Early Socioeconomic Disadvantage and the Cumulative Impact of Socioeconomic Status Over the Life Course On Adult Health *

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Abstract:

While much research has confirmed the association between adult SES and adult health, still little is known about the impact of SES trajectories on adult health. SES is hypothesized to affect health over the life course primarily through its cumulative effects on health, regardless of when adversity is experienced in the life course. In addition to those cumulative effects, it has been argued that the experience of adverse socioeconomic conditions in critical periods, such as early in the life course, may be even more detrimental to adult health than later disadvantage. In addition, there has also been recent speculation as to the effect of intragenerational mobility trajectories on health. Using data from the NLSY79, this study will examine (1) the cumulative impact of financial resources, (2) the differential impact of those resources at different periods in the respondents' life courses, and (3), the impact of intragenerational mobility trajectories in early and mid-adulthood. In addition, the main and moderating effects of early disadvantage on these relationships will be assessed. Findings suggest that financial resources do have cumulative effects on health through early and mid-adulthood. In addition, while there appeared to be critical period effects when respondents were in their late twenties, there were no critical period effects of poverty in the early twenties, nor were there discernable mobility effects.

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In spite of a wealth of evidence accumulated over the past 20 years on the association between socioeconomic status (SES) and health, the pathways by which individuals' social positions come to affect health remain unclear. One reason for this may be that the study of socioeconomic inequalities in health has been conducted without much modeling of the processes that occur "upstream" of adult achieved socioeconomic positions (Graham 2002; Wadsworth 1997). Thus, while we know a lot about the effects of being in a certain social position at a given point in time, little is known on the impact of life course socioeconomic trajectories on health. This omission is most problematic, since the process of occupational stratification across the life course offers a framework that conceptually mirrors the dynamic nature of pathogenesis in modern societies.

In this study, I show that research on socioeconomic differentials in health can be advanced by relying on a theoretical framework of intergenerational transmission of social status informed by social stratification research and in which health is viewed as one form of life-course capital (O'Rand 2001). Using a theoretical framework drawing on Blau and Duncan's (1967) model of occupational achievement, I will determine first whether adult financial resources have a cumulative impact on health independently of the effects attributable to family of origin and education. Secondly, I will examine the effects of financial resources at different periods through the life course, and model the impact of intragenerational mobility trajectories. Finally, I will estimate the moderating effects of early low SES on the relationship between all these specifications of financial resources and health in adulthood.

Adult Health and SES Through the Life Course

Social stratification theories and methods have increased our understanding of processes of status accumulation through the life course, whereupon different social position factors have

"both common and independent pathways (Robert and House 2000: 80)" linking them not only to achieved status, but also presumably to health. For instance, following Blau and Duncan (1967), adults' positions in the social structure can be viewed as the result of a stratification process that begins at birth with the existence of such ascribed characteristics as gender, ethnicity, or parents' social status. With advancing age, achieved characteristics such as education or occupation become in turn increasingly salient in the positioning of individuals in the social structure, in some cases even curtailing the effects of social origins. Adult health can then be viewed as one of the outcomes resulting from this process of intergenerational transmission of social status.

This framework of life course status attainment is particularly salient for the study of adult health in developed societies, where chronic diseases have become over the past 50 years the primary causes of disability and mortality (Rogers, Hummer and Nam 2000; Wadsworth 1997). These illnesses exhibit long latency periods, which points to the impact of socioeconomic conditions both earlier in life and throughout the life course (Wamala, Lynch and Kaplan 2001). As such, the process of occupational stratification across the life course offers a framework that conceptually mirrors the dynamic nature of pathogenesis in modern societies.

While this is still an underdeveloped area of inquiry (Robert and House 2000), three main hypotheses have been advanced to explain the effects of SES over the life course on health in adulthood (Graham 2002; Hallqvist et al 2004). First, in what has been termed the *critical period* hypothesis, researchers have privileged adverse socioeconomic conditions in utero, and during infancy and childhood as critical determinants of poor health in adulthood (Barker et al. 2002; Barker 2003; Hertzman 1999). In turn, proponents of the *accumulation* hypothesis have argued that SES has cumulative effects on health, regardless of when adversity is experienced in

the life course (Power, Manor and Matthews 1999). This implies a dose/response relationship between SES and health, and also makes room for the possibility that favorable circumstances can compensate for the effects of earlier disadvantage (Graham 2002). The third hypothesis builds on the two first ones by suggesting that inter and intragenerational mobility trajectories in adulthood may also have an impact on health (Hallqvist et al. 2004).

In support of the first hypothesis, research on the impact of childhood experiences on adult health has intensified in the past decade, with findings convincing enough to warrant the establishment of social policies and interventions to ensure the optimal psychological and physical development of children (Health Canada, 2001; Gouvernement du Québec, 2002; Power, Manor and Matthews, 1999). Most studies in this area of research have indeed found that adverse socioeconomic conditions during childhood are associated with greater risk of health outcomes such as poor self-reported health, cardiovascular disease and higher mortality (Barker et al. 2002; Barker 2003; Gliksman et al. 1995; Goya-Wannamethee et al. 1996; Lynch et al. 1994; Nystrom-Peck 1994; Vagero and Leon 1994; Wadsworth and Kuh 1997).

More recently, researchers have built on these findings by adopting a life course framework to show that socioeconomic conditions throughout life contribute to the observed socioeconomic differentials in adult health (Wadsworth 1997). Thus, and this pertains more to the second hypothesis, both childhood and adult socioeconomic factors were found to have an impact on adult psychosocial functioning, cognitive function, coronary heart disease and self-rated health (Blane et al. 1996; Davey Smith et al. 1997; Harper et al. 2002; Kaplan et al. 2001; Lynch, Kaplan and Salonen 1997; Reynolds and Ross 1998; Turrell et al. 2002; Wamala, Lynch and Kaplan 2001). In addition, exposure to cumulative socioeconomic disadvantage across the life course was associated with worse health outcomes in most instances (Blane et al. 1996;

Davey Smith et al. 1997; Harper et al. 2002; Kaplan et al. 2001; Lynch, Kaplan and Salonen 1997; Reynolds and Ross 1998; Turrell et al. 2002; Wamala, Lynch and Kaplan 2001).

Moreover, some of these studies have also highlighted the impact of social mobility on health, noting that early disadvantage could be compensated by later upward mobility, and inversely, that downward mobility was detrimental to outcomes such as self-rated health and cognitive function, and was also associated with higher mortality (Mare 1990; Power, Manor and Matthews 1999; Turrell et al. 2002). Of course, these hypotheses are not mutually exclusive, as a likely mechanism for the lasting impact of early adversity may be that it leads to lower educational opportunities, which in turn restrict both achieved status and health in adulthood, thus exposing individuals to chronic low SES (Graham 2002; Wadsworth and Kuh 1997). However, no studies have specifically tested this pathway model empirically (Hertzman 1999).

Proposed Model

Using a theoretical framework drawing on Blau and Duncan's (1967) model of occupational achievement, I will determine first whether adult financial resources have a cumulative impact on health independently of the effects attributable to family of origin and education. Secondly, I will examine the effects of financial resources at different periods through the life course, and model the impact of intragenerational mobility trajectories. Finally, I will estimate the moderating effects of early low SES on the relationship between these specifications of financial resources and health in adulthood. These relationships will be estimated using data from the NLSY79, a survey that followed prospectively American cohorts over 21 years of their life.

Research Design

Study Population

Data are drawn from the publicly available files of the 1979 National Longitudinal Survey of Youth (NLSY79), an ongoing longitudinal panel survey that has been following since 1979 a national probability sample of 12,686 American civilian and military youth aged 14 to 21 years old in 1978 (Zagorsky and White 1999).

The NLSY79, sponsored by the Bureau of Labor Statistics (BLS), was designed principally to gather longitudinal information on the socioeconomic status and labor force experiences of young American men and women. As such, the NLSY79 is particularly well-suited for the study of stratification outcomes, as it includes data about social origins and traces a comprehensive, prospective and continuous work history of its respondents, from age 14-22 to 36-44. Recent additions to the survey also make it an important source for the study of health and SES over the life course.

The outcome, general health, was measured only among individuals who were 40 years and over in 1998 or 2000. Thus, the sample was limited to those who were 18 to 22 years old at baseline in 1979 (N=5,026)[1], of which 3,425 respondents remained in 1998 or 2000. In addition, four respondents who never reported any income over the period 1985-1997/99 were excluded from the analyses. Once all missing values were deleted, 2,639 respondents remained for the analyses and weights adjusting for the complex survey design, and using data from multiple years brought the analytic sample down to 2,095 respondents. This substantial drop in the sample size is mainly due to the fact that 18 data points covering 21 years of the respondents' lives are used in these analyses. Respondents with complete data are comparable to the original sample in terms of gender, race, average family size and average education in 1979.

Measurement

Self-reported general physical health 1998/2000.

A single question assessing the respondent's general health ("In general, would you say your health is – Excellent, Very good, Good, Fair, Poor") will be used. Measures of health-related quality of life circumvent a limitation of the NLSY79, namely that the respondents are still relatively young at the latest waves (40-44 years old), and they provide an evaluation of respondents' health status that is both relatively independent from their propensity to seek medical care or use of formal services (Seccombe and Amey 1995) and highly predictive of mortality and morbidity (Power, Manor and Matthews 1999).

Origins.

Mother's and Father's highest grade completed (as reported in 1979) is the first measure of parental socioeconomic status[1]. These measures range from 0 to 20 years of education. This information on social origins can be considered as covering most of the respondents' teenage years. Indeed, it is plausible that the great majority of parents will have completed their education before the respondents reach their teenage years. When the information was missing on these variables for one sibling, values were imputed from other siblings present in the survey (the NLSY79 had a household sampling design that included all eligible respondents in a household, and thus included 596 clusters of siblings). When values were missing for all siblings or if there were no siblings, the other parents' education was imputed. Finally, when siblings imputation was not possible and education was missing for both parents (less than 1% of

[1] All analyses were also conducted with measures of parents' occupational prestige when the respondent was 14 and in 1978, and the results (not shown) were substantively equivalent to those presented here. Measures of highest grade completed were preferred because they resulted in less attrition than the measures of occupational prestige, which were limited by the fact that many mothers were not working (and imputation from the other parent was in those cases clearly less justifiable than for education).

cases), the mean sample value of education for the relevant parent was assigned. In addition, a variable was created to denote the existence of missing information. This variable took a value of 0 if no information was missing, 0.5 if it was missing for one parent, and 1 if it was missing for both parents. Inclusion of this variable in the analyses had no effect on the findings.

Parents' Health. The recent health modules (1998, 2000) include information about the respondents' biological parents' health. All information was collected for both mothers and fathers separately. Both respondents whose parents were deceased and those whose parents were still alive were then asked whether either of their parents had a major health problem. In the affirmative, the health codes for up to four major problems were recorded.

Two dummy variables were created with this information. These variables simply take a value of 1 respectively if the respondent's father or mother had a major health problem[2].

Socioeconomic status in adulthood

Early disadvantage. Respondents were considered to have experienced early disadvantage if the respondent's family income was below the poverty level in 1978. This measure follows the USDHHS poverty guidelines (Zagorsky and White 1999). About 22% of the respondents were classified as being in poverty at that time, and half of them were still living with either one of their parents in the household[3] .

Education. Respondents' years of completed education were measured in 1984, and range from 0 to 20 years. This measure of educational attainment very closely approximates the

[2] Two other dummy variables were created that take a value of 1 if the respondents' father or mother was deceased of a heart attack/ stroke, cancer or emphysema (rather than of old age or accidents). These causes of death were taken as representing potential genetic risk factors for the respondents. These variables were included in other analyses (results not shown) without substantially changing the results presented here.

highest degree attained in 2000, as three-fourths (75.02%) of the respondents had attained their final (2000) educational status in 1984.

Average numbers of hours worked annually. A variable measuring a logarithmic transformation of the average number of hours worked annually from 1986 to 1996/98 (in 100 of hours) was included in the analyses.

Financial resources from 1986 to 1996/98 were operationalized by household-level variables, *household income* and *income to needs ratio*. Household income is the total household income of all family members in $10,000s constant dollars, inflated to 2000 price levels using the Consumer Price Index, and with extreme values (less than 1% of cases for any given year) capped at $200,000. The income to needs ratio is obtained by dividing household income by the poverty levels provided by the NLSY79 for each respondents. These poverty levels were based on the official U.S. poverty thresholds and take into account family size and region of residence.

Household-level variables were preferred over individual measures of SES in these analyses because this is a prime childbearing period for the women in this sample, and using a household measures circumvents the fact that they may temporarily leave the labor force due to a pregnancy. In addition, poverty level allows to take into account the size of the family (which may vary according to fertility behavior) and the region of residence.

Several specifications of these variables were developed to test the various hypotheses. *Cumulative impact of income:* First, the measures were averaged over the period 1985 to 1997/99. A logarithmic transformation of this variable was also included to test a potential non-linear functional relationship between income and health.

[3] All analyses were conducted with restricted samples composed only of those individuals still living with their parents in 1978 and with those who reported having lived with both biological parents until age 18, and the same

Impact of different periods: The measures were also averaged over three five-year survey periods in the early and mid-adulthood of the respondents, namely (1) 1985-1989, (2) 1990-1994 and (3) 1995-1997/99. These periods correspond respectively to when the respondents were aged (1) 24-28 to 28-32, (2) 29-33 to 33-37 and (3) 34-38 to 40-44.

The analyses presented here were all interacted with the current age of the respondents to see if there were any differences in the different cohorts' experiences, and these effects were not significant (results not shown). In addition, analyses not shown here were conducted with measures that represented the average of income and the income to needs ratio over five-year age ranges in the life course of these individuals and the results were comparable, even with a substantial decrease in operative sample size due to the fact that individuals did not have measures at all ages. These results suggest that the findings presented here do operate consistently across broader age ranges in early and mid-adulthood.

Intra-generational mobility: Respondents were assigned to groups indicating either low, medium or high financial resources, based on their position in the distributions of the period averaged measures (see Table 4 in Appendix A for the groupings and the average values they represent). Then, a categorical measure of mobility was created to account for the different possible trajectories taken by individuals. While there were 27 mathematically possible and observed trajectories (see Table 5 in Appendix A), nine trajectories based on the initial and last period status summarized the mobility experience of individuals equally well statistically and more parsimoniously (see Table 1). The category of predominantly low across all three periods was used as the reference category.

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pattern of results (not shown) emerged.

Control variables

The capacity to work is strongly influenced by prior health and SES. In consequence, in addition to race/ethnicity (White, non-Hispanic; Black; Hispanic; other) and gender, variables measuring health and SES prior to 1985 were also included as controls (see equation 1). The NLSY79 included no measure of general health prior to 1998. However, work-related health information was collected, as well as indirect measures of health, such as parental health problems, or height and weight, which allow a calculation of the body mass index.

Early health 1979-85 was assessed by two variables. One variable measures the number of years between 1979 and 1985 in which respondents reported their health prevented them from working. The second variable measures the number of years obese between 1981 and 1985. The respondent's body mass index (BMI) was calculated from height and weight measures in 1981, 1982 and 1985 and individuals were considered obese if their BMI was greater than or equal to 30 (National Heart, Lung, and Blood Institute 1999). Relying on health-related work limitations may not permit the detection of minor chronic health problems or of slowly progressing illnesses (Zagorsky and White, 1999). However, it should screen out the most extreme cases of ill-health or disability. In turn, a high BMI (>25) is strongly associated with an increased risk of diabetes, hypertension, coronary heart disease, and all-cause mortality, including death from cardiovascular disease and cancer (Calle et al. 1999; Willett, Diez & Colditz 1999). Finally, by taking the number of years respondents report a work-related limitation, I can differentiate acute limitations such as accidents from which the respondents recover from more chronic and persisting conditions.

Analyses

Ordered logistic regressions will be estimated for each hypothesis and outcome measure with the following equation:

$$C_{i,j} = \Pr(y_i \leq j \mid x_i) = \frac{\exp(\alpha_j + x_i'\beta)}{1 + \exp(\alpha_j + x_i'\beta)} \quad (1)$$

Tests of structural change will contrast the regressions for those having experienced low ascribed SES with those who did not. All the analyses were weighted to adjust for the complex survey design, for using data from multiple years and for mortality. All the models presented here met the proportionality of odds assumption (Long and Freese 2001).

Results

Tables 1 presents the descriptive statistics and estimated coefficients for the control variables common to all regressions. For ease of interpretation, tables 2 and 3 will only include the different parametrization of the respondents' financial resources, respectively income and income to needs ratio.

Cumulative effects

Model 1 in Table 2 presents the odds ratio and confidence interval associated with the average annual family income in linear form and scaled in $10,000s, 2000 dollars. This shows that average income in early and mid-adulthood has statistically significant and positive effects on health in adulthood. More specifically, these results indicate that for a standard deviation increase in income (σ = 3.309 $10,000s, 2000 dollars), the odds of excellent health increase by 38%. This is comparable to the effect of education in 1984, which shows a 35% increase in the odds of excellent health with each standard deviation increase (σ = 2.237 years of education).

In Model 2, income is measured in logarithmic form to express a functional relationship where the health benefits to increasing income are greater at lower end of the income distribution. This effect is also significant and positive, and provide a better fit to the data, as the BIC and BIC' presented in Table 2 indicate that there is strong evidence to prefer Model 2 to Model 1 (BIC_1-BIC_2=8.938). In this case, a 61% increase in income (based on a standard deviation increase in logged income: $e^{\sigma} = e^{0.476} = 1.609$) is associated with a 43% increase in the odds of reporting excellent health ($e^{\beta*\sigma} = e^{0.744*0.476} = 1.425$).

Similarly, Model 1 in Table 3 presents the statistics associated with the income to needs ratio averaged over the 1985-1997/99 period. The income to needs ratio also has significant effects on health, and the magnitude of these effects appears comparable to that of income, as a standard deviation increase of 233% in the income to needs ratio is associated with a 28% increase in the odds of excellent health ($\sigma = 2.333$ 1/100 percent). As with income, the comparison of the BIC and BIC' indicate that there is very strong evidence to prefer the loglinear transformation of the income to needs ratio presented in Model 2 to the linear version in Model 1 (BIC_1-BIC_2=15.808). Here, a 56% increase in the income to needs ratio (based on a standard deviation increase in logged income: $e^{\sigma} = e^{0.445} = 1.560$) is associated with a 38% increase in the odds of reporting excellent health ($e^{\beta*\sigma} = e^{0.731*0.445} = 1.384$).

Critical period effects in adulthood

Model 3 of Tables 2 and 3 go beyond the previous results by testing whether there are specific effects of the periods during which these conditions are experienced. More specifically, model 3 presents the average income for the period 1985-89, when the respondents are in their late twenties, followed by the differences in income between the subsequent periods (1990-94 and 1995-97/99) and this first period. What is striking here is that the average income for 1985-

89 has an impact on health that is not significantly different from that of the average income from 1985-1997/99 in Model 1. Given this, it is not surprising to find that the effects of changes in income in subsequent periods are not significantly different from 0. Substantively, this means that the higher the respondents' income level when they were in their late twenties, the better their health, and this even if this income level remains stable in subsequent periods. Model 3 in Table 3 shows the same patterns with the income to needs ratio.

In addition, changing the base year does not alter those results. These alternative models (results not shown) indicate that the higher the average financial resources in any given period, the better the health. However, while the difference in resources between the first and the base period was significant, thus indicating that higher financial resources in the late twenties are preferable, the difference between the base period and the remaining later period was not.

These results suggest that the period from 1985 to 1989, when the respondents ranged in age between 24 to 28 (1985) to 28 to 32 (1989) years old, may be a critical period for health in adulthood. Nevertheless, these results must be interpreted with caution, as the BIC and BIC' indicate that model 3 is not preferable to Model 2, most likely because it comports two additional variables but does not provide any additional information.

Intragenerational mobility

Model 4 in Tables 2 and 3 presents a more formal test of intragenerational mobility patterns. Nine trajectories were distinguished in the data, as illustrated in Table 1. In the multivariate analyses, the category of "consistently low" is taken as the reference category.

Model 4 in Table 2 indicates that individuals with predominantly high income were 2.5 times as likely as those with predominantly low income to be in excellent health. In turn, individuals who had experienced upward mobility from the second third of the income

distribution to the upper third as well as those who were predominantly in the second third of the income distribution had odds of excellent health that were 68% higher than those of individuals with consistently low income. However, contrary to expectations about the positive effects of upward mobility, it also appears that individuals who experienced downward mobility from the upper to the second third of the income distribution have odds of excellent health that are 72% greater than those who were consistently in the bottom third of the distribution.

These patterns are also obvious with the income to needs ratio measures of financial resources presented in Model 4 of Table 3, as individuals who were either predominantly in the upper third of the distribution or upwardly mobile from the mid- to the upper third were more than twice as likely as those who were predominantly in the lower third to have excellent health. In turn, those who were predominantly in the middle category and those who were downwardly mobile from the upper to the middle category were respectively 47% and 58% more likely to have excellent health than those in the lower category.

Of all the models estimated here, Model 4 appears to be the one with the worse fit, as evidenced by the higher BIC values. Moreover, this specification appears to point not to the impact of mobility per se, but rather once again to the cumulative impact of financial resources, as the trajectories of upward and downward mobility that emerged as being positively associated with better health are the inverse of one another, and have in common the fact that respondents in those two trajectories spent at least one period in the upper and the middle third of the distribution.

Model 5 presents a simpler specification of the measures used to create the trajectories to test the hypothesis that it is not the shape of the financial resources trajectory but rather the length of time with more financial resources. In consequence, Model 5 only presents the number

of periods in either the upper or the middle third of the distribution. The number of times in the lower third of the distribution was omitted from this model because it can be calculated from the other two measures and thus would lead to perfect multicollinearity if introduced in the model. A first thing to note is that, while Model 2 still provides the best fit to the data, Model 5 fits better than all other models, which again adds to the evidence that financial resources in adulthood have cumulative effects on adult health that are not due to either critical periods or mobility.

Substantively, comparing an individual who never had a high income to one who did in all three periods yields an increase in the probability of excellent health of 0.183, holding all other variables constant at their means. Income in the middle of the distribution exhibits an analogous pattern, though of lesser magnitude, as going from no period with a middle-level income to all periods with such an income is associated with an increase in the probability of excellent health of 0.104. Similar changes in the income to needs ratio yield changes in the predicted probability of excellent health of 0.165 and 0.071, respectively. Considering that the probability of excellent health for an average individual in the sample is 0.205, all of these constitute substantial increases in the probability of excellent health.

Early disadvantage

Even though there may not seem to be critical period or intragenerational mobility effects in adulthood, the literature on life course epidemiology considers critical periods as more salient when they involve developmental phases in the individual life course (such as in utero, or during childhood). The NLSY79 does not have measures of financial resources in childhood, or even in adolescence, but it does have those measures in early adulthood, when the respondents were 18 to 22 years old, and for the majority of them, living with their parents.

To test this hypothesis, tests of structural change were conducted on all the models to see whether the experience of poverty in 1978 moderated the relationship of financial resources later in the life course with health. Not only did poverty in 1978 have no main effect on adult health once later financial resources were taken into account, but it had not moderating effect on the relationships between those variables and health.

Discussion

This study aimed to model the impact of financial resources in health in adulthood, by testing different hypotheses regarding the nature of these effects. Results indicate that financial resources (both income and income to needs ratio) have a cumulative impact on health, and that this effect follows a pattern of diminishing returns to increasing resources that is effectively approximated by a logarithmic function. In addition, while this effect of resources did appear to be stronger in the respondents' early twenties, it was not however explained by mobility trajectories. Finally, there were no critical period effects of the experience of poverty in the early twenties, as it had neither a direct, main effect on health, nor a moderator effect of later financial resources.

An important contribution of these analyses is that they examine the impact of financial resources on health during early and mid-adulthood, an age range that has received little attention in the U.S. up until now. Thus, this study can be seen as filling an age gap between studies looking at the impact of SES during childhood on adolescent or young adult health outcomes (e.g. Wickrama et al. 2003) and those looking at the impact of SES on populations above the age of 45 (e.g. Lynch, Kaplan and Shema 1997 or McDonough et al. 1997). As Wickrama et al (2003) suggest, the lack of studies on health in early and mid-adulthood is likely to be related to the fact that these populations exhibit few serious health problems. However, a

substantial body of literature is amassing in Europe showing the emergence, even at these young ages, of a pattern of socioeconomic inequities in health (see Wadsworth, Montgomery and Bartley 1999; Power, Manor, Matthews and colleagues 1996, 1997, 2001, 2003 for Great Britain; Hart, Davey Smith, Blane and colleagues 1996, 1998a, 1998b for Scotland; Hallqvist et al. 2004 for Sweden).

In fact, the patterns observed here are congruent with those of a recent study conducted by Hallqvist and colleagues (2004) on the effects of SES over the life course on the risk of myocardial infarction among a Swedish population. Interestingly, while that study measures SES with a dichotomous class measure (manual/non manual) and looks at a different population (Swedish men) and outcome (myocardial infarction), it finds the same patterns of effects as the present study. More specifically, beyond the cumulative effects of SES, Hallqvist et al (2004) find that manual social position when respondents were 25 to 29 years old had larger effects on the risk of myocardial infarction than in the other two periods (during childhood and between 51 and 55 years old). The authors also found effects of social mobility, which, in contrast to the present study, they argued were not reducible to the accumulated number of periods in a certain position.

However, while they offer some support for the reproducibility of the findings of this study, the results presented by Hallqvist et al (2004) offer no explanation for the particular impact of the socioeconomic status in the later half of the twenties. In particular, one of the first caveats we must address is whether this is a causal relationship, or simply an empirical association. If this is a causal effect, then there must be something developmentally critical about the late twenties. Yet, it is unlikely that this is the case, since most studies and hypotheses about latent developmental effects postulate that these effects occur very early on in individuals'

life courses, such as in utero (Barker 2003) or in childhood (Hertzman 1999). Of course, this may also explain the lack of critical period effects in early adulthood (the impact of being in poverty in 1978) observed in this study.

Alternatively, if the late twenties exhibit a "critical" effect on adult health, it could be interpreted as an indicator of the individuals' positions shortly after entry into the labor market. The average predicted trajectory of income and income to needs ratio in this cohort is one of growth. In this sense, individuals who have a higher initial level at their entry in the labor force are more likely to also have higher levels of income and income to needs ratio in mid-adulthood. As such, this status may not be causally related to adult health in a strict sense, but it may rather be the pathways of which it is part that have this causal effect on health (Hertzman 1999).

Given these findings about the impact of average financial resources at different life stages, it is not overly surprising that the effects of intragenerational mobility appeared to be reducible to the cumulative effects of financial resources over these periods. In fact, these results can be related to a thirty-year-old line of research in social stratification, whose goal has been to distinguish the effects of mobility per se from the main effects of origins and attained adult status. This line of inquiry has focused mainly on the consequences of mobility on fertility and political views, and even as it underwent significant methodological refinements (Sobel 1981, 1985), has mainly confirmed Blau and Duncan's (1967) findings that there were no effects of mobility per se beyond those of origins and achieved status. Thus, while the current analyses do not estimate the effect of intergenerational mobility (there were no comparable measures of income for earlier periods), the same processes appear to be at play.

An important limitation of these analyses comes from the sample and the period under study. The NLSY79 covers only the cohorts of 1957 to 1961, aging from 1978 to 1998/2000.

These cohorts all passed through these period effects at a relatively homogenous time in their life course mobility. This raises the problem of generalization of these results, as they may in fact reflect an interaction of cohort and period effects. This is of course always a crucial concern with cohort studies, and so I conducted one supplementary test to ensure that the lack of critical period effects was not in fact due to structural factors emanating from the labor market specific conditions of the 1990s. Thus, I included lagged variables measuring the unemployment rate of the region of residence of the respondents at each panel year. These variables had no impact on the analyses, suggesting that these results are not due to this dimension of specific labor market conditions.

In conclusion, this study fills an important gap in life course studies of the impact of socioeconomic status on adult health by exploring the effects of financial resources in early and mid-adulthood on health. While there did not appear to be effects of mobility per se or of financial resources in early adulthood, there were clear cumulative effects of both income and income to needs ratio on health. In addition, resources in the late twenties were found to have a more substantial impact on health than in other life course periods, which is taken as a suggestion of a pathway effect of financial resources on health.

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Table 1. Means and standard deviations for all the variables in the analyses and odds ratios and confidence intervals for the control variables.

Variable	Mean	SD	Min	Max	OR [CI]
Self-rated health	3.689	1.009	1.000	5.000	
Control variables					
Male	0.473	0.499	0.000	1.000	1.227* [1.019 - 1.477]
Black	0.272	0.445	0.000	1.000	0.817+ [0.658 - 1.014]
Hisp	0.188	0.391	0.000	1.000	1.237 [0.920 - 1.662]
Age in 1979	19.881	1.133	18.000	22.000	1.001 [0.921 - 1.089]
Father's education	10.821	3.886	0.000	20.000	1.02 [0.985 - 1.055]
Mother's education	10.879	3.274	0.000	20.000	1.016 [0.971 - 1.063]
Father's health problems	0.479	0.500	0.000	1.000	0.762** [0.629 - 0.922]
Mother's health problems	0.482	0.500	0.000	1.000	0.643** [0.530 - 0.780]
Yrs health prevented work 78-84	0.124	0.442	0.000	5.000	0.741** [0.591 - 0.928]
Years obese 1978-84	0.225	0.683	0.000	3.000	0.696** [0.612 - 0.793]
Education in 1984	12.742	2.380	0.000	20.000	1.207** [1.148 - 1.268]
Financial resources in adulthood					
Poverty status 1978	0.205	0.404	0.000	1.000	
Household income					
Mean HH income 85 to 97/99	4.948	3.184	0.037	21.929	
Log of mean HH income 85 to 97/99	1.656	0.505	0.036	3.132	
Mean HH income 85 to 89	4.557	2.943	0.000	21.559	
MHHI 90 to 94 - MHHI 85 to 89	0.477	2.634	-18.048	16.679	
MHHI 95 to 97/99 - MHHI 85 to 89	1.031	3.349	-16.825	19.930	
Predominantly upper	0.225	0.417	0.000	1.000	
Upwardly mobile mid-upper	0.096	0.295	0.000	1.000	
Upwardly mobile low-upper	0.031	0.175	0.000	1.000	
Upwardly mobile low-mid	0.095	0.293	0.000	1.000	
Predominantly mid	0.155	0.362	0.000	1.000	
Downwardly mobile upper-mid	0.089	0.285	0.000	1.000	
Downwardly mobile upper-low	0.037	0.189	0.000	1.000	
Downwardly mobile mid-low	0.091	0.288	0.000	1.000	
Predominantly low	0.180	0.384	0.000	1.000	
Number of periods upper	1.052	1.196	0.000	3.000	
Number of periods mid	1.029	1.032	0.000	3.000	

Variable	Mean	SD	Min	Max	OR [CI]
Income to needs ratio					
Mean INR 85 to 97/99	3.339	2.250	0.019	19.678	
Log of mean INR 85 to 97/99	1.354	0.469	0.019	3.029	
Mean INR 85 to 89	3.100	2.126	0.000	17.263	
MINR 90 to 94 - MINR 85 to 89	0.249	1.703	-8.323	16.168	
MINR 95 to 97/99 - MINR 85 to 89	0.666	2.209	-13.035	15.103	
Predominantly upper	0.230	0.421	0.000	1.000	
Upwardly mobile mid-upper	0.092	0.289	0.000	1.000	
Upwardly mobile low-upper	0.028	0.164	0.000	1.000	
Upwardly mobile low-mid	0.087	0.282	0.000	1.000	
Predominantly mid	0.161	0.368	0.000	1.000	
Downwardly mobile upper-mid	0.091	0.287	0.000	1.000	
Downwardly mobile upper-low	0.033	0.180	0.000	1.000	
Downwardly mobile mid-low	0.087	0.282	0.000	1.000	
Predominantly low	0.192	0.394	0.000	1.000	
Number of periods upper	1.055	1.208	0.000	3.000	
Number of periods mid	1.020	1.045	0.000	3.000	

Note: Robust 95% confidence intervals in brackets. All the analyses were weighted to adjust for the complex survey design, for using data from multiple years and for mortality. Female is the omitted category for gender, white is the omitted category for race.
+ significant at 10%; * significant at 5%; ** significant at 1%

Table 2. Odds ratios and 95% confidence intervals from the regression of self-rated health on income measures in adulthood, National Longitudinal Survey of Youth 1979.

	Model 1	Model 2	Model 3	Model 4	Model 5
Cumulative measures					
Mean HH[a] income 85 to 97/99	1.101**				
	[1.063 - 1.141]				
Log of mean HH income 85 to 97/99		2.105**			
		[1.660 - 2.670]			
Period-specific measures					
Mean HH income 85 to 89			1.118**		
			[1.075 - 1.163]		
MHHI[b] 90 to 94 - MHHI 85 to 89			0.996		
			[0.950 - 1.044]		
MHHI 95 to 97/99 - MHHI 85 to 89			1.038+		
			[0.998 - 1.080]		
Mobility trajectories					
Predominantly upper				2.473**	
				[1.738 - 3.521]	
Upwardly mobile mid-upper				1.675**	
				[1.134 - 2.472]	
Upwardly mobile low-upper				0.828	
				[0.438 - 1.563]	
Upwardly mobile low-mid				0.869	
				[0.573 - 1.317]	
Predominantly mid				1.679**	
				[1.169 - 2.412]	
Downwardly mobile upper-mid				1.715*	
				[1.134 - 2.594]	
Downwardly mobile upper-low				1.286	
				[0.700 - 2.362]	
Downwardly mobile mid-low				1.090	
				[0.718 - 1.656]	
Cumulative position in thirds					
Number of periods upper					1.416**
					[1.265 - 1.586]
Number of periods mid					1.222**
					[1.086 - 1.376]
Observations	2095	2095	2095	2095	2095
LL	-2636.28	-2631.811	-2633.095	-2625.393	-2631.37
CHI2	254.984	276.601	264.091	287.402	280.783
DF	13	13	15	20	14
BIC	-10618.548	-10627.486	-10609.622	-10586.791	-10620.721
BIC'	-238.095	-247.033	-229.17	-206.339	-240.268

[a] HH: household
[b] MHHI: mean household income.
Note: Robust 95% confidence intervals in brackets. All the analyses were weighted to adjust for the complex survey design, for using data from multiple years and for mortality. All the models presented here control for the variables in Table 1. Predominantly low and number of periods low are the reference categories respectively for mobility trajectories and cumulative positions in thirds.
+ significant at 10%; * significant at 5%; ** significant at 1%

Table 3. Odds ratios and 95% confidence intervals from the regression of self-rated health on income to needs ratio measures in adulthood, National Longitudinal Survey of Youth 1979.

	Model 1	Model 2	Model 3	Model 4	Model 5
Cumulative measures					
Mean INR [a] 85 to 97/99	1.110**				
	[1.052 - 1.172]				
Log of mean INR 85 to 97/99		2.076**			
		[1.591 - 2.710]			
Period-specific measures					
Mean INR 85 to 89			1.136**		
			[1.072 - 1.204]		
MINR [b] 90 to 94 - MINR 85 to 89			0.981		
			[0.915 - 1.052]		
MINR 95 to 97/99 - MINR 85 to 89			1.034		
			[0.980 - 1.091]		
Mobility trajectories					
Predominantly upper				2.311**	
				[1.614 - 3.310]	
Upwardly mobile mid-upper				2.051**	
				[1.358 - 3.099]	
Upwardly mobile low-upper				0.782	
				[0.408 - 1.501]	
Upwardly mobile low-mid				0.818	
				[0.546 - 1.224]	
Predominantly mid				1.465*	
				[1.050 - 2.044]	
Downwardly mobile upper-mid				1.581*	
				[1.062 - 2.353]	
Downwardly mobile upper-low				1.087	
				[0.516 - 2.290]	
Downwardly mobile mid-low				1.097	
				[0.725 - 1.660]	
Cumulative position in thirds					
Number of periods upper					1.369**
					[1.222 - 1.532]
Number of periods mid					1.150*
					[1.031 - 1.284]
Observations	2095	2095	2095	2095	2095
LL	-2646.133	-2638.269	-2642.734	-2629.197	-2636.999
CHI2	237.641	265.835	252.371	283.327	269.651
DF	13	13	15	20	14
BIC	-10598.842	-10614.57	-10590.346	-10579.183	-10609.463
BIC'	-218.309	-234.117	-209.893	-198.731	-229.011

[a] INR: income to needs ratio
[b] MINR: mean income to needs ratio
Note: Robust 95% confidence intervals in brackets. All the analyses were weighted to adjust for the complex survey design, for using data from multiple years and for mortality. All the models presented here control for the variables in Table 1. Predominantly low and number of periods low are the reference categories respectively for mobility trajectories and cumulative positions in thirds.
+ significant at 10%; * significant at 5%; ** significant at 1%

Appendix A. Measures of intragenerational mobility

Table 4. Means, minima and maxima of average income and income to needs ratio for the periods under study, National Longitudinal Survey of Youth 1979.

	Mean	Min	Max
Household income			
1985-89			
Upper	1.691	0.000	2.828
Mid	3.898	2.833	5.060
Low	7.676	5.061	21.559
1990-94			
Upper	1.600	0.000	2.780
Mid	4.046	2.782	5.342
Low	8.957	5.345	25.286
1995-97/99			
Upper	1.809	0.000	3.188
Mid	4.585	3.191	6.050
Low	9.817	6.050	22.598
Income to needs ratio			
1985-89			
Upper	1.089	0.000	1.868
Mid	2.589	1.871	3.386
Low	5.327	3.387	19.058
1990-94			
Upper	1.040	0.000	1.878
Mid	2.671	1.879	3.510
Low	6.025	3.511	25.266
1995-97/99			
Upper	1.276	0.000	2.229
Mid	3.101	2.230	4.035
Low	6.636	4.036	25.465

Table 5. Frequency, proportion and cumulative proportion for all 27 mobility trajectories in the data, National Longitudinal Survey of Youth 1979.

	Household income			Income to needs ratio		
	Freq.	Percent	Cum.	Freq.	Percent	Cum.
000	523	17.070	17.070	559	18.250	18.250
001	167	5.450	22.530	149	4.860	23.110
002	52	1.700	24.220	47	1.530	24.650
010	78	2.550	26.770	80	2.610	27.260
011	113	3.690	30.460	113	3.690	30.950
012	33	1.080	31.540	20	0.650	31.600
020	7	0.230	31.770	5	0.160	31.770
021	13	0.420	32.190	10	0.330	32.090
022	18	0.590	32.780	15	0.490	32.580
100	128	4.180	36.960	119	3.890	36.470
101	59	1.930	38.880	56	1.830	38.300
102	12	0.390	39.280	16	0.520	38.820
110	123	4.020	43.290	126	4.110	42.930
111	353	11.520	54.820	363	11.850	54.780
112	135	4.410	59.220	127	4.150	58.930
120	27	0.880	60.100	14	0.460	59.390
121	65	2.120	62.230	70	2.290	61.670
122	132	4.310	66.540	145	4.730	66.410
200	33	1.080	67.610	25	0.820	67.220
201	21	0.690	68.300	22	0.720	67.940
202	1	0.030	68.330	3	0.100	68.040
210	40	1.310	69.640	41	1.340	69.380
211	97	3.170	72.800	102	3.330	72.710
212	62	2.020	74.830	59	1.930	74.630
220	33	1.080	75.910	34	1.110	75.740
221	142	4.640	80.540	139	4.540	80.280
222	596	19.460	100.000	604	19.720	100.000
Total	3,063	100		3,063	100	

Note: 0 designates the lowest third of the distribution, 1 the middle third and 2 the upper third, and the numbers are arrayed by period. For instance, a trajectory of 012 represents upward mobility from the lowest third in the 1985-1989 period to the middle third in the 1990-1994 period to the upper third in the 1995-1997/99 period.

[1] The NLSY79 was originally composed of three probability samples, one nationally representative of the noninstitutionalized civilian youth population, one oversampling economically disadvantaged youth and one oversampling the military. The military oversample was mostly dropped in 1991. The white males and females of the economically disadvantage sample were dropped in 1991.