

Childhood Events and Circumstances Influencing High School Completion

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This paper is an empirical exploration of the effects of a variety of family and economic circumstances experienced during childhood on one indicator of success in young adulthood—high school completion. The estimates suggest that parental education and mother's work are positive and significant determinants of high school completion, whereas growing up in a family with more children (who compete for resources), being persistently poor and on welfare, and moving one's residence as a child have significant negative impacts on high school completion. The effects of some family stress and economic events differ depending on the age of the child when they occur. The results support the economic model of investment in children, as well as the welfare culture and socialization models.

Increasing inequality—both among and within important demographic and economic groups—has occurred over the past 15 years and has been documented in both governmental and scholarly studies (Levy 1987). These growing gaps are an important cause of the persistence of aggregate income poverty and especially of the increasing poverty rate among children (Danziger and Gottschalk 1986). From 1978 to 1988, the children's poverty rate has increased from 14% to 20%.

In light of the well-established connection between events and circumstances experienced during childhood (often proxied by the economic status of parents) and the probability of a child's success when he or she becomes an adult, these recent patterns in poverty and inequality suggest important changes in intergenerational relationships.

In this paper we explore the effect of a variety of family and economic circumstances experienced during childhood on one indicator of success in young adulthood—high school completion. Indeed, the failure to complete high school is a primary characteristic of those

experiencing persistent poverty and living in the urban underclass. In addition, graduation from high school is associated with productivity in a variety of household and other nonmarket activities (Haveman and Wolfe 1984). These recognized links between high school completion and economic success focus attention on the socioeconomic determinants of educational attainment.

Our empirical estimates of this intergenerational relationship build on several models prominent in the social science literature. These include Becker's (1981) and Becker and Tomes's (1986) human capital model, in which parents are viewed as investing in their children (and enjoying current consumption), constrained by family resources. These resources include both human wealth (parents' education and their time, for example) and nonhuman wealth (income or assets). The greater the value of parental resources, the larger the investment in children and the greater the children's educational attainment. The "working mother model" is related to the human capital model in that mothers' work is seen to have two offsetting effects. On one hand, the loss in parental time spent with children associated with mothers' market work is viewed as fostering developmental problems in children and reducing educational attainment. On the other hand, mothers' work contributes income to the family; these resources may translate into increased attainment by children. This hypothesis yields no unique prediction regarding the impact of mothers' labor force behavior on their children's attainments.

The role model theory discussed by sociologists provides a third, and complementary, perspective. This theory stresses that parents set examples for their children. Hence a parent with more education and greater earnings acts as a model to encourage similar behavior by his or her offspring. Finally, the intergenerational welfare transmission literature emphasizes the negative influence of growing up in a family that is supported (or primarily supported) by welfare. Parents who are dependent on welfare are viewed as discouraging independence and reducing their children's motivations for market success.

The research reported here draws from these theories to explore the determinants of schooling, with a focus on the role of family characteristics, resources, and events. Using a rich longitudinal data base of about 1,300 children, we estimate a reduced-form model in which educational attainment (measured as graduation from high school) is related to a variety of economic and family background characteristics. Our concern is the measured effect of such characteristics during childhood years (e.g., family economic status, family stress factors, family educational orientation, the amount of child care time received during preschool years) on the probability that a child will graduate from high school. In particular we focus on the timing of these circumstances and events and on the impact of these dated occurrences on educational attainment. We conclude that a variety of these circumstances and events are related closely to educational outcome, and that the timing of some of these occurrences is particularly important.

In the first section we review briefly the relevant economic and sociological literature on the correlates of educational attainment, describing both the methods used and the estimated results. None of the extant studies employ longitudinal data of the length and richness of those used in this research. In the second section we describe the data that we have constructed and use in this study. In the third we present the basic results of our empirical exploration, moving from the simplest models to those of increasing complexity. There we document the reduced-form relationship of the economic and family characteristics during childhood years with educational attainment. Next we relate the timing of these circumstances and events to the outcome of interest, and describe the time-related occurrence of the circumstances and events on educational achievement. The final section contains a summary and conclusions.

Research on Educational Attainment

The process of intergenerational status attainment has been studied extensively from both economic and sociological points of view. These analyses are distinguished by a wide variety of theoretical approaches, numerous methodological and statistical models, various observed outcomes, and a multitude of data sets.¹

Consider first the numerous theoretical perspectives that guide this research. *Economic theory*, which emphasizes the allocation of resources within the family,² and *socialization theory*, which stresses the possible effects of parental attainments and behaviors on their children's aspirations and performance,³ are the two primary analytical paradigms. Each generates hypotheses regarding the transmission of parental characteristics and attainments, most of which are complementary, to children. These analytical frameworks have been supplemented by more specialized hypotheses regarding the effects of parental decisions or circumstances on children. The "*working-mother*" hypothesis, for example, suggests that the mother's absence from the home may be the source of developmental problems in children, manifested in reduced achievement in a variety of dimensions (see Hetherington, Camara, and Featherman 1983). Alternatively, mothers' work contributes income to the family, which may enhance the children's future prospects. The *welfare culture hypothesis* emphasizes the harmful effects that parental dependence on public assistance may have on children's aspirations and on their capacity for independent actions.⁴ Finally, the *signaling framework* suggests that a variety of readily observable characteristics of parents simply may serve as signals of (or proxies for) important unmeasured characteristics of parents (e.g., motivation, farsightedness, constitution) that influence the child's productivity.

Guided by these conceptual frameworks, empirical studies have focused on a variety of children's outcomes. Educational attainment is perhaps the most common and most basic outcome on which researchers have concentrated, on the presumption that schooling is an important contributor to a wide variety of subsequent behaviors and attainments. Sociologists, typically working from the conventional model of socioeconomic attainment, focus on children's eventual occupation (or occupational prestige), although a number of these studies also have chosen earnings as a dependent variable of interest.⁵ Most of the work on intergenerational transmission by economists has adopted offspring's earnings (or their wage rates) as the chosen indicator of attainment (see Behrman, Hrubek, Taubman, and Wales 1980; Behrman and Taubman 1985; Corcoran and Datcher 1981; Kiker and Condon 1981). Several more specialized studies employ specific indicators of behavior or performance, such as whether the children are dependent on welfare as young adults, or their patterns of fertility and family structure (e.g., Hogan and Kitagawa 1985).

As with analytical frameworks and outcomes of interest, researchers emphasize a variety of parental socioeconomic background characteristics and attainments in analyzing the transmission process. Education-to-education and occupation-to-occupation studies are common in the sociology-demography literature, although this literature also emphasizes the impact of parental income on a variety of child outcomes.⁶ Economists generally emphasize intergenerational relationships in income, earnings, or wage rate, but use a wide variety of parental demographic and sociological background variables, though mainly as controls. The numerous more specialized studies focus on parental receipt of welfare income, the extent of mother's market work time, or the child's exposure to one-parent or "mother only" family structure.⁷ All of these studies include demographic background characteristics such as race or ethnic background, religion, region, urban residence, birth position, and number of siblings, used with no particular consistency.

The data used for studying these intergenerational relationships are as varied as the theoretical frameworks, outcomes of interest, and background characteristics. Among the earlier studies conducted by demographers and sociologists, the primary data sources were

a cohort of male high school seniors in Wisconsin (Sewell and Hauser 1975), the Occupational Change in a Generation data from special census studies (Featherman and Hauser 1978), Project Talent data (Jencks et al. 1972), Explorations in Equality of Opportunity (EEO) (Jencks, Crouse, and Meuser 1983), and a variety of special surveys, such as the data on cohorts of children living in particular cities or neighborhoods (Alwin and Thornton 1984). Most of these data bases rely on parental socioeconomic characteristics at a given point in time; the children's attainment attributes are measured either at a point in time or through repeated interviews following the children through time. More recent studies by researchers from all of the relevant disciplines employ longitudinal data, typically from the Michigan Panel Study of Income Dynamics (PSID) (Hill and Duncan 1987; McLanahan 1985) or the various National Longitudinal Surveys (NLS) (Shaw 1982). These data bases follow individual children for prolonged periods of time, tracking both the characteristics and the circumstances of the families in which they grew up as well as their own educational, economic, and demographic behavior.

The empirical models employed in estimating these intergenerational relationships include straightforward regression analysis, path models (often used by sociologists and demographers to reflect causal relationships and to capture both the direct and the indirect effects of particular variables of interest), and simultaneous equation models designed to reflect the endogenous nature of some relationships of particular interest. Economists also have attempted to estimate the pattern of intergenerational effects by using twin and sibling models (and hence data on twins and siblings) to capture the effect of unmeasured variables on the transmission process (e.g., Behrman and Taubman 1985).

The diversity of analytical approaches and data makes it difficult to summarize the research results found in the literature in any simple way. Among the studies that focus on educational outcomes, parental income generally has been found to have an important positive effect (Hill and Duncan 1987 review these studies), as has the mother's education. Father's education and occupation also are associated positively and significantly with the child's educational attainment; occupation appears to be the slightly stronger of the two. Growing up in a single-parent family also appears to affect educational outcomes—in this case, negatively—although much of this effect appears to result from the lowered family income associated with single parenthood (McLanahan 1985). Blacks have a substantially lower level of completed education than whites, but the independent effect of race often disappears when controls are introduced for a variety of socioeconomic background characteristics. Children's educational attainment has been found to be related positively to being the eldest child in the family, but related to the number of siblings. Finally, studies that attempt to test for the influence of welfare reciprocity and mother's work on children's educational attainment have found inconsistent results that are difficult to interpret (Stafford 1986).

Whereas research on the intergenerational transmission process has progressed along with the availability of longitudinal data, even the most recent studies of educational attainment are subject to a variety of criticisms. A basic problem with the available studies is the relatively brief period of time over which children have been observed—from their presence in their parents' household until their completion of education. A maximum of 12 to 15 years of longitudinal data has been available; thus the status of the child's family can be observed over only a relatively small number of adolescent years—typically from ages 14 to 17. As a result, the effects of family circumstances when the child is young have not been measured; hence the differential impact of various time-indexed circumstances during childhood or adolescence remains unexplored. Moreover, only a relatively narrow range of variables has been employed to explain educational attainment. Generally the studies have attempted to test one or another of the theories of educational attainment noted above, and have included variables relevant to the particular hypothesis under study. No study has

sought to introduce the full set of variables relevant to any of the hypotheses regarding the nature of the process. Finally, a number of potentially important variables consistent with several of the hypotheses have not been included in any of the studies. We refer in particular to variables reflecting stressful events during a child's upbringing—variables such as the number of times the family moves, the number of parental separations, or the number of household changes over the course of childhood and adolescent years. The work reported here attempts to remedy a number of these limitations.⁸

The Data and the Variables

For our analysis we use a sample of observations from the 1987 tape (Wave 20) of the University of Michigan's Panel Study of Income Dynamics (PSID). The individuals selected from that tape are those who were aged 4 years or younger in 1968, the first year of the panel survey, and who were still in the survey sample in 1987—a total of 1,258 observations. In 1987 these individuals ranged from 19 to 23 years of age.⁹

The individuals in this sample, then, were children during most of the period of observation, but by the terminal year were all young adults. Information relevant to each observation (child/youth) is taken from each of the 20 years of the panel survey; it includes personal characteristics (e.g., race, gender, age, and years of education), characteristics of the family (typically, the parents' household) in which the person lived (e.g., number of parents and the characteristics of each, such as age, race, religion, and years of education), characteristics of the child's grandparents, changes in family composition (e.g., marital separation or divorce), number of siblings, the family's income, the parents' labor force participation, receipt of welfare benefits, and location by urban or rural site. Those variables which are not permanent characteristics of either the child or his or her parents are time indexed.¹⁰

To enable observations from different birth years to be compared, we transformed all of the time indexes from the year of the survey to the child's age. Hence for two children aged 1 and 4 in 1968, for example, we obtain comparable information on each child from ages 4 through 15 by using the data on the 1971–1982 waves for the younger child and the data on the 1968–1979 waves for the elder. For monetary data, we converted all dollar values to 1976 prices, using the Consumer Price Index.

In order to estimate the amount of time that parents spent in child care activities with their children, we merged data from a second source—the University of Michigan's Time Use Data Set—with the basic PSID data. We constructed the time use data from time diaries filled out in 1975–1976, in which respondents entered the amount of time spent in various activities in a "typical" day. We constructed a "time spent in child care" variable by adding the times the respondents spent in those activities that we judge to be child care; then we expanded this estimate to an annual basis. This was done for all families in the Time Use Data Set in which at least one child was under age 19.

Next we regressed this total for child care time on family characteristics, including number of children, income, and other variables that the Time Use and the PSID data have in common.¹¹ The coefficients from this regression were applied to every family in the PSID data for each year; thus we computed child care time estimates for each and every year. We made the estimate of child care time separately for each parent, even though some of the independent variables (such as family income) were the same for both. Separate regressions were run for the father and the mother; one of the independent variables was the presence or absence of a spouse. If there was only one parent in the family unit for a particular year, we based the child care time on an estimate for that parent only. (The list of regressors and coefficients is shown in Appendix A.)

Our high school attainment estimates are based on a probit regression in which the dependent variable is equal to 1 if the individual had completed high school by 1987 and 0 otherwise. Individuals aged 19 and still in high school in 1987 were coded as having completed high school. We focus on high school graduation here to eliminate the censoring problems that would arise if we measured the education outcome as a continuous variable. The proportion of the sample completing high school was 82.4%.

We included a very rich set of independent variables in our analysis and grouped them into six categories (detailed definitions of the variables are presented in Appendix B). These groupings reflect related characteristics, events, or circumstances relevant to the child, or to his or her childhood years of 4 to 15.¹²

Gender, Ethnic Group, and Religion

This category includes background factors: child's race, gender, religion, and whether the head of the child's family was foreign-born.

Child's Family Position

In this group we included two demographic background factors that often have been associated with children's school performance: number of siblings and whether the child is the oldest sibling in his or her family.

Child Care Time

This category consists of the hours of total parental child care time (human wealth) allocated to the child when he or she was younger than school age.

Family Educational Orientation

We used the level of schooling attained by the child's mother and father to indicate the emphasis placed on schooling and education by the family as well as a measure of the parents' productivity in producing high-quality children.¹³

Family Economic Circumstances

The family's economic status is represented by the number of years the child's family was in poverty or receiving welfare benefits from the Aid to Families with Dependent Children (AFDC) program,¹⁴ the number of years the child's mother worked (thus we captured the income that she contributed to the family), and whether the child's grandparents were poor.

Family Stress

This category comprises a variety of variables reflecting potentially stressful events or living conditions during the years of the child's upbringing, including the number of times

the child's household moved, the number of parental separations, remarriages, or changes in household head, and the number of years the child lived in an SMSA as opposed to a nonmetropolitan area.

In the following estimates we will present the effects of these variables on educational attainment, both suppressing the time of occurrence of those events and circumstances which are time-related and identifying the time during childhood (ages 4–15) when the child experienced the event or circumstance.

The Basic Estimates

Table 1 shows the relationship between the correlates of educational attainment that we have identified and our education outcome variable. Column 1 presents the probit coefficients (and their standard errors) describing the relationship between each of the independent variables and high school graduation without controlling for the effects of the other variables. We calculated these zero-order results from a two-variable probit model fit to our sample of 1,258 children and young adults. Columns 2 through 6 show these relationships when each category of related variables is used alone in the equation. Column 7 presents the estimates when all of the variables except those reflecting the economic status of the child's family or family stress during childhood years are introduced into the equation. Finally, Column 8 is the full specification, including the economic status and stress factors.

The zero-order results of Column 1 are self-explanatory, and the signs on the variables are all as expected. With few exceptions, the variables are significant at the 10% level; most are significant at the 5% level.

Considered separately, the probit equations containing each of the categories of variables (Columns 2–6) are significant. The loss of significance of female and Protestant (Column 2), firstborn (Column 3), and number of parental separations and remarriages (Column 6) are the only noteworthy changes in these columns, relative to the zero-order results.

The estimates in Column 7—containing the basic demographic, family position, and family educational orientation variables—reveal a number of results that differ substantially from the zero-order results. The nonwhite race variable changes sign from negative to positive, and loses significance.¹⁵ Similarly, the significant zero-order effect of being the eldest child (firstborn) disappears, though the relationship remains positive. Although the effect of both father's and mother's education is monotonic and significant through the post-high school level—consistent with other literature (Engle 1980; Wolfe and Behrman 1984)—the effect of the mother's or the father's being a college graduate is not a significant determinant of the probability that the child will graduate from high school.

The full specification of the model in Column 8 shows effects for the basic demographic, family position, and education variables that are very similar to those shown in Column 7: the addition of the economic status and family stress variables to the estimate does not alter these basic relationships in any important way. In this full specification, only two of the family economic circumstance variables remain associated significantly with graduation: a negative effect of being poor and dependent on AFDC (significant at the 10% level) and a positive effect of the extensiveness of the mother's market work time (significant at the 5% level). From the set of family stress variables, only the number of residential moves remains strongly negative and significant at the 5% level.

In this full specification, the categories of demographic or family position variables are not jointly significant. The family's educational orientation and its level of stress are jointly

Table 1. Probit Estimates of Determinants of Educational Attainment
(High School Graduation = 1)
(Standard Errors in Parentheses), N = 1,258

Variables	Alternative Specifications							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant		.83 (.16)	1.22* (.09)	.61** (.07)	1.05** (.10)	1.40** (.10)	.29 (.27)	.32 (.33)
<i>Gender, Ethnic Group, and Religion</i>								
Nonwhite	-.35** (.08)	-.35* (.12)					.19 (.14)	.19 (.16)
Female	.21** (.08)	.16 (.13)					.10 (.14)	.11 (.15)
Nonwhite × Female	-.03 (.10)	.14 (.17)					.26 (.19)	.25 (.19)
Catholic	.48** (.12)	.49** (.18)					.55** (.20)	.42** (.21)
Jewish	.77* (.47)	.82* (.49)					-.45 (.69)	-.81 (.66)
Protestant	-.32** (.10)	.11 (.15)					.19 (.16)	.09 (.17)
Head foreign-born	.25 (.33)	.07 (.34)					-.14 (.36)	-.07 (.36)
<i>Child's Family Position</i>								
Firstborn	.33** (.11)		.18 (.11)				.10 (.13)	.21 (.13)
Number of siblings	-.14** (.03)		-.12** (.03)				-.10** (.03)	-.06* (.04)
<i>Child Care Time</i>								
Preschool time	-.10E-3* (.06E-3)					.56E-4 (.79E-4)		1.29E-4 (.85E-4)

(continued)

Table 1. continued

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Family Educational Orientation</i>								
Father high school graduate	.47** (.11)			.39** (.13)			.39** (.13)	.42** (.14)
Father some college	1.03** (.22)			.87** (.24)			-.94 (.26)	.95** (.27)
Father college graduate	.83** (.21)			.45* (.25)			.47* (.26)	.38 (.27)
Mother high school graduate	.40** (.09)			.38** (.10)			.39** (.11)	.39** (.12)
Mother some college	1.24** (.29)			1.19** (.31)			1.25** (.32)	1.27** (.33)
Mother college graduate	3.57 (15.2)			3.58 (15.10)			4.20 (23.84)	4.31 (23.07)
One parent in 1968	-.52** (.10)			-.26** (.11)			-.30** (.13)	.02 (.15)
No parents in 1968	-.32* (.19)			.02 (.20)			-.08 (.22)	.05 (.23)
<i>Family Economic Circumstances</i>								
Number of years in poverty	-.09** (.01)				-.05** (.02)			-3.97E-3 (1.97E-2)
Number of years in poverty x AFDC	-.13** (.02)				-.07** (.02)			-.05* (.03)
Number of years mother worked	.04** (.01)				.03** (.01)			.04** (.01)
Grandparents poor	-.16* (.08)				-.08 (.09)			.01 (.10)

jointly significant at 1% level

jointly significant at 5% level

(continued)

Table 1. *continued*

Variables	Alternative Specifications							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Family Stress</i>								
Years in SMSA	-.01 (.01)					-.02* (.01)		-.02* (.01)
Number of location moves	-.14** (.02)					-.14** (.02)		-.13** (.03)
Number of parental separations	-.15* (.08)					-.02 (.10)		-.09 (.12)
Number of parental remarriages	-.16* (.09)					.11 (.12)		.04 (.14)
Number of other changes in family	-.30** (.12)					-.26** (.12)		-.15 (.13)
Log likelihood of equation								
Degrees of freedom		-565.15 (7)	-569.28 (2)	-517.15 (8)	-540.81 (4)	-556.70 (5)	-501.33 (18)	-470.73 (27)

* Significant at 10% level, two-tailed test; 5% level, one-tailed test.

** Significant at 5% level, two-tailed test.

jointly significant at 1% level

significant at the 1% level; the family economic circumstance category is jointly significant at the 5% level.¹⁶

What, then, have we learned from this analysis? First, in keeping with other studies, nearly all of the individual independent variables we have studied are, by themselves, related significantly to the probability of high school graduation and are in the expected direction (Column 1). Moreover, each of the categories of variables has a significant impact when considered apart from the others (Columns 2–6). When the set of variables introduced into the analysis is expanded, however, many of these zero-order relationships and some of the group effects fail to persist. Among the variables with strong and persistent independent positive effects are parental education, Catholic religion, and the extensiveness of mother's work (reflecting her income contribution to the family). The number of siblings, being persistently poor and dependent on welfare, and especially the number of residential location moves to which the child was subjected have a significant negative impact on the probability of graduation, even after the effects of the large number of other variables are controlled. The categories of family educational orientation, family stress, and family economic circumstances are jointly significant in the full regression; those of gender, ethnic group and religion, and the child's family position are not. Although the parental time devoted to child care when the child is very young is not statistically significant in the full model, the sign is positive and the *t*-statistic generally exceeds 1.5.¹⁷ These results, then, are consistent with both a Becker-type investment model and a role model hypothesis (including the welfare culture hypothesis). Both the "absence from the home" and the "contribution to family income" aspects of the working-mother hypothesis are reflected in the estimates, but only the latter is statistically significant.

The Time-Related Estimates

Although the estimates presented in Table 1 show the effects of a variety of family background, economic, stress, educational orientation, and child care time factors on youths' educational attainment, they reveal little about the timing of these effects on educational achievement. Does it matter when during childhood the family is poor or dependent on welfare? Does a family breakup or a location move have a large effect only during adolescent years, or do these family stress factors also affect performance adversely if they occur during early childhood? Given the 20 years of longitudinal data, we can provide evidence on these questions.¹⁸

In Table 2 we present results directed at these issues of timing. The period over which we observed the individuals in our sample as children (ages 4–15) is broken up into three age categories of equal length: ages 4–7, 8–11, and 12–15. Then the effect of those family economic circumstance and family stress factors that can be identified with the child's age are measured with respect to each of these periods in the child's life. We used time periods of equal length in order to allow for the same number of potential events or years of particular economic circumstance in each period.¹⁹

Column 1 shows the zero-order results for those time-related variables with persistent statistically significant effects in the basic estimates (Table 1). Each time-specific variable is significant at the 1% level. Column 2 presents the results for these variables when all of the other variables, both non-time-related and time-related, also are included in the model.²⁰ These results are discussed below.

Although experiencing poverty and welfare dependence in the family as a young child (ages 4–11) does not appear to have a significant effect on the probability of graduating from high school, this adverse economic condition has a negative and significant effect on educational attainment when it occurs during adolescence. The same economic status effect

Table 2. Probit Estimates of Time-Related Determinants of Educational Attainment^a
 (High School Graduation = 1)
 (Standard Errors in Parentheses), N = 1,258

Time-Related Variables	Zero-Order Results (1)	All Variables in Model ^b (2)
Number of years in poverty × AFDC, ages 4–7	–.31** (.04)	–.06 (.08)
Number of years in poverty × AFDC, ages 8–11	–.26** (.04)	.04 (.09)
Number of years in poverty × AFDC, ages 12–15	–.10** (.01)	–.16** (.07)
Years mother worked, ages 4–7	.06** (.02)	.22 E-2 (.04)
Years mother worked, ages 8–11	.09** (.03)	.03 (.05)
Years mother worked, ages 12–15	.12** (.03)	.06** (.04)
Number of location moves, ages 4–7	–.30** (.05)	–.21** (.06)
Number of location moves, ages 8–11	–.17** (.04)	–.03 (.06)
Number of location moves, ages 12–15	–.24** (.04)	–.15** (.06)

^a Only those time-related variables which are significant in Column 8 of Table 1 are shown. Other predictor variables in the probit equation of Column 2 are those listed in Column 8 of Table 1. The time-related variables not shown were entered into the probit equation with the same three age categories.

^b Log likelihood for this equation is –461.20 with 43 degrees of freedom.

** Significant at 5% level, two-tailed test.

is reflected in the mother's labor market work variable. Having a mother who works—and who thereby contributes to income—has a positive association with high school completion; the size of the positive effect is small during the child's younger years, whereas the variable is a significant and positive contributor to educational attainment in the age period from 12 through 15.

The results for the location move variable—an element of family stress—are most revealing. Disrupting the child's physical location when he or she is young (7 years or younger) or an adolescent (ages 12–15) has a strong negative and significant effect on achievement. The latter effect is especially consistent with the common impression that disrupting the child's peer group, school, and physical location while he or she is in high school is detrimental to school performance. The large effect in the youngest age period is consistent with the view of child development experts who stress the importance of events during the early years of life. Although the older-age effect is not shown in the table, this effect also is observed for the parental separation variable (for which the probit coefficient becomes increasingly large and negative with the child's age, though it never becomes significant), the parental remarriage variable (for which the probit coefficient is positive and approaches significance in the age 12–15 period), and the variable representing other

changes in family arrangements (such as moving from a mother's to a father's home), where the effect is negative and significant in the oldest age category.²¹

Although the probit coefficients of Tables 1 and 2, together with their standard errors, show which of the independent variables are statistically significant correlates of the dependent variable, by themselves they provide little evidence of the extent to which the value of the dependent variable will change in response to changes in the independent variables. In Table 3 (Column 1), we present *predicted* values of the probability of graduating from high school associated with *assumed* values of the independent variables. In effect we use the probit equation described in Table 2, Column 2, to show how the probability of graduating from high school changes when each of the independent variables is assigned the value shown in the table, while each of the other variables is held at the actual level for each individual. The estimates in Column 2 of Table 3 show how these predicted probabilities change in relation to the base probability of .82, obtained when the actual value of all of the independent variables for each individual is used in the probit equation.

The differential probabilities displayed in Table 3 show the quantitative effect on the probability of graduating from high school associated with a wide variety of values of the independent variables, taken one at a time. Only a few of these effects will be noted here because their interpretation in the table is straightforward. In the gender, ethnic group, and religion category, being female or nonwhite is associated with a higher probability of graduating from high school, but none of the probit coefficients on which these estimates are based are significant when the full range of other control variables is included in the equation. The effect of growing up in a Catholic family is seen to raise the probability of graduating from the base probability of .82 to .88, an increase greater than 6%. (The small number of Jewish families in the sample and the very large standard error on the probit coefficient renders meaningless the large effect for this variable shown in the table.) Although neither of the variables in the child's family position or the child care time category is statistically significant, being a firstborn child and experiencing substantial hours of child care time as a preschooler have a positive and quantitatively large effect on educational attainment, whereas having a large number of siblings has a negative and quantitatively large impact. These results suggest the importance of parental time (human wealth) allocation to a child for his or her achievement.

The quantitative effect of the educational orientation of a child's family is strikingly large. Having a father with some college education increases the probability that the child will graduate from high school by 14% over the base probability; having a mother with a college degree makes the child's graduation from high school a virtual certainty. As noted, these differential probabilities generally are based on statistically significant coefficients, and are consistent with both Becker's human capital model and the role model hypothesis.

Although the number of years living in poverty has virtually no independent quantitative effect on the probability of high school graduation (and is statistically insignificant), being poor *and* being dependent on AFDC benefits (which also serves as a proxy for growing up in a mother-only family) are related strongly to the child's educational outcome. For example, the predicted probability of graduating from high school for a child who spent all 12 years from ages 4 through 15 in poverty and on welfare is only .67, compared to a probability of .84 for a child growing up in a family that was never simultaneously poor and receiving welfare.

We also tested the age-specific effect of those economic circumstances variables which displayed a statistically significant effect on the probability of high school graduation (see Table 2); the quantitative effect of those age-specific variables is also shown in Table 3. Growing up in a family that is poor and dependent on AFDC benefits has an adverse effect on a child's educational attainment, an effect that is especially pronounced when the child is

Table 3. Predicted Probability of Graduation and Percent Change from Population (Base) Probability^a

Description of Persons	Probability of Graduation	Percent Change from Population Probability (.82)
Base	.82	—
<i>Gender, Ethnic Group, Religion</i>		
<i>Race</i>		
White	.81	-2.4
Nonwhite	.84	1.5
<i>Gender</i>		
Male	.81	-1.1
Female	.83	1.2
<i>Race-Gender</i>		
White male	.81	-2.2
Nonwhite female	.86	4.7
<i>Religion</i>		
No religion	.80	-3.2
Catholic**	.88	6.2
Jewish	.57	-31.3
Protestant	.82	-0.9
<i>National Origin of Head</i>		
United States	.82	0.0
Foreign	.81	-0.7
<i>Child's Family Position</i>		
<i>Birth Order</i>		
Second or later	.82	-1.0
Firstborn	.86	4.0
<i>Number of Siblings</i>		
Zero	.86	4.1
Two	.83	1.2
Four	.81	-1.9
Six	.78	-5.3
<i>Child Care Time</i>		
0 hours/day	.76	-7.4
2 hours/day	.80	-2.6
4 hours/day	.84	1.6
12 hours/day	.94	13.6
24 hours/day	.99	20.1
<i>Family Educational Orientation</i>		
<i>Father's Education</i>		
Less than 12 years	.79	-3.7
High school graduate**	.87	5.9
Some college**	.94	14.4
College graduate	.87	5.7
<i>Mother's Education</i>		
Less than 12 years	.77	-6.2
High school graduate**	.86	4.3
Some college**	.97	17.3
College graduate	.99	21.3

(continued)

Table 3. *continued*

Description of Persons	Probability of Graduation	Percent Change from Population Probability (.82)
<i>Family Economic Circumstances</i>		
Number of Years in Poverty		
0	.83	0.5
6	.83	-0.1
12	.82	-0.3
Number of Years in Poverty and Receiving AFDC*		
0	.84	2.3
6	.77	-7.0
12	.67	-18.2
Number of Years in Poverty and Receiving AFDC		
Ages 4-7: 0	.83	0.7
3	.79	-3.7
Ages 8-11: 0	.82	-0.6
3	.84	2.3
Ages 12-15: 0	.84	2.2
3	.73	-11.0
Number of Years Mother Worked**		
0	.78	-5.6
6	.82	-0.6
12	.86	3.8
Number of Years Mother Worked		
Ages 4-7: 0	.82	-0.1
3	.83	0.1
Ages 8-11: 0	.81	-1.3
3	.83	0.6
Ages 12-15: 0	.79	-3.9
3	.83	1.1
<i>Family Stress</i>		
Years in SMSA		
0	.86	3.8
6	.84	1.3
12	.81	-1.3
Number of Location Moves**		
0	.88	6.5
1	.85	3.7
2	.83	0.5
3	.80	-2.9
Number of Location Moves		
Ages 4-7: 0	.86	3.8
3	.71	-13.7
Ages 8-11: 0	.83	0.6
3	.81	-1.7
Ages 12-15: 0	.85	2.5
3	.74	-10.0

(continued)

Table 3. *continued*

Description of Persons	Probability of Graduation	Percent Change from Population Probability (.82)
Number of Parental Separations		
0	.83	0.7
1	.81	-1.7
2	.79	-4.2
3	.77	-6.9
Number of Parental Remarriages		
0	.82	-0.2
1	.83	0.8
2	.84	1.8
3	.85	2.7
Number of Other Changes in Family		
0	.83	0.4
1	.79	-3.5
2	.76	-7.9
3	.72	-12.6

^a Predicted value of probability of graduation from indicated value of independent variable (rather than actual value) and percent change from base value (that resulting from prediction using mean of all independent variables).

* Significant at 5% level in non-age-specific estimation.

** Significant at 1% level in non-age-specific estimation.

an adolescent. Being poor and in a welfare family for three of the four years during ages 12 to 15 decreases the probability of graduating from high school to .73, an 11% reduction from the base probability of .82. Having a working mother also has a significant and large effect—in this case positive—if it occurs in the adolescent years (although it appears to be positive whenever it occurs). The effect of the mother's working (and hence of contributing income to the family) for three of the child's four adolescent years increases to .83 the probability that he or she will graduate, 1% above the base probability but 5% above the predicted probability if the mother does not work at all during the years of adolescence. This evidence argues in favor of the economic model (particularly the importance of nonhuman wealth constraints) and for the "contribution to family income" aspect of the working-mother hypothesis.

All of the family stress factors (except living in an SMSA) have quantitatively large effects on the probability that a child will graduate from high school. Only the variable measuring the number of location moves is significant, however. With zero location moves, the predicted probability of graduating increases to .88, nearly 7% above the base probability. Three location moves, however, decrease the probability of graduation to .80. Such moves have their largest adverse effect when the child is in the youngest (ages 4–7) or oldest (age 12–15) age categories. Three location moves when the child is age 4 to 7 result in a .71 probability of graduating from high school, 14% below the .82 base probability. Similarly, three moves while the child is an adolescent reduce the probability of graduating to .74, a 10% decrease from the base probability. Although none of the other family stress variables are statistically significant, both parental separations and other changes in family head (such as moving from a mother's residence to a father's) have a quantitatively large effect on the probability of graduating from high school.²²

In addition to the models described in the three tables, we ran similar models to test whether the oversampling in the PSID from the low-income population has a significant effect on our results. Because other researchers studied only whites (e.g., Behrman, Pollak, and Taubman 1986), we applied our model separately to whites and to nonwhites, as well as to the low-income and minority Survey of Economic Opportunity (SEO) subsample observations. The null hypothesis that the model was the same for each of the relevant pairs of groups could not be rejected, even at the 10% level of significance. The time-specific probit models for whites, nonwhites, and the SEO-minority subsamples are available on request from the authors.²³

Summary and Conclusions

This study addresses the intergenerational factors that affect one indicator of young adults' success, namely educational attainment. This outcome is related significantly to a variety of other aspects of adults' success, including labor market income and social status attainment. We look specifically at high school completion because completing high school has been described as a primary intervention to reduce the probability of long-term dependence on welfare and of living in poverty.

We analyze this question using a very rich longitudinal data base of nearly 1,300 children and young adults for whom we have a large set of individual and parental characteristics. These data allow us to explore determinants of high school completion from the perspective of a variety of models, such as the Becker investment model, the working-mother hypothesis, and various versions of the role model hypothesis. We grouped these variables into six categories: gender, ethnic group, and religion background variables; the child's position in the family; child care time; parental educational orientation; family's economic circumstances while the child is growing up; and family stress measures. A number of these variables vary from year to year as the child grows up, and we analyze their effect in two ways. First, we measure the number of times (years) each event or circumstance occurred when the child was age 4 to 15. Second, we divide the child's childhood years into three periods (4–7, 8–11, and 12–15 years of age) and measure the number of times each event or circumstance occurred during each period.

In our zero-order estimates, we find that nearly all of the variables are of the expected sign and are statistically significant. These estimates, however, do not allow us to distinguish among the various theories of intergenerational determinants of educational attainment. Our estimates over the complete period of childhood studied (4–15 years of age) suggest that parental education and mother's work are positive and significant determinants of educational attainment, whereas growing up in a family with more children (and thus competing for resources), being persistently poor and on welfare, and moving one's residence as a child have a significant negative impact on the probability of graduating from high school, after we control for the large number of other variables. These results then seem inconsistent with the "absence from the home" aspect of the working-mother hypothesis but consistent with the economic model of investment in children, with both versions of the role model hypothesis—the welfare culture and the role model of encouraging similar behavior in one's offspring—and with the "contribution to family income" aspect of the working-mother hypothesis.

In analyzing the effect of the timing of the family economic and family stress events on a child's educational attainment, we found that experiencing poverty and welfare in adolescence has a negative and significant effect, whereas such an experience earlier in life does not have such a strong impact. Having a mother who works—and who thereby contributes to family income—also has a significant association with high school

completion when it occurs while the child is a teen. Again, the influence is smaller when the child is younger. These results suggest that the additional resources contributed by a working mother dominate the negative impact of her absence and that this dominance increases as her child grows older. Finally, we find a very strong and negative impact of location moves while the child is young (age 4–7); this finding suggests that events early in life are important. Such moves also are related negatively and strongly to the probability of graduating from high school if they occurred during adolescence.

These results, then, support a number of findings suggested in previous literature, but they do so with a large and unique data set of children whose life course was traced over a 20-year period. They also suggest a number of influences—such as the change in physical location and the receipt of welfare benefits if the family is poor—that have not been addressed in previous studies. The longitudinal nature of the data allowed a large number of economic, family stress, and child care events and circumstances to be analyzed, while holding constant a number of important background and parental circumstances.

The general picture that emerges is consistent with the economic model of investment in children, as well as with the welfare culture and socialization (role) models. The results also suggest an additional factor—aspects of family stress—that complements the primary models discussed in the literature. Among these aspects, the negative effect of household location moves stands out.

These findings—particularly, the dominant role played by parental education levels—suggest that it will be difficult to increase high school completion rates through standard policy interventions. Yet the important effects of the variables measuring family stress, disruption, and low economic status suggest that policies designed to address the special problems of children who are at risk from these events may be effective. Insofar as programs can be designed to ameliorate the adverse effects of these events, the findings on the timing of the effects reported here can be useful in targeting such interventions.

Notes

¹ Hill and Duncan (1987) review several recent studies of the effect of parental income on children's socioeconomic attainment. They pay particular attention to the various theories that motivated much of this work. Our discussion of theoretical approaches draws from their paper.

² Becker's model guides most of the work by economists on this issue (see Becker 1981; Becker and Tomes 1986; Tomes 1981). In this model, household decisions regarding children's schooling are viewed in the same framework as other choices regarding the allocation of family resources. Parents are assumed to be concerned with their children's well-being, and hence are faced with the choice of devoting their resources to their own consumption or to investments in their children. Knowing the relevant determinants of their children's well-being (except "luck"), parents have a demand function for their children's education that depends on the family's income, the children's endowments, and market luck. The model also has been expanded to include parental fertility decisions, and thus introduces the tradeoff between child quantity and quality. The Becker model has encouraged the focus on parental income in much of the economic research on this question.

³ Socialization theory, also known as "role model theory," posits that parents' behavior, goals, and attitudes affect the children's performance in that parents serve as both "models for self" and "models for objects." In this framework, parental economic success is relevant to children's attainment insofar as it reflects the examples that parents provide for their children (see Woelfel and Haller 1971).

⁴ Macaulay (1977) presents the essence of this theoretical position most explicitly. The welfare culture hypothesis is related closely to the "culture of poverty" model: both frameworks emphasize the influence of the state of poverty or welfare dependency on personal adequacy, independence, and self-esteem.

⁵ See Featherman and Hauser (1978); Hauser and Daymont (1977); Hauser and Featherman

(1977); Jencks, Crouse, and Meuser (1983); Sewell and Hauser (1975). The important books by Jencks and his colleagues (1972, 1979) adopt a similar framework, but focus on the inequality of outcomes rather than on the process of transmission.

⁶ Sewell and Hauser (1975) emphasized the persistence and importance of parental income on both children's education and their earnings.

⁷ McLanahan (1985) studied the effects of family status (particularly, the father being absent when the child is age 17) on educational attainment (being in school at age 17 and the extent of completed education by age 23).

⁸ Two of the most recent studies of the intergenerational determinants of children's education, those by Hill and Duncan (1987) and by McLanahan (1985), are subject to many of these criticisms.

⁹ Our full sample consisted of all those aged 0 to 6 in 1968, 3,099 observations. Of these 3,099 observations, 1,753 remained in the sample in 1987, a loss of about 1,340 observations. Most of these losses were due to attrition; a few were due to a lack of two or more years of information. Our sample of those aged 0 to 4 in 1968 who also were in the sample in 1987—1,258 observations—was reduced from 1,283 observations because of the exclusion of observations with two or more years of missing information.

¹⁰ The parents' education and religion variables were measured in 1968, the first year for which this information was available on PSID files. The questions were asked of the current family head and wife. In most cases information was obtained from the child's parents, but in some cases the information described a stepparent or other family member. If the child was in a single-parent home in 1968 (usually female-headed), there was no information for the second parent. We created a dummy variable, one parent = 1, and assigned it to these observations. If the child lived with grandparents or other nonparents in 1968, and if no information was available on either parent, we created and assigned a dummy variable, no parents = 1. For these children, all of the corresponding parental education variables were set equal to 0. Observations with only one year of missing data (22 observations) were retained in the sample, and we filled in the missing data by averaging the values of the variables for the two years contiguous to the year for which information was missing.

¹¹ Because of attrition from the time use data, we corrected for sample selection bias in making these estimates. Of the original 619 respondents, 133 failed to participate in all four waves of the survey. We calculated a Heckman two-step estimator and used it in the regression to correct for the (possible) nonrandom attrition from the sample.

¹² These groupings are judgmental; variables placed in one of our categories may well reflect effects related to another category. For example, although the AFDC reciprocity variable is included among the group of variables describing the family's economic status, it also may reflect elements of stress in childhood years. Similarly, the variables reflecting the absence of one or both parents in 1968 (used to obtain unbiased estimates of the effect of parental education when parental information is missing) may reflect the effect of living in a mother-only family or in a household where parents are not present.

¹³ This category also includes the dummy variables reflecting the nonavailability of information on the education of one or both of the child's parents due to the absence of one or both parents from the household in 1968 (see Note 10). These variables also may reflect the effect of growing up in a family with one or no parents present. Finally, parental education also may reflect genetic factors.

¹⁴ The occurrences of particular economic circumstances (e.g., poverty status) or family stress events (e.g., marital separations) are measured as the total number of times each time-related event occurred in the family during the period when the child was age 4 to 15, or (in the time-related estimates) as the total number of times the circumstances or event occurred during each relevant time period.

¹⁵ The absence of a negative relationship between nonwhite race and educational attainment when other controls are introduced into the equation contradicts conventional wisdom, but has been found in a number of other studies (see Altonji 1988; Corcoran, Gordon, Laron, and Solon 1987; Crane 1988; Jencks et al. 1972). We conducted a test for structural change (a Chow test for probit estimation) to determine whether the two racial groups have significantly different underlying determinants of high school graduation when this specification is used. The test showed that the null hypothesis of no structural difference could not be rejected at a 5% significance level.

¹⁶ We tested these specifications using the likelihood ratio test, which compares the restricted

model to the unrestricted model. This ratio is distributed Chi square with degrees of freedom equal to the number of restricted variables.

¹⁷ Because child care time is constructed as a predicted value from a "noisy" regression, it is measured with substantial error. The persistence of the positive sign, together with the nontrivial level of significance, could justify a cautious attribution of a positive effect.

¹⁸ Speculation and some research (Krein 1986; Krein and Beller 1988; Marino and McCowan 1976) suggest that the timing of the occurrence of certain events or circumstances indeed is relevant to the outcomes of interest. For example, the provision of parental child care time when a child is young is often alleged to have a stronger effect on the child's development than the provision of such time later in the child's life. Similarly, the impact of family stress is believed by many to be greater in the years immediately following the event than in subsequent years (McLanahan 1985).

¹⁹ Alternative breakdowns (e.g., preschool age, elementary school age, and junior high school age) also could have been used.

²⁰ The effects for the non-time-related variables in the categories of gender, ethnic group, and religion, child's family position, and family educational orientation showed little change in the estimated full model with the period-specific estimates for the time-related variables from those shown in Table 1, Column 8. The few relevant patterns for the time-related variables not shown in Table 2 are discussed in the text.

²¹ In this time-related model, the preschool child care time variable again is positive but not quite significant (t-statistic = 1.3), as in the Table 1, Column 8 results.

²² The small proportion of children who experienced a change in family structure other than a parental separation or remarriage (such a change was experienced in less than 1% of the observed child-years recorded in the data) leads to the large standard error on the estimate for this variable and hence contributes to the lack of statistical significance. If this variable were statistically significant, the magnitude of its impact would be noteworthy. Three such family changes over the 12 years of childhood are predicted to decrease the probability of high school graduation by nearly .13% from its base probability of .82.

²³ We also tested for structural differences across genders and among gender-race subgroups, again using the Chow test for probit estimation (see Note 15). In no case was there a significant difference between groups at the 5% level. Results of these subsample tests also are available from the authors.

Appendix A. Coefficients and Standard Errors from Time Use Data Regressions

Variables	Men	Women
Constant	256.4 (276.1)	1051.9** (492.1)
Number of children	3.5 (13.3)	39.9 (33.1)
Age	-0.0919 (4.40)	-7.34 (6.74)
Spouse's age	-3.26 (4.45)	-7.92 (7.47)
Education		
8-11	-4.84 (65.8)	(296.7)* (174.7)
High school graduate	-11.9 (61.4)	23.8 (145.8)
Some college	-51.4 (84.9)	80.3 (175.2)
College graduate	-36.0 (87.6)	19.8 (190.9)
Spouse's Education		
8-11	65.9 (74.1)	-110.0 (152.0)
High school graduate	27.0 (49.3)	-134.4 (114.2)
Some college	34.5 (68.9)	39.0 (152.4)
College graduate	4.11 (90.5)	-50.8 (145.3)
Hours (market) work	-0.514 (3.11)	-18.1** (8.32)
Hours work squared	-0.0263 (0.0405)	0.249 (0.161)
Spouse's hours work	-0.842 (1.02)	-3.70 (3.02)
Owned house? (0-1)	-66.7 (76.8)	-75.5 (103.2)
Family income	0.00263 (0.00164)	-0.0112* (0.00628)
Spouse present? (0-1)	216.7 (193.5)	647.8* (341.6)
Adjusted R-square	.102	.200

* Significant at 10% level.

** Significant at 5% level.

Appendix B. Definitions, Means, and Standard Deviations of Variables
(N = 1,258)

Variables	Mean	Standard Deviation
<i>Dependent Variable</i>		
High School Completion (high school graduate = 1)	0.824	0.381
<i>Gender, Ethnic Group, and Religion</i>		
Race (nonwhite = 1)	0.477	0.500
Gender (female = 1)	0.501	0.500
Race × Gender (nonwhite × female = 1)	0.250	0.433
Religion:		
Catholic	0.192	0.394
Jewish	0.017	0.131
Protestant	0.707	0.455
National Origin of Head (head foreign-born = 1)	0.020	0.140
<i>Child's Family Position</i>		
Birth Order (firstborn = 1)	0.232	0.422
Number of Siblings	2.460	1.565
<i>Child Care Time</i>		
Preschool Time (total number of hours allocated to child care in preschool years, ages 4 and 5)	2252.8	663.28
<i>Family Educational Orientation</i>		
Father's Education		
Father high school graduate	0.233	0.423
Father some college	0.109	0.312
Father college graduate	0.091	0.288
Mother's Education		
Mother high school graduate	0.378	0.485
Mother some college	0.091	0.288
Mother college graduate	0.043	0.203
One Parent in 1968 (hence no education variable is available for father)	0.184	0.387
No Parents in 1968 (hence no education variable is available for either parent)	0.042	0.201

(continued)

Appendix B. *continued*

Variables	Mean	Standard Deviation
<i>Family Economic Characteristics</i>		
Number of Years in Poverty (family's income below the matched poverty line for year = 1)	2.734	3.736
Number of Years in Poverty x AFDC (family in poverty and received benefits from the AFDC program in that year = 1)	1.039	2.414
Number of Years Mother Worked (mother worked outside the home in that year = 1)	6.792	4.170
Grandparents Poor (head's parents were poor while head grew up = 1)	0.513	0.500
<i>Family Stress</i>		
Years in SMSA (lived in SMSA that year = 1)	8.619	5.029
Number of Location Moves (change in household location of the family in that year = 1)	1.880	1.964
Number of Parental Separations (parents of individual separated or divorced in that year = 1)	0.255	0.494
Number of Parental Remarriages (parents of individual remarried in that year = 1)	0.163	0.416
Number of Other Changes in Family (change in family head other than through separation or remarriage in that year = 1)	0.079	0.321

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