175 (22)

children were associated, albeit less strongly, with OCC (rank correlation 0.13,  $P < 0.001$ ), with more money available to children of lower social class.

Multiple linear and ordinal regressions both showed that phone ownership, car ownership and use of bedroom all independently predicted OCC at  $P < 0.001$  in children for whom OCC was available. A significantly better prediction was obtained by using information on 0, 1 and 2+ phones/cars rather than simply using a binary coding of these items into no/yes. A composite score was therefore calculated for each child based on ownership of up to two phones (0–2) and cars (0–2) and own bedroom (0–1) producing an ordinal scale (0–5) which we have termed the Family Affluence Scale (FAS).

Table IV shows the relationship between FAS and OCC in all age groups combined, and also gives the mean FAS score separately in each age group for the different categories of OCC. The percentage distribution of FAS shows a steady trend across the six OCC categories for those children in whom an OCC classification was possible, while the FAS distribution in children for whom OCC could not be coded was similar to that for OCC categories at the lower end of the range. This is confirmed by the mean values shown in

Table IV, which also show that the relationship between these two measures of SES was very similar in all age groups. One exception was the stronger trend with low OCC in the older age groups. The rank correlation coefficient between OCC and FAS was 0.41 ( $P < 0.001$ ).

A further series of exploratory multiple linear regressions was carried out to compare the associations between the three socioeconomic indicators with the various health measures. The results are shown in Table V. Significance levels have been adjusted for age, sex and interaction between age and sex, and the effect of spending money (MONEY) was assessed by including this indicator on a logarithmic scale since its distribution was highly skewed.

The direction of the independent associations shown in Table V is indicated by the use of signs, with a positive sign implying that the health/health behaviour measure concerned was more common for high values of the socioeconomic indicator. Thus a health/health behaviour measure associated with high occupational class, affluence or high spending money corresponds to positive signs of OCC, FAS and MONEY, while the opposite is true for health/health behaviour measures associated with low occupational status, poverty and low

**Table IV.** Relationships between OCC and FAS (column percentages in parentheses; mean FAS scores for each category of father's occupation (OCC) are shown for each age group separately)

		OCC						
		I	II	IIIN	IIIM	IV	V	other
FAS	0	1 (0)	2 (0)	3 (1)	19 (2)	10 (4)	3 (7)	50 (5)
	1	0 (0)	14 (1)	8 (3)	81 (8)	23 (9)	8 (20)	136 (15)
	2	16 (4)	86 (8)	34 (12)	202 (20)	61 (23)	11 (27)	173 (19)
	3	65 (16)	234 (21)	101 (37)	298 (29)	82 (31)	10 (25)	232 (25)
	4	128 (31)	355 (31)	80 (30)	313 (30)	66 (25)	6 (15)	178 (20)
	5	205 (49)	439 (39)	45 (17)	120 (12)	22 (8)	2 (5)	93 (10)
Mean FAS	age 11	4.27	3.97	3.42	3.07	3.13	2.87	2.70
	age 13	4.20	3.90	3.34	3.08	2.86	2.21	2.72
	age 15	4.28	4.06	3.47	3.22	2.71	2.22	2.78

**Table V.** Significance of associations between socioeconomic indicators and health/health behaviour measures

	OCC <sup>1</sup>	FAS <sup>1</sup>	MONEY <sup>1</sup>	OCC <sup>2</sup>	FAS <sup>2</sup>	MONEY <sup>2</sup>
Self-rated health	+++	+++		+++	+	
Self-rated fitness			+++			+++
Ever smoked	-		+++		+	+++
Current smoking	-		+++			+++
Beer drinking	-	+++	+++	-	+++	+++
Wine drinking	+++	+++		+++	+++	
Vigorous exercise	++	+++	++	++	+	+++
Watch TV	-	-	+++	-	-	+++
Fruit	+++	+++		+++	++	+
Chips	-	-	+++	-	-	+++

*P* values shown for each indicator are unadjusted/adjusted for the effect of the other two indicators as follows: OCC<sup>1</sup>, FAS<sup>1</sup> and MONEY<sup>1</sup>—unadjusted; OCC<sup>2</sup>, FAS<sup>2</sup> and MONEY<sup>2</sup>—adjusted for both the other two indicators. In addition, adjustments are made in each case for age, sex, and interaction between age and sex. The sign shows the direction of the independent association for each indicator and the number of signs indicates significance  $P < 0.05$  (one sign),  $P < 0.01$  (two signs) or  $P < 0.001$  (three signs). Positive sign implies that health behaviour was more common for high values of socioeconomic indicator.

spending money. In Table V, the associations indicated under OCC<sup>1</sup>, FAS<sup>1</sup> and MONEY<sup>1</sup> are adjusted for age and sex and age–sex interactions only, that is they are not adjusted for the effects of each other. The OCC<sup>2</sup>, FAS<sup>2</sup> and MONEY<sup>2</sup> figures are each adjusted for the other two variables in addition to age, sex and age–sex interactions. For simplicity the OCC<sup>1</sup>, FAS<sup>1</sup> and MONEY<sup>1</sup> figures will hereon be referred to as unadjusted, and the OCC<sup>2</sup>, FAS<sup>2</sup> and MONEY<sup>2</sup> as adjusted.

The unadjusted associations allow for a compar-

ison of the relationships between different socioeconomic indicators and various health measures which permit assessment of the use of alternative indicators to OCC. For example, in the situation where OCC is not measurable could FAS operate as a proxy? MONEY has not been conceptualized as an alternative to OCC as it measures the financial status of the child. Nevertheless it is of interest conceptually to study its relationship to health measures for this very reason. Overall, OCC<sup>1</sup> and FAS<sup>1</sup> show very similar patterns of association

with respect to all the health measures with the exception of smoking and beer drinking. FAS<sup>1</sup> shows no association with the two smoking variables but OCC<sup>1</sup> shows significant negative associations, i.e. children from higher OCC backgrounds are less likely to have ever smoked or to smoke currently. Beer drinking is significantly associated with high family affluence but with low occupational status. MONEY<sup>1</sup> shows rather different patterns of associations to the parental and household status variables, OCC and FAS. For example, it is very strongly positively associated with negative health behaviours including smoking, beer drinking, watching TV and eating chips, but it also associated with taking vigorous exercise. All these activities require having disposable 'income', even exercise, when the cost of equipment and sports club membership are considered.

The adjusted associations allow the consideration of independent associations between each socioeconomic indicator and the health measures, and thus an assessment of the differences between the indicators. Comparison of unadjusted figures above, in contrast, allowed assessment of areas of overlap or similarity. OCC<sup>2</sup> and FAS<sup>2</sup> show very few differences with the exception of the opposite direction of effects on beer drinking, this difference indicating the diverging effects of culture and affluence. Being wealthy but from a lower occupational background predicts beer drinking, but being affluent and from a higher occupational background predicts wine drinking. Neither OCC nor FAS strongly predict smoking behaviour once adjusted for the effects of MONEY and for all other measures there are only differences of strength of effect. Again MONEY is revealed as being rather a different dimension of SES than OCC or FAS, strongly predicting all consumption behaviours with the exception of wine and fruit. Clearly young people from higher OCC and FAS families consume their parents' purchases of these items.

Further multiple regressions incorporating interaction terms were carried out to investigate whether the associations between health/health behaviour measures and socioeconomic scales varied according to age or sex. Although a number of these

interactions were significant, they nearly all corresponded to variations in the magnitudes rather than the direction of the associations. Thus the signs shown in Table V can be taken in most cases as summarizing the trends found within individual age/sex groups as well as on average overall.

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## Discussion

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This paper deals with the issue raised by Klerman (1993) that the link between economic status and adolescent health is difficult to establish due to significant limitations of existing data bases derived from youth surveys. These surveys seldom request economic information from adolescents directly because 'few know the income of their parents and some are even uncertain of their parents' occupations' (Klerman, 1993). In an attempt to tackle this problem in the case of the WHO HBSC survey where only around 80% of children could be coded according to occupational background, non-occupationally based measures were also developed for the survey questionnaire. The aim was for these to be simple to answer and permit measurement of family SES and child SES as well as parental SES. It was not intended that the new indicators should supplant the occupationally based SES measure but to investigate whether supplementary and complementary measures could be developed. Thus a comparative appraisal of several SES indicators was conducted in order to assess their usefulness and meaning for assigning SES in youth health surveys.

The FAS scale proposed here represents a potentially useful addition to conventional occupational measures of SES for assessing the socioeconomic status of adolescents. It is constructed on the basis of three simple questions and therefore has the advantage over OCC of achieving a very high response rate (98%) in these age groups. The items also have the advantage of requiring no intermediate coding. Although we have not carried out validity or reproducibility studies we believe that it is likely to reflect reasonably reliable information on items involved, especially in an anonymous questionnaire context where children

are not under any pressure to present their families as affluent to their peers. However, further research into the validity of the measures when used in different contexts, e.g. face to face versus self-administered questionnaire or different age groups of children, is to be encouraged.

In contrast to FAS, OCC could only be classified substantively in around 75% of the children. The value of father's occupational status as a sole measure of SES in children's self-completion surveys is therefore limited. Furthermore, school-based surveys that request information on parental occupation are sometimes unacceptable to education authorities and to parents from whom increasingly consent is required before such surveys may proceed. In addition to indicators of family SES, this study included an indicator of children's own economic status, weekly spending money, for which 92% of children gave responses.

The items phone, car and bedroom were each found to be significantly correlated with OCC; however, when combined as the FAS they had more predictive power. The combined score is therefore considered to be a useful indicator. The FAS characteristics of the missing OCC cases were similar to those of the lower OCC categories showing that this is a non-representative group. This finding gives added impetus to the search for indicators that permit classification of the SES of the majority of such an adolescent sample.

Analysis of OCC and FAS indicated that they were distinct but related concepts measuring multiple aspects of social class, as Abramson *et al.* (1982) concluded in their analysis of the adult SES measures of occupation, income and education. OCC and FAS showed a large degree of overlap as dimensions of adolescent SES but also independently predicted certain health outcome measures. Differences in the influence of wealth versus culture were demonstrated in their associations with youth drinking patterns. MONEY appeared to be different dimension of adolescent SES. It was only weakly correlated with OCC, and showed rather different patterns

of association with the adolescent health measures compared to both OCC and FAS.

Just as the methodological problems described for occupational measures of SES have recently been subjected to scrutiny (Rose, 1995) so the limitations and biases that may apply to non-occupational measures must be examined. For example, telephone and car ownership will vary according to areas of residence—rural versus urban, and bedroom sharing will vary according to family size, and age and gender of children, although these and indicators of material affluence/deprivation have previously been used with little regard to such issues. This is not to say that the measures should be discarded, but rather that future work needs to address these methodological issues and explore the possibility for weighting data according to locality/family size, etc.

This paper argues that the use of a FAS based on relevant items has potential as a supplementary measure to parental occupation in youth health surveys. It may be a particularly useful proxy where OCC is unavailable, although awareness that OCC and FAS are not identical dimensions of adolescent SES is essential for meaningful interpretation of findings. Further research is needed to examine the usefulness of the FAS as a socioeconomic indicator in adolescent health studies and to clarify the role of family affluence as an influence on adolescent health.

The paper also indicates the value of using multiple measures of SES—in this case a measure of the child, a measure of the parent and a measure of the family—in order to gain a better understanding of health inequalities among children and adolescents (Abramson *et al.*, 1982; Liberatos, 1988; Durkin *et al.*, 1994). Where possible a range of measures of SES need to be included in youth health surveys in order that these can inform the development of relevant and effective health promotion programs targeting young people. This point is emphasized by Klerman (1993) in her discussion of youth health promotion and in particular in her consideration of the design of health promotion programmes aimed at poor youth in the US.

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## Conclusions

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For large-scale surveys which gather information directly from schoolchildren on their health and health behaviours the measurement of SES is problematic. This paper concludes that material affluence of the family as measured by the FAS provides a useful complementary or alternative indicator of SES to conventional occupational measures.

The three indicators of SES used in our study measure overlapping but distinct dimensions of SES as shown by their inter-relations and their associations with a range of health indicators and health behaviour measures. Further research is required to gain a better understanding of the way in which different elements of inequality—social, educational, physical environmental and economic—impact on adolescent health and health behaviour. This is essential in order to devise the appropriate interventions to reduce social variations in health in the population (Department of Health, 1995).

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