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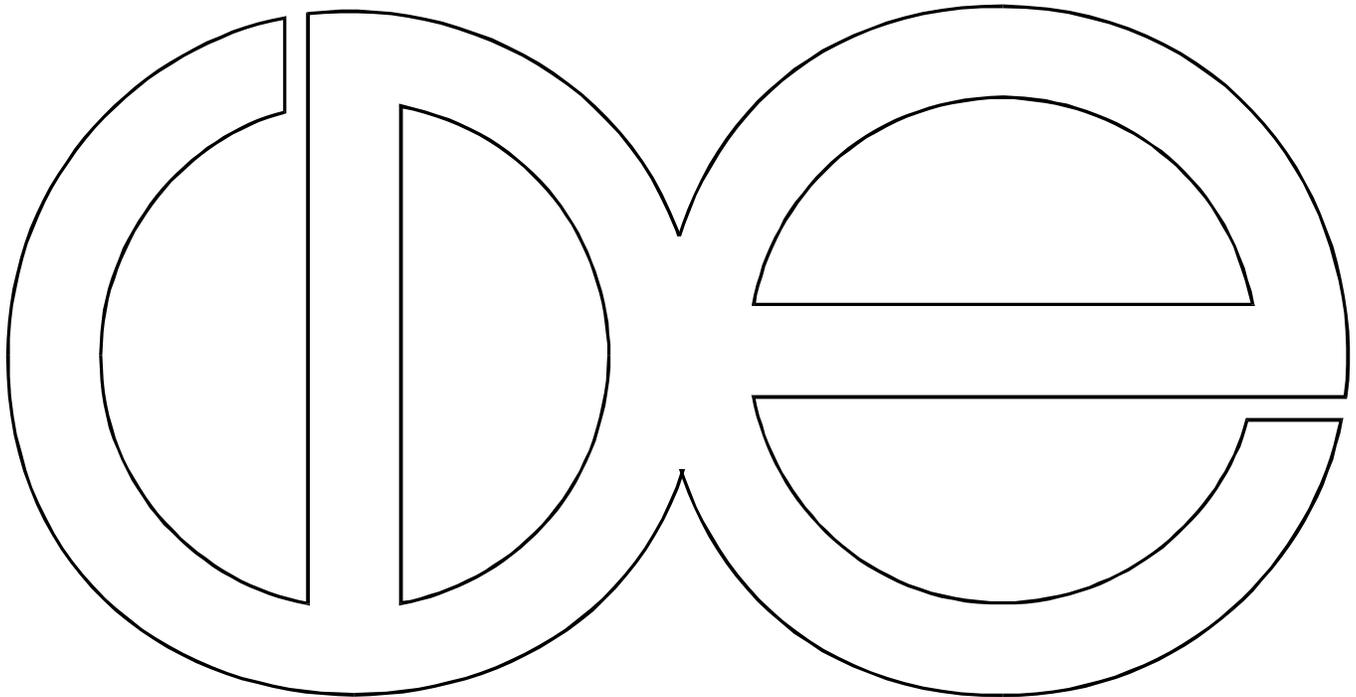
University of Wisconsin-Madison

**A Review of the Wisconsin Longitudinal Study of Social
and Psychological Factors in Aspirations and
Achievements 1963-1992**

William H. Sewell

Robert M. Hauser

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A Review of the Wisconsin Longitudinal Study of Social
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William H. Sewell
Robert M. Hauser

Department of Sociology
The University of Wisconsin-Madison

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Abstract

The authors review the Wisconsin Longitudinal Study of Social and Psychological Factors in Aspirations and Achievements (WLS). The WLS has sought to understand the effects of social and economic origins and social psychological factors on educational and occupational aspirations and achievements. The most important contributions of the WLS to date have been in the development of causal models of the process of stratification, but the WLS data have also been used in many other ways over the years. This review brings readers up to date with the work of the project as of 1990, the year in which the WLS began a new phase of data collection as a study of aging.

A Review of the Wisconsin Longitudinal Study of Social
and Psychological Factors in Aspirations and
Achievements 1963-1990

I. Origins of the Wisconsin Research Program

Our research program is anchored in a 1957 survey of the post-high school educational plans of all high school seniors in the public, private, and parochial schools of Wisconsin. J. Kenneth Little, with the cooperation of the Wisconsin State Superintendent of Schools, conducted the survey, whose results were extensively used by the state in planning its program of support for postsecondary education in the 1960s (Little 1958; Little 1959). In 1962, William H. Sewell obtained the survey data and the coded and punched cards for further analysis. After an extensive preliminary examination of the quality of the data, we selected a random sample of the respondents, consisting of 10,317 cases (approximately one-third of the seniors), for further study. We then added information on the measured mental ability of each student to the cards from the files of the Wisconsin State Testing Service, which at that time conducted a testing program covering all eleventh graders in the state. We developed a number of indexes based on information from the survey--including the socioeconomic status of the student's family, the student's attitudes toward higher education, educational and occupational plans, and perceived influence of significant others on educational plans--and then added these to each student's card. Finally, using secondary sources, we constructed relevant measures of school, neighborhood, and community contexts, such as, the socioeconomic composition of each senior class,

the percentage of its members who planned on going to college, the size of the school, the size and degree of urbanization of the community of residence, and the distance of the student's place of residence from the nearest public or private college or university.

A. Community Contexts and Educational Aspirations

During the first several years of the project, we examined the influence of community and neighborhood background on the educational aspirations of youth. From our earlier work (Sewell, Haller, and Straus 1957), the results of which were later confirmed by others, we knew that socioeconomic origins and measured academic ability were major factors in the educational and occupational aspirations of youth. Also, from our previous work and the research of others, we knew that females tended to have lower aspirations than males. Consequently, in most of our subsequent analyses, we have taken gender, ability, and socioeconomic status into account in assessing the effects of other independent variables, such as community and neighborhood characteristics, on aspirations and achievements. Several of our investigations which used multiple cross-tabulation procedures showed that community of residence significantly influenced the aspirations of both males and females, except when the socioeconomic origins and the measured ability of the students were taken into account (Sewell 1963, Sewell 1964; Sewell and Orenstein 1965). However, we were intrigued by the fact that high status, high ability farm boys were markedly less likely to have high aspirations than were similarly advantaged boys from urban communities.

The lower aspirations of rural boys prompted us to carry out further analyses. Sewell and Haller (1965) checked a number of theoretically derived explanations, such as those dealing with opportunity structure and self-perceptions, to explain differences in the aspirations of rural and urban youth. Sewell and Haller (1967) and Portes, Haller, and Sewell (1968) attempted to explain differences in the aspirations of farm boys in terms of the differences in their family backgrounds, social-psychological supports, and self-conceptions. They found that the boys aspiring to farm, blue collar, or white collar jobs came by and large from the same type of family, received the same amount and type of social psychological support, and had similar self-conceptions; the boys who aspired to professional positions were quite different, however, from those aspiring to any of the lower status occupations.

B. Neighborhood and School Contexts and Educational Aspirations

Our research on community background and aspirations had led us to the tentative conclusion that differences in aspirations may be due more to differences in the gender, socioeconomic, and ability compositions of communities, neighborhoods, and schools than to normative differences among them. Consequently, Sewell and Armer (1966) rigorously tested the popular thesis that the socioeconomic composition of a student's neighborhood of residence has an important effect on the educational aspirations of that student, over and above the influence of other known sources of aspirations. The essential arguments and expectations of the thesis are as follows: (1) ecological processes in large cities result in socioeconomic segregation; (2) school

segregation is in large part a consequence of residential segregation; (3) public high school enrollment areas represent functioning subcommunities for high school youth within large urban complexes; and (4) consequently, it may be expected that normative climates or modal levels of aspiration have a pervasive effect on the educational aspirations of all youth residing in a neighborhood regardless of individual socioeconomic status or academic ability levels. The same reasoning would apply equally, of course, to other social structures, such as the school districts or schools located in larger social systems (nations, regions, or states).

In the test of this hypothesis, Sewell and Armer's study population included all 3,999 public high school seniors in the Milwaukee metropolitan area for whom responses to the 1957 survey were available; they estimated that this was approximately 95 percent of the public high school graduating seniors. Sewell and Armer developed socioeconomic status indexes for each neighborhood (public high school district) and examined the relationship between neighborhood socioeconomic status and the percentage of seniors in the high school who said they were planning on attending a college or university. They found the same pattern of differences between high-, medium-, and low-status neighborhoods that other researchers had reported: namely, the higher the status of the neighborhood, the larger the percentage of seniors with college plans (Wilson 1959; Rogoff 1961; Michael 1961; Sherif 1961; Havighurst and Neugarten 1962; Cleveland 1962; Coleman 1961; Turner 1964). When they controlled the student's socioeconomic status, measured ability, and gender, all of which had been shown to be related to aspirations, the differences between neighborhoods were greatly reduced; they concluded, therefore, that neighborhood

status made no great contribution to educational aspirations. To summarize the contribution of neighborhood status to college plans, Sewell and Armer also carried out a correlation analysis, using actual numbers or scores on each of the variables rather than categories. They found that the addition of neighborhood status as a predictor variable to an equation that already included the student's socioeconomic status, intelligence, and gender--all variables that are usually considered logically prior to neighborhood status--resulted in an increase in R^2 of 1.8 percent. On the basis of this analysis Sewell and Armer concluded that past claims of the importance of neighborhood and school contexts in educational aspirations had been overstated.

In the same year that the Sewell and Armer study appeared, James S. Coleman and colleagues published the results from their national study of Equality of Opportunity (Coleman, et al. 1966); they found, also, that contrary to popular wisdom, American public schools are remarkably homogeneous in resources and in educational outcomes. In other words, school resources have little or no effect on student learning that cannot be accounted for in terms of the family backgrounds and ability characteristics of the students. A number of researchers have challenged this finding, but its broad conclusions appear to have survived critical review and further research (Mosteller and Moynihan 1972; Jencks et al. 1972; Averch, et al. 1972; Shea 1976; Spady 1976).

It is interesting that sociologists have been remarkably reluctant to accept either Sewell and Armer's findings or those of Coleman and his colleagues. We suspect that many sociologists have held onto the notion that community, neighborhood, and school contexts have strong effects on educational aspirations and achievements despite the

preponderance of evidence against it. Perhaps this is because of the traditional sociological overtones of this notion and because it provides the discipline with a unique explanation of how a social system (a neighborhood or a school) can influence social inequality.

C. The Neighborhood and School Context Controversy

Several scholars who had previously emphasized the importance of residential and school contexts in explaining educational aspirations quickly disputed Sewell and Armer's results (Turner 1966; Michael 1966; Boyle 1966). They vigorously questioned Sewell and Armer's methods, causal priorities, and interpretation of the evidence; Sewell and Armer equally vigorously answered in return (Sewell and Armer 1966). The consequence of this debate was a lively and persistent controversy that stimulated a number of investigators to reexamine Sewell and Armer's data and methods, to suggest alternative conclusions, to propose new directions for research, to suggest other statistical models for the study of contextual effects, and, most importantly, to investigate the problem of neighborhood and school contexts with new data (Wilson 1967, Wilson 1969; McDill, Meyers, and Rigsby 1967; McDill, Rigsby, and Meyers 1969; McDill and Rigsby 1973; St. John and Smith 1969; Hauser 1969; Hauser 1970a; Hauser 1970b; Hauser 1972b; Hauser 1974; Hauser 1978; Spady 1970; Meyer 1970; Barton 1970; Smith 1972; Nelson 1972a; Nelson 1972b; Sewell and Armer 1972; Armor 1972; Heyns 1974; Farkas 1974; Bain and Anderson 1974; Alexander and Eckland 1975b; Alexander and Eckland 1977; Griffin and Alexander 1978; Alexander, D'Amico, Fennessey, and

McDill 1978; Karweit 1977; Karweit, Fennessey, and Daiger 1978; Bidwell and Kasarda 1975; Bidwell and Kasarda 1976; Hannan, Freeman, and Meyer 1976; Alexander and Griffin 1976; Hauser, Sewell, and Alwin 1976; Alwin 1976b; Otto and Alwin 1977; Sorensen and Hallinan 1977; Sorensen 1978). The important substantive issues raised by this controversy are the following: (1) whether residential and school effects interact with other variables, such as socioeconomic background (Spady 1970) and gender (Smith 1972; Hauser 1972b); (2) whether opposing normative and comparative processes mask the effects of neighborhoods and schools on aspirations (Meyer 1970; Hauser 1972b; Nelson 1972a; Nelson 1972b; Alexander and Eckland 1973); (3) how large are the effects of various dimensions of student body composition and how can these effects best be interpreted (Meyer 1970; Smith 1972); and (4) the extent to which neighborhood and school contexts affect later educational and occupational careers (Folger, Astin, and Bayer 1970; Griffin and Alexander 1978).

In pursuing these questions, Hauser, Sewell, and Alwin (1976) reanalyzed the Milwaukee data and extended Sewell and Armer's 1966 analysis to the statewide sample. They employed a recursive structural equation model, rather than the correlational model used by Sewell and Armer, and extended the substantive concerns to include postsecondary educational achievement in addition to educational aspirations. They found that the coefficients of the recursive model did not differ substantially across schools in the Milwaukee sample. The (additive) effects of schools on aspirations were small and largely explained by school composition; this supports the original conclusions of Sewell and Armer. These findings held for educational attainment, as well as for aspirations in the Milwaukee sample. Hauser, Sewell, and

Alwin's analysis of the variations in educational aspirations and achievements within and between 424 Wisconsin high schools showed that most of the variability in educational aspirations and achievement occurs within schools rather than between schools, just as was true for the Milwaukee sample.

Hauser, Sewell, and Alwin's structural equation model included social background, measured ability, grades, curriculum placement, perceived encouragement of significant others, educational aspirations, and postsecondary educational achievement; thus it was more comprehensive than the correlational model of Sewell and Armer. The most important extension of the earlier findings was that academic performance (grades in high school) works differently than curriculum placement (college preparatory vs. non college preparatory) in the attainment process. Grades depend much more on ability and less on socioeconomic background than does curriculum placement; moreover, the effects of grades are larger and more persistent than those of curriculum placement. Thus, while curriculum tracking is a highly visible form of social differentiation in the high school, Hauser, Sewell, and Alwin's findings suggest that in the long term, tracking may not significantly contribute to social stratification. Their conclusion remains tentative, however, because researchers using other data sets have obtained conflicting findings about the influence of tracking (Alexander and McDill 1976; Alexander and Eckland 1975b; Marini 1978; Rosenbaum 1978).

Hauser, Sewell, and Alwin's analysis further reinforced the original conclusion of our research team: that community, neighborhood, and school contextual effects on educational aspirations (and achievements) are rather small, once the socioeconomic

background, ability, and gender of students are taken into account. Other studies have confirmed our findings (Heyns 1974; Jencks and Brown 1975; Alwin and Otto 1977; Alexander and Eckland 1975b). We suggest, therefore, that future analysis of the effects of neighborhoods and schools on educational aspirations and achievements might better focus on processes that take place within neighborhoods and schools rather than on neighborhood-to-neighborhood or school-to-school variations.²

D. Social and Psychological Factors in Educational Aspirations

From the beginning of our research we have been interested in understanding the contribution of social psychological factors in the development and maintenance of aspirations. We have been convinced that, if we could explain educational aspirations, we would be well on our way to explaining educational achievements. On the basis of our own research and that of other scholars, we have thought that differences in aspirations between children from higher and lower socioeconomic status groups could probably be explained at least in part by differences in the social psychological experiences of children in the several status groups. More specifically, we think that children from higher status homes are more likely than those from lower status homes to score better on tests of cognitive skills, both because of their more favorable opportunities to develop these skills and because of the emphasis placed on academic achievement by their parents. Because of their more developed cognitive skills and the

² However, in recent years, the hypothesis of neighborhood and community influence on the life-chances of youth has resurface as a theme of research on the urban underclass.

greater emphasis placed on school achievement by their parents, higher status children strive for high grades in school. Because they are seen to be brighter and better achievers than their lower status peers, higher status students are likely to be encouraged by their parents, their teachers, and other significant persons to take the courses that will best equip them for college. Their aspirations to attend college are reinforced by their superior grades in high school and by the encouragement of their parents, teachers, and peers. By the time they are high school seniors they are likely to have committed themselves to college and to the professional and managerial occupations that college graduates can command.

Lower status children are less likely to demonstrate high levels of cognitive skills upon entering school. Consequently, they will earn lower grades on average, will receive less encouragement from parents, teachers, and peers, and will develop lower aspirations--or if their initial aspirations are high, will tend to reduce their aspirations on the basis of their experiences in school. Therefore, they are less likely to have college aspirations as seniors, and if they do, are less likely to apply for admission and to attend college than are their higher status peers. We believe that the failure of many able, lower status children to have high aspirations is as likely to result from the student's perception of lack of encouragement by parents and teachers as it is to the lack of financial resources.

We have confirmed these ideas through extensive analyses of our data. In our first effort, Sewell and Shah (1967) mapped out the differences in the educational plans of the students according to their socioeconomic origins. Their analysis demonstrated, as had research based on an earlier sample of Wisconsin high school students (Sewell,

Haller, and Straus 1957), that for each gender, socioeconomic status is a powerful determinant of who will plan on college--even when measured intelligence is controlled. The differences were large and monotonic between the successive socioeconomic status categories in every measured ability group. For example, boys who were in the highest quarter of intelligence and the highest quarter of socioeconomic status were twice as likely to plan on college as were equally able boys in the lowest socioeconomic status category. Girls in the highest quarter of intelligence who were also in the highest socioeconomic quarter were almost three times more likely to have college plans than were their equally able peers from the lowest socioeconomic quarter. Low ability but high status boys were only somewhat less likely to plan on college than were high ability low status boys. For girls, the tendency was even more marked: low ability high status girls were somewhat more likely to plan on college than were their high ability but low status peers.

We then turned to an examination of the effects of significant others on the educational aspirations of children. We were particularly interested in the effects of parents on the development and maintenance of their children's aspirations. Parents serve as models to be emulated, and they are constantly revealing their overt and covert evaluations and expectations through interactions with their child. We believe it is the child's perception of the parents' intent to encourage or discourage his/her educational aspirations that is crucial to the development and maintenance of those aspirations. Our measure of perceived parental encouragement has occasionally been misinterpreted as a proxy for (unmeasured) parental attitudes and behaviors toward the child. That interpretation is incorrect, for we believe the child's perception of his

parents' encouragement is more consequential in the foundation of aspirations. The linkage between encouragement by parents and the child's perception of it is worthy of study in its own right, but it has not been an issue in our research.

Using multivariate cross-tabular and regression techniques, Sewell and Shah (1968b) found that the educational attainments of both parents had strong positive effects on the aspirations of their children. The effect of father's education tended to be greater among sons, but the effect of mother's education was generally greater among daughters. If parents' educational levels were discrepant, the question about which parent had the greater effect on the child's aspiration depended on the gender of the child, the academic ability of the child, and the level of the parents' education. High levels of education of both parents were far more important in motivating to high levels of educational aspirations than was discrepancy in parents' educational achievements--regardless of which parent had the higher or the lower level of educational achievement. This finding offers no support for the theory of status crystallization as applied to children's educational aspirations (Ellis and Lane 1963), but it strongly supports the idea that the child who has for a model at least one parent with high educational achievement is likely to develop high educational aspirations. If there are two such parental models, the child is still more likely to develop high levels of educational aspiration.

Several researchers (Kahl 1953; Bordua 1960; Simpson 1962) have assumed that a child's perception of his/her parents' expectations and the encouragement given to him/her are powerful factors in that child's educational aspirations. Past research on the influence of parental encouragement, however, has not established whether

observed social class differences in educational aspirations can be explained in terms of perceived parental encouragement--particularly when the child's ability is taken into account--and, if not, what additional influence parental encouragement may have on educational aspirations when the influence of socioeconomic status and ability are both taken into account. Another analysis by Sewell and Shah (1968a) showed that there are large differences in educational aspirations, for both boys and girls, depending on their perception of the degree of encouragement given them by their parents. Regression analysis revealed that these differences persist even when gender, socioeconomic status, and measured ability are controlled. At the same time, neither parental encouragement nor measured ability, singly or jointly, can account for socioeconomic status differences in educational aspirations for either girls or boys.

Sewell and Shah (1968a) then extended the analysis using a path model to determine and compare the direct and indirect effects of socioeconomic status, measured intelligence, and parental encouragement on college plans. They assumed that parental encouragement would be influenced by the socioeconomic status and measured ability of the child, and that all three variables would have direct effects on college plans. This analysis revealed that for both genders, the effect of socioeconomic status on parental encouragement is greater than that of ability. At the same time the effect of socioeconomic status on parental encouragement is greater for girls than for boys, whereas the effect of ability on parental encouragement is greater for boys than for girls. The direct effect of parental encouragement on the college plans of both genders is greater than the direct effect of socioeconomic status or of ability. However, both socioeconomic status and ability have indirect effects on the college plans of both

females and males. The total effects of socioeconomic status and ability on the college plans of boys are quite similar, but the total effects of socioeconomic status are much greater than the total effects of ability on the college plans of girls. While this simple model explains a significant amount of variance in parental encouragement and in college plans, it also left much of the variance in college plans unexplained, thus suggesting that additional variables be introduced into the model.

The data in Sewell and Shah (1968a) have been reanalyzed by Fienberg (1977) under a conditional logit specification. Feinberg's reanalysis confirms several of the findings reported above. It also locates interaction effects of ability and socioeconomic status on parental encouragement and a strong interaction between gender and the direct effect of ability on college plans; ability has a much larger direct effect on college plans among boys than among girls.

II. Studies Based on the 1964 Follow-up Survey

All of the work described up to this point was based on the 1957 questionnaire data, combined with test scores. From the beginning, we had planned to do a follow-up study to determine the extent to which the aspirations of the students had been realized after graduating from high school. In the spring and summer of 1964, seven years after the students had graduated from high school, we undertook a follow-up study for all students in our original sample. Using a questionnaire on a double postal card, we obtained information from parents on the post high school education, current occupation, military service, marital status, and present residence of

over 87 percent of the sample (Sewell and Shah 1967; Pavalko and Lutterman 1973). Various comparisons between known characteristics of the sample and the students in the 1964 response group indicate no significant differences on any of the major variables that were and have been used in our previous and subsequent analyses (Sewell and Hauser 1975). Later, with the cooperation of the Wisconsin Department of Revenue (and following their strict arrangements to guarantee the privacy of individual records), we determined the parents' occupations and income from their 1957 to 1960 state income tax returns. Still later, we learned, from the Social Security Administration, what the males in our sample earned during each year of covered employment from 1957 to 1967. This phase of the project required an elaborate linkage procedure to protect individual identity. Later, we extended the earnings record to cover the period from 1957 to 1971. To our data we then added information, obtained from several published sources, on the characteristics of the secondary and postsecondary schools, colleges, and universities attended by our students. Numerous publications have been based on these data, many of which are cited in this review. The next two sections of the review summarize some of the major findings about the influence of social origins on educational attainment and about the role of education in the socioeconomic attainment process.

A. Socioeconomic Origins and Educational Attainment

The first paper we published using the information from the 1964 follow-up survey was largely descriptive and attempted to show the effects of socioeconomic

origins on educational attainment. We have always thought schooling to be the key variable in the attainment process, not only because education is an important status variable in its own right, but also because it greatly facilitates later occupational, economic, and sociopolitical attainments (Sewell and Shah 1967). Using a socioeconomic index, which included parents' income, father's and mother's educations, and father's occupation, we found large differences in the educational attainments of the socioeconomic groups. These differences were large no matter how we defined educational attainment-whether as continuation in any kind of postsecondary education, college entry, college graduation, or professional and graduate education.

Thus, when we divided our sample into quarters in socioeconomic status, we found that a student in the highest quarter of socioeconomic status had a 2.5 times greater chance of obtaining postsecondary education than did a student in the lowest quarter of socioeconomic status. The high status student had approximately a 4 to 1 advantage in entering college, a 6 to 1 advantage in college graduation, and a 9 to 1 advantage in graduate or professional education. In the middle socioeconomic status categories, the rates were consistently between these extremes: The lower the socioeconomic status category, the lower the educational attainment. These socioeconomic status differences in educational attainment held for both genders, but the educational attainments of women were uniformly less than those of men at every socioeconomic level. The advantage of males, however, was greatest in the lowest socioeconomic quarter and least in the highest socioeconomic status quarter.

When academic ability was controlled by dividing the sample into fourths according to the students' measured mental ability, we still found that higher socioeconomic status students attained substantially higher educations than did lower status students. Thus, among students in the top quarter in ability, a student from the lowest quarter in socioeconomic status was approximately half as likely to attend college or to graduate from college as a student from the highest quarter in socioeconomic status. The chances of a high ability student obtaining graduate or professional education, where one would presume ability would be determinant, were approximately 3.5 times greater if that student came from a family with high socioeconomic status than from a low socioeconomic status family. The pattern described for the high ability quarter was the same for each ability quarter and for both genders, but was most marked for the lowest ability group, where a student from the highest socioeconomic level enjoyed a 4 to 1 advantage in attending college and a 9 to 1 advantage in graduating from college.

It must be pointed out that some members of even the most socioeconomically disadvantaged groups made it through the system to the highest educational levels, and a few from the highest socioeconomic levels did not continue their education beyond high school. Nevertheless, the findings reported above lead to the inevitable conclusion that in the attainment of higher education, the members of this cohort found it difficult to escape the effects of their socioeconomic origins. The effects of socioeconomic background operate independently of ability and of gender at every stage of the higher education process. Those who overcome the handicap of status

origin at one transition point find themselves again disadvantaged at the next transition point.

There are, of course, many other ways in which students from lower socioeconomic origins are handicapped in the process of obtaining higher education. With measured ability held constant, low socioeconomic status persons are less likely to make early application to college, to make multiple applications, to know about the possibilities of scholarships, to go to college immediately after high school graduation, or to attend high quality colleges; obversely, low status persons are more likely to drop out of college, and they are less likely to return to college if they do drop out. Further, we found that women suffer disadvantages in the process of higher education which closely parallel those of persons with low socioeconomic status (see also Sewell 1971).

B. The Development of the Wisconsin Models

We devoted much of our research on the project from the late 1960s to the early 1980s to the development of causal models of the status attainment process. We began working on causal models in the mid-1960s and were greatly influenced by frequent consultations with Otis Dudley Duncan and by his early writings on path models (Duncan 1966). We presented the first paper in which we employed path analysis at the meetings of the International Sociological Association in 1964, although we published it sometime later (Sewell and Shah 1967). For the analysis described in this paper, much of whose content was summarized in the section above, Sewell and Shah constructed a four-variable linear causal model that captured the direct and indirect

effects of socioeconomic status and measured intelligence on educational attainment as mediated by educational aspiration. Perhaps the most interesting finding was that educational aspiration strongly affected educational attainment, independent of its relationship to measured intelligence and socioeconomic status; aspiration also mediated much of the effect of those two variables among both males and females. The total effects of socioeconomic status on educational attainment were greater for females than for males, whereas the total effect of measured intelligence was greater for males than for females. Sewell and Shah also constructed a number of simple linear causal models involving socioeconomic status and intelligence as predetermined variables with single intervening variables, such as parental encouragement, teacher encouragement, and peer influence in which educational aspiration or educational attainment was the dependent variable. Only the two of these discussed in the previous section were actually published because all were in a sense preparatory to the development of more complex models of educational attainment and early occupational achievement.

Building on the influential work of Blau and Duncan (1967), we developed a linear causal model in order to elaborate and explain the effects of socioeconomic background and measured ability first on educational achievements and then on occupational attainments. According to that model, these influences are mediated by social psychological variables such as academic achievement in high school, the influence of significant others, educational aspirations, and occupational aspirations. In the first of two papers Sewell, Haller, and Portes (1969) presented the theoretical rationale for this social psychological model of the educational and early occupational

attainment process. Using a subsample of farm males, they demonstrated that this general model successfully elaborates the complex process by which social psychological variables mediate the influence of status origins on educational and occupational attainments; the model also adds substantially to the explanation of variance in these attainments. The model proved to be neither as simple nor as elegant as we had postulated when it was applied to men from subsamples representing a wider range of community size categories (Sewell, Haller, and Ohlendorf 1970). In particular, there were a few direct paths in addition to the indirect paths which we had assumed would mediate all of the earlier influences. Moreover, the model proved to be considerably more effective in accounting for educational attainment than occupational achievement, explaining from 52 to 58 percent of the variance in educational attainment and from 32 to 42 percent of the variance in occupational attainment, depending on community size. This differential was understandable because most of the social psychological variables in the model were conceptually and temporally more proximate to schooling than to jobs.

This model has come to be known as the "Wisconsin Social Psychological Model of Status Attainment" or simply as the "Wisconsin Model" (Haller and Portes 1973; Alexander and Eckland 1975a; Alexander, Eckland, and Griffin 1975). While we have been pleased with the recognition and influence accorded this model, we think it would be unfortunate if other researchers came to reify our scheme. For example, the specification of our model not only reflects our ideas about the social and psychological mechanisms of achievement, but also the accessibility to us of particular measurements which were mainly designed and obtained by others. Further, we do not regard our

model as an alternative to a simpler causal scheme, like that of Blau and Duncan (1967), but as one useful elaboration of it. We believe our model has been useful and influential because of the quality of our data and because our specification reflects several important themes within an active research community of sociologists and economists. At the same time we do not want our future research to be circumscribed by the visibility of its past, nor do we want other investigators to be so limited.

Using this model, we have shown that socioeconomic status has no effect on high school performance (as indicated by rank in high school class) independent of measured ability. Socioeconomic status does have strong direct and indirect effects on significant other's influence and on educational and occupational aspirations, and via these aspirations, on educational attainment and occupational achievement. The effects of measured ability are somewhat different. Ability has strong direct effects on high school performance, independent of socioeconomic status; it also has direct and indirect effects on perceived encouragement from significant others and on educational and occupational aspirations. Through these mediating variables, ability affects educational attainment and occupational status.

C. Modifications and Extensions of the Wisconsin Model

We have modified and improved this basic model by (1) shifting measured ability from its position as an exogenous variable to the first mediating position in the model, thereby accommodating the widely held view that social status affects measured intelligence (Turner 1964 [but see Scarr and Weinberg, 1978, for negative

evidence on this]); (2) disaggregating the socioeconomic status and the significant other indexes (Hauser 1972a; Sewell 1971; Sewell and Hauser 1972); (3) adding other background and intervening variables to the model (Alwin 1974; Wang and Sewell 1980; Hauser, Sewell, and Alwin 1976; Alwin 1976a; Sewell, Hauser, and Wolf 1980); and (4) extending the model to include earnings as a dependent variable (Sewell and Hauser 1972, 1975).

Although there is not space to discuss the results of all of the above modifications in the original model, it is important to indicate briefly the results obtained when we shifted the position of measured intelligence in the model, disaggregated the socioeconomic status and the significant others indexes, and added earnings as the final dependent variable in the model. These points are best considered in relation to our first complete exposition of the expanded and extended model by Sewell and Hauser (Sewell and Hauser 1972). Their work was later discussed in greater detail in their book dealing with education, occupation, and earnings (Sewell and Hauser 1975). The result most worthy of note was that when Sewell and Hauser disaggregated the socioeconomic status variable into its component parts--father's education, mother's education, father's occupational status, and parents' income--they found that each of the socioeconomic variables had an approximately equal effect on educational attainment and on all of the intervening variables in the model. This suggested that there are real limits on the ability of social scientists and policy makers to interpret social inequalities in terms of income differences. The effects of the socioeconomic variables on educational attainment, net of measured ability, were impressive: a year of either father's or mother's education; ten points in father's

occupational status (as measured by the Duncan (1961) Socioeconomic Index); or \$1,000 in parents' income was worth from about one-half to eight-tenths of a year's schooling for the son. The influence of measured ability was likewise impressive: Even when socioeconomic background was well specified, a ten-point difference in ability was worth four-tenths of a year of schooling. Less than one-fifth of the association between ability and schooling could be attributed to the mutual dependence of these variables on socioeconomic background.

Most of the effects of the socioeconomic background variables on educational attainment were mediated through their influence on the perceived encouragement of significant others and on educational aspirations. Although there were small effects on measured ability, there were no direct effects of the socioeconomic background variables on son's grades. There were effects of socioeconomic origins on perceived parental encouragement and peer's influence which were independent of ability and grades. The socioeconomic background variables also affected aspirations directly and indirectly through their effect on parents and peers. There were no direct effects of socioeconomic background on perceived teacher's encouragement. Teachers apparently were perceived to base their encouragement on ability and grades but, unfortunately, had much less effect on educational aspirations than did parents or peers. Finally, father's education had a small direct effect on son's educational achievement, but most of the effect of parents' education was mediated by the intervening variables in the model. Son's occupational status was affected by father's occupational status, even when other variables in the model were controlled, but this direct effect was not large. The effect of all of the other socioeconomic status variables

on occupational attainment was completely mediated by the other variables in the model, especially by the son's educational attainment. There were also substantial effects of ability on occupational status, both directly and indirectly through grades, significant others, and educational and occupational aspirations, but particularly through education. There was, as expected, a very large direct effect of education on occupational status.

When son's earnings were added to the model as the final dependent variable, Sewell and Hauser found, as expected, that son's educational and occupational attainment each played an important part in son's earnings. About half of the effect of educational attainment on earnings was due to its effect on occupational achievement and about half was due to its direct effect on earnings. In other words, higher education led to better jobs and to higher pay at any level of occupational status. The effects of both educational and occupational attainment on earnings represented just about one-half of their correlation with earnings, and the remaining half was due to the mutual dependence of earnings, occupational status, and educational attainment on prior variables in the model. Net of all prior variables, one year of postsecondary education was worth \$169 in son's annual earnings (in 1967), and ten points on the Duncan SEI were worth \$123. By far the most surprising finding was that parents' average annual income (from 1957 to 1960) had the largest effect on son's earnings of all the variables in the model. Even after the effects of the other socioeconomic background variables, the social psychological variables, and the son's educational and occupational attainments were taken into account, \$1,000 in average parental income ten years earlier was worth \$123 dollars in son's current earnings (note: earnings, not

income). The social psychological variables other than ability and occupational aspirations had little or no effect on earnings. Ability had an important effect on earnings which was virtually all mediated by its effects on grades, significant others, and aspirations. There was also an important direct effect of occupational aspirations on earnings, but significant others and educational aspirations had no significant effects on earnings.

In contrast with its effectiveness in explaining educational and occupational attainment, our social psychological model was not particularly effective in explaining earnings. With the sample used in the research reported here, the model explained 54 percent of the variance in educational attainment and 43 percent of the variance in occupational status (in 1964), but only 7 percent of the variance in earnings (in 1967). This is not surprising because the model was not designed to explain economic achievement. It did not contain contemporaneous measurements of jobs and earnings, nor social psychological variables that are more directly relevant to economic success, such as measures of the individual's economic aspirations, orientation toward work, and attitudes toward his job. Neither did the model contain other variables, such as job authority, occupational experience, seniority, on-the-job training, and labor market information, which are usually considered to be important in the explanation of earnings. That such measurements would help is suggested by the results of an analysis in which Wang and Sewell (1980) added place of origin, current residence, and migration to the Sewell and Hauser model to examine the influence of these variables on earnings. These residential variables added significantly to men's earnings but did not alter the effects of socioeconomic and ability variables on earnings. Current place

of residence was particularly important in that it had a large effect on earnings, even after adjusting for the other variables in the model. This size-of-place effect should be interpreted with caution, however, for it partly reflected the comparatively low cash incomes of farmers at that time.

Another reason why our model was not highly effective in explaining earnings is the relatively short time that had elapsed since our students were high school seniors. Many of the college educated men in our sample were still in graduate and professional training, were completing military service, or had just entered the civilian labor market. Thus, the sample was truncated at the top of the distribution of potential earnings; further, among persons with earnings, schooling and labor market experience were strongly negatively correlated. With the cooperation of the Social Security Administration we extended our personal earnings histories through 1971, and our analyses of annual cross-sections show a regular pattern of growth in the effects of schooling and ability on earnings (Hauser and Daymont 1977). In the more recent period, however, the effect on earnings of social psychological factors was still mediated almost completely by the length of schooling.

We have used the current version of our model in several other studies based on the Wisconsin data: the effects of neighborhoods and high schools on the educational aspirations and attainments of their students (Hauser, Sewell, and Alwin 1976; this research was discussed in an earlier section of this chapter); the effects of colleges on the likelihood that their matriculants graduated and on early occupational and economic achievements (Wegner and Sewell 1970; Alwin, Hauser, and Sewell 1975; Alwin 1974, Alwin 1976a); and gender differences in occupational careers (Sewell,

Hauser, and Wolf 1980). We turn now to a discussion of the work on college effects, leaving the research on gender differences in occupational careers for a later section.

D. College Effects on Educational, Occupational, and Economic Attainments

The effect of colleges on their matriculants is a topic of enduring interest. Most of the issues and much of the earlier research have been critically reviewed by Feldman and Newcomb (1969), by Feldman and Weiler (1976), and by Bowen (1977). Because different types of colleges select different types of students, it is necessary to control student input characteristics (such as socioeconomic background, measured intelligence, grades in high school, significant other's influence, and aspirations) in determining the effect of colleges on the student's graduation, occupational attainment, and earnings.

In the Wisconsin sample, the type of college attended has a small but significant effect on college graduation when the student input variables are controlled. Different types of colleges have different effects for students of different socioeconomic and ability levels. Students usually attend the types of institutions in which their chances for graduation, in light of their socioeconomic background and academic ability, are more favorable (Wegner and Sewell 1970). We have examined the effects of colleges on early occupational and economic achievement using the background and social psychological variables in our model as student inputs which are logically prior to the effects of college. We have posited that these inputs determine the types of colleges attended and that years of college completed depend both on the student input

variables and on the type of college attended; that occupational status attainment depends on student inputs, type of college attended, and educational achievement; and that earnings depend on all of the preceding sets of variables, including occupational attainment. Space is not available to trace the various indirect and direct influences of each of the separate input variables and types of colleges on eventual educational attainment and early occupational and economic attainments; see Alwin, Hauser, and Sewell (1975) and Alwin (1974, Alwin 1976a) for the details. It is clear from our analyses, however, for the sample of men included in our study, that types of colleges differ in respect to the educational, occupational, and economic achievements of their students. Only a small proportion of the gross differences in the achievements of students, however, is explained by differences in the types of colleges: 8 percent of the variance in years of college completed, 6 percent of the variance in occupational status, and 5 percent of the variance in earnings. Consequently, the role of college quality differences in explaining early career attainments cannot be great relative to other sources of variability in attainments. After taking into account the selection-recruitment processes, which our analysis indicates are essentially additive, the initially small gross differences between types of colleges are reduced by more than one-half. Moreover, our analysis showed the weakness of unidimensional conceptions of college quality; different types of colleges were favorable in their influences on school completion, on occupational status, and on early career earnings. With net college effects of such small magnitudes it is difficult to continue to accept past claims about the great importance of college characteristics, especially college quality, on educational, occupational, and earnings achievements. We are equally unimpressed

with similar claims made by Griffin and Alexander (1978) on the basis of analyses of 1970 data for men in the Explorations in Equality of Opportunity sample of 1955 high school sophomores.

As with other effects on earnings, it must be remembered that the influence of college may be greater when the men in our sample reach their peak occupational status and earnings levels later in their careers. Evidence from another study indicates that college effects may be greater twenty years after graduation than earlier in the earnings career (Solmon 1973). We intend to further examine this possibility using more recent data on education, occupation, and earnings, but on the basis of our past research and that reported by others we are not optimistic about the likelihood that college quality will prove to be a major factor in socioeconomic success once the student input variables are controlled.

III. Studies Based on the 1975 Follow-up Survey

With the completion of the analysis so far reported in this paper, we became increasingly aware of the limitations of our model and of the need for more complete and more recent information about our sample. In preparation for a resurvey of our sample members, we began, in 1974, a tracing operation, the details of which are given elsewhere (Clarridge, Sheehy, and Hauser 1977), that resulted in locating 97.4 percent of our original 1957 sample of Wisconsin high school seniors. Meanwhile, we developed and pretested an interview schedule used to obtain the following information from our sample members: (1) composition of family of origin: age,

gender, and education of each sibling; the occupation and address of a randomly selected sibling; and the parents' ethnic and religious background; (2) the education of the respondent: content, timing, and location of all postsecondary schooling, including vocational, collegiate, and military schooling; (3) labor force experience: dates and types of military service; first civilian job; occupation in 1970; current (1975) job; longest job in 1974; earnings in 1974; weeks and hours worked; location, size, and type of work organization; work satisfaction; work authority; occupational aspirations; and labor force participation and jobs held before marriage and in each birth interval (women only); (4) characteristics of family of procreation: marital status, marital history, a roster of children by age and gender, and educational and occupational aspirations for a randomly selected child; and spouse's work status, education, occupation, and 1974 earnings; (5) selected retrospective information: aspirations while in high school and names of best high school friends; and (6) social participation: membership in organizations, church attendance, visiting behavior, and voting.

The interviews were conducted in 1975 by telephone by the staff of the Wisconsin Survey Research Laboratory who had been trained in the use of our interview schedule. We were successful in interviewing 95.0 percent of all persons for whom we had telephone numbers, with an overall response rate of 91.4 percent of all sample members not known to be dead, too disabled to be interviewed, or living outside of the continental United States. We coded all of the data from the 1975 survey onto magnetic tapes, and then edited and merged them with our existing data files, which already contained the information from the 1957 survey, from the 1964 resurvey, and from Wisconsin tax files and other public records. The Social Security

Administration then merged the files of men with earnings data for the period 1957 to 1971, using procedures which assure the anonymity and privacy of information on individuals, in keeping with the then current federal legislation. Our first and most extensive use of these data to date involved a comparative analysis of the educational and occupational attainments of men and women.

A. The Educational and Occupational Attainments of Women and Men at Mid-Life

Most of our past work with the Wisconsin model examined the achievements of the men in our sample. Only on a few occasions did we apply our original model to women, and those results were published only in summary form (Sewell 1971). We have been impressed and somewhat puzzled by the fact that the application of our model and the models of others seems to indicate that the process of status attainment is essentially the same for men and women, despite some minor differences in the patterns of direct and indirect influences for the genders (Sewell 1971; Carter 1972; Hout and Morgan 1975; Treiman and Terrell 1975; McClendon 1976; Featherman and Hauser 1976). With the additional information obtained from our 1975 follow-up survey, we have been able to examine more completely the educational and occupational achievements of the men and women in our Wisconsin sample at mid-life, using the best measurements currently available from all of our data sources (Sewell, Hauser, and Wolf 1980). We now have information on first jobs (first, full-time civilian job after leaving school), as well as on 1975 occupation. Previously, neither we nor others had information on the status of first job to include in models comparing the

occupational attainments of men and women. Specifically, the inclusion of first job in our models allowed us to ascertain (1) whether the ways in which education affects current occupation are different for men and women (by decomposing the total effect of education on current occupation), and (2) whether the effect of status of first job on current occupation differed for women and men. Also, we were able to ascertain whether the effects of socioeconomic background and the social psychological variables (mainly involving the school experience) diminish over time, as evidenced by their effects on the status of first job and status of current occupation. Furthermore, we could now investigate the importance of a number of social background variables which have been thought to be implicated in the educational and occupational achievement process but whose contribution to complex models such as ours remained to be determined. These variables include mother's employment, number of siblings, rural-urban origins, and intact family.

As was stated above, past research has indicated that the attainment of occupational status occurs in essentially the same ways for employed men and women; the evidence for this similarity is equivalent means, standard deviations, and parameter estimates for the effects of socioeconomic background and education on occupational attainment. Of course, similarity between genders in the attainment of occupational status does not imply similarity in other aspects of the jobs held by men and women or in the processes by which those jobs were obtained. We are well aware that occupational status is not the only important outcome of labor force activity, but we believe that it is a significant labor market outcome. Our previous analysis had shown that there are similarities between men and women in the effects of socioeconomic

background and in the total effects of education on early occupational status. The similarity in the total effects of education is deceptive. Our inclusion of status of first job in the models has revealed striking gender differences in the occupational attainment process. However, these differences do not unilaterally disadvantage females. In fact, the nature of the gender differences suggests a complex process, whereby females are advantaged at certain stages and males at others. For example, women obtain first jobs whose occupational status is, on the average, ten points higher on the Duncan SEI than those of men, while at the same time women have a much narrower range of variation in first job statuses than do men. At mid-life men's mean occupational status level is higher than women's because men, on the average, have increased their occupational statuses over their work lives, whereas women have lost some ground. Thus, we find that women are advantaged with respect to at least some aspects of first job placement, but seem clearly to be disadvantaged from that point onward.

An inspection of the process through which men and women are sorted into positions of occupational status at mid-life on the basis of their own prior achievements (education and status of first job) suggests a very complicated allocation process. Despite striking gender differences, the total returns that men and women obtain for their educational attainment are essentially the same. With regard to the status of their first job, women obtain much smaller returns on their education than men do. However, later in the life cycle, women obtain higher occupational status returns on their educational qualifications than do men, while men obtain higher returns on their earlier occupational achievements. We believe that these latter differences are easily

understood if the patterns of employment of men and women at different points in the life cycle are taken into account. Women are forced to rely at mid-life on formal qualifications such as educational attainment for occupational placement because they are frequently reapplying to the labor market after interruptions; men are better able to build on their earlier occupational experience because of their more continuous work histories.

Male-female differences in reliance on educational qualifications and on work experience are articulated with patterns of job segregation between the sexes. The fact that women have relatively high levels of status in first jobs can be explained in part by what we know about the kinds of jobs they enter. The status of first jobs of women is higher than that of men because women with educational levels between twelve and fifteen years usually take first jobs in lower white collar occupations (clerical and sales jobs) which have higher occupational statuses than the occupations that men with the same levels of education tend to enter (blue-collar jobs). The fact that women fail to gain occupational status over their work lives can also be explained by occupational segregation. First, it should be noted that this lack of movement is probably not due to the fact that women have interrupted employment because of family obligations; even subgroups of women who have no children or very continuous employment experience do not, on the average, experience increases in levels of occupational status over the course of their lives, as indicated by the research of Wolf (1975) and Rosenfeld (1976). Wolf and Rosenfeld (1978) have speculated that this might be due to the fact that female-dominated occupations are easier to reenter after interruptions in employment, yet do not offer much chance for upward mobility; their empirical analysis offers some

confirmation of this speculation. Grimm and Stern (1974) have shown that although women are highly represented in certain professional occupations (nursing, social work, school teaching, librarian), men are over-represented in the higher level positions within these same occupations. This implies that if "female-typed" occupations offer any chances of advancement, it is men in these occupations who have been more likely to be promoted. Research based on our data also indicates that women are much less likely than men to be in positions of authority--control over the work process of others--even when the effects of educational attainment, level of occupational status, and self-employment are held constant (Wolf and Fligstein 1979a, 1979b). These pieces of evidence suggest that women, in part because of their concentration in female-typed occupations, are less likely than men to be upwardly mobile over their working careers and tend not to be promoted to higher level supervisory positions. On the other hand, despite the fact that the first jobs of men are lower in status, men are much more likely to obtain higher status jobs later in the life cycle.

In briefly presenting the overall results of our analysis of the occupational achievements of males and females and the quite different role that first jobs play in explaining men's and women's current occupational achievements, we have not stressed other differences in the educational and occupational attainment processes for men and women. The reason for this is that the few differences we find are so small that they tend to lack substantive significance. One interesting difference is that rural origins have a small negative effect on parental encouragement for males and a small positive effect for females. This probably is due to the fact that farm parents are concerned that their son's attendance at college might interfere with the continuation of

the family farm business. Other gender differences are that the aspirations of males are generally more affected by significant others than are those of females; educational aspirations are of great importance in determining the educational achievements of both females and males but have more effect on women's than on men's attainments; and mother's education has a small but significant effect on daughter's educational attainment, but the perceived influence of parents and friends does not.

Given the complex allocation process that we have observed, the strategies for producing equality of opportunity for men and women are not obvious. Further extending the chances for advancement of women in female-dominated occupations would clearly improve the situation; also, women are gradually having increased opportunities to obtain the graduate and professional education necessary for entry into the higher professions and higher levels of administration in both the private and public sectors. But this is not enough. We think it unlikely that great progress will be made in reducing occupational (or economic) inequalities between the women and men unless and until occupational gender-typing and outright discrimination are substantially reduced.

Other findings from our analysis of gender differences in attainment should be mentioned briefly. The introduction into our models of several additional measures of social background--number of siblings, rural origin, broken family, and mother's employment--did not substantially alter our previous interpretation of the processes of educational or occupational achievement. Rural origins tended to depress the occupational achievements of both men and women, and those from larger sibships were slightly disadvantaged at every stage of the achievement process. Among our

sample numbers neither broken families nor maternal employment had significant effects on the achievement process. As expected, the direct effects of social background and of most aspects of the high school experience tend to decrease the more distant in the life cycle the socioeconomic outcome is from these experiences, particularly as more recent experiences and achievements come into play. There are some interesting exceptions to the general pattern of decay in the lagged effects of background and school variables. For example, among men, the total effect of academic ability on current occupational status is almost as large as its total effect on first occupational status, whereas, among women, the total effect of ability on current occupational status is larger than its effect on first occupational status. For women as for men, the effect of high school grades on current occupational status is less than that on first occupational status, but among women (and not men), there is a significant positive effect of high school grades on current occupational status--even when aspirations, schooling, and first occupational status are controlled. This appears to parallel our earlier finding that educational attainment has a larger direct effect on the current occupational standing of women than of men. Obversely, occupational aspiration has a more persistent influence on the occupational standing of men than of women.

B. The Impact of the Wisconsin Models

It would be difficult, without a much more detailed inquiry than we care to make, to assess the influence of the Wisconsin Models of Status Attainment on other studies of stratification. Also, we make no claims of objectivity in the evaluation of our

own work. At the same time, several sources of evidence indicate that other workers have given much attention our models and that these models have served in one way or another in the development of their own research. One evidence of this is the frequency with which the three publications dealing with the development of the models (Sewell, Haller, and Portes 1969; Sewell, Haller, and Ohlendorf 1970; Sewell and Hauser 1975) have been cited. All of them have become "citation classics" based on the frequency of their citations in the Social Science Citation Index. Still another publication on the decomposition of effects in path analysis (Alwin and Hauser 1975), which grew out of our work on these and other models developed in the Wisconsin Longitudinal Study, has also become a citation classic. Several other articles have received numerous citations. Moreover, the Wisconsin models have been reviewed in all recent textbooks on social stratification and in many books on economics, social psychology, education, and occupation, and in more recent years in introductory sociology texts. Other recent reviews and evaluations of our work are contained in the Bielby (1981), Campbell (1983), and Featherman (1981) discussions on status attainment research.

C. Replications and Extensions of the Models

We have been impressed, too, that a number of researchers have seen fit to apply the Wisconsin model in studies of national samples of American youth or in studies of other states, regions, or nations. Also, the model has been used to interpret differences in the aspirations and achievements of men and women, of blacks and whites, of old

American and other ethnic groups, and of rural and urban persons. Seldom have these applications of the model been genuine replications; often some variables have been missing, while others were not measured in the same way that we measured them. In many instances, educational and occupational achievements have not been included because of lack of these data; thus, the models estimated are actually used to explain aspirations, not attainments. Quite often measured intelligence is not included because of lack of test scores. In other instances, new variables have been added to the model, such as curriculum placement, student's self-assessments, athletic participation, and measures of social contexts. The applications have usually been modeled after the original social psychological model (Sewell, Haller, and Portes 1969; Sewell, Haller, and Ohlendorf 1970), rather than the disaggregated model (Sewell and Hauser 1972, 1975).

There have been several replications of the earlier version of the Wisconsin model (Sewell, Haller, and Portes 1969; Sewell, Haller, and Ohlendorf 1970) which have treated educational and occupational aspirations as the ultimate dependent variables. Only one of the more interesting and complete of these replications will be discussed here. It is Gilbert's (Gilbert 1977) study of twelfth grade male students in Ontario. When the Wisconsin model is estimated for the Canadian sample, it explains the same amount of variance in educational aspirations as in the Wisconsin sample, but it explains considerably less of the variance in occupational aspirations in the Ontario sample. Also, the effects of significant others on educational aspirations are greater in the Canadian sample; the direct and indirect effects of socioeconomic status on educational aspirations are greater in the Canadian sample; and the direct and indirect

effects of ability are smaller in the Canadian sample. From these findings, Gilbert argues that ascriptive influences working through the family make Canadian society less meritocratic than American society. He then expands the model to include self-concept of ability and program of study as intervening variables; these additional variables significantly increase the explained variance in the aspirations of Ontario youth. He interprets the causal paths in the extended model as further evidence that the Canadian family serves as a prime mechanism of status transmission through its strong direct influence on educational and occupational aspirations and its powerful effect on program selection. He suggests that the differentiated program in Ontario schools merely serves to perpetuate the social inequalities found throughout Canadian society.

Other complete and partial replications include a study by Wilson and Portes (1975) of the Youth in Transition national sample of one thousand boys; the Kerckhoff (1974) study of four samples of American boys; the Porter (1974, Porter 1976) study of Project Talent men; the Picou and Carter (1976) study of Louisiana youth; the Marini (1978) longitudinal study of the Adolescent Society sample; and the Rosen and Aneshensel (1978) study of gender differences in aspirations in upper New York State. The models also have been applied in several studies based on samples from other nations: the Williams (1972) longitudinal study of Canadian youth; the Hansen and Haller (1973) study of Costa Rican youth; the Hansen (1977) study of Brazilian youth; the Yuchtman and Samuel (1975) study of the aspirations of Israeli youth; the Nachmias (1977) comparison study of kibbutz and urban high school students in Israel; the Dronkers (1978) study of Dutch youth; and the Naoi and Fujita (1978) study of men in

the Tokyo area. In all of these applications of our model, with American samples and with samples from other countries, we have been impressed with the similarity of findings where reasonably similar measurements were employed.

The first substantial replication of the Sewell and Hauser version of the model was undertaken by Alexander, Eckland, and Griffin (1975); see also Alexander and Eckland (1975a), who used fifteen-year longitudinal data from a national sample of males first sampled in 1955 as high school sophomores. After extensive comparisons that revealed some differences between the results for the Wisconsin and the national sample, they concluded that the social psychological variables in our model (they called them "interpersonal and subjective school variables") mediated most of the effects of social background and ability on later status attainments, thus indicating complex processes quite similar to those demonstrated in our original analysis. They concluded that the minor differences in results of the two studies are probably due to differences in sample composition and research design.

Another complete replication of the full model by Jencks, Crouse, and Mueser (1983), in which the model is tested using Project Talent, EEO data, and the WLS data, concludes that all three data sets yield results broadly similar to those originally reported by Sewell and Hauser (1972; Sewell and Hauser 1975). Both the direct and indirect effects are very similar to those we originally reported. They conclude that the relatively small differences found in the results obtained from the three samples can probably be explained by terms of differences in question wording, age of sample members, and population coverage.

In a still earlier study, Otto and Haller (1979) had arrived at similar conclusions using conceptually similar but operationally non-identical structural equation models to examine the social psychological theory of status attainment. In this research they also compared the results obtained using the WLS and EEO data with those obtained using the Lenawee County Michigan data. On the basis of their analysis they concluded there was strong support for the social psychological explanation embodied in the Wisconsin model.

Most other applications of the Wisconsin model have not been intended primarily as replications, but rather have sought to examine and elucidate contextual, gender, and racial and ethnic differences. Much of the literature on contextual effects has been discussed in an earlier section of this paper. In these applications, measures of school characteristics have been added to the basic equations of our model in order to estimate the extent and nature of school effects. The best known applications of the models are by Alexander and Eckland (1975b), on school context and educational attainment, and by Alwin and Otto (1977), on educational aspirations. Both studies confirm Meyer's (Meyer 1970) suggestion that effects of average ability level of the school tend to cancel out the positive effects of school socioeconomic or interpersonal process levels. Some of the other notable applications of the model, in whole or in part, to the study of school effects include the following: the Alexander and McDill (1976) study of curriculum placement; the McDill and Rigsby (1973) research on the impact of educational climates; Rosenbaum's (1976, 1978) study of the effects of teaching and class rankings on educational aspirations and achievement; Heyns' (1974) research on social selection and placement within schools; the Jencks and Brown (1975) article on effects

of schools on students; and the Alwin, Otto, and Call (1976) replication of the Hauser, Sewell, and Alwin (1976) study.

The Wisconsin model has also been used in studies of race and gender differences. Because we have discussed the most extensive applications of the model to gender differences in educational and occupational achievements in an earlier section of this paper, our attention here will be devoted to its use in the study of racial differences. It has often been noted that we have not considered race in the development and application of the Wisconsin model. The reason is obvious: Less than 2 percent of Wisconsin's population was black at the time the original data were gathered. Moreover, at that time, Wisconsin law made it illegal to include questions regarding race, ethnic background, and religion in school surveys. The law has changed, and we obtained information on these matters in our 1975 survey; still, the number of blacks in the sample is too small to justify any extensive analysis of the status attainment of blacks. Other samples have been used to apply the Wisconsin models in studies of black-white differences in the status attainment process. Several of these studies have focused on educational aspirations, not only because of the important role that aspirations play in educational attainment, but also because data were lacking on educational attainment. These include the studies of Carter, Picou, Curry, and Tracy (1972), Hout and Morgan (1975), and DeBord, Griffin, and Clark (1977).

Three studies, however, are known to us which have used the Wisconsin model to explain differences in the educational attainments of blacks and whites (Porter 1974; Portes and Wilson 1976; Kerckhoff and Campbell 1977). Of these, the closest to a

replication of the Wisconsin model is that of Portes and Wilson (1976), which is based on the Youth in Transition sample (Bachman 1970). The Porter (1974) analysis, based on a national sample of Project Talent males, provides useful findings but substantially alters the structure of the model. The Kerckhoff and Campbell (1977) analysis, based on a sample of boys in Fort Wayne, Indiana, omits the influence of significant others and omits occupational aspiration, but it adds junior high school performance and school disciplinary problems to the model. The reader is referred to these publications for their detailed findings, but a brief summary of the major conclusions may be helpful. All three studies find that socioeconomic status is a much more important determinant of aspirations and attainment for whites than for blacks. This is apparent at almost every successive stage of the status attainment process, including educational and occupational aspirations and attainments. At the same time, the effects of measured ability on aspirations and attainments are strong both for blacks and for whites. The crucial factor in educational attainment for blacks is their high school performance; nothing in the model helps consistently to explain aspirations among blacks. The Portes and Wilson and the Porter analyses explain more variance in white than in black ambitions and attainments; the Kerckhoff and Campbell finding differs only in that their expanded model explains slightly more variance in the educational attainment of blacks than of whites. In summary, the variables in the Wisconsin model form a cohesive and powerful model for whites, but are much less effective in explaining the aspirations and attainments of blacks. These findings lead us to the conclusion that other aspects of the background, ability, and experience than the

limited set of variables in the Wisconsin model will be needed to explain more fully the aspirations and achievements of blacks.

We have encountered a number of other studies in which the model was used to estimate the effects on aspirations and achievements of some variable not originally included in it. Perhaps the best example is the study by Otto and Alwin (1977) of the effects of athletic participation on educational aspirations and socioeconomic attainments (a subject that has received considerable attention in past research; see Coleman 1961; Rehberg and Schafer 1968; Spady 1970; Spady 1971; Spreitzer and Pugh 1973; Snyder and Spreitzer 1977). Briefly, Otto and Alwin find that athletic participation has positive effects on educational aspirations and attainments, as well as on occupational attainment and income, that persist when all other variables in the model are controlled. They find no support for the claim that the influence of athletic participation is mediated by students' perceptions of acceptance by peers; rather, the encouragement of educational plans by significant others is the major mediating variable.

D. Methodological Contributions

It is difficult to separate the methodological from the substantive contributions of our research on the Wisconsin models. From the first, our interests have been primarily substantive, not methodological. However, a number of methodological publications have originated in the day-to-day work of the project or in our consideration of strategies for the analysis of stratification processes. Space does not

permit a full discussion of these publications, but a brief annotation may steer the reader to those of interest. They include techniques for locating and interviewing members of a panel (Clarridge, Sheehy, and Hauser 1977); effects of non-response bias on univariate, bivariate, and multivariate statistics (Sewell and Hauser 1975; Pavalko and Lutterman 1973); the extent and nature of bias in information reported by respondents for other persons (Mason, et al. 1976; Matras 1975); comparability of results of multivariate models applied to state and national data sets (Sewell and Hauser 1975); use of factor analysis in the construction of linear composites (Alwin 1973); effects of disaggregating indexes into their components (Hauser 1973); treatment of unobservable variables in path analysis (Hauser and Goldberger 1971); decomposition of effects in path analysis (Alwin and Hauser 1975); problems in contextual analysis (Hauser 1974); development of comparable data in national mobility studies (Featherman, Hauser, and Sewell 1974); models for the study of sibling resemblance (Sewell and Hauser 1977); development and uses of structural equation models (Bielby and Hauser 1977); and methods for the analysis of mobility tables (Hauser 1978). (The more recent methodological contributions are discussed in a later section of this paper).

E. Critical Reactions to the Models

Finally, we should acknowledge that our work on the models has aroused a good deal of critical comment. Some of the early criticism of our work centered on the question of the proper ordering of the variables in the models, particularly the belief that ability is causally prior to ambition or aspiration (Turner 1966; Rehberg, Schafer,

and Sinclair 1970; see the Sewell and Armer [1966] answer to Turner and the Alwin and Mueller [1971] refutation of the Rehberg, Shafer, and Sinclair argument). Another related criticism is that our models do not take into account feedback mechanisms between some of the social psychological variables of the models, particularly between grades and parental encouragement, and between parental encouragement and aspirations (see Alexander and Pallas [1983] and the Hauser and Sewell response [1986b]). In general, we have not modified our model in response to these criticisms because we feel that the theory we have set forth properly specifies the causal ordering of the variables, given the particular measurements obtained for our sample. For example, our measurement of high school grades (rank in class) is a cumulative reflection of performance in secondary school, while our measure of parental encouragement refers to the perception of the student late in his senior year. Still others have faulted us for not meeting the assumptions of the statistical models we employ, such as additivity and linearity; for example, some criticize us for not taking into account important interactions among our variables (Smith 1972). For the most part, these charges arise because critics have failed to read our work carefully-- particularly the technical footnotes and appendices of our articles and monographs (Gasson, Haller, and Sewell 1972; Sewell and Hauser 1975; Hauser and Daymont 1977).

The most serious theoretical criticism is that our models are too social psychological--that they ignore social structural features, such as community, neighborhood, and school contexts. Specifically, it has been said that our social psychological models are insufficiently concerned with allocative processes. Our models are said to assume that the individual is relatively free to move in the social

system, so what one attains will be determined by what one chooses to do and how well one does it, whereas the reality is that the individual is quite constrained by the social structure, so one's attainments are determined by what one is permitted to do (Kerckhoff 1976; Pursell 1977; Horan 1978). This is, we believe, a gross oversimplification that rests in part on an inadequate or incomplete reading of our research on social stratification. From the very beginning, our concern has been with the question of the extent to which one's social origins (the premier allocation variables) have a determining effect on one's aspirations and achievements, even when other achievement-relevant variables, including ability, are taken into account. As earlier sections of this paper have shown, these basic structural effects persist beyond aspirations and continue to influence occupational and economic attainments at least up to mid-life, which is the phase of the life cycle of our sample with which our current data deal.

We have attempted to measure other structural variables, such as community, neighborhood, school context, curriculum, and quality and type of college. We have found that these variables add little to the explanation of attainments and do little or nothing to elucidate the attainment process. We have found that selection processes, both self-selection, as in the case of neighborhoods and schools, and institutional selection, as in the case of colleges, account for most of what had appeared to be contextual, institutional, or structural effects. Nor are we impressed with the small increases in explanatory power that others have found by adding allocation variables such as curriculum placement, other types of tracking, discipline, and counselor's advice, to our models (Rosenbaum 1978; Kerckhoff 1976); indeed, most of the evidence

seems to show that these decisions are based on performance criteria (Rehberg and Rosenthal 1978; Heyns 1974). Parenthetically, neither are we impressed with the explanatory power demonstrated thus far by the inclusion in attainment models of such social psychological variables as need for achievement, creativity, conformity, parents' aspirations (rather than children's perceptions of parental encouragement), or students' wishes (rather than expectations) (Featherman 1972; Porter 1974; Rosenbaum 1978).

We do not claim that allocation factors are not at work throughout the life cycle of the individual. We believe they are, that allocation processes help to determine aspirations and attainments, and that these processes are reflected in the empirical relationships observed in our models. In no way, for example, do our findings that ability or ambition affects life chances presume that actors are unconstrained by social structures or institutions. Allocation involves selection processes that are based in part on appraisals of merit, which are frequently unreliable, as well as on unmerited discrimination. Also, they often involve self-selection processes. Finally, allocation decisions frequently take place over a long period of time; they are cumulative, and sometimes they are made in secret or in covert ways. For all of these reasons, it is difficult to define and assess allocation variables in ways that will provide valid and reliable measures for use in models of attainment. This does not mean that the effort should not be made. To date, we have been trying to explain the status attainment process with the best variables available to us, picking up new theoretical ideas wherever we can find them, and following up those ideas which are most strongly supported by the data. The allocation variables we have used have added little to our models. We welcome the introduction of additional allocation variables into status

attainment models and think that if they are well measured and specified, their introduction will further explain the attainment process. The problem so far is that much of the thinking about them has been fuzzy and that their measurement has been inadequate; as in many areas of sociology, in stratification research the concept of social structure has been more a symbolic acknowledgment of the goals and limits of our knowledge than a guide to theory and research.

Finally, our models have been criticized because they explain appreciably less of the variance in occupational attainment than in educational attainment and still less of the variance in earnings (Kerckhoff 1976). Indeed, accounting for variance, rather than explaining and interpreting social processes, appears to be the aim of many sociological researchers; we believe this is a most unfortunate form of goal displacement. Our models were, of course, developed to explain educational attainment and were not designed originally to explain occupational status, much less earnings, except through their influence on education. Actually, it turned out that models based almost entirely on experiences and characteristics of high school students do remarkably well at explaining later occupational attainments. Because educational attainment and work experience are, *ipso facto*, negatively correlated among youth, one should not expect to account very well for cross-sectional variations in earnings among young people (Hauser and Daymont 1977).

We should note, however, that with the new data we plan to gather in the next restudy of our Wisconsin cohort, we expect to develop models that explain occupational and earnings achievements more adequately. Incidentally, much of the new data will deal with career allocation variables, such as family formation and

dissolution, job entry, on-the-job training, job market characteristics, continuity in the labor market, type of industry, self-employment, migration, and community and region of residence, but relevant social psychological experiences will not be ignored. We have little faith in questions asked late in life that demand recall of experiences that took place in the early years of our respondents' lives. For this reason, we must depend on others who are now studying more recent cohorts to devise models of early educational aspirations and attainments that more adequately specify the complex structural and social psychological experiences that children and youth encounter in the course of their development. Meanwhile, we expect to devote our attention to the further explanation of later life achievements. We hope to develop models that take into account the more proximate experiences that, we believe, will better explain socioeconomic achievements in the later phases of the life cycle.

V. Analyses Based on the 1977 Sibling Survey

During the 1975 interview, we obtained a roster of each respondent's siblings, which includes age, gender, and highest level of schooling. This information on family structure has permitted us to begin an extensive analysis of the influence of age, gender, birth order, sibship size, and child spacing on ability, educational attainment, and occupational achievement, while taking into account the complex logical interdependencies among these structural variables and their empirical relationships with socioeconomic status and other variables. The great advantage of our data over those used in past studies resides in the fact that we have detailed information both on

families and on samples of persons. A second advantage is that we have detailed information on the structural characteristics of each sibship. By using the data on families, on sibling pairs, and on our respondents, we can overcome the dual problems of the fact that data on families are inherently confounded with temporal changes in the larger society, while data on samples of persons risk confounding family structure with other characteristics of the family. Elsewhere we have discussed these issues in greater detail (Sewell and Hauser 1977).

In each sibling roster, we identified a randomly selected person by name and ascertained that person's occupation, current address, and the name of the last secondary school (if any) attended by that person in the state of Wisconsin. From these randomly selected siblings, we chose a highly stratified probability sample of persons whom we interviewed during 1977. In this survey we obtained information on postsecondary schooling and familial and socioeconomic careers of the siblings, using much the same interview schedule and the same search, interviewing, and coding techniques that were used in the 1975 survey. We also ascertained data on the academic ability of the siblings whenever they were available from the Wisconsin State Testing Service. Interviews were completed with 90 percent of the selected siblings, and test scores were obtained for 80 percent of them. The sample contains approximately 1,500 same-sex pairs of siblings (750 male-male pairs and 750 female-female pairs) and 500 cross-gender pairs of siblings.

With these data, we have analyzed the effects of the family on measured ability and educational, occupational, and economic achievements. The resemblance of siblings raised together is, of course, a fundamental indicator of the force with which

the family functions to create and maintain systems of social differentiation and inequality. Sibling resemblance captures the effects of social and economic background, of family structure, and of all other commonalities of social and psychological functioning of the family. It is possible to give sibling resemblance an explicit interpretation to the extent that shared familial characteristics have been measured. Our study provides the needed minimal measures of social background, ability, educational attainment, and occupational achievement for sibling pairs drawn from a large and representative sample. Again, Sewell and Hauser (1977) have described the potential use of our data for sibling and family studies in greater detail.

VI. Wisconsin Longitudinal Study Contributions, 1980-1990

Since the publication of our last comprehensive report on the Wisconsin Longitudinal Study of Social and Psychological Factors in Educational and Occupational Aspirations and Attainments (Sewell and Hauser 1980), more than forty publications authored by present and past members of our project staff have appeared, mainly in the major journals of sociology.³ It is not the purpose of this review to exhaustively discuss the findings of each article but rather to indicate the nature of the research questions with which we have been concerned and the results of our efforts to deal with them. These publications cover a wide variety of subject matters. Most are based on the WLS data and employ structural equations and other multivariate models

³ Our data have been in the public domain for several years, but we have not attempted to trace their use in publications by researchers who were not members of our project staff or graduate students at the UW-Madison.

that we have used in earlier research on the project and have modified to meet the needs of the current research. While it is difficult to categorize these studies, they may be placed roughly under the following broad headings: (1) Studies of Siblings; (2) Other Studies of Stratification Processes; and (3) Methodological Studies.

A. Sibling Studies

The major thrust of our research in the past decade has been concerned with the study of the influence of family structure on ability and educational and socioeconomic achievement. With the information gained from our 1975 restudy of our original respondents, we now have data on the age, birth order, gender, sibship size, child spacing, and education of all their siblings. We also have data on the occupational status of a randomly selected sibling and more extensive data on the ability and educational, occupational, and socioeconomic achievements of a representative sample (1977) of these siblings. These data have permitted us to undertake several important studies: First, we have studied the effects of the structure of the family of origin on various achievements, including the effects of age, birth order, gender, sibship size, and child spacing on cognitive achievement and socioeconomic careers, while taking account of the complex logical interdependence among these structural variables and their empirical relationships with socioeconomic status and ability. Second, these data have permitted us to measure and interpret the total effects of family of origin on socioeconomic and family careers by studying the homogeneity of same-sex and

opposite-gender sibling pairs in respect to our achievement variables and their measured antecedents.

The first research publication using these data (Hauser, Sewell, and Clarridge 1982) was in the form of a progress report in which we discussed the selection of the sibling samples, compared response rates for the 1975 survey of respondents with the 1977 survey of siblings, and compared the personal and demographic characteristics of the respondents to our two surveys with similar characteristics of respondents to other national surveys. Having satisfied ourselves that our data are representative of high school graduates, we then analyzed the effects of birth order on educational attainment by comparing the mean years of schooling of our respondents and their siblings by sibship size and birth order, finding no significant relationships. We then elaborated a tentative structural model for estimating the similarity of sibling pairs and tested that model on like-gender and cross-gender pairs. Our tentative findings indicated that the usual array of social background and ability variables do not fully account for the similarities in sibling's socioeconomic achievements. This preliminary work led us to believe that it would be possible to develop more adequate structural equation and variable component models for the further analysis of sibling resemblance.

B. Sibling Resemblance

Hauser designed the measurement models used in the preliminary analysis of sibling similarity reported above, and he also took the lead in testing and modifying these models in our subsequent research. Our data set on siblings is probably better

than any other body of such data in existence: It is for a large sample of siblings and contains more complete and better measures of social background, ability, family structure, and achievement variables over a longer span of years than any other data set currently known to us.⁴ However, it is not without limitations. Perhaps its greatest weakness is that a random selection of high school graduates, rather than a random selection of families, serves as the basis for the selection of siblings into the sample. This, of course, has to be taken into account in making generalizations to other populations. A second weakness is that some of the information on the characteristics of our respondents' siblings is from the respondents themselves. For example, in our large sample of respondents and their siblings who have been used in our analysis of birth order effects on educational attainment, the reports on years of schooling completed come from their brothers or sisters who were respondents to our 1975 survey. Fortunately, we have self reports taken at different times for many of the important variables on our original respondents and for both original respondents and the selected siblings who comprise our 1977 sample of sibling pairs. Thus, we can generate estimates of the errors in variables which may be used in our measurement models, but this, of course, further complicates already complex models.

⁴ The Panel Study of Income Dynamics includes a large sample of offspring of the original members of the panel, but these data do not include measures of the ability of the offspring, and many of them have been lost from the sample over the years. That may be remedied by a new follow-up effort. The National Longitudinal Study of Youth, whose sample was aged 14 to 21 years old in 1979, was drawn from a household sample, and thus includes several thousand sibling pairs. Because of the inclusion of rich social background data, good ability measurements, and high retention in the sample, the NLSY sibling data are a most valuable resource. However, because the sample is still relatively young, the full value of the NLSY data will not be realized for several more years.

Another problem, not specific to our data, is that the effect of family socioeconomic background on educational and socioeconomic attainment may lead to bias in simple regressions of occupational status or other outcomes of schooling on educational attainment. This is usually called "family bias." In an article on this subject, Hauser (1984) developed a structural equation model of sibling resemblance in occupational attainment which took into account possible family bias. He then tested this model on data on sibling pairs from the WLS sample and the Olneck (1976) Kalamazoo sample. He found that family bias in the effect of schooling on occupational status is less than others have claimed and that estimates of family bias are very sensitive to specifications of response variability in schooling. He also provided some useful methods for cross-population comparisons of structural equation models.

Hauser and Mossel (1985) used variations of these models in the regression of occupational status on schooling in a sample of 518 pairs of brothers from the WLS sibling sample. Their models corrected for response variability and incorporated a family variance component. They discovered that the regression of occupational status on educational attainment was relatively insensitive to both response variability and to the specification of family factors. Family membership accounted for about half of the variance in occupational status, but there was little evidence that failure to control family background led to upward bias in estimates of the effect of schooling on occupational status. In a subsequent paper, Hauser and Mossel (1987) provided a more extensive methodological treatment of these models, including detailed documentation of estimation procedures.

Hauser and Sewell (1986a) further analyzed the influence of family effects in models of education, occupational status, and earnings for fraternal pairs from the WLS sibling sample. They modeled the effects of measured and unmeasured family background, mental ability, and educational attainment on occupational status and earnings. Their models were estimated from incomplete data (for brother pairs who may or may not have been interviewed in 1977), with corrections for measurement error, and permitted direct comparisons of within- and between-family regressions. No evidence was found that the effects of family background lead to bias in the effects of mental ability on schooling or in the effects of schooling on occupational status or earnings. Family background did have large effects on ability and schooling but smaller effects on socioeconomic achievement. They then replicated this analysis using data on Olneck's (1977) Kalamazoo brothers and concluded that, after correcting for attenuation, the Kalamazoo data provide no more evidence of family bias than the Wisconsin data.

Hauser (1988) extended the work on sibling resemblance by comparing two structural equation models of educational and occupational resemblance among Wisconsin men. Each model decomposed the regression of occupational status on schooling into a between-family regression and a pair of within-family regressions. In the first model, between-family regressions were written in unique within-family factors, and in the second model, the within-family regressions were in total educational and occupational variables. Both models were equivalent when within-family regressions were the same for each member of the pair; otherwise, they were not equivalent. Using the WLS sample of sibling pairs, Hauser showed that either model,

under certain conditions, may exhibit symptoms of near-underidentification or even be underidentified. This problem was more likely to occur when using the second model than the first.

Hauser and Wong (1989) further extended the work on sibling resemblance and inter-sibling effects using data from a Nebraska sibling sample originally studied by Benin and Johnson (1984). Their reanalysis of these data showed that there was no unusually high level of resemblance between brothers in the data, but that there was a strikingly low similarity between older sisters and younger brothers. They then reanalyzed Olneck's (1976) Kalamazoo data and found clear evidence of reciprocal affects of brother's levels of education, net of common family background and the effect of each brother's mental ability on his schooling. The unconstrained effect of older brother's schooling on younger brother's schooling was larger than the reciprocal effect, but a model of equal effects fit almost as well. This left open the question of whether reciprocal influence occurs in other types of sibling pairs and whether there is a predominant influence of older on younger siblings. A preliminary analysis of the structural model developed in the Hauser and Wong research for examining sibling resemblance and cross-sibling effects on educational attainment has been tentatively tested using the WLS data on sibling pairs (Lee 1989). These data permitted us to examine mixed-gender and like-gender pairs. Also, we improved the model by adding other measures of social background and adolescent aspirations. We are not yet satisfied with these preliminary analyses, however, primarily because the sample sizes in sex specific pairs become too small when we work with a large number of variables

at once. We expect to enlarge our sample of sibling pairs in our next follow-up study so that we can make a more definitive test of this tentative finding.

C. Family Structural Characteristics and Sibling Differences

All of the above studies attempted to explain why siblings resemble one another more than unrelated persons resemble one another. The next group of studies investigated why and how siblings are different from one another. The latter question is the one that has drawn the greatest attention over the years. The particular aspect of family structure that has been most studied is the relation of birth order to cognitive achievement. At least since the time of Galton (1874), scholars have been fascinated with the question of the influence of birth order on various cognitive achievements. Recent reviewers of this massive literature agree that past studies have been so seriously flawed that their findings cannot be accepted (Adams 1972; Schooler 1972; Ernst and Angst 1983; Steelman 1985). The more common faults are inadequate samples, selection biases, poor measures of key variables, and failure to control for variables known to be related both to birth order and the outcomes under study. Moreover, most past studies have not had sufficient information to simultaneously examine the role of other family structural variables on career achievements.

We have examined the effects of birth order and size of sibship on educational attainment for the full sibships of our primary respondents (Hauser and Sewell 1985). We did this analysis because of the recent revival of interest in birth order effects resulting from theories proposed by Zajonc and Markus (1975) and Lindert (1977). In

our study of over thirty thousand men and women in the full sibships of our nine thousand primary respondents, we found no effects of birth order on educational attainment when size of sibship and other relevant family structure and family background variables were controlled, whether we looked at selection into the sample of high school graduates, postsecondary educational attainments of those graduates, or educational attainments within full sibships. Educational attainment appeared to increase with birth order when family size was controlled, but this happened when secular increases in schooling had occurred within as well as across families. Thus, when we controlled birth year and parental education, there was no significant association between birth order and educational attainment: There were no linear or nonlinear effects, there were no effects of being first or last born, and there were no statistically significant or patterned differences among ordinal positions. There was no need to invoke any of the more complex theories of child development or intra-familial resource allocation to explain the effects of birth order on educational attainment because there was nothing to explain.⁵

The findings of this study were quite upsetting to the psychologists who had developed confluence theory to explain apparent negative effects of birth order on mean intelligence scores grouped by family size and birth order for a large body of

⁵ Recently Retherford and Sewell (1993) have presented an analysis of birth order and educational attainment using like-gender and cross-gender pairs for this sample of siblings. This strategy has the advantage of controlling for both the measured and unmeasured aspects of family background. Their results confirm those of Hauser and Sewell (1985) but even more strikingly show the disparity between women and men in educational attainment in this sample. In every statistically significant comparison of like-gender and cross-gender pairs analyzed by birth order and family size, women are disadvantaged in educational attainment.

Dutch inductees into military service. These mean intelligence scores clearly declined as family size and birth order increased. Singletons scored lower than first-born children in small families, and mean intelligence scores declined especially rapidly for last born children. Zajonc and Markus (1975) postulated that these findings resulted from the confluence of two factors: the family intellectual environment and a teaching function. They argued that the average mental age of parents and the children constitute a family intellectual environment that declines with each successive birth. Thus, the relationship between family size and birth order tends to be negative. The teaching function effect arises presumably because the teaching of a younger sibling stimulates the intellectual growth of the older sibling. Because singletons and last born children have no one to teach, their intellectual development is handicapped. Zajonc and Markus formulated a complex nonlinear mathematical form of the theory which they claim explains not only the trends in the Dutch data but also those in several other large data sets (Zajonc and Bargh 1980). A number of other scholars have attempted to assess the theory in relation to cognitive achievements in other samples but have failed to confirm distinctive propositions based on it (including the Hauser and Sewell study discussed above). Zajonc and his colleagues have flatly rejected the evidence from these studies because the studies use regression techniques; they claim that these techniques fail to take into account the complexities of the dynamic theory on which the confluence model is based, particularly, the changing intellectual environment of the family as children are born and develop.

Retherford and Sewell (1991) published a comprehensive set of tests of the model using the WLS data.⁶ These tests involved a strict application of the mathematical form of the model to aggregate data, to between-family data on individuals, and to within-family data on individuals. In none of these tests did the model detect or explain any significant birth order effects. They then created a simple test using IQ differences within sibling pairs and found no significant differences in intelligence due to birth order. Finally they reapplied the mathematical form of the confluence model to the Dutch data and, after correcting for serious errors in the original application of the model, found no birth order effects in those data either. As might have been predicted from their responses to other scholars who found no support for confluence theory, Zajonc and his colleagues (1991) published an evasive and error-filled response to the Retherford and Sewell article. In their response, they dismissed the reported findings without effectively contesting the validity of the analytic techniques used by Retherford and Sewell and made fallacious statements about the nature of the WLS sibling data; see Retherford and Sewell (1992) response for the proof of this assertion.

On the basis of the results of research to date using WLS sibling samples, we doubt that there are any birth order effects in our data when they are properly analyzed.⁷ On the other hand, we are pleased with the progress we have made in

⁶ We have included this paper in our review because a preliminary version was published as a discussion paper in 1990 (Retherford and Sewell 1990).

⁷ Retherford and Sewell (1993) have examined birth-order effects on first and current occupation for like-gender and cross-gender sibling pairs using the WLS data. So far no confirming evidence of birth-order effects on occupational status in any of these comparisons has been found.

modeling sibling similarity and with the prospects of further measurement with new samples and other achievement and family formation variables.

D. Other Studies of Stratification Processes

During the past decade, our project staff conducted a number of other studies of stratification processes. These studies covered a wide range of topics and will be discussed more or less in chronological order.

Stryker (1981) studied the effects of religio-ethnic background on educational and occupational attainments in the early career, finding that Jews had the most positive orientation to education and occupational status, followed by Irish and Anglo-Saxon Catholics, Italian Catholics, and German Lutherans. Cultural mediation through academic performance, significant others' influence, and educational plans accounted for much of the religio-ethnic effect on educational and occupational attainment.

In another study Williams (1981) employed WLS data in an attempt to separate peer influence from peer selection in the status attainment process. Some critics of the Wisconsin model had claimed that rather than measuring peer influence our model assesses the influence of peer selection. Using a truncated form of the original Wisconsin model (Sewell, Haller, and Portes 1969) and a model developed by Duncan, Haller, and Portes (1968), Williams found that both models yielded almost identical estimates of peer influence. Even when the variables that affect both status attainment and peer selection in the Wisconsin model (curriculum, rank in class, and teacher

encouragement) were controlled, the peer influence effect remained highly significant, although it was about half as large as originally estimated.

Symonette (1981) used WLS longitudinal data, including our information on colleges for those who attended college, to determine what effect type of college has on earnings. Earlier work on the project had demonstrated that students generally chose the types of colleges in which their background characteristics maximize their graduation chances (Wegner and Sewell 1970), but that quality of the college attended accounted for only a small part of their educational and occupational attainments, when the students social origins and ability were taken into account (Alwin 1974; Alwin, Hauser, and Sewell, 1975). Symonette found large average differences in the 1974 earnings of those who attended various types of colleges. Student background characteristics greatly influenced the type of college the students attended; both self selection and college admission policies account for this. These student variables accounted for about 90 percent of the differences among colleges in average earnings. Symonette attributed the remaining differences to college effects. These results generally confirm the findings of our earlier studies and elaborate the process by which student background influences college composition, which in turn affects earnings.

MacDonald and Rindfuss (1981) used WLS data to test the well-known Easterlin hypothesis that marriage will occur earlier when young men judge their economic prospects to be favorable with respect to their parents' income. They found no support for the hypothesis. They did find, however, that young men's earnings were positively related to earlier marriage, net of schooling and military service; increased wages apparently make marriage more affordable. Completed years of schooling had no

effect on marriage timing when time spent in school and military service were taken into account.

Janssen and Hauser (1981) used WLS longitudinal data to study the effects of religion and residence on fertility, finding that Catholic and farm reared women have much higher fertility than non-Catholic and non-farm women. Catholic religious background affects fertility by increasing the likelihood of having more than two children; its indirect effects operate through religious schooling and continuing Catholic affiliation.

Sorensen (1983a, Sorensen 1983b) used WLS data on the occupational achievements of ever married women to investigate two problems: the influence of number of children on (1) their mothers' occupational status achievements and (2) married women's decisions to enter and leave the labor force. In the first study she found that although children had a significant effect on a mother's gains in occupational status from her first to her current job, there were no differences by number of children when status of job held at the birth of her first child was controlled. This was interpreted to indicate that a woman's family responsibilities, measured by number of children, influence the status of the job she returns to, but not the gains in status once she returns to the labor force. The second study revealed that the determinants of employment patterns and the decision to leave and reenter the labor force are based on different factors and combinations of life-cycle variables.

Hodson, using WLS data and additional information on corporate economic structure taken from business directories such as plant size, capitalization, type of industry, and geographic location, has produced a monograph (Hodson 1983) and

several articles (Hodson 1984a, 1984b; Hodson and Seitz 1988) showing how corporate organization influences workers' earnings. He finds that workers in large plants with advanced production technology have higher earnings, better fringe benefits, and steadier employment than workers in smaller firms. Of all of the variables used to represent corporate and industrial structure, plant size was most important in determining labor market outcomes. Traditional labor market segmentation concepts proved to be of very limited use in this analysis. He also found that, although organizational size has a negative effect on job satisfaction, capital intensity and budgetary autonomy have positive influences on job satisfaction (Hodson 1984b). In another study based on our 1975 data, Hodson (1989) found that on average women report greater job satisfaction than men in spite of objectively inferior jobs. His interpretation of this finding is that women compare themselves with other women who are still worse off than they are and that women are less willing to verbalize their dissatisfaction with their work than are men.

Retherford and Sewell (1988) critically surveyed research on measured intelligence and fertility and concluded that no definitive conclusion could be reached from the results of past studies of this relationship because of nonrepresentative samples, inadequate measurements of intelligence, faulty data on fertility, and inadequate statistical analyses. They then used the reproductive histories of our WLS sample members and our measure of intelligence to estimate the IQ selection differential for this cohort. They calculated the IQ selection differential for this sample to be a decline of eight-tenths of an IQ point in a generation. The contribution of females to this decline was five times as great as that of males. Using genetic models

and recent heritability studies, as well as the above selection differential, they concluded that the generational change in mean genotypic IQ is not more than one-third of an IQ point in this cohort and its offspring. In a related study Retherford and Sewell (1989) conducted a path analysis of the effects of IQ on fertility for the same sample and found that higher education leads to lower fertility. This is particularly true for females and is why women's contribution to the fertility decline is greater than that of men.

E. Recent Methodological Contributions

In the past decade members of our project staff have continued to work on methodological problems encountered in our own research or in the research of others working on similar problems in social stratification. In this section we will discuss these efforts, except those that model sibling similarity, which we have already covered in the section on sibling studies.

One of the questions frequently raised in survey research is the extent and nature of response variability in self reports and proxy reports dealing with socioeconomic status. Massagli and Hauser (1981), using a variety of repeated measurements of socioeconomic variables in the WLS data, both self reports and proxy reports, and various methods for assessing agreement, found no support for the frequent assertion of some scholars that inconsistencies in these reports invalidate the results of most stratification studies.

Perhaps the most thorough examination of the question of response bias in stratification models is the one by Hauser, Tsai, and Sewell (1983) who estimated the influence of response error in social and psychological variables was estimated for the original Wisconsin model. Their analysis was designed to measure the power of this model to account for social influences and educational and occupational aspirations and achievements when measurement error is taken into account. There are two or more indicators of most theoretical constructs in the model; many of these were ascertained from independent sources, on the same occasion or as many as twenty years apart. The model identifies selected response correlations ascertained on the same occasion, from the same person or using the same method. It also permits retrospective reports of social influences and aspirations to be contaminated by intervening events. Our revised estimates provide empirical support for the original specification of the model, a modified causal chain in which social background and ability affect post-high school outcomes primarily by way of their effects on encouragement from significant others and on educational and occupational aspirations. We also find that the model, when corrected for measurement error, is much more powerful in explaining the process of educational and occupational attainment than the original model. For example, the model accounts for 69 percent of the variance in postsecondary schooling, for 73 percent of the variance in the status of first jobs, and for 69 percent of the variance in occupational status at age 36. This work will furnish a template for our future research on models of stratification processes.

Still another methodological study is Hodson's (1985) work on the functional form of earnings. He used the WLS data to determine the best specification of four

functional forms of earnings. He found that each of four functional forms (dollar earnings, perceived earnings, log earnings, and a Box-Cox transformation of earnings) produced identically signed regression coefficients with similar levels of statistical significance. However, when he evaluated the generalized model of earnings across class, sector, and gender groups, he found that the dollar earnings and perceived earnings specifications produced the most clearly interpretable results.

During the past decade Hauser was involved in several other methodological studies of social mobility that did not use project data. These will be mentioned briefly in this review because they address questions that are of concern to the overall interests of the project and its participants. In one of the most interesting of these Hauser (1982) used data that were constructed by several social historians (Hershberg et al. 1974) on occupations of residents of five North American cities in the 19th century to develop occupational status scales for that period. He demonstrated that the correlation between the 19th and 20th century scales indicated a good deal of invariance in occupational status in the two periods.

In another paper Hauser (1984) also analyzed data on vertical class mobility in England, France and Sweden, previously studied by other scholars who came to different conclusions about the extent of non-vertical and vertical mobility in the data. Hauser proposed new models for analyzing the data which provide evidence for a gradient in immobility across the three nations and suggest complementarities between vertical and non-vertical models of class mobility.

In a related article Grusky and Hauser (1984) reanalyzed the intergenerational classifications used by Hazelrigg and Garnier (1974) in their cross-national study of

occupational mobility in sixteen countries. They used log-linear and log-multiplicative models to compare occupational mobility and to assess the effects of industrialization, educational enrollment, democratic government, and income distribution on immobility. They found that mobility and immobility were similar across countries, but systematic differences were not easy to explain. The determinants of mobility varied between countries and over time, but variation in observed mobility rates seemed to be more dependent on historical and cultural differences in occupational structures rather than on differences in exchanges between occupations.

Finally, in another study of comparative mobility, Hauser and Grusky (1988a, 1988b) reexamined the data on twenty-two nations that Slomczynski and Krauze (1987) used to disconfirm Featherman, Jones, and Hauser's (1975) hypothesis that variations in observed mobility within industrial nations arise more from historical and cultural differences in their occupational structures than from differences in their relative chances of social mobility. Hauser and Grusky discovered numerous defects in the Krauze and Slomczynski work, particularly in their matrix decomposition and a number of errors in other aspects of their analysis. Hauser and Grusky were unable to reproduce Slomczynski and Krauze's results when the analysis was performed correctly.

VII. Plans for a 1992 Survey

In closing this review of the WLS research during the past three decades, we are pleased to report that we are well along in a follow-up of our original sample and their

siblings, which began during 1992 with major support from the National Institute of Aging and supplemental funds from the MacArthur Foundation and the National Science Foundation. In brief, we are interviewing the survivors of the more than ten thousand men and women who were included in our original sample of Wisconsin high school seniors in 1957, whether or not they were covered in the 1964 and 1975 follow-ups. They are about 53 years old during this round of interviews.

Approximately 540 members of the original sample are known to have died. Overall, we have located about 97 percent of the members of the original sample, living or dead. During this round of the study, we will also interview a randomly selected sibling of each respondent. Thus far, among the respondents to the 1975 survey who have survived, we have completed a one hour telephone interview in 85 percent of the cases,⁸ and we are obtaining a 20-page supplementary mail questionnaire from more than 82 percent of persons completing the telephone interview. The study has five specific goals: (1) to extend models of occupation and earnings and to elaborate the roles of aspirations during adolescence and mid-life, of previous achievements, and of familial responsibilities in current economic and social standing, subjective well-being, mental and physical health, disability, and wealth; (2) to identify and measure local effects on opportunity, that is, specific characteristics of a person, firm, or economic sector that directly influence the chances of obtaining a job or a limited range of jobs; (3) to extend and elaborate models of sibling resemblance that will elucidate influences of the family of origin on the life course; (4) to investigate self assessments of well-

⁸ This phase of data collection is almost complete, and we expect the final telephone interview completion rate among surviving 1975 WLS respondents to exceed 86 percent.

being in the context of aspirations, accomplishments, and relationships with significant others; and (5) to measure social and economic exchange relationships with parents, children, and siblings, and assess the consequences of those relationships for well-being.⁹ We believe that the WLS data will be a valuable public resource for studies of aging and the life course, intergenerational transfers and relationships, family functioning, social stratification, physical and mental well-being, and mortality.

⁹ See Hauser, et al. (1992) for additional details of the study design and content.

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Center for Demography and Ecology
University of Wisconsin
1180 Observatory Drive Rm. 4412
Madison, WI 53706-1393
U.S.A.
608/262-2182
FAX 608/262-8400
comments to: hauser@ssc.wisc.edu
requests to: cdepubs@ssc.wisc.edu