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SAGE Research Methods Case Health Submission for Consideration

Case Title

Assessing the view from bottom: How to measure socioeconomic position and relative deprivation in adolescents

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Published Articles

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Abstract

Assessments of socioeconomic position (SEP) and relative deprivation are important to many areas of child and adolescent research. These related constructs are typically measured using data on household income or parental education or occupation. However, because such data can be difficult to collect in youth surveys, the World Health Organisation's Health Behaviour in School-aged Children (HBSC) study uses an inventory of common material assets in the home. The HBSC Family Affluence Scale is used to measure socioeconomic

conditions in 11- to 15-year-olds in over 40 countries. This article examines the importance of SEP and relative deprivation to adolescent health and demonstrates simple calculations of these variables using the data from the Family Affluence Scale. We show how to transform a summation of material assets to a SEP index and apply Yitzhaki's (1979) index of relative deprivation to material assets using schoolmates as a social comparison group. These calculations are useful to investigating the contextual determinants of health and developmental inequalities in young people and can be modified for other socioeconomic variables in and populations.

Learning Outcomes

1. To understand the socioeconomic gradient in adolescent health.
2. To calculate a riddit-based SEP index using data on material assets
3. To understand the theoretical constructs of relative deprivation and economic inequality
4. To apply the Yitzhaki index of relative deprivation to data on consumption, income, or material assets.

Case Study

Introduction

Socioeconomic measurement tools are important to many areas of child and adolescent research. This paper discusses the importance of socioeconomic conditions in shaping health and development during this formative stage of the life course, and the unique challenges in measuring socioeconomic position (SEP) in adolescent surveys. We examine the causal mechanisms that underlie socioeconomic differences in adolescent health and then demonstrate two versatile calculations that can be used to estimate SEP and relative deprivation using data on material assets. These methods can be modified for other socioeconomic variables and populations in researching social inequalities in health. We start with a brief synthesis of the literature on the graded relationship between SEP and adolescent health.

The gradient effect

A concerted effort is underway to understand the social determinants of adolescent health. The Lancet Commission on Adolescent Health and Wellbeing reported that SEP is one of most powerful such determinants (Viner et al., 2012). SEP is the relative position of an individual or family within a stratified social structure, according to their access to, or control over, wealth, prestige and power (Pfortner et al., 2015). An adolescent's SEP can be estimated using data on family income, material possessions, parental education or occupation, or combinations of these indicators. Regardless of how it is measured, individual differences in SEP typically share a graded, monotonic relationship with health and development (Bradley & Corwyn, 2002). Across the full range of socioeconomic conditions, health, wellbeing, and development tend to be better on the level above and worse on the level below (Reiss, 2013).

Two examples of the 'gradient effect' are shown in Figure 1. Both charts show increasing behavioural problems and increasing prevalence of serious behaviour disorders from high to low SEP groups in 6- to 17-year-olds in the United States (Singh & Ghandour, 2012). The gradients are similar whether SEP is estimated using parental education (left panel) or household income (right panel).

Other data like these on an array of health and developmental outcomes show that the likelihood that young people are happy, healthy, and doing well in school all significantly improves as their SEP rises. Some research had suggested that socioeconomic differences in health emerge in early childhood and then diminish in early adolescence as peer influences intensify, only to re-emerge in adulthood (Macintyre & West, 1991; West, 1997). However, a large body of evidence in this area shows socioeconomic gradients in health at every stage of the life course, including adolescence (Inchley et al., 2016). A higher SEP relates to better health behaviours (e.g., physical inactivity, poor nutrition, or smoking), better physical and mental health, better socioemotional development, and higher wellbeing. This is a robust social pattern that emerges early in life – long before children develop the capacity to comprehend social class differences (Odgers, 2015).

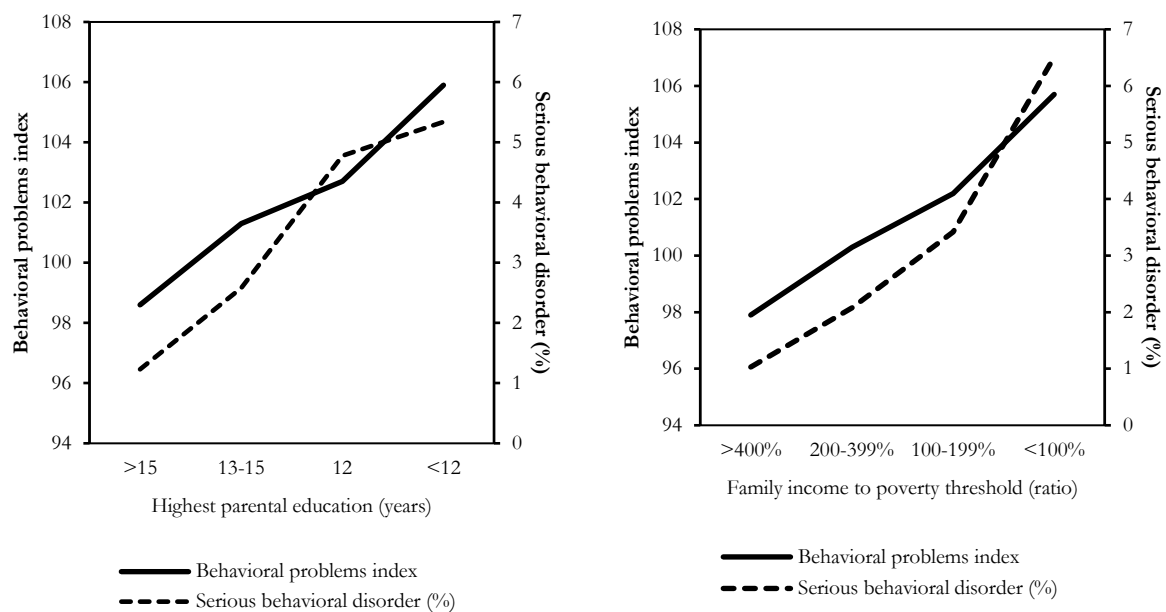


Figure 1. Social class gradients in child behavioral problems and serious behavioral disorders in 91,642 American children. Adapted from data published by Singh and Ghandour (2012).

Developmental origins

An extensive body of research in psychology, neuroscience, and life course epidemiology has examined the developmental origins of SEP differences in health, tracing back to socioeconomic exposures *in utero*, infant stress responses, and brain development (Bradley & Corwyn, 2002; Gillman, 2005). Longitudinal research found that SEP differences in emotional functioning are linked to prenatal exposures to maternal stress, early childhood experiences that alter neuroendocrine stress responses, and pathways in neuroregulatory centres of the brain that govern emotion, attention, and social functioning (Borghol et al., 2012). Cohort studies by Gary Evans and colleagues at Cornell University have found that a low SEP in 9-year-olds prospectively predicts physiological stress dysregulation, emotion dysregulation, and emotional and behavioural symptoms when the child reaches adolescence (ages 13 and 17) even after baseline differences in SEP were controlled (Doan, Fuller-Rowell, & Evans, 2012; Evans & Kim, 2012).

The burgeoning field of epigenetics explores changes in gene expression caused by early-life experiences, including early-life SEP. While the precise mechanisms through which maternal stress relates to emotional dysregulation are not yet sorted out, they are likely to include cortisol output and psychosocial inflammatory responses (Lam et al., 2012). The data are preliminary and still difficult to apply to clinical interventions (Heijmans and Mill, 2012). What is clear is that health consequences of early socioeconomic exposures are transmitted through maternal stress, which can have both lagged and cumulative effects on the developing brain (Shonkoff, Boyce, & McEwen, 2009).

This ‘biological embedding’ of SEP early in life explains how its negative effects on health can endure through adolescence and adulthood and go on to define lifelong social inequalities in health, education, employment, and life expectancy. Social inequalities in health are an exciting and multidisciplinary field of study that incorporates work in genetics, neuroscience, social and developmental psychology, and epidemiology. Together, the science speaks forcefully for the need to redress health inequities in early life (Hertzman et al., 2010).

Unpacking the gradient

The research on the causal pathways that account for SEP differences in health has identified two complementary pathways: the direct health consequences of material wealth and the indirect, psychosocial effects of social status. First, the lack of material resources (e.g., low household income) affects health directly by increasing exposure to environmental risks and stressors and decreasing protective factors. It limits access to basic necessities such as housing, nutritious food, clean water, and security. These are fundamental, material assets that impact health regardless of one’s social position or the surrounding social context.

Second, the psychosocial consequences of SEP stem from one’s social rank in the socioeconomic hierarchy. Low SEP marginalises the poor, fosters class anxiety and financial worries about the future, elicits psychological stress, and reduces access to social resources that help people to cope with stress. The powerful psychosocial effects of low SEP help to explain why the socioeconomic gradient is most pronounced for chronic, stress-related health problems.

And it is not just that the poor are unhealthy. It is telling that the SEP gradient in health holds through the full range of socioeconomic conditions - including the middle and upper social classes. The pattern is found in nearly every age group, race, culture, and health domain in which it has been studied, in societies with and without universal access to health services, and regardless of whether status is measured objectively (e.g., household income) or subjectively (e.g., drawing an ‘X’ on the picture of a ladder to indicate perceived status). These aspects of the SEP gradient in health are difficult to explain based on material conditions alone (Marmot, 2004).

Demetris Pillas, Michael Marmot and colleagues at University College London recently carried out a systematic review of 201 studies on socioeconomic differences in children’s health (Pillas et al., 2014). Their results showed that a large majority (~70%) of studies had reported worse health and more developmental problems in lower SEP children and adolescents in terms of cognitive development, school readiness, mental health, asthma, cancer, mortality and various other domains.

Although the material and psychosocial pathways are not mutually exclusive (each can compound the effects of the other), only the psychosocial effects of SEP explains how two adolescents with the same family income might differ in health when one is surrounded by more affluent peers and the other by less affluent peers, *ceteris paribus*. The difference in SEP can lead one individual to feel poorer and more deprived when making comparisons to a standard of living that is perceived to be more desirable. Similarly, the university graduate

who weighs competing job offers from companies in Montreal and Manhattan will quickly realise that the same salary in these contexts may correspond to different SEPs and different standards of living. As Robert Sapolsky, an endocrinologist at Stanford University, once noted, “the surest way to feel poor is to be endlessly made aware of the haves when you are a have-not” (Sapolsky, 2005, p. 98).

The view from the bottom

Sociologists and economists have long studied SEP and poverty through the related construct of *relative deprivation*. Like material wealth, a person can be deprived in either an absolute sense by lacking basic necessities for health (e.g., shelter and nutrition) or in a relative sense by not meeting the desirable standard of living that is set by the rest of society. Like low SEP, relative deprivation generates stress and anxiety independently of absolute deprivation. The key difference between these concepts is that relative deprivation is shaped not only by one’s status in the socioeconomic hierarchy but also the amount of inequality in the hierarchy.

Relative deprivation has long been the focus of social commentary and philosophy on social equality. Karl Marx wrote about the dynamic of SEP and inequality in his 1847 essay, ‘Wage Labour and Capital:’

“A house may be large or small; as long as the neighboring houses are likewise small, it satisfies all social requirement for a residence. But let there arise next to the little house a palace, and the little house shrinks to a hut. The little house now makes it clear that its inmate has no social position at all to maintain, or but a very insignificant one; and however high it may shoot up in the course of civilization, if the neighboring palace rises in equal or even in greater measure, the occupant of the relatively little house will always find himself more uncomfortable, more dissatisfied, more cramped within his four walls.”

Contemporary definitions of relative deprivation have been influenced by analyses of poverty in post-war Britain. For instance, Walter Runciman’s (1966) description of poverty in England focused on the frustrations felt from explicit upward social comparisons of income. According to Runciman, we all share a natural tendency to compare our situation to an imagined situation of some other person or group that is better off – the so-called comparative reference group:

“The magnitude of a relative deprivation is the extent of the difference between the desired situation and that of the person desiring it” (Runciman, 1966, p. 10).

Peter Townsend (1993) also conceptualised poverty in terms of relative deprivation but recognised more than Runciman the subjective nature of the grievance. In his analysis of absolute and relative poverty in Europe, Townsend showed how the lack of certain socially defined necessities can result in social marginalisation – even in the world’s most affluent countries:

“People are relatively deprived if they cannot obtain, at all or sufficiently, the conditions of life - that is, the diets, amenities, standards and services which allow

them to play the roles, participate in the relationships and follow the customary behaviour which is expected of them by virtue of their membership of society. If they lack or are denied the incomes, or more exactly the resources, including income and assets or services in kind, to obtain access to these conditions of life they can be defined as living in poverty” (p. 36).

The subjective, comparative aspect of relative deprivation has two implications for measurement. First, it means that an individual with any particular standard of living (e.g., has access to electricity but no access to the Internet) may be deprived in some societies (e.g., urban Canada) but not in another (e.g., rural Bangladesh; Adjaye-Gbewonyo & Kawachi, 2012). Second, the subjective nature of the comparison also means that its value can be influenced by age, gender, culture, technological advances, and psychological factors. For instance, having electricity in the home may have been considered a luxury during the 1920s, like electrical appliances in the 1950s, a personal computer in the 1990s, or access to the Internet in 2000s. Context is everything.

These distinctions between poverty, SEP, and relative deprivation may seem trivial to some researchers. We would argue that they matter greatly when deciding what to measure and then figuring out how to use the data. There is no strong consensus in the literature on how relative deprivation is perceived, although the severity of deprivation likely depends on how the individual frames the reference group and the value placed on the asset or activity that is compared.

Illustrating this, Christine Eibner and colleagues used data on household income in the United States to examine the effects of relative deprivation on adult health. The researchers specified the comparative reference group according to the individual’s state, race, education, and age group. Their results showed that relative deprivation in relation to a demographically-matched comparative reference group predicted the risk of experiencing a mental health disorder (Eibner, Sturm, & Gresenz, 2004), significantly poorer general health, and a higher rate of mortality (Eibner & Evans, 2005), after differences in absolute affluence were considered.

Opening the Gini bottle

Beyond the field of economics, the theoretical construct of relative deprivation has resonated with population health researchers who are interested in the consequences of income inequality. The idea that health is affected by both absolute and relative poverty forms the basis of the “income inequality hypothesis.” The hypothesis states that if we were to compare whole societies in terms of the difference between the top and bottom of the income distribution (commonly quantified by the Gini index of inequality), then we would find more relative deprivation and more of the health and social consequences of low SEP in the more unequal countries.

In their book *The Spirit Level: Why Some Societies do Better than Others*, British epidemiologists Wilkinson and Pickett (2009) proposed that the psychosocial consequences of relative deprivation (chronic stress, class anxiety, etc.) accounts for why international

differences in income inequality correlate with so many seemingly unrelated problems (e.g., mental illness, mortality, child well-being, obesity, homicide rates). They and others have found that more egalitarian societies – though not necessarily richer – tend to have better health outcomes and fewer social problems (Wilkinson & Pickett, 2009). This growing body of evidence is now used to campaign for social justice and reduced health inequalities, not by improving health services for the poor but by closing the income gaps that give rise to such inequalities in the first place.

The bridge from income inequality to relative deprivation is not just conceptual. The most commonly used formulas for measuring relative deprivation are extensions of the Gini index of income inequality. The most common is Yitzhaki's (1979) index, which operationalises the amount of relative deprivation (RD) for individual i as the average distance between the individual's affluence (y_i) and the affluence held by better off peers in the reference group (y_j):

$$RD_i = D(y_i) = \int_{y_i}^{y^*} [1 - F(z)] dz \quad [\text{Equation 1}]$$

where y^* is the greatest affluence in the reference group and $F(z)$ is the cumulative affluence distribution. This formula was later simplified by Subramanian, Kawachi, Berkman, and Subramanian (2009) to denote the size of the reference group (N):

$$RD_i = \frac{1}{N} \sum (y_j - y_i), \forall y_j > y_i \quad [\text{Equation 2}]$$

The formula can be further simplified as:

$$RD_i = (1 - F(y_i)) * (\mu_i - y_i) \quad [\text{Equation 3}]$$

where $F(y_i)$ is the frequency of individuals with affluence higher than affluence of individual i , and μ_i is the mean affluence of individuals whose affluence is higher than affluence of individual i . In Equation 3, RD_i is the difference between the average affluence of individuals with affluence above y_i and the affluence of individual i , weighted by the proportion of individuals that have a higher affluence than individual i in the reference group.

Consistent with Runciman's (1966) definition, the Yitzhaki index formula assumes that deprivation is felt through upward social comparisons. However, the unit scale of the index depends on how income or wealth is measured. Therefore, the Yitzhaki index is not easily compared between groups that were measured using different monetary currencies, affluence measures, or at different time periods (Eibner & Evans, 2005).

To address this limitation, Deaton (2001) modified Yitzhaki's formula by dividing it by the mean income of the reference group, thus creating a unit-free, normed index of relative deprivation that ranges from 0 to 1. The average Deaton index among individuals in the reference group is equal to the Gini index of income inequality. Unlike Runciman's and Yitzhaki's approach, Deaton's formula balances upward and downward comparisons equally

so that relative deprivation increases with increased inequality above or below the individual's income.

There are other ways to measure relative deprivation. Some researchers prefer to replace the income variable in Yitzhaki's formula with the natural log of income. This log-normal formula also yields proportional upward and downward comparisons. Any of these formulas give researchers a tool to investigate the health or social consequences of income inequality at the individual level. However, the literature on relative deprivation (and SEP) has mostly used data on household income, which begs a practical question for child and adolescent researchers.

What if income cannot be measured?

Studying the developmental origins of social inequalities in health requires age-appropriate measures of SEP and deprivation. However, some socioeconomic indicators (e.g., household income, parental education) are not feasible to include in youth self-report questionnaires. In our experience in the HBSC study, adolescents' reports of parental occupation and household income yield high rates of missing data (> 50%).

The World Health Organisation's Health Behaviour in School-aged Children (HBSC) study addressed this problem by developing a brief self-assessment of material assets in the home – the *HBSC Family Affluence Scale* (Currie et al., 2008). The scale contains a set of easy to answer, non-intrusive questions about common material assets and activities that provide or reflect affluence (Table 1).

Table 1. *HBSC Family Affluence Scale.*

<i>Item</i>	<i>Response options</i>
1. Does your family own a car, van or truck?	0 = No; 1 = Yes, one; 2 = Yes, two or more
2. Do you have your own bedroom for yourself?	0 = No; 1 = Yes
3. How many computers do your family own (including laptops and tablets, not including game consoles and smartphones)?	0 = None; 1 = One; 2 = Two; 3 = More than two
4. How many bathrooms (room with a bath/shower or both) are in your home?	0 = None; 1 = One; 2 = Two; 3 = More than two
5. Does your family have a dishwasher at home?	0 = No; 1 = Yes
6. How many times did you and your family travel out of the country for a holiday/vacation last year?	0 = Not at all; 1 = Once; 2 = Twice; 3 = More than twice

The Family Affluence Scale may seem rudimentary at first glance, but it effectively exposes socioeconomic differences in adolescent health (Boudreau, & Poulin, 2009; Currie et al., 2008; Inchley et al., 2016). The responses to the six items can be summed to represent *absolute affluence* (ranging from 0 to 13 points) with the caveat that this score may correspond to different SEPs depending on its context. In international surveys like the HBSC, which spans 45 countries throughout Europe and North America, these economic conditions vary widely (Inchley et al., 2016). A score of 9 might reflect a relatively low SEP in a high-income country and a high SEP in a low-income country. Therefore, absolute affluence does not correspond directly to SEP in such heterogeneous samples.

A similar situation exists in USAID’s Demographic and Health Survey (DHS), which measures health and material assets in some 90 countries. DHS researchers developed a regression-based SEP index to account for varying economic conditions across low- and middle-income countries. This index, the DHS Comparative Wealth Index, predicts infant and child mortality, fertility, maternal health care, and children’s nutritional status independently of absolute affluence (Rutstein & Staveteig, 2014). Investigating both absolute and relative differences in affluence can help isolate the material and psychosocial components of the gradient effect, which have different implications for health and social policy (Elgar et al., 2013).

From material assets to SEP

We now demonstrate a simple approach to estimating SEP using the HBSC Family Affluence Scale or similar tools. The approach is useful in international analyses that require comparable measures of SEP and it can be applied to data that are drawn from heterogeneous economic conditions. The method transforms the summary score (i.e., absolute affluence) into a cumulative proportion or “ridit.” Similar to a percentile, the ridit represents the cumulative proportion (P) of responses in all lower categories plus one-half the proportion of cases in the category itself:

$$Ridit_j = \sum_{n=1}^{j-1} P_{2n} + P_{2j}/2 \quad \text{[Equation 4]}$$

The transformation can be used to transform ordinal data of any kind to a continuous variable. The term *ridit* is an acronym that stands (somewhat awkwardly) for “relative to an identified distribution integral transformation,” analogously to the probit and logit (Bross, 1958). The formula explicitly operationalises SEP on an “identified distribution” of affluence in the population.

Our demonstration uses data that were collected from 26,584 Canadian adolescents in the 2014 HBSC survey. Table 2 shows five columns. Column A is the distribution of summary scores ranging from 0 (lowest) to 13 (highest). Column B is the number of cases (n) per summary score. Column C is the sample proportion that corresponds to each score. For example, a score of 5 was found in $1348/26,584 = 0.051$ of the sample, or 5.1%. Column D is the cumulative proportion and equals the sum of Column C values at or below each score. A score of 5 or below found in $0.001 + 0.001 + 0.005 + 0.013 + 0.028 + 0.051 = 0.099$ of the

sample, or 9.9%. To calculate the ridit in Column E, we simply add the cumulative proportion of the adjacent lower value to one-half the proportion of the value itself. The ridit of 5 is $(0.048 + (0.051/2)) = 0.073$. The ridit of 10 $((0.584) + (0.158/2)) = 0.663$.

Table 2. SEP in Canadian adolescents

(a) <i>Summary score</i> (<i>absolute affluence</i>)	(b) <i>n</i>	(c) <i>Proportion</i>	(d) <i>Cumulative proportion</i>	(e) <i>Ridit</i> (<i>SEP</i>)
0	18	0.001	0.001	0.000
1	33	0.001	0.002	0.001
2	130	0.005	0.007	0.004
3	352	0.013	0.020	0.013
4	744	0.028	0.048	0.034
5	1348	0.051	0.099	0.073
6	2,040	0.077	0.175	0.137
7	2,906	0.109	0.285	0.230
8	3,594	0.135	0.420	0.352
9	4,365	0.164	0.584	0.502
10	4,205	0.158	0.742	0.663
11	3,306	0.124	0.867	0.805
12	2,222	0.084	0.950	0.909
13	1,321	0.050	1.000	0.975

There are three key advantages to this approach. First, the resulting SEP index has an intuitive theoretical range of 0 to 1 and a mean of 0.5, regardless of how absolute affluence was measured or distributed. When added to a regression model of health, the coefficient for the SEP index represents the slope index of health inequality (i.e., the difference in health between the highest and lowest SEP groups). Note that the observed range of the ridit is slightly less than 1 point. This guards against misestimating the slope index of inequality when there many or zero cases in an extreme category.

Second, the formula can be applied to just about any measure of affluence. It creates a normally distributed SEP variable, even if the original variable is skewed, ordinal, or highly granular data (e.g., income bands), that can be applied to statistical tests that assume a continuous parametric scale. So long as the distribution of responses is conceptually equivalent, a ridit-based SEP index allows the researcher to draw valid conclusions about socioeconomic differences between populations, survey cycles, monetary currencies, or even different versions of the same socioeconomic measure.

Third, the researcher can customise the “identity distribution” by stratifying the cumulative proportions. Since SEP is a contextualised construct, it helps to think carefully about the composition of the reference group from which to estimate an individual’s status. Equation 4

(shown above) can be directly applied to microdata within many common statistical software packages. Table 3 provides sample syntax for SPSS, SAS, and STATA that computes the SEP index with stratification by gender groups, thus eliminating endogeneity in the variable owing to gender differences. Similar stratifications can be performed for age group, race, schools, workplaces, or countries.

Two limitations of this approach should also be noted. First, the ridit-based SEP index is ‘unitless’ and may seem too abstract for researchers whom are more comfortable using hard-nosed data on income or wealth. Indeed, many published articles and reports that present data from the HBSC Family Affluence Scale used only the summary score of absolute affluence (Currie et al., 2008). Second, Bross’s ridit formula (Equation 4) does not work if there are zero observations in any of the response categories. Therefore, some data manipulations may be needed for small or unique samples (e.g., banding the affluence variable).

Table 3. Syntax for transforming affluence data to a ridit-based SEP index.

<i>Description</i>	<i>Syntax</i>
SPSS calculates the ridit through the RANK command (Transform – Rank Cases in the menus).	RANK VARIABLES = VAR(A) by GENDER /PROPORTION /FRACTION=RANKIT.
In SAS, the transformation can be carried out using PROC FREQ with the ridit option in the table statement.	proc freq; by GENDER; tables VAR/ scores=ridit; run; .
STATA users can generate ridits by installing the EGENMORE or the WRIDIT package from SSC sources (the later offers the capability for stratified calculations and weights).	wridit VAR, generate(SEP) by (GENDER)

From material assets to relative deprivation

Next, we demonstrate how to calculate the Yitzhaki index of relative deprivation using the data from the HBSC Family Affluence Scale. As the case with SEP, our first consideration is the comparative reference group. Deprivation relative to whom? Is the group naturally identified in the data by classroom, school, community, or region? Should the reference group be profiled according to demographic characteristics, workplaces, or peer groups (e.g., Eibner and Evans, 2005)? This is an important decision, both conceptually and statistically. Working through the process of calculating relative deprivation only makes sense if there are differences in absolute affluence between the comparative reference groups (this can be checked beforehand by calculating the intraclass correlation coefficient). In the HBSC study,

we have assumed that schoolmates form a meaningful comparative reference group for adolescents.

The second consideration is the affluence variable. Data on income, education, or occupation are not available in the HBSC but we assume that displays of symbolic capital, like the material possessions and activities that are measured by the Family Affluence Scale, resonate with adolescents at least as much as income differences. Readers may refer to Adjaye-Gbewonyo and Kawachi (2012) and Elgar et al. (2016) for further discussion about estimating relative deprivation in terms of material assets.

Our STATA syntax for calculating the Yitzhaki index of relative deprivation [Equation 3] is shown below in Table 4. Based on the ecological analyses of income inequality in relation to the prevalence of mental illness (Pickett & Wilkinson, 2010), school bullying (Elgar et al., 2009), and obesity (Pickett Kelly, Brunner, Lobstein, & Wilkinson, 2005), we have used the Yitzhaki index to isolate the effects of school-level relative deprivation on adolescent psychosomatic symptoms (Elgar et al., 2013), school bullying (Napoletano et al., in press), and obesity risk factors (Elgar et al., 2016). These studies have found that regardless of the level of absolute deprivation, adolescents who are relatively worse off than their schoolmates report more internalising mental health problems, lower life satisfaction, more bullying victimisation, fewer breakfasts, less physical activity, and fewer healthful food choices.

Relative deprivation is an intriguing dimension of the gradient effect that would be difficult, if not impossible, to observe using a unidimensional SEP variable. This research has lent further support to the income inequality hypothesis (Wilkinson and Pickett, 2009) and has brought this line of epidemiological evidence down to the individual level, to the adolescent's world of schoolmates, privilege, and status.

Table 4. STATA syntax for calculating the Yitzhaki index of relative deprivation.

```
bys SCHOOL_ID (FAS) : /*
*/ gen diff=FAS[_n+1]-FAS[_n]
bys SCHOOL_ID: gen num=_N-_n
bys SCHOOL_ID (num) : /*
*/ gen outcome_var=sum(diff*num)
bysort SCHOOL_ID: gen Yitzhaki = outcome_var/(_N-1)
```

Note: School_ID is the reference group variable. FAS is the affluence variable.

Society on a gradient

Status, power, and inequality loom large in today's globalised, urbanised, 21st century society. Despite an unprecedented level of material wealth and technological achievement, millions of young people worldwide are relegated to a lifetime of poverty and ill health. In

every society – regardless of its GDP – less advantaged youth are more likely to lack social supports in early life, struggle in school, suffer from mental and physical health problems, lack access to essential health services, become victimised by violence and crime, become involved in criminal activity themselves, and drop out of school (Bradley & Corwyn, 2002; Odgers, 2015). That so many families struggle to keep their children healthy, safe, and prepared for adult life might seem at odds with our collective level of prosperity.

Clyde Hertzman of the University of British Columbia once described the juxtaposition of poverty and plenty as “modernity’s paradox” (Hertzman, 1999). For young people who have yet to enter the workforce and shape their own futures, differences in the conditions that limit their health are widely regarded as socially unjust (UNICEF Office of Research, 2016). Fairness in health is an underlying principle of the United Nation’s Convention on the Rights of the Child and its newly ratified Sustainable Development Goals and is recognised by the Organisation for Economic Co-operation and Development (OECD, 2015) as a means to promote social and economic development. It is clear that monitoring and reducing social inequalities in the health of young people is a policy objective in many countries.

Conclusion

This article describes how socioeconomic differences in adolescent health set the stage for lifelong disparities between the rich and the poor. It examines the socioeconomic gradient in adolescent health and the related constructs of SEP and relative deprivation. We demonstrate how we have measured SEP and relative deprivation using data that were collected using the HBSC Family Affluence Scale. These methods can be adapted for other types of data and populations and are well suited to large epidemiological studies carried out in diverse economic settings.

We hope these tools will facilitate further research on the impacts of poverty and inequality on youth and contribute foundational, policy-relevant evidence to governments. Such evidence is urgently needed in a global context of widening health disparities and growing economic inequality.

Exercises and Discussion Questions

1. How would you describe your socioeconomic position? Is it in absolute terms (e.g., I’m safe, I’m well fed, and I have a decent place to live)? Is it relation to your siblings, colleagues at work, neighbours, or your parents when they were your age? What are you comparing?

2. How is SEP different in adults and adolescents? Is it shaped more by peer influences, personal resources (e.g., spending money), or family income?
 3. What do you see are the strengths and limitations of the HBSC Family Affluence Scale? What items would you change or add to the scale, and why?
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Further Readings

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Web Resources

The WHO Health Behaviour in School-aged Children Study is an international alliance of researchers that collaborate on a cross-national survey of 11-, 13-, and 15-year-olds in 45 countries. The HBSC study collects data on health, well-being, social environments and health behaviours (www.hbsc.org).

The MacArthur Research Network on Socioeconomic Status and Health is a multidisciplinary collaboration that explores environmental and psychosocial pathways by which SEP alters biological systems, thereby affecting disease risk and mortality (<http://www.macses.ucsf.edu>).

The Equality Trust is a campaigning organisation dedicated to reducing income inequality in the UK (www.equalitytrust.org.uk).

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