

RESEARCH REPORT

Social class gradients in health during adolescence

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Study objective: To review existing data on social class gradients in adolescent health and to examine whether such gradients exist in new data concerning US adolescents.

Design: Review of relevant publications and unpublished data; regression analyses using adolescent self reported health status data to determine whether there are gradients by social class, using three classes categorised by adolescent reported parental work status and education.

Participants: Adolescents of ages 11–17.

Main results: Findings from the literature indicate the presence of social class gradients in some but not all aspects of adolescent health. Results from new data showed social class gradients in several domains of health and in profiles of health. The likelihood of being satisfied with one's health, of being more resilient (better family involvement, better problem solving, more physical activity, better home safety), having higher school achievement, and of being in the best health profiles were significantly and progressively greater as social class rose. Moreover, the probability of being in the poorest health profile type group was progressively higher as social class declined.

Conclusions: The review of existing data and the new findings support the existence of social class gradients in satisfaction with one's health, in resilience to health threats, in school achievement, and in being in the best health overall (as manifested by the health profiles composed of four major domains of health). The study had two especially notable findings: (1) the paucity of studies using the same or similar indicators, and (2) the consistent existence of social class gradients in characteristics related to subsequent health, particularly intake of nutritional foods and physical activity. The sparseness of existing data and the different aspects of health investigated in the relatively few studies underscore the need for (1) the development of conceptual models specifically focused on adolescent health and social class; (2) additional inquiry into the measurement of social class and adolescent perceptions of class; (3) inclusion of contextual variables in study design; and (4) longitudinal cohort studies to better understand the specific determinants of health during adolescence.

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Social gradients in health, wherein health is found to be better at each successive level of social position, are consistently found for the vast majority of health indicators in infancy,^{1,2} early childhood,³⁻⁵ and adulthood.⁶ However, there is debate about the existence of social gradients in late childhood and adolescence, the time during which much of the foundation for subsequent health is being established. Several investigators, most notably from the United Kingdom, have reviewed much of the relevant literature through 1996 and have found little evidence that the health of adolescents varies with their parents' social class.⁷

Perhaps the greatest support for absence of a gradient effect was provided by West.⁸ In his extensive review of the literature up to the mid-1990s, West set the stage for viewing social differences in the context of past experiences as well as current ones. Attempting to delineate effects attributable to chronological age from those attributable to life contexts, he hypothesised that there might be social class gradients in adolescence for chronic illness, particularly severe or activity limiting chronic illness that might be a consequence of social disadvantage earlier in life and continuing. On the other hand, those aspects of illness that are newly occurring in the adolescent period might not show social class gradients because of the homogenising effects of experiences in school, with peers, and with pervasive youth culture. His review revealed relatively consistent social gradients for height and for severe chronic conditions, and only very inconsistent gradients for some other aspects of health in either males or females but not both. The studies derived largely from longitudinal datasets in the United Kingdom, and often grouped adolescent age groups with younger age groups, or only considered a very limited age range (often one year of age within adolescence).

Furthermore, social status was overwhelmingly characterised by occupational status of the head of the household, with certain limitations noted on this method of classification. Also, the conclusions about the existence of gradients often were limited to differences between the lowest social group and higher ones, rather than a progressive increase (or decrease) across the social groupings.

Like West,^{7,8} other investigators have attributed the absence of a consistent effect of social class on the health of adolescents to increasing autonomy and involvement outside the family⁹ as well as to the equalising effect of culture in the adolescent period. Alternate explanations are possible. An extensive review of the literature, primarily from the US, concerning the frequency and severity of 16 health problems in poor compared with non-poor children and youth indicated that poor children and adolescents had more severe illnesses and complications from illnesses (and consequently more mortality) than non-poor youth. In contrast, the differences between the classes in simple frequency of different types of illnesses was not as dramatic.¹⁰ Thus, it is possible that severity rather than incidence might distinguish health in the different social classes and, if so, might provide a basis for postulating an effect of medical care that, if received early enough to prevent or reverse progression, might reduce the disparities in health among the social classes.¹¹ However, studies of mortality, chronic illness, and illness in general face the problem of demonstrating differences when the events are generally uncommon, as is the case in adolescence. Finally, the absence of gradients in one country does not necessarily mean that class gradients in health do not exist elsewhere.

Studies in children and youth, as compared with those in adults, narrow the range of possible explanations for the

influence of social class on health. Social drift (wherein poor health leads to downward social mobility as a result of reduced earning potential) is likely to be minimal before adulthood. It is also possible that illness in young children could reduce parental work opportunities and earnings. Therefore, studies of social gradients in adolescence have the potential for providing better understanding of pathways than is the case earlier in life or later in life.

To determine whether such gradients exist, this paper will do the following: (1) update the published literature on the presence or absence of social class gradients in adolescent health since 1996; (2) present the results of heretofore unpublished data from US national health surveys using family income as the measure of social class; and (3) present new data on the self reported health status among US adolescents using a new measure of social class that integrates parental education and occupation.

We conceptualise health broadly, recognising that it includes not only overt disease but also the ability to participate in tasks and activities that are appropriate to the age of the individual. Because young people are still developing, ill health may be manifested by decelerations in the rate of attainment of normal features rather than by abnormality of form or function. Development is an accepted component of health in childhood and adolescence, partly because of what abnormalities imply for the present and partly because of what they portend for the future. For adolescents, behaviours associated with testing independence are a normal aspect of development, although some of these behaviours may reduce the quality of current and future health. Adolescents incorporate such risky behaviours as well as positive health behaviours in their concepts of health and illness.^{12, 13} Thus, our concept of health includes not only mortality and morbidity, but physical and emotional discomfort, limitations of activity and social functioning, and behaviours and exposures that are likely to heighten risk to health or, conversely, to enhance resilience to threats to health.

REVIEW OF RECENT LITERATURE ON SOCIAL CLASS GRADIENTS

To characterise current knowledge about the nature of social gradients in adolescent health, we undertook a review of the literature published about adolescents (ages 11–17 years) since 1996 when West⁷ concluded his review. Several earlier studies not included in West's review were also considered here. To effectively test for the presence of a social class gradient in health, the reviewed studies had to include three or more categories of social class, usually defined as social class of the parents. For example, we specifically excluded studies that included only poor/non-poor comparisons. We concluded that a gradient was present only if there was an ordering of health progressively across the levels of the social gradient (either directly or inversely), rather than only differences between two groups. Thus, our interest was in social gradients in itself rather than differences associated with poverty or near poverty. The existence of social gradients in health is likely to provide more potential for generalisable explanations than differences associated with poverty, which are more likely to be attributable to a constellation of related factors associated with pervasive deprivation.

This overview of recent literature is organised according to the aspect(s) of health under consideration, specifically mortality, injury, and self or parent reported health status of adolescents.

MORTALITY

West⁷ concluded that there seems to be no gradient in disease mortality by social class. At least two studies not cited by West showed gradients such that the higher the social class, the lower the mortality. Pensola and Valkonen¹⁴ found a gradient

for all cause mortality among youth of ages 15–19 in Finland (which were attributable to accidents and alcohol related deaths, and Wise *et al*¹⁵ found a progressive increase in mortality with decrease in family income among 10–14 year olds and, to a lesser degree, in 15–19 year olds.

INJURY

Findings on the existence of social gradients associated with injuries vary with the type of injury. Recent research and studies that were not captured in the review by West⁷ suggest that frequency of injury mortality is higher the lower the social class.^{16–19} However, these studies did not separate adolescents from younger children.

One study examined the variation in injury by social class among adolescents. In 1997, Williams and colleagues⁹ used a cluster sample of school classes in Scotland to survey 11, 13, and 15 year olds to ascertain the frequency of medically attended non-fatal injury, as well as to rank injury risk and protective behaviours. Whereas there were no social gradients for overall rates of medically attended injuries, there were marked differences both in where injuries occurred and the activity associated with the injury. For example, lower social class youth were more likely to sustain injuries as pedestrians, when riding a bicycle, and from fighting, whereas being in a higher social class was associated with sports injuries and injuries sustained at school and while riding in motor vehicles. Similarly, a gradient was observed such that being in a lower social class was associated with friends doing dangerous things, fighting, smoking and drunkenness, and being in one of the higher social classes was increasingly associated with riding bicycles, playing sports, using protective gear when playing sports, and drinking alcohol. Thus, the existence of gradients seems highly associated with differences in the types of exposure to sources of injury across the social strata.⁹

MORBIDITY AND HEALTH STATUS

The presence of social gradients in adolescent morbidity and health status depends upon the health condition and the type of social class measure.

A study of Dutch children (those with parents born in the Netherlands) in Rotterdam showed gradients across four social classes in the height of 5, 7, 11, and 14 year olds, among both boys and girls.²⁰ These findings are consistent with prior findings from cited studies in the earlier Dutch National Growth Study of 1980, and an earlier study in the UK. The ratio of weight to height showed similar but less pronounced social class gradients, with more obesity among the lower classes, consistent with cited studies in France and Stockholm.²⁰ Interestingly, the height deficit of low birth-weight infants was smaller in the higher social class groups when children were assessed at 7, 11, 16, and 23 years of age.²¹ By the age of 16, the deficits of higher social class adolescents were no longer significantly different from that of their normal birthweight peers.

In 1999, the Health Survey for England: The Health of Young People '95–'97 reported that mental health status (as measured by the General Health Questionnaire 12), accident rates, and blood pressure rates among youth (ages 13–15 years) were not related to social class (as measured by parental occupation) or income. Social class gradients were observed for psychosocial difficulties, as measured by the Strengths and Difficulties Questionnaire (SDQ); however, these variations were examined in both children and youth ages 4–15,²² and gradients were not presented for adolescents specifically.

The British General Household Survey²³ found that material living conditions (based on home ownership, family structure, work status of household head) were strongly and consistently related to activity limiting, longstanding illness in youth 10–16 years. However, the observed gradient in earlier childhood is flattened during youth when examining these

Table 1 Parent reported behavioural problem scale scores by family income level for adolescents 12 to 17 years old: United States, 1981

	Mean scores*			
	Income†			
	All*	Low	Moderate	High
Behavioural problem index	5.7	7.2	6.4	5.3
Antisocial subscale	0.9	1.2	1.1	0.8
Anxious/depressed subscale	1.6	1.9	1.7	1.5
Headstrong subscale	1.8	2.1	2.0	1.7
Hyperactive subscale	1.2	1.5	1.4	1.1
Peer conflict/social withdrawal subscale	0.3	0.4	0.4	0.3

*Higher scores indicate more behaviour problems; †includes unknown income. Source: Microdata from the 1981 National Health Interview Survey, Child Health Supplement.

health differentials by social class (as measured by the occupation of the family household head).

An analysis of 1995 data from the US National Longitudinal Study of Youth²⁴ found a progressive decrease in rates of depression and obesity with increases in social class, regardless of whether social grouping was characterised by mother's education, father's education, highest educated parent, or income. Suicide attempts were highest in the lower two income classes when grouped by family income only. There was no statistically significant gradient in the prevalence of asthma or sexually transmitted diseases. Using the same dataset, other investigators found highly significant direct and indirect effects of decreasing family income on the increased prevalence of depression. This effect was seen even after taking into account mediating factors, such as self esteem, a variety of types of stressors, health behaviours, social ties, and access to medical care. There was a similar independent effect of decreasing levels of parental education (although not income) on self reported health status.²⁵

Using the Australian Youth Survey, Siahpush and Singh²⁶ conducted a multivariate analysis of the association between social class of origin (as measured by highest education and occupational class of parents) and self rated general and psychological health of 16 year olds. The results indicate that adolescent health and psychological health improve with higher levels of parental education and occupation; however, the differences were not statistically significant.

RISKS AND RESILIENCE

Using the Youth Risk Behavior Supplement to the 1992 National Health Interview Survey in the US, Lowry and colleagues found that adolescent cigarette smoking, sedentary lifestyle, inadequate consumption of fruits and vegetables, and episodic heavy drinking were more prevalent as the educational level of the responsible adult and family income decreased, after controlling for age, sex, race/ethnicity, and school enrollment status of adolescents.²⁷

Using the same dataset, Santelli and colleagues²⁸ reported such factors as living in a two parent family structure, being white, and higher parental education were each independently associated with adolescents never having had sexual intercourse but not other sexual behaviours. Specifically, this study found a positive gradient for adolescent (ages 14–17 years) abstinence when using parental education as a measure of social class; however, family income was not related to any of the sexual behaviours. Rates of sexually transmitted diseases and pregnancy were not fully explained by the discrepancy in sexual behaviour by race/ethnicity and social class (as measured by parental education). These findings indicate that other factors, such as problems attributable to differential access to care, may account for such health disparities.

The latest World Health Organisation Study of Health Behavior in School-Aged Children (1997–8) ascertained social

status directly from adolescents.²⁹ The Family Affluence Scale (FAS) was based on whether the family had a car, the adolescent had his/her own bedroom, and frequency of family holidays. Perceived Wealth was assessed as a rating of how well off the family is. Father's and mother's jobs were also coded. Data on 11–15 year olds in 11 countries, including the United States and many in Europe, showed a direct relation of social class for the FAS and Perceived Wealth on happiness, confidence, physical activity, and eating fruit, and satisfaction/wellbeing, and an inverse effect of class on symptoms. In contrast, there was no relation between social class and risky behaviours and also a very limited relation of these behaviours with parental job category. A more detailed analysis of a prior administration of this WHO-EURO study in Iceland (not included in the 11 countries of the more recent study) showed a strong social class gradient in strenuous exercise during leisure time.³⁰

Thus, the sparse data on social class gradients in the health of adolescents are consistent in showing that with decreases in social class, health is worse for some, but not all indicators and measures of health. Moreover, the literature indicates that different measures of objective and perceived social class are related to health in different ways.

EVIDENCE FROM OTHER EXISTING US DATA

To examine these relations more extensively, we examined unpublished data from the US national health surveys, which are briefly reported here. We also analysed data collected from adolescents in various areas of the United States on a self report health status instrument, the Child Health and Illness Profile-Adolescent Edition (CHIP-AE).³¹

Unpublished data from the 1981 National Health Interview Survey, which for the first time included a behavioural problem scale, showed a progressive decrease in behavioural problems with increasing family income. The effect was also found in most subscales of this scale (table 1). This dataset also indicates a social class gradient in both perceived ill health and limitations of activity because of chronic illness in adolescents. Figure 1 shows that problem rates are highest when family income is under \$10 000, somewhat less when income is between \$10 000 and \$25 000, considerably less when family income is between \$25 000 and \$50 000, and markedly lower with family incomes of \$50 000 or higher. Figure 2 shows that the same is the case when the health indicator is days spent in bed; restricted activity; or school absence attributable to acute illness.

EVIDENCE FROM NEW DATA

The following summarises the methods and results of our own studies of the relation between parental social class and adolescent health, when both are self reported. The new data analyses presented in this paper are based on adolescent self report of health, which may more accurately reflect experiences that are not known by parents.

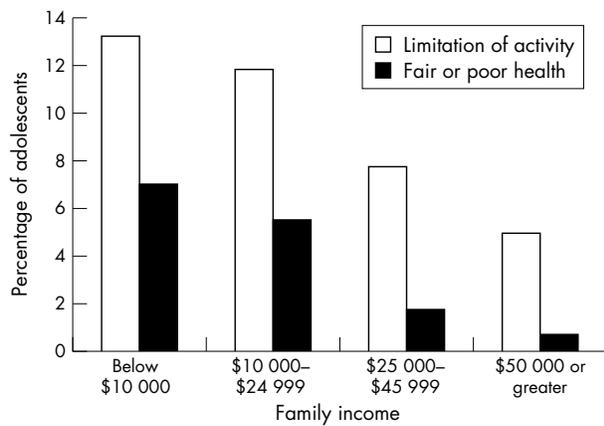


Figure 1 Perceived health and limitation status by income groups, US adolescents, 1995.

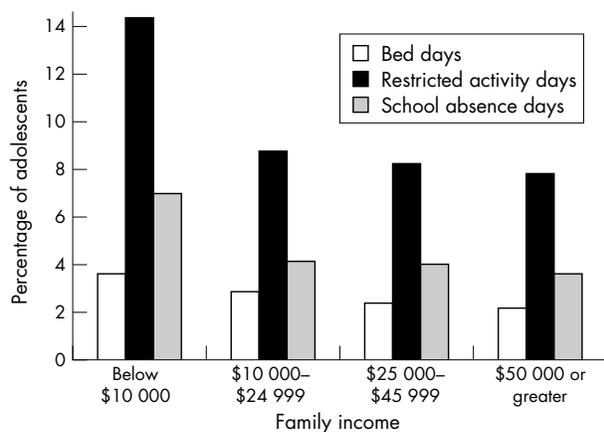


Figure 2 Illness days by income group, US adolescents, 1995.

METHODS

Instruments/measures

The Child Health and Illness Profile-Adolescent Edition (CHIP-AE) was used to comprehensively measure health status and socio-demographic and health need variables of youths 11–17 years of age.³³ The CHIP-AE measures six domains of health status (table 2). All domains have internal consistency reliability above 0.80 and one week test-retest reliability of greater than 0.60 (intraclass correlations).³² At least 70% of items in a domain had to be completed for a domain score to be calculated.

Health profile measures

To develop a composite measure of health that would characterise individuals according to their overall level of health, we developed and validated a taxonomy of profiles of health.^{32 33} These profiles are based on the distribution of scores on each of four domains of the CHIP-AE: Satisfaction, Discomfort, Risks, and Resilience.³³ In order to be assigned to a profile type, at least 70% of items in the four domains had to be completed. Scores for each of these four key domains of health were trichotomised into poor (lowest quartile), average (two middle quartiles), and good (top quartile). Clinical and cluster-analytical approaches were used to combine the level and aspects of health to describe the 13 unique patterns or profile types.³³ Table 3 provides the profile types.

Social gradient measures

The social class measure was based on a composite of parental employment and education status. Specifically, the groups were formed based on the adolescent’s report of mother’s and father’s highest education level and employment status. Parental education levels were initially grouped into the following categories, in descending order: one or both parents obtained a college degree; both parents obtained some college education; both parents obtained a high school diploma; or one or both parents did not receive a high school diploma. In addition, parental employment status was defined using the following criteria, from highest to lowest: both parents with full time

Table 2 CHIP-AE domain and subdomain descriptions

<i>Satisfaction:</i> Perceived level of health and wellbeing (12 items)	
1	<i>Satisfaction with health:</i> overall perceptions of and beliefs about one’s health
2	<i>Self esteem:</i> general self concept
<i>Discomfort:</i> Specific physical and emotional sensations/feelings that interfere with comfort (45 items)	
1	<i>Physical discomfort:</i> positive and negative somatic feelings and symptoms
2	<i>Emotional discomfort:</i> positive and negative emotional feelings and symptoms
3	<i>Limitations of activity:</i> restrictions in age appropriate activities and limitations in mobility
<i>Resilience:</i> States and behaviours potentially associated with positive future health (32 items)	
1	<i>Family involvement:</i> level of activities with family and perceived family support
2	<i>Social problem solving:</i> active approaches to solving an interpersonal problem
3	<i>Physical activity:</i> level of involvement in activities related to fitness
4	<i>Home safety and health:</i> aspects of home that reduce/increase likelihood of harm
<i>Risks:</i> States and behaviours that increase the likelihood of subsequent illness or injury (38 items)	
1	<i>Individual risks:</i> activities that threaten individual health and development
2	<i>Threats to achievement:</i> behaviours that typically disrupt social development
3	<i>Peer influences:</i> involvement with peers who engage in risky behaviours
<i>Achievement:</i> Expectations for role performance in school and/or work (11 items)	
1	<i>Academic performance:</i> school performance and involvement
2	<i>Work performance:</i> work involvement and performance
<i>Disorders:</i> Diagnostic conditions, injuries, and impairments (45 items)	
1	<i>Acute minor disorders:</i> eg, colds, tonsillitis, sprains, etc
2	<i>Acute major disorders:</i> eg, pneumonia, broken bones, hepatitis, etc
3	<i>Recurrent disorders:</i> eg, ear infections, asthma, allergies, etc
4	<i>Long term medical disorders:</i> eg, arthritis, diabetes, epilepsy, etc
5	<i>Long term surgical disorders:</i> eg, scoliosis, vision problems, hearing problems
6	<i>Psychosocial disorders:</i> eg, speech problem, eating problem, learning disability

Table 3 Criteria for defining profile types

Profile	Type	Criteria
A	Excellent health	Excellent health on 3 or 4 domains, with no domains of poor health
B	Good health	At least average health on all domains, with excellent health on no more than 2 domains
C	Dissatisfied	Poor health only on satisfaction
D	Discomfort	Poor health only on discomfort
E	Low resilience	Poor health only on resilience
F	High risks	Poor health only on risks
G	Dissatisfied/high discomfort	Poor health on satisfaction and discomfort
H	Dissatisfied/low resilience	Poor health on satisfaction and resilience
I	Dissatisfied/high risks	Poor health on satisfaction and risks
J	Discomfort/low resilience	Poor health on discomfort and resilience
K	Discomfort/high risks	Poor health on discomfort and risks
L	Low resilience/high risks	Poor health on resilience and risks
M	Worst health	Poor health on 3 or 4 domains

jobs, one parent with a full time job, or no one in the household with a full time job. These educational and parental employment status groups were then combined to form three mutually distinct and ordered categories (high, middle, and low). Fathers and stepfathers who were not living in the household were included in these analyses. Missing data on the father's employment were set to "no full time job", and missing education levels were set equal to the mother's education level. This classification was validated by examining parent report on family income, education, and work status in a separate sample of 288 school adolescents surveyed in 1993. Applying our education-employment social class grouping to the income-per-household-resident data resulted in the following sample specific mean income distribution. Lower social class included families earning, on average, \$7300 per household member; middle social class families' income per person was \$11 300; and, for those categorised in our higher social class group, income per person averaged \$17 100 in 1993.

Sample description

All data were collected from adolescents 11–17 years old in public school settings. Three samples were combined for this study. One sample was from an all city magnet school in Baltimore City (n=877); the other two were from rural areas, one in Appalachia (western Maryland, n=1878) and the other in Maine (n=963), both designated as non-metropolitan statistical areas. The rural samples involved all youth in the public schools in their respective counties.

Each of the samples had approximately equal numbers of boys and girls and youth at each age. Racial distributions differed by site. The majority of youth in the urban site were African American (approximately 86%) with the remainder predominately white, non-Hispanic. Almost all youth in the rural sites were white. After eliminating those with missing data for profile assignment (n=294), social class gradient (n=337), or both (n=72), the total number of adolescents in the analysis of health profile types was 3015.

More than a third of the urban youth were in families that participated in a free or reduced cost school lunch programme, compared with less than a quarter of the families in the rural sites. In the rural sites, youth were likely to be in households with both biological parents present (58%). In the urban site, only about 38% of the youth were living in homes with both parents.

Data collection

Health surveys were administered in close cooperation with school personnel. Before administration, information explaining the survey was mailed to parents from the school principal and the principal researcher explaining the survey. The survey was then administered in school classrooms to all students who themselves agreed to participate and whose parents did not object to their taking the survey; this procedure was approved by the appropriate University Institutional Review Board and the school district administration. The response

Table 4 Sample description of adolescent reporting data for a social class gradient

	Baltimore, Maryland 1992	Western Maryland 1992	Rural Maine 1999	Total
Total sample, N (%)	826 (25.0)	1649 (49.8)	834 (25.2)	3309 (100)
Male, N (%)	382 (46.2)	836 (50.9)	403 (48.4)	1621 (49.1)
Female, N (%)	444 (53.8)	805 (49.1)	430 (51.6)	1679 (50.9)
Mean age (SD)	14.3 (1.76)	14.6 (1.78)	14.4 (2.04)	14.5 (1.85)
<14, N (%)	258 (31.2)	519 (31.6)	305 (36.7)	1082 (32.8)
14–15, N (%)	310 (37.5)	546 (33.3)	251 (30.2)	1107 (33.6)
≥16, N (%)	258 (31.2)	576 (35.1)	274 (33.0)	1108 (33.6)
Race/ethnicity				
White, N (%)	98 (12.0)	1584 (97.0)	733 (88.6)	2415 (73.8)
Black, N (%)	689 (84.6)	9 (0.6)	13 (1.6)	711 (22.7)
Other, N (%)	27 (3.3)	40 (2.4)	81 (9.8)	148 (4.5)
Social class gradient				
Highest, N (%)	471 (57.0)	578 (35.1)	434 (52.0)	1483 (44.8)
Middle, N (%)	212 (25.7)	577 (35.0)	212 (25.4)	1001 (30.3)
Lowest, N (%)	143 (17.3)	494 (30.0)	188 (22.5)	825 (24.9)

Table 5 Means (SD) of domain and subdomain standardised scores by social class gradient. Higher scores = better health for all domains and subdomains. (n=3309 adolescents)

Domain/subdomain	1 Lower social class (n=825, 24.9%)	2 Middle social class (n=1001, 30.3%)	3 Higher social class (n=1483, 44.8%)	Significant comparisons†
<i>Satisfaction</i>	16.3 (5.35)	17.1 (5.13)	18.3 (4.88)	3>1,2***; 2>1*
Overall satisfaction	18.6 (5.41)	19.3 (5.03)	20.3 (4.85)	3>1,2***; 2>1*
Self esteem	17.7 (5.90)	18.4 (5.91)	19.2 (5.30)	3>1***
<i>Discomfort</i>	18.3 (5.92)	19.0 (5.51)	19.2 (5.55)	ns
Physical discomfort	18.7 (6.27)	19.5 (5.58)	19.4 (5.62)	2>1*
Emotional discomfort	17.5 (5.44)	18.1 (5.37)	18.8 (5.25)	3>1**
Limitations	20.8 (4.59)	21.0 (4.46)	21.2 (4.29)	3>1*
<i>Resilience</i>	19.9 (5.36)	21.0 (5.55)	22.4 (5.55)	3,2>1***; 3>2***
Family involvement	19.1 (5.69)	20.0 (5.21)	20.5 (5.05)	3>1***; 2>1**
Problem solving	15.5 (6.26)	15.9 (6.33)	17.2 (6.08)	3>1,2***
Physical activity	21.1 (4.98)	22.1 (4.97)	23.0 (5.27)	3>1,2***; 2>1***
Home safety	19.9 (5.18)	20.9 (5.30)	22.7 (5.29)	3>1,2***; 2>1***
<i>Risks</i>	20.3 (6.17)	20.2 (6.09)	20.9 (5.94)	3>1**
Individual risks	21.0 (6.74)	20.8 (6.71)	21.5 (6.65)	3>1*
Threats to achieve	20.0 (5.07)	20.1 (5.02)	20.5 (4.88)	3>1*
Peer influences	18.8 (6.53)	18.5 (6.46)	19.2 (6.23)	NS
<i>Achievement</i>	20.4 (4.98)	21.4 (4.72)	22.4 (4.96)	3,2>1***; 3>2**
Academic perform	19.9 (4.87)	20.9 (4.78)	21.9 (4.93)	3>1,2***; 2>1***
Work performance	21.2 (4.73)	21.2 (4.52)	21.0 (4.94)	NS
<i>Disorders</i>	19.1 (5.88)	19.3 (6.18)	19.3 (5.92)	NS
Acute major	18.6 (6.69)	19.0 (7.16)	19.2 (6.26)	NS
Acute minor	18.4 (6.23)	18.4 (5.87)	18.6 (5.74)	NS
Recurrent	20.2 (4.99)	20.4 (4.92)	20.2 (5.00)	NS
L-T medical	19.4 (5.78)	19.5 (6.75)	19.8 (5.86)	NS
L-T surgical	19.0 (6.36)	19.0 (6.70)	18.5 (7.30)	1,2>3*
Psychosocial	19.6 (5.54)	20.2 (5.38)	20.0 (5.85)	NS

†Linear regression model with age, sex, and rurality as covariates. *p<0.05; **p<0.01; ***p<0.001.

rates averaged more than 90%, with refusals and absence from school approximately equally split.

Table 4 summarises the gender, age, race/ethnicity, and social class distributions for each of the three samples in these analyses. The urban and rural composition is defined by the sample locations.

Data analysis

Mean scores for CHIP-AE domains and subdomains were regressed on the social class gradient with age, gender, and rurality as covariates using multivariate general linear models. Post hoc testing for differences among the three social class groups in these measures of health was conducted with Bonferroni adjustment for multiple comparisons. The distribution of adolescents within health profile types was examined by social class gradients. Logistic regression analyses were used to ascertain the likelihood of being in the best or worst health profiles by social class. Age, gender, and rurality were included as covariates. (We were unable to include race in the model because of the high extent of overlap with rurality. When the analyses were re-done using race instead of rurality as a control variable, almost identical findings resulted.)

RESULTS

Domain and subdomain scores by social groups

Table 5 provides the results of the Domain and Subdomain analyses. There are marked and statistically significant gradients—that is, better health with higher social grouping, for the Satisfaction domain and one of its subdomains (Overall Satisfaction with Health), for the Resilience domain and two of its subdomains (Physical Activity, Home Safety), and

for the Achievement domain and one of its subdomains (Academic Performance). There are statistically significant differences between an upper and a lower social class group for the three subdomains of Discomfort and for the Risks domain and two of its three subdomains. There was no statistically significant gradient in the Disorders domain, although there are apparent trends for the two more severe subdomains (acute major and long term medical conditions).

Profile types by social groups

Table 6 shows that the odds of being in the best health profiles (combinations of four domains, with adjustment for age, gender, and rural area of residence) are significantly smaller for those in the lowest social class compared with those in the middle group, and lower for those in the middle group as compared with those in the highest group. Conversely, the odds of being in the worst health profile were significantly higher the lower the social class.

Because social gradients in health might conceivably be a result of differences in access to health services, we used the 1994 US National Health Interview Survey to determine the proportion of adolescents with physician visits and the average number of visits in four family income quartiles. Except for the known deficit in visits in the second to lowest income group (as a result of less financial coverage for health services), we found no gradients in use (data available on request).

DISCUSSION

This review of studies and the findings of adolescents' self reports of health indicate complex effects of social gradients in

Table 6 Odds of adolescents being in the best or the worst health profile category as predicted by social status—results of two logistic regression analyses† (n=3015)

Health groupings‡	Social class comparison	Odds ratio	95% confidence intervals for odds ratio
1 Excellent/good health v all other profiles	Highest v middle	1.27**	1.06 to 1.52
	Middle v lowest	1.36**	1.09 to 1.68
	Highest v lowest	1.72***	1.41 to 2.11
2 Poor health v all other profiles	Lowest v middle	1.43**	1.10 to 1.86
	Middle v highest	1.30*	1.01 to 1.67
	Lowest v highest	1.86***	1.44 to 2.39

†Logistic regression analysis controlled for age, gender, and rurality; ‡excellent/good health is defined as having one of the two healthiest profiles; poor health is defined as having poor health scores on 3 or 4 domains. *p<0.05; **p<0.01; ***p<0.001 for Wald statistic.

the lives of adolescents. In the US national data and in our own data, direct social class gradients in health are found for profiles of good health (and in the reverse direction, for profiles of poor health), for reported overall health (“Satisfaction” in our conceptualisation of health), Resilience, and for Achievement of developmental expectations (school performance). The statistically significant differences in reported symptoms of discomfort are primarily between the higher classes and the lowest class. There are no gradients in Disorders, at least as they were categorised in our conceptualization (in five different *types* of disorder rather than as specific disorders).

The absence of social class gradients in some areas of health and the strong presence of those effects in others may be explained by differences in conceptualisation, measurement, choice of health outcomes, and differences in social context. “Social class” can be conceptualised in terms of relative social position and/or economic resources, and the method of measurement may capture one component better than another. The production of class based differences may proceed most directly in youth from the economic resources available and this may, in fact, define adolescents’ social class for them. However, the social standing of adults is clearly influenced by not only economic resources, but also by one’s educational and occupational achievements. Moreover, the question of whose social standing or economic resources should be measured has not been adequately addressed. Adolescence is a time of transition. Goodman’s work³⁴ shows that adolescents have strong and reliable perceptions about their relative social standing, which differ from those of their parents. The few studies on older adolescents’ achieved social status indicated that their own social status is more consistently related to their health than is the social status of their parents.^{35–37}

It is relatively clear that the presence of social class gradients in health depends on which outcomes one observes. The effect is inconsistent in prevalence of major chronic diseases. It is likely that the development of the major chronic diseases requires time and sufficient exposure to causal vectors that adolescents have not had time to experience. The complex pathogenesis of many diseases, based on genetic predispositions and various types of environmental exposures, may also account for the absence of consistent gradients. For example, Goodman and colleagues found the highest prevalence of asthma in the lowest (fifth) income group, and the highest two classes had rates above the third and fourth classes.²⁴ Social class gradients appear to be absent for injuries overall but not when the sources and activities involved in the injury are examined; there are clear social class gradients. In all aspects of self perceived health, protective behaviours, and growth and obesity, there is a clear gradient such that youth with higher social class are healthier. Indeed, early life disadvantage such as low birth weight is more effectively overcome by those in each successively higher social strata.²¹

Conspicuously missing from all studies is consideration of the social context. The findings reported in this paper

concerning gradients in characteristics related to subsequent health underscore the need for consideration of context, including not only social context but also material context, including access to food markets with affordable nutritious foods and access to safe facilities for physical exercise. If, indeed, the health of adolescents reflects increasing independence and exposure to different social contexts, as originally suggested by West, their omission is a major weakness in existing studies.

It is conceivable that at least some social gradients in health differ from country to country as a result of differences in the balance of the many determinants of health. If there is more commonality in exposure to risky situations (such as motor vehicles), effects of social gradients may be diminished. If there are differences in school situations, peer groups, and youth culture, there may well be differences in gradients in different population subgroups or in different countries. Moreover, areas with larger social gradients in early life may be more likely to show persistently larger gradients in later childhood and adolescence. For example, countries with comparatively high rates of low birth weight, which are disproportionately found among infants of lower social class, may have larger social gradients in later childhood because the adverse sequelae of low birth weight will be reflected in larger subsequent social gradients.

Although the pathways through which socioeconomic status influences current and subsequent health are unclear, developments in theory suggest multiple and interacting types of effects.^{6,38} Material circumstances that result in different levels of resources available to individuals and families play a substantial part. Psychological effects associated with access to resources and differences in social class are also believed to operate.³⁹ The development and acceptance of a theoretical model, or at least of alternative models, will be critical in helping the study of social class gradients in adolescence to advance from a descriptive ad hoc stage to an analytical and explanatory stage. Several methodological considerations require attention, among them the way in which ill health is characterised. Another key methodological consideration concerns the way in which social class is characterised. The explanatory nature of social class depends on what the categories of “class” are based on. Parental job status, parental education, family income, adolescent achievement, and perceptions of social class are different and are likely to exert different effects. In fact, Goodman *et al* recently reported differences in beliefs about social class among working and upper middle class adolescents, in that working class adolescents were more likely to mis-categorise themselves into a higher social class position.³⁴

Perhaps the major contribution of this paper is that we have systematically addressed the data on wellbeing, satisfaction with health, and risk and protective behaviours. In most of the published studies we could find, as well as in our own data, we observed a social class gradient in perceived wellbeing. In our

Key points

- There is debate about the existence of social class gradients in health during adolescence, the period during which much of the foundation of adult health is being established.
- The findings support the existence of social class gradients in several aspects of health, but not in all.
- These findings underscore the need for: (1) the development of conceptual models specifically focused on adolescent health and social class; (2) additional inquiry into the measurement of social class and adolescent perceptions of class; and (3) longitudinal cohort studies to better understand the specific determinants of health during adolescence and across the life span.

studies, we found strong effects of those aspects of health that predispose to better health later in life. We also found in our analyses of profiles that both presence and absence of constellations of various types of health problems are associated with social class gradients, with likelihood of better health in higher classes and likelihood of poorer health in lower classes. The gradients we found seem to be evidence of a linear effect of class on health. We cannot rule out the presence of threshold as well as or instead of linear effects; in fact, we found evidence of health disadvantage primarily among the lowest social group in at least one aspect of health (discomfort), and for the two lower groups in one category of disorders (long term surgical disorders).

Health behaviours established in adolescence may mediate and moderate the development of disease in adulthood and influence the health of the next generation. It may be useful to begin to conceptualise the effects of social class on health in terms of these long term and intergenerational influences and exposures to different social and material contexts. New knowledge about the determinants of health and their predictiveness over the life span will require longitudinal cohort studies, preferably beginning at birth. Collaborative studies that use the same or similar theoretical framework and comparable measures would provide greater generalisability of findings. Cross-national studies may add a new dimension of understanding of the type and salience of the many determinants of health, including social class gradients, in different cultures and political jurisdictions.

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