A MODEL OF EDUCATIONAL ATTAINMENT
FROM A SOCIAL LEARNING THEORY PERSPECTIVE

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by
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CHAPTER I
Introduction

To undertake a study of educational attainment is to follow in a long tradition of interest centered upon the role of education in modern stratification systems. The literature on the educational and occupational attainment processes for youth is quite extensive and has continued to increase in both volume and methodological sophistication particularly since the mid-1950s. Unfortunately, this cumulative advance has not been mirrored from a theoretical standpoint.

Research tradition in this field has centered on the development of a model of the individual status attainment process from the data at hand. That is, the model has been formed and modified on the basis of empirical findings from different data sources over time. The literature has generally failed to formulate a model whose form and content is dictated by theory and which is theoretically, as well as empirically, modified and improved with time. Nor has data been specifically generated and tailored for the purpose of testing such a theoretical model. Indeed, it is likely that much difficulty with the measurement of concepts and inconsistencies of findings in the literature could have been avoided if more time had been devoted to theoretical concerns.

This lack of theoretical guidance is particularly evident in several aspects of the attainment process. The first regards the
effects of family background factors. It is not sufficient to assume that composite measures of socioeconomic status capture socialization influences on the attainment process. The mechanisms through which various family background factors influence attainment need to be clarified and possible variations by sex specified. The general failure of previous models to find sex differences in the attainment process may be the result of the lack of theoretically grounded a priori expectations as well as inappropriate specification of the models by sex. Indeed, the failure to incorporate both marriage and fertility events as intervening factors in the attainment process for both young men and young women is another limitation of previous research. This study will address both issues.

Status attainment research originally stemmed from sociological concern over the relative distribution of wealth, power and prestige within societies. Much attention was devoted to investigating the relative intertemporal stability or instability of these distributions and to how they related to social mobility or immobility between and within generations of individuals. The newly industrialized United States around the turn of the century provided ample material for theorists and researchers of social mobility and social class structure. Whether due to the enormous volume and variety of new immigrants, a capitalistic form of economy or a democratic form of government, the United States experienced a social transition somewhat different from its European predecessors. A growing societal emphasis on public education particularly strengthened the tie between
educational attainment, occupational accomplishment and social status allowing greater proximity between the older and wealthier American upper class families and the intelligent and/or ambitious working man. Social class no longer was solely determined by heritage. Social mobility resulting from ambition, hard work and occupational success was not only possible but aspired to. With overall improvements in the national standard of living, the provision of fundamental education for most citizens, and increasingly advanced technologies, education came to be viewed, and is still viewed today, as a primary avenue for obtaining individual occupational success and improved social status in this country.

But early studies of social mobility were content to simply describe and document the extent to which particular social status distributions varied from generation to generation (inter- or intra-generational mobility changes). It was not until the late 1960's that researchers began to examine the causal mechanisms of social mobility at the level of the individual. While such individual level models both then and now have not been adequate for explaining societal level status inequalities, they do provide insights into how individuals acquire their respective adult statuses and associated niche in the societal structure.¹

One relatively early attempt at outlining the occupational attainment process was a model developed by Blau and Duncan (1967). Their model focused on the role of education (or achievement) as a principal factor mediating the influences of family background on early
occupational attainments. This model tried to determine the relative importance of ascribed versus achieved characteristics in the status attainment process. The significance attributed to education in this regard later led some researchers to elaborate the occupational attainment process while others focused more exclusively on various aspects of the educational attainment process itself.

William H. Sewell and associates at the University of Wisconsin (Sewell, Haller and Portes (1969); Sewell, Haller and Ohlendorf (1970); Sewell and Hauser (1972); Sewell and Hauser (1975)) are most notable for their contribution to the basic Blau-Duncan model of occupational attainment. They extend the model to account for mediating social-psychological influences. Such influences as the attitudes of significant others and the individual's own educational and occupational aspirations are posited as intervening between the effects of family background on educational attainment and subsequent occupational attainment.

While numerous studies have made various minor modifications or extensions of the Blau-Duncan and later Sewell model, or have replicated them using different data sets, few have contradicted their primary finding concerning the relative importance of ascriptive over achieved characteristics in the attainment process (Sewell and Hauser (1980); Campbell (1983)). But while this literature has increased in volume and sophistication of statistical technique, it has never managed to provide adequate theoretical underpinnings for the model. This deficit continues to be pointed out by researchers. (See Horan's (1978)
discussion of this issue as well as Hauser, Tsai and Sewell (1983), and Campbell (1983).)

Rather than let theory dictate the form of the overall model, the literature is frequently characterized by empirical modelling whereby the model is cumulatively adjusted to fit empirical facts or findings. When theorizing does occur, it is often limited to explaining only one portion of the model, such as in Haller and Portes (1973). Their theoretical interpretations are limited to the psychological impact of the attitudes of significant others and of achievement upon the formation of status aspirations and to the context in which these aspirations affect subsequent behaviors. In most instances, family background variables are simply assumed to impact upon the status attainment process but no theoretical framework is ever provided that offers an explanation for the mechanisms by which this occurs. Generally, family background is conceptualized as an early status characteristic of the individual (i.e., parental socioeconomic status) that affects his or her later status attainments. The socioeconomic status of the parents presumably represents a summary measure of class values, wealth, and prestige which has long-standing influences on the individual over the life-span. Why or how family background influences the attainment of offspring is never adequately discussed.

The purpose of this paper is to develop a model of the individual educational attainment process which uses social learning theory as its foundation (Bandura and Walters (1963) and Bandura (1971)). Particular attention will be given to theoretical discussions of the effects of
family background on subsequent parts of the model, although the framework will provide for testable propositions with regard to other key aspects of the model. Using the basic Blau-Duncan model of status attainment and including the later Sewell, et al. modifications, this new model will theoretically decompose the concept of family background more thoroughly than past studies have done. In addition, it will simultaneously control for the impact of such life cycle discontinuities as marriage, childbearing and military service on ultimate educational attainment. Such measures have usually been unavailable in past work.

Finally, unlike the majority of past research on educational attainment processes, a priori theoretical hypotheses with regard to the model will be empirically tested on a national sample. And, while most previous theoretical and empirical work has represented the nature of the attainment process only for men, this paper will examine the model on separate national samples of men and women in order to determine what differences or similarities exist between the sexes. Research that has examined sex differences in the past frequently has not used separate samples. Rather, such studies have limited analyses to tests of sex-main or limited sex-interactive effects within a single model and have generally ignored the impact of several important life-cycle events in comprehensive models of the attainment process for both young men and young women.
NOTES

1 As Horan (1978) points out, analyses of individual status attainments could be considered useful analyses of social structure if one makes the theoretical assumptions that occupational differentiation represents a single dimension by which individuals are allocated to status positions in a society and that this allocation process (as measured by individual characteristics) operates in an open and competitive market. Empirically, studies have shown neither assumption to be justified and thus the theoretical connection between societal and individual levels of analysis has remained tenuous.
CHAPTER II
Review of the Literature

I. The Pioneering Work of Blau and Duncan

Blau and Duncan (1967) are generally acknowledged as the first researchers to model the status attainment process at the individual level (Haller and Portes (1973); Sewell and Hauser (1975)). Their approach represented a new way in which to examine social mobility. The goal of their research was to causally order the sequence with which an individual acquired particular statuses throughout the life-cycle. Rather than a simple comparison of beginning and ending statuses that was characteristic of previous social mobility research, their study represented a first attempt at interpreting the process by which early ascribed characteristics and intermediate achieved characteristics impacted on later occupational attainments. Viewing the process of status attainments in this fashion also required an appropriate analytical technique which the authors introduced as a block-recursive structural model of socioeconomic achievements over the lifecycle.

The Blau-Duncan model causally arranged the status attainment process as starting with early family background characteristics (education and occupation of the father) followed respectively by the son's educational attainment and first occupation. The son's occupation in 1962 represented the ending point of the linear sequence. Empirically tested on a national sample of males age 20 to 64 in 1962, Blau and Duncan's model was used to quantify the relative effects of
family background and educational attainment on both the first and the occupation as of 1962. Their findings included:

(1) that educational attainment accounted for most of the effect of family background on subsequent occupational attainments;

(2) that, controlling for background factors, son's education had a more pronounced effect than son's first job on 1962 occupation;

(3) that educational attainment had a large independent (of family background) effect on later occupational attainments.

II. Early Elaboration of the Blau-Duncan Model: The Focus on Educational Aspirations

Work on the Wisconsin model of status attainment, an eventual elaboration of the Blau-Duncan model, also began in the 1960s. Having access to a data base for a 1957 Wisconsin sample of high school seniors, William H. Sewell and associates, prior to the publication of the Blau and Duncan model, pursued various topics related to the attainment of higher education. This data base contained information on family background characteristics, educational experiences and educational and occupational aspirations. Early exploratory research with this data set, as well as the contemporaneous research of other social scientists had begun to highlight the role of educational and occupational aspirations in the attainment process. For example, Sewell (1964) investigated differences in occupational and educational aspirations by community of residence. Aspirations were shown to be positively related to the size of community. Young men from larger (or more urban) communities had higher aspirations than their counterparts in
smaller (or more rural) areas. But much of this difference in aspirations by community size could be accounted for by differences among communities in the distribution of socioeconomic status, sex and ability levels. However, some sample subgroups posed exceptions: rural boys of high socioeconomic status and intelligence had lower aspirations than urban boys with similar characteristics. An even earlier study of aspirations by Haller and Butterworth (1960) proposed that interaction between peers influenced their levels of educational and occupational aspirations. Controlling for similar backgrounds, correlations between the aspirations of peers persisted.

These studies are early examples of research that would generate an ongoing concern in the status attainment literature with the social contexts within which aspirations are formed and altered. These contexts include school, neighborhood and home environments and involve either structural (aggregate) characteristics of environments or social-psychological characteristics of the individual's schooling experience. Results of a study by Sewell and Armer (1966) led the Wisconsin group to conclude that neighborhood and school characteristics had little independent effect on educational plans of high school students as compared to background factors. Thus, they began to concentrate on examining the social-psychological influence of significant others on educational aspirations not long after the 1964 followup of the Wisconsin sample provided new information on later educational and occupational attainments.
A. The relative influence of background factors and ability

These studies of educational aspirations, like later studies of educational and occupational attainment, underscore the importance of factors related to socio-economic background and ability, although the significance of social-psychological variables and variables measuring family structure would eventually be demonstrated. Under the rubric of background (or ascribed) characteristics fell influences due to parental education and occupational status of the father. These characteristics were frequently combined into a composite index of socio-economic background and were interpreted as reflecting a general social class value orientation towards the need for and general worth of an education for youth. The implicit assumption here was that the higher the socio-economic level of the family of origin, the higher would be the value placed on education and the stronger would be socialization pressures on children to personally adopt these same values.

Also felt to be an important factor in the achievement process was a student's level of intelligence as measured by various standardized tests. It was thought to affect the overall motivation and ability to pursue higher education independent of family background. The obvious connection here was that higher intelligence spawned higher aspirations and eventual attainment. This notion implicitly assumed that individuals accurately perceived their own inability or ability to succeed in this regard, i.e., that aspirations would be commensurate with some degree of realism.

Results of early studies such as that of Sewell and Shah (1967)
which utilized the Wisconsin attainment data emphasized the pervasive influence that intelligence and family background characteristics continue to exert over the educational careers of youth. Their study was one of the first to highlight the relative importance of family background factors on female educational attainment as compared to the significant role that intelligence level plays in the educational progress of males (a finding continually replicated in future studies). But the issues related to contextual effects of school and home environments still needed to be addressed. More social-psychologically oriented explanations of aspirations and attainment began to appear. According to Sewell and Shah (1968) these explanations stemmed more from a need to interpret, post-hoc, the inadequacies of previous models and the unintended findings of other empirical work than from any antecedent theoretical outlining and testing of educational processes within social-psychological theoretical frameworks.

B. Intervening social-psychological influences

Parental encouragement, primarily to continue education beyond the high school level, was one of the first social-psychological variables to be recognized. It was treated as a variable which mediated the effects of family background and intelligence on educational aspirations and attainment. Sewell and Shah (1968) suggest that Kahl (1953) was most likely the first to question the implicit assumption of early studies that a particular social class was the sole possessor of a particular educational value system. Kahl found that boys from lower
working class families who received parental encouragement to attain levels of education higher than that accomplished by the parents, had educational aspirations as high as upper class boys despite their lower class origins. As a result of his findings Kahl emphasized the importance of not typing children on the basis of their social class. From Kahl's analysis, one can draw the implication that children from similar socioeconomic backgrounds should not be assumed to be subject to the same socialization and psychological influence within the family.

Kahl's suggestions prompted Rehberg and Westby (1967) and Sewell and Shah (1968) to examine the role that parental encouragement might have in the development of educational aspirations and expectations. Encouragement was viewed basically as a way in which parents translated achievement and mobility values into role expectations for their children. Rehberg and Westby found in their sample of urban males that the frequency of parental encouragement (a combination of mother's and father's) and the effectiveness of any frequency level of parental encouragement on educational expectations decreased as family size increased. Because of the overall significant impact of encouragement on educational expectations regardless of socioeconomic background, the authors suggested that the frequency of encouragement might vary with the intelligence of the child, a test they could not make since they lacked individual data on measured intelligence.

Thus, in 1968, Sewell and Shah added parental encouragement to their path model of educational aspirations as a factor mediating the effects of socioeconomic background (SES) and intelligence. Using the
Wisconsin sample and analyzing results for males and females separately the authors concluded that:

1) for both males and females, socioeconomic status (an index of father's occupational status, father's education and mother's education) intelligence and parental encouragement (mother and father's combined) have independent effects on educational aspirations;

2) intelligence and encouragement cannot completely account for the effect of SES on college plans;

3) SES has a greater effect on aspirations of females while intelligence has a greater effect than SES on the aspirations of males.

4) SES contributes more to encouragement than intelligence for both boys and girls but that the SES effect on encouragement is greater for girls than boys and intelligence has a greater effect on encouragement for boys than girls.

5) males have higher educational aspirations than do girls controlling for SES, intelligence and parental encouragement.

Parallel to the developing literature on the effects of parental encouragement was a continuation of the literature revolving around school effects, primarily in the form of peer and teacher influence on educational aspirations. McDill and Coleman (1965) concluded that their results challenged the generally held position that family background explained more of the variation in educational aspirations than peer influence. Their sample was drawn from six, rather homogeneous, Illinois high schools. It contained observations on each student's status (as defined by his peers) in the social structure of the school. This construct was considered a measure of peer influence by
the authors. With regard to the student's college plans they found that this measure of peer influence increases in explanatory power relative to the family background variables from the freshmen to the senior year. In a similar vein, Campbell and Alexander (1965) showed that the effect of socioeconomic composition of the school one attended (a structural variable) on college plans was mediated by the individual's own status characteristics.

Another type of study which attempted to separate out the influence of peers on educational aspirations was work by Duncan, Haller and Portes in 1968. This study addressed the problem of reciprocal influence of peers on each other first highlighted by Haller and Butterworth in 1960. By extending the traditional path analytic technique to account for just-identified and over-identified models, and taking into account family background and intelligence of both respondent and friends, the authors attempt to quantify the mutual influence of peers on each other's educational and occupational aspirations. They conclude that a large part of the similarity of aspirations between male friends is due to their mutual influence but that another important part is also due to the way in which they come to associate in the first place (i.e., family background characteristics). This latter point represents a problem inherent in studies of peer influence both then and now. To the extent that cross-sectional data are used for such studies, ferreting out the effects of background versus peer influence on aspirations becomes problematic since the basis upon which assortive friendships are formed is
unclear. If friendships are formed on the basis of mutual educational aspirations, then conventional models need to be reformulated to account for this simultaneity with the dependent variable.

III. The Wisconsin Model: Outcomes of Revisions to the Basic Blau-Duncan Framework

In 1969, the Wisconsin group (Sewell, Haller and Portes (1969)) made their first attempt at synthesizing the role of significant others, measured intelligence, family background and educational aspirations in the process of educational attainment. In this early model, they especially attribute great importance to the influence of significant others and they introduced academic performance (rank in high school class) as an additional "social structural" antecedent of attainment. The model posits that: (1) mental ability has substantial impact on academic performance; (2) significant others are influenced by the respondent's academic performance, socioeconomic background and other exogenous factors; and (3) significant others affect aspirations, which in turn affect later attainment.

As in previous studies, significant other influences were viewed as the translation of achievement values of potential influential persons in the respondent's high school years (a combined index of parents, teachers and peers) into expectations which they held for him with regard to his ultimate educational attainment. In this research, significant others were seen as a special case of reference group influence. Such influence more likely operated on an individualized
rather than a collective basis, and it did so by directly forming educational aspirations of youth either through modelling or communication of expectations for appropriate behavior. Thus, significant others were seen as defining the individual's situation for him, from which he derived his aspirations.

Such was the cursory theoretical treatment given to their model of attainment to this point. Tests of their model using path analysis on the Wisconsin sub-sample of rural males indicated direct effects of significant other influence on educational aspirations and educational attainment. They also discovered direct effects of academic performance on educational aspirations and attainment. That is, not all of the effects of this variable on aspirations and attainment were mediated through the influence of significant others.

Throughout the 1970s various modifications and replications of this model were discussed in the literature. Sewell, Haller and Ohlendorf (1970) revised their model of attainment to allow direct paths from academic performance to educational aspirations and attainment and then tested the model on young men from various community sizes (unlike their 1969 article that utilized only young males from farms). As of this point in time their model took the following form:*
where:

A = Socioeconomic Status (index of mother's education, father's education, father's occupation and family income)
B = Mental Ability (Score on Henmon-Nelson test of mental ability)
C = Influence of Significant Others (perception of parental, teacher and peer encouragement, combined)
D = Academic performance (high school rank)
E = Occupational aspiration (Duncan score of desired occupation)
F = Educational aspiration (3 categories of college plans)
G = Educational attainment (4 categories)
H = Occupational attainment (Duncan score of job held 1964-65)

*Note that their sample excluded respondents who dropped out of high school before their senior year

The results of their 1969 article were generally substantiated in this 1970 study containing a somewhat more residentially representative sample of males, although the introduction of the new paths somewhat reduced the importance of significant other influence in the model.

The basic outline of this model in the literature has remained relatively stable over time (with the exception of the deletion of the path from mental ability to socioeconomic background) despite the occasional inclusion or exclusion of additional factors hypothesized to affect educational attainment or aspirations, differences in measurement of concepts, methodological differences and the use of different data sets. A study by Sewell and Hauser (1972) was one of the first to break out the components of family background into its individual components. They found that over fifty percent of the effect of mother's education, father's education, father's occupation and family
income on attainment was mediated by the group of intervening variables (academic performance, significant others and aspirations). The overall model explained 54 percent of the variance in educational achievement. In addition they discovered that the influence of parents and peers on educational attainment was about equal and twice the effect of teachers. Unlike parents and peers, teachers' influence was less dependent on socioeconomic background factors and more dependent on the student's mental ability and academic performance.

IV. Theoretical Developments Associated with the Wisconsin Model

Although the literature on status attainment which incorporates the Wisconsin extensions (primarily the role of significant others and academic performance) is rather large, few studies have provided any theoretical framework for the model. While not an explicit test of the Wisconsin model, an article by Woelfel and Haller (1971) represents an exception. Using data from the senior class of one Wisconsin high school, they modelled the development of educational and occupational aspirations within a theoretical framework pertinent to an attitude formation process. Their theory was based on the use of information. Attitudes were defined as an individual's perceptual construction of his relationship to objects. Situational factors influence the types of significant others an individual is exposed to and the kind of information they impart to him/her (either verbally or by modelling). This information, in conjunction with self-observation of his own activities (self-reflexion) sets the context out of which he forms his
attitude. This information is then compared to previously obtained information (e.g., other related attitudes) to check for consistency. In this way the new aspiration is formed.

Intriguing as it was, this theory could not be tested simply by using data already available in the literature. Thus the authors developed a new instrument to gather greater detail on the content of significant other's influence and on actual expectations of these persons for the respondent's educational and occupational career. The results support their notions about how influence proceeds in three distinct ways: interpersonal, self-reflexive and in comparison to other relevant attitudes. They suggest that the effects of social structural factors on behavior can be partially explained by: (1) the constraints these factors put on who an individual interacts with; (2) the type of information transmitted to the individual in the course of these interactions; and (3) how those with whom the individual interacts define the situational contexts within which he or she must act (reflexively). For example, the individual school classroom setting influences the student's behavior by determining the particular teacher he or she will interact with. The educational objectives of the class (or subject matter) represent the context within which interaction between teacher and student will occur. Teacher verbal feedback to the student regarding his or her individual performance or overall classroom performance will condition the student's future willingness to initiate student-teacher interaction. The assumption here is that positive feedback generates increased self-confidence in the student and may
equally indicate teacher receptiveness to classroom discussion.

Haller and Portes (1973) use a similar framework to discuss the Wisconsin model. They view the model as presenting the process by which aspirations are formed and by which they influence subsequent attainments. Status attainment is hypothesized to be a function of two main components: (1) a cognitive-motivational one (aspirations) and, (2) a contextual one (factors affecting the enactment of aspirations). Aspirations are formed by two processes. The first is interpersonal influence which includes reflexive adjustment of others' expectations and self-reflexion. In the model, interpersonal influence is represented by the direct path from significant others' expectations to aspirations and the indirect path to aspirations from academic performance via influence of significant others. Self-reflexion is the second process by which aspirations are formed and it is represented in the model by the direct path from academic performance to aspirations. One unfortunate aspect of their paper is that it fails to completely specify the contextual variables within which status aspirations are enacted (a major component of their theory). Similarly, they never discuss the role of family background factors within the theoretical framework.

In 1976, Sewell, Hauser and Featherman published their book titled *Schooling and Achievement in American Society*. This volume was a useful compendium of studies addressing the contemporary issues related to research on the status attainment processes. Three chapters in this book discussed various theoretical perspectives from which to view the
process of educational attainment. Chapter Two by Atkinson, Lens and O'Malley uses a theory of action to distinguish the causal antecedents of an immediate action from a cumulative one. An example of an immediate action is an individual's performance on an achievement test. Measures of grade point average or ultimate educational attainment represent cumulative action. Assuming a constantly motivated individual, this theory attempts to demonstrate how an individual's personality (including his abilities, motivations and stock of knowledge) and his situational context affect behavior. Their theory is dynamic, allowing for personality change with age and for reciprocal interaction among various parts. This framework gives great detail on how the interaction of ability and achievement motivation influence cumulative achievement over the educational career. However, treatment of the role of family background in this process is limited except to say that true ability and motivation are its products. Background is simply viewed as part of the formative environment in which ability and motivation interact.

In this same volume, Chapter Three by Trevor Williams uses social learning theory as a framework within which to analyze the effects of family environment on the development of intellectual abilities in children. Conceptually, the ways in which family environment impacts on children's abilities are through:

(1) the stimuli that parents provide children by consciously organizing the opportunities available to them and the people they interact with;
(2) the reinforcement practices used by parents to modify the intellectually-relevant behaviors of children;

(3) the expectations that parents hold with regard to appropriate performance on these particular behaviors.

The primary emphasis here is on the behavioral rather than the physical characteristics of the family environment.

Parental abilities condition these dimensions of the environment. For example, they affect the type of stimuli parents provide children whether this be in the form of learning materials made available to their children both inside or outside the home or the quality of verbal or other types of interaction which occur within the home. Parental abilities may affect reinforcement practices by determining the form of punishment administered to the child (physical or otherwise), the flexibility allowed with regard to appropriate rules of behavior, or parental dominance characteristics. Parental abilities may also condition parental standards or expectations of what constitutes appropriate performances on various behaviors for their children. Williams argues that models which link family background characteristics and children's abilities generally do not take into account parental intellectual abilities as antecedents to family background characteristics such as father's occupational prestige. By not doing so, they most likely overestimate the influence of background on abilities. Furthermore, he believes that children's abilities have reciprocal influence on the dynamics of family environments. Children's abilities impact on parental behaviors by way of the stimuli which
parents provide and the expectations they hold for their individual children.

Using a small, somewhat unrepresentative Canadian sample of adults and their male children, he tests the hypothesis that the children of intellectually advantaged parents have a triple advantage with regard to development of their own abilities. Not only are their parents supposedly more likely to provide stimulating environments for them, but these offspring are, to some extent, more favorably genetically endowed with respect to intelligence and hence have the added advantage of being more capable of manipulating the environment to their own intellectual advantage.

Williams uses path analysis to test the nonrecursive structural equation model specified by his hypothesis. Acknowledging the limitations of his sample, he concludes that there is some evidence to support the contention that childrens' own abilities affect the environment to which they are exposed. Empirical tests of his model also show that family environments do affect childrens' abilities and that parental abilities contribute to variability in these environments and therefore indirectly affect the intellectual abilities of their offspring. Stimulus and expectations dimensions of environments seem to exert the greatest influence on childrens' intellectual abilities. While useful in explaining the development of intellectual abilities in children, Williams never extends the framework to account for the development of aspirations and their subsequent impact on educational attainment. Furthermore, to the extent that families structure
opportunities and dispense different types of rewards and expectations for female as opposed to male children, the generalizability of the results is somewhat limited.

Finally, Chapter Four by Joe Spaeth looks at the socioeconomic achievement process as characterized by a single underlying dimension of cognitive complexity. The basic Blau-Duncan model of attainment is viewed as a model of exposure to environmental settings. Occupational prestige is a measure of cognitive complexity of a job. Socioeconomic status of the parents is seen as a measure of the cognitive complexity of a child's home environment. And, the process of educational attainment is viewed as increasing cumulative exposure to more complex educational environments with advancement in school. Status attainment is thus perceived to be a function of the development of an individual's competency (accumulation of knowledge and skills) to cope with increasingly complex cognitive phenomena. The effectiveness of any particular setting in developing competency varies directly with the length of exposure to and the variety of stimuli within that setting. Every setting, whether in school, at home, or on the job, is characterized by the actual stimuli that take place and the variety of that stimuli; the greater the variety of stimuli, the more complex the setting. Each setting also has actors (including ego) and each actor affects ego through the amount, type, and motive behind each interaction with him or her. Home settings have an effectiveness advantage in developing competencies over school and job settings by virtue of the greater likelihood that interaction will be on a one-to-one basis rather
than in a group setting, that much interaction occurs at an early age when the child is first developing personality, and that few constraints are placed on parents (as opposed to employers and teachers) with regard to the quality, intensity and goal of interaction. All settings have both an active and passive component for the individual.

Reviewing the literature of environmental influences on intellectual development, Spaeth concludes that standard measures of parental socioeconomic status are crude indicators of family cognitive environment and do influence a child's intellectual abilities. However, when more detail on the home environment is available (e.g., on possessions and parental expectations and goals for children), these measures mediate much of the effect of socioeconomic background on IQ. He believes that this finding indicates that there is a missing link with regard to how family cognitive environments affect the child, mainly the effect of parental mental abilities. Thus, he concludes that his model is misspecified because parental abilities have been omitted and adequate data on this characteristic is unavailable.

In summary, while each theoretical perspective contributes to our understanding of the status attainment process, none represents a complete analytical framework by itself. Almost all of the above authors (Woelfel and Haller (1971); Haller and Portes (1973); Atkinson, Lens and O'Malley (1976); Williams (1976); and Spaeth (1976)) discuss the linkages between an individual and the environmental settings within which he operates. Williams is the most fundamental in terms of his reduction of the interplay between individual psychological development
and characteristics of environmental settings into the components of stimuli, rewards and expectations. Spaeth is the most comprehensive in applying a single outcome of this interplay (the development of cognitive complexity) to various types of attainment throughout different stages of the life cycle (including childhood, education and jobs). While both Spaeth and Williams suggest that the individual is not simply a passive actor in this process, but has conscious (or unconscious) influence, neither give much discussion to the ways in which this occurs. In contrast, Atkinson, et al., and Haller and Portes devote more attention to the ways in which the individual's own motivation, abilities and perceptions contribute to his or her own success, and in what ways these processes are operationalized within a model of status attainment.

V. Variations on the Wisconsin Model

Having reviewed the relatively few theoretical advances in the status attainment literature, the following discussion will be devoted to a review of the major modifications and replications of the Wisconsin status attainment model since the early 1970s. Besides the criticism that status attainment models were lacking in their theoretical foundations, other deficiencies were noted. The overwhelming majority of studies were limited to testing their models on geographically restricted samples that were homogenous in nature with regard to race and sex. Basically these models represented attainment processes for white males and little attention was given (whether due to lack of data
or for other reasons) to the character of status attainment processes for women and blacks. This was surprising given the imposition of social structural constraints and potential differences in family background effects for these groups. In addition, due to their own inability to explain a significant proportion of the variation in status attainment, researchers increasingly acknowledged (more out of common sense than theoretical considerations) that additional variables such as various life cycle events (marriage, childbearing, military service); composition of family of origin with regard to size, sex of children and birth order; and school context variables (including the influence of peers and teachers) might contribute to a more complete picture of the attainment process.

A. Replication

Despite differences in samples and measurement in past studies, Wilson and Portes (1975) set out to "replicate" the basic Wisconsin model on a national sample of young men. Using path analysis on national longitudinal data from the Youth in Transition Project carried out at the University of Michigan, the authors contradict the major findings of previous studies. They conclude that the effects of parental background factors and academic achievement on educational attainment are not mediated to any appreciable extent by social-psychological intervening factors or by the respondent's mental ability. But, while previous studies lacked data on high school dropouts, this study was missing information on respondents who graduated from college, perhaps a
source of differences in results. This study exemplifies the problems of replicating studies when many sources of error are possible (e.g., sampling, measurement and time of data collection).

In 1983, Jencks, Crouse and Meuser went to great lengths to replicate the results of the Wisconsin model on the Project Talent data for 1960 and compare results to those of Sewell and Hauser (1975) who used the Wisconsin data, and Alexander, Eckland and Griffin (1975) who used the Explorations in Equality of Opportunity (EEO) data. They conclude that the Wisconsin data, despite its geographic and educational restrictions (i.e., no data on high school dropouts) and the EEO data, despite its low response rate will not systematically bias conclusions drawn from them and that their study using Project Talent data generally agrees with the substantive conclusions drawn by these other works. But while the results of their study show evidence that the measurement procedures and sample used by the Wisconsin researchers are adequate to test their model, they do not believe that the model fully represents the actual attainment process. In other words, they advocate the need for more detail on family background dynamics and the allowance for nonrecursive aspects in the model.

B. Sex differences in the attainment process

Studies of status attainment processes which compare males to females gained popularity in the late 1970s. Marini (1980) suggests that the models for females were, in general, not as elaborate as those for males. Even for those that were (e.g., Alexander and Eckland
(1974)), the traditional form of the model still failed to explain a significant portion of the male-female differential in educational attainment. When non-traditional variables such as marriage and childbearing appeared, they usually entered models for females only and hence, no sex comparisons with regard to their effects could be made.

Though, in general, studies have found the process of status attainment to be quite similar for males and females, certain differences seem to persist. The first is that characteristics of the family of origin have greater effects on the attainment of females than males, while achievement characteristics have greater effects for males than females (see Alexander and Eckland (1974); Rosen and Aneshensel (1978); Marini and Greenberger (1978)). The effects of background factors on status expectations and subsequent attainment of men and women also seems to be channeled through the influence of the same sex parent (Treiman and Terrell (1975); Rosen and Aneshensel (1978); Marini (1978)). Parental encouragement seems to have a stronger effect on the educational attainment of males than females (Hout and Morgan (1975); Marini (1978)). The levels of educational attainment are usually lower for females than males as are their educational aspirations. Marini and Greenberger (1978) also point out that there is less discrepancy between the educational aspirations of young men and the education levels they actually expect to attain than for females.

In short, status attainment models for females are not always fully comparable with those for males and therefore leave open the question of similarity/dissimilarity between the sexes in the process of educational
attainment. Furthermore, studies which have separated male samples from female have been geographically restricted while those with national samples have usually combined males and females and examined sex-main or limited sex-interaction effects. National samples, separated by sex, have generally not been utilized although they have the advantage of not imposing the restriction that certain variables have the same effect for boys and girls (as in a combined sample). Using separate samples, the data is allowed to demonstrate (or refute) the possibility that this may be so.

Studies by Marini (1978) and Kerchoff and Parrow (1979) were among the first to examine the effects of early marriage on the educational attainment of young adults. Marini, comparing samples of males and females, found that the earlier the age at first marriage, the lower the educational attainment for women.¹ Age at first marriage had no appreciable effect on the educational attainment of men. Furthermore, age at first marriage had a stronger effect on the attainment of women than did any of the other kinds of variables usually considered in male models of educational attainment. She also points out that when intervening variables such as parental encouragement, curriculum or aspirations are included in the attainment model, socioeconomic background and achievement affects on educational attainment no longer differ significantly by sex. This suggests that male/female differences in the attainment process are most likely to occur in the translation of educational resources attained in high school into subsequent educational attainment. It also implies that variables measuring other
life cycle contingencies are especially important in understanding the educational attainment process for women.

Contrary to Marini, Kerchoff and Parrow find that, for unmarried male high school students in 1966 but not college students, marriage during the next four years significantly lowers additional educational attainment by 1970. In addition, Hogan (1978) in his examination of the ordering of life events finds that military service is a major disruptive factor in the life course of men, particularly as it enhances the probability of early marriage and subsequent divorce.

C. Racial differences in the attainment process

The variability in results from studies of race differences in educational attainment (see Gottfredson (1981)) makes it difficult to precisely outline the nature of separate attainment processes for blacks and whites. Differences in sample characteristics (e.g., cohort age and grade in school, time of data collection and geographic region), measurement of concepts and statistical techniques contribute to this problem. Duncan (1968) was one of the first to highlight the initial disadvantage that blacks have compared to whites in the attainment process. They begin with lower levels of socioeconomic resources than whites, including lower educational attainment of parents and lower family income. Blacks are also handicapped relative to whites in the translation of these background resources, as well as intervening achievement characteristics, into subsequent occupational prestige and earnings. According to Gottfredson (1981), this finding is one that
generally holds across studies.

Portes and Wilson (1976) examined racial differences using an expanded version of Duncan's status attainment model, including additional measures on mental ability, academic performance, self-esteem and educational aspirations. They found that variables represented early in the attainment sequence, such as socioeconomic status, mental ability, and academic performance were better predictors of the educational attainment of whites while intervening variables such as self-esteem and educational aspirations were important for blacks. Their interpretation of this finding is that for blacks, movement towards higher educational attainment is less dependent on institutionalized mechanisms of mobility in society (e.g., family background and achievement (in the form of grades) than upon individual ambition and positive self-concept.

Porter (1974) also suggested that performance was less of a criterion for educational achievement of blacks than was conformity to middle class norms and sponsorship by the elite. On the other hand, for whites, educational attainment reflected more of a "contest" form of mobility. Conformity also seems to be dependent on encouragement by significant others and Hout and Morgan (1975) point out that, especially for black females, this encouragement can also translate into higher academic performance.

In summary, though various differences between blacks and whites have been found in the literature no conclusive models have been forthcoming. While it is clear that the models of educational
attainment to date explain the process for white males better than any other race or sex group (see Hout and Morgan (1975)), no alternative models for other racial groups have been firmly identified.

D. The influence of family composition on attainment

Family composition effects have also been of interest to those modelling the status attainment process. As early as 1967, Kammeyer reviewed the literature related to birth order effects on various social and psychological factors. He concluded that little a priori theoretical justification for the consequences of this type of variable had been offered to date. It was his feeling that the study of birth order effects had gained popularity in the literature as a result of positive findings in previous research. Description and interpretation of birth order effects had usually been ad-hoc and revolved around differing child rearing practices in the family or sibling relationships. Because of the character of these interpretations, Kammeyer called for new studies of family interaction patterns and the development of theoretical systems that would link such patterns to extra-familial experiences. Adams (1972) notes however that, despite various theoretical and methodological problems still present in research related to birth-order effects as of the early 1970's, one finding consistently reappears in the literature. That is, first borns (including only children) have greater educational attainment and are more likely to attend college than later borns.

Subsequent to Kammeyer's comments, the literature on birth order
effects began to expand to encompass other aspects of family composition that might affect educational attainment. While some studies have examined the direct effects of such variables on educational attainment, a larger number have been concerned with the effects of family composition on specific aspects of that process such as the development of mental abilities or educational aspirations. Marjoribanks, Walberg and Bargen (1975) indicate that the number of siblings has an important influence on mental abilities. The higher the number of siblings that an individual has, the lower the individual's IQ. They also suggest that the general finding in the literature of higher achievement for first borns may be an artifact. First borns may not excel simply because they are first born but rather, because they receive all parental attention if they are an only child or they receive all of their parents' time until later children are born. With each subsequent child, less parental time input per child is likely. These factors may be complicated by differing familial interaction patterns or expectations based on the sex of the child, or in large families, by increased experience in child rearing practices.

Zajonc and Marcus (1975) and Zajonc (1976) have presented a theoretical framework which tries to explain the strongly empirically documented higher achievement of first borns as compared to later borns. Based on similar insights to those of Majoribanks, et. al., the first child is viewed as being born into a family intellectual environment undiluted by the presence of other children. In social learning terms, this means that the first born (particularly until other
children are born) is exposed to a greater average frequency and intensity of adult interaction throughout his or her childhood, with subsequent impacts on ability levels.

This theory would therefore explain the negative effects of higher numbers of siblings on IQ. However, the framework needed to be expanded to account for the intelligence discontinuity of only children as compared to first borns from larger families, and the effects due to differential child spacing. Basically, the only child intelligence discontinuity was explained by the cognitive gain to tutoring younger siblings. The age-spacing differential indicated that smaller gaps between children gave an even lower average amount of parental time (and parental IQ) inputs to later born children while very large gaps presented a less diluted intellectual environment for younger children due to the older ages of siblings.

Numerous studies have used this framework to examine family composition effects on measured ability. Pfouts' (1980) findings support the hypothesis that close spacing of children hinders the academic ability of later born children. Mercy and Steeiman's (1982) research also supports the confluence model prediction that both number of older and number of younger siblings are negatively related to ability with number of younger siblings having the strongest impact. Interestingly, Paulhus and Shaffer (1981) show that females are less likely to be negatively affected in terms of scholastic aptitude by increasing numbers of younger siblings than are males. They attribute this to the intellectual benefits accrued from general caretaking and
teaching responsibilities of older daughters. For both males and females, larger numbers of older siblings have negative effects on aptitude.

Most studies examining family composition factors have not investigated the effects on adult outcomes. Exceptions to this are studies by Adams and Meidam (1968) and Lin and Oliver (1979). Adams and Meidam found that the number of siblings, sex of siblings and child spacing are each related to an individual's actual college attendance. Number of siblings had a negative effect while child-spacing was positive. Sex of siblings particularly mattered for females from blue collar families. These young women were hampered in attending college by the presence of many male siblings. Lin and Oliver also find modest effects of sex of siblings on educational aspirations and parental encouragement for young women. Women with only female siblings have higher educational aspirations and perceive more parental encouragement and higher parental aspirations for their education than those raised in families with only male siblings.

But even these studies are vulnerable to the problem of omitted variables. Because much previous work on birth order effects has been based on cross-sectional data from different families, more importance may have been attributed to sibling related variables which in fact may measure the impact of unobserved parental characteristics (Lindert (1977); Olneck and Bills (1979)). Both studies address this issue by comparing the educational attainment of siblings, thereby holding family background constant. Each study confirms the continuing importance of
family size even when intra-family data is utilized and parental characteristics are controlled for. Furthermore, when measures of family time inputs by sibling position are examined for their effects on educational attainment, Lindert finds that greater parental time inputs to children of higher birth orders (especially first borns) have significant positive effects on educational achievement.

Olneck and Bills on the other hand, find that the effects of birth order disappear once family size is controlled for in a sample of brothers. In addition, family size effects persist after controlling for parental characteristics (including parental mental ability).\(^2\) They interpret this finding to mean that, without birth order effects (a proxy for parental time inputs), the persistent effect of family size suggests the importance of other family preferences such as differential economic resource allocations among children.

It seems clear that family composition accounts for some part of the attainment process, particularly with regard to its impact on intellectual ability. Some uncertainty still exists with regard to the impact of these variables on ultimate educational attainment since previous studies have not simultaneously controlled for the various factors. Birth order and number of siblings seem to have the most substantial impacts (particularly the latter) while sex composition of siblings has had modest effects depending on the sex of the respondent.

E. Institutional effects on attainment

Institutional effects, particularly the impact of high school
characteristics (including faculty, curriculum and facilities), have been another area of concern to researchers of the educational attainment process. Spady (1976) gives an excellent review of the literature pertaining to these issues. He concludes that previous research on the effects of school resources on student achievement has been plagued with methodological (as well as theoretical) problems. While such studies have been concerned with the way in which characteristics of the student's school impact on his or her educational achievement, they have generally lacked data on measures of individual motivation and ability. This has led to overestimation of the effects of parental background on attainment as well as underestimation of school effects due to the possible interaction of school characteristics with an individual's academic ability and performance characteristics. In general, however, there have been significant effects of school characteristics on student achievement independent of ability and socioeconomic background even though these effects were smaller than expected. In particular, socioeconomic and racial (e.g., percent black) composition of the school have had small but consistently positive effects on educational outcomes independent of other characteristics.

Hauser, Sewell and Alwin (1976) in the same volume as Spady's work, address some of the methodological problems of previous work in this area. Using a structural equation model for Wisconsin data on educational aspirations and attainment, the authors searched for interactions of high school characteristics (i.e., school-wide averages on the dependent variable) with academic ability, curriculum, class
rank, socioeconomic background, sex, peers' educational plans, and other
to background and social-psychological inputs frequently used in the
Wisconsin model. After extensive testing for interaction effects they
too conclude that high school effects are minimal in explaining
variations in educational aspirations and attainment.

F. The influence of peers in the attainment process

One characteristic of school and neighborhood environments which
has been given particular attention is the influence of peers on an
individual's educational aspirations. Peers' college plans and the
encouragement they offer friends to continue their education beyond high
school have been the usual measures of peer influence. But this
literature also suffers from some of the same methodological problems as
does the literature on institutional effects. It is unclear whether
assortive friendship patterns are determined by characteristics of a
particular school environment or by parental background characteristics
which influence choice of school. That is, are students more likely to
seek friends with similar educational goals and/or abilities once they
have chosen a school or are these friendships defined prior to attending
the same school by virtue of similar family background characteristics
(or ability)? Aggregate measures of school resources as indicators of
favorable or unfavorable school contexts have similar problems of
simultaneous determination with family background and/or individual
ability characteristics.

Keeping in mind these problems of interpretation with regard to
school context effects, including influences of teachers and peers, various results regarding the influence of significant others on educational attainment and aspirations have been noted in the literature. While earlier studies (e.g., Campbell and Alexander (1965); and Duncan, Haller and Portes (1968)) had documented peer influences on attainment processes, little attention had been devoted to the relative magnitude of peer influence as compared to the influence of parents or teachers. Williams (1972) discovered that the influence that parents and peers exerted on educational aspirations changed over time, with that of adults increasing relative to that of peers as the education of the student progressed. Certain sex differences have been noted. While parents maintain strong influences on aspirations measured in tenth grade for both sexes, for girls, teachers and peers gain in influence by twelfth grade. At both points in time it seems clear that adult influence on educational aspirations is much stronger than that of peers.

A more recent article by Davies and Kandel (1981) finds similar relationships with regard to the relative effects of parental compared to peer influences on educational plans. They also show a stronger peer effect for girls relative to boys. The consistency of these results between studies is encouraging when allowance is made for measurement differences in the concept of influence by significant others. While most studies concerned with peer influence on educational processes used the respondent's perceptions of encouragement from significant others to pursue a post-high school education or used peers' educational plans,
other works (like that of Davies and Kandel) have incorporated both actual reports of influence from a parent or best friend as well as student perceptions of influences to measure these effects.

The relatively small impact of peers on an individual's educational aspirations has also been documented while controlling for aspirations of peers at the point when friendships are formed. Cohen (1983) indicates that earlier estimates of peer influence have been inflated by over one-hundred percent because they failed to separate peer influence that occurred subsequent to the formation of friendships from initial similarity of aspirations at the beginning of the friendship. Once these components are accounted for, he finds very little effect of high school peer influence on educational aspirations.

Other issues with regard to the literature on educational attainment will be left to subsequent chapters. These include discussions of methodological controversies and the incorporation of new family background variables not previously considered to any appreciable extent in the literature.
NOTES

1 Marini (1984) further indicates that the earlier the entry into parenthood, the lower the educational attainment of women independent of the effect of the timing of entry into marriage.

2 Parental family income is not explicitly controlled in this study. Rather, this and other similar family background effects are controlled by defining variables in the model in terms of sibling differences.
CHAPTER III

Educational Attainment from a Social Learning Theory Perspective

I. Overview of Social Learning Theory

Social learning theory (Bandura and Walters (1963); Bandura (1971)) emphasizes the role of modelling in the acquisition of behavioral patterns. In this framework, learning can occur simply by observation of a model. Observation of rewards for the model's behavior is not necessary for knowledge concerning particular behaviors to the cognitively stored. However, knowledge of this reinforcement affects what aspects of the modelled behavior are focused on and cognitively retained. While positive reinforcement of the model is a necessary condition which motivates the observer to perform a learned behavior, it is not sufficient to produce overt action. Performance also depends on the particular aspects of the observed behavior which were focused upon and cognitively retained, their applicability to current situational factors and the developmental skills of the individual performer.

A model's behavior serves as a source of information and this information is actively processed by the observer. These processes involve symbolic and cognitive organization and storage (attention and retention, including mental rehearsal) of the processed information. They also involve the acquisition of appropriate motor skills for enactment of behavior and retention of the instrumental value of the action (i.e., the motivation for the model's response).
People differ in the degree to which modelling affects their behavior. To a large extent, the behaviors that are modelled are highly correlated with their conditions of reinforcement. In other words, a behavior that takes on a high functional value for the observer because of its reward will most likely be modelled. In addition, the higher the prestige, power, and status of the model, the more effective will be his or her influence in producing matching behavior from the observer since past success is tangible evidence of the functional value of their activity. Furthermore, the prestige of these models will tend to generalize to activities different from that which produced the original association. Behaviors which are novel also have higher attention-getting properties.

Bandura's theory emphasizes the contiguity between the model's actions and the stimuli within the model's environment which promoted the response. But his theory also emphasizes the individual's ability to cognitively retain information from observed activities. This store of information is used in varying situational contexts by either imitating, innovating, or mentally rehearsing activities without actually performing them. He also allows for the acquisition of abstract modelling. This occurs when the observer abstracts the common attributes of a variety of modelled responses and develops rules for enacting behavior of a similar type under varying environmental conditions. This "derived" behavior need not have actually been performed by a model. In abstract modelling, the emphasis is on the role of internal and symbolic motivators and mediators of behavior.
rather than external rewards or punishments.

Bandura points out that as individuals age and verbal development strengthens, more modelling occurs verbally than behaviorally. This is because many different types of complex behaviors can be described in words (e.g., instructional manuals). Also, as Shaw and Costanzo (1982) indicate, abstract modelling is one mechanism by which the socialization process changes over time. As we age, extrinsic demands, rewards, and sanctions, as well as immediately available behavioral models, are replaced in the socialization process by symbolic and intrinsic controls.

Despite the cursory treatment of social learning theory presented above, it is now possible to apply some of its principles to the role of background factors and parental encouragement in a model of educational attainment. In this model, background factors are examined within the context of how they affect the educational development of the adolescent. As pointed out earlier, at older ages the motivations and rewards associated with a model's actions or words can have effective impact on an observer at more abstract levels than is the case with young children. Even so, the following discussion of ways in which each background factor impacts on the educational attainment process will be pertinent to early as well as to later childhood. To the extent that parental characteristics change over time, however, the environmental settings in which each factor plays a part may be different from early childhood to adolescence. In this study, the educational attainment of the parent is viewed as relatively unchanging over time. It should also be pointed out that parental education, in addition to parental income
and occupation and other family characteristics (which may change over time) are measured as of the base survey year or at the point when the respondent was age 14. Thus, they are quite likely to be adequate representations of the family setting for the respondent during his or her teenage years.

II. The Influence of Family Background from a Social Learning Theory Perspective

In this model, parental socio-economic status will be decomposed in order to separate the effects which may have complicated prior interpretations of this variable. This concept has usually represented an eclectic assortment of influences upon the adolescent. On the one hand, it is viewed as a status variable. At the same time, it is viewed as a measure of income or family well-being. In addition, it is recognized as a reflection of some amorphous collection of values and norms which characterizes a particular social class. Finally, it has often been considered the sum total of the types and amounts of socialization experiences of the child. Seldom are the mechanisms that underlie these interpretations discussed. Bandura's social learning theory has several advantages in this respect. It enables us to decompose the usual index into individual components with different underlying mechanisms for impacting on the development of educational attainment. Furthermore, this decomposition facilitates discussion of how these mechanisms may differ depending on the sex of the respondent and the sex of the parent.

In this model, family income is included as a background factor
separate from parental education and occupation. Family income is viewed less as a socialization factor than as a control on financial resources available to the family. Income level is hypothesized to affect educational attainment of youth directly by determining the economic ability of the family to finance post-secondary education for the child. Income should also indirectly impact on educational attainment by virtue of its effect on achievement, the level of parental encouragement and on the level of the adolescent's own educational aspirations. If parents realize they have no financial resources available to enable them to send their child to college, they may actively discourage him or her from doing so. The reality of such financial constraints may also prompt students to lower their educational goals.

Parental income also is important for its role in characterizing the learning environment of the individual. Families with high incomes theoretically should be better equipped to purchase greater quantities of both material objects and experiences for their children than low income families. This larger supply of intentional environmental stimuli should, in turn, result in more complex surroundings. Greater environmental complexity, while fostering growth in cognitive skills, also provides a larger repertoire of behavior from which the child or adolescent can selectively choose to model. In this complex fashion, parental income generally exhibits a positive influence on educational achievement.

Parental education can be viewed from a modelling perspective. To the extent that more highly educated parents engage in more overt
intellectual activities, e.g., reading, writing, or conversing at more abstract levels, (which may directly involve the child or not), the child will acquire a more complex symbolic repertoire of language and behavior. In this sense, education of the parent is not viewed as a role modelling influence on the adolescent's educational aspirations. Rather, parents' education is viewed as a reflection of a particular learning environment for the child, an environment composed of specific parental behaviors that are affected by the parent's own educational attainment vis a vis his or her propensities to engage in these modelled educationally relevant behaviors. Thus, parental education is viewed as having direct influence on the child's academic skills and achievement and hence, indirectly affects educational attainment.

A further elaboration of the effect of parental education can and should be made in this model. As Maccoby and Jacklin (1974)(p. 363) point out, social learning theory not only suggests that children learn through imitation of same sex models, but that they are also differentially reinforced when they imitate same-sex as opposed to opposite-sex models. This differential reinforcement leads to a generalized tendency to model same-sex parents. Though offspring may learn from opposite-sex parents, certain sex-linked behavior is seldom performed, because of previously observed negative consequences. Thus, the social learning theory framework suggests that it is preferable to separately examine the differential impact of mother's, as compared to father's, educational level on educational attainment of youth. This would involve examining the effects of both mother's and father's education in
separate models for boys and girls.

Since a basic condition in Bandura's learning theory for modelling to occur is the observation of the model in contiguity to the stimuli producing the modelled behavior, it would seem likely that regardless of sex of child, mother's education, as opposed to father's would have the greater effect. This is due to the traditional tendency for women to remain in the home during working hours. This is not to say that behavior will not be learned from the father since behavioral information can be retained despite the absence of the model. It is only that the greater frequency and intensity of exposure to the mother's actions may produce stronger connections between herself and her children's behavior.

On the other hand, more recent studies such as Booth and Edwards (1980) suggest that father's are equally involved as mother's in interaction with their children once consideration has been given to the number of non-working hours fathers have available to spend with their children. This finding implies that, to adequately assess the influence of same-sex parents on educational achievement, it is important to control for potential parental time inputs. The present study, unlike most previous research, is able to do this by incorporating a variable measuring the employment status of the mother when the respondent was age 14.

One further point related to the issue of parental actions brings us to the role of parental occupational status and employment with regard to the youth's educational attainment. In general, most previous
studies have ignored mother's employment and occupational status and have included father's occupation in one of two ways. Either it has been included separately as a proxy for family income or it has been combined with father's education (and sometimes mother's education) into a composite index of socio-economic status. In the latter instance, its interpretation is overlapping, involving both an economic and a "class value" representation. It is the contention of this paper that, with measures of family income and parental education included directly in the model, there is no additional theoretical reason to justify the inclusion of father's occupational status as an independent predictor in the model. From a social learning perspective, it is unclear whether father's occupational status would have an effect on educational attainment of youth over and above the effect of parental education.\(^3\)

On the other hand, it is possible to envision how mother's employment and occupational status may impact on children's educational behavior. Hoffman (1974) suggests that families in which a mother works may offer different environments for modelling behaviors than families where she does not work outside the home. In families where both parents work, the division of household labor between marital partners is usually somewhat more egalitarian and of a less "traditional" sex-role nature. These variations upon performances of "traditional" male and female roles theoretically should impact on both sons and daughters. For example, these role differences have been shown to especially affect the self-concept of girls. Daughters of working mothers, as compared to daughters of nonworking mothers, view their
mothers in particular and women in general as more competent and effective. They also appear to be more highly motivated to model their mother's behavior since her actions are viewed as valuable and desirable.

The opposite side of the coin indicates that sons of working mothers are more likely to view men as warm and expressive. However, if the mother is working out of sheer economic necessity and not because she wants to or is satisfied to do so, the son is more likely to devalue the father as a positive role model. With this study's control on family income, it will be possible to examine the effect of mother's employment on sons (as well as daughters) more clearly.

In short, if working mothers contribute to increased self-esteem for young women, these daughters may be more willing to attempt more difficult educational goals than daughters of non-working mothers. Also, to the extent that working mothers demand greater independence of both their sons and daughters than non-working mothers, these children will most likely develop skills and personal assessments of skills that are advantageous to the accomplishment of educational goals. Thus, mother's employment status should have a direct and positive impact on educational goals for both boys and girls as well as an indirect effect on goals through educational achievement. Educational aspirations then becomes the vehicle by which maternal employment impacts on educational attainment.

Previous empirical research involving various methodologies and measurements of concepts indicates that maternal employment per se has
no significant direct effects on educational outcomes for youth (see, for example, Wallston (1973); Etaugh (1974); Hoffman (1974); Rosenthal and Hansen (1981); D'Amico, Haurin and Mott (1983)). Indirect effects of mother's employment status have generally not been examined in structural equation models of educational attainment, nor has the concept of maternal employment been given adequate theoretical treatment with regard to its predictive effect on educational attainment. Furthermore, previous studies have often been limited in their ability to control for confounding factors such as family income or sex of children. While it may be that mother's employment status positively affects the family environment in the ways mentioned earlier, it is also possible that her work status proxies for the time available for mother-child interaction. If this is so, such countervailing effects may reduce the overall effect of mother's employment to near zero.

Aside from the mother's employment status, her occupational status may especially impact on a daughter's educational behavior. If the mother is engaged in an occupational activity that is atypical for women (i.e., it is not a traditional stereo-typical occupation), her occupational behavior represents a novel behavior for women that is presented within the context of the child's broader family environment. To the extent that a child internalizes this occupational related behavior as appropriate for all women (i.e., women can do whatever men do), and therefore is acceptable for herself, and can abstract and apply such meaning to the appropriateness of the acquisition of higher education for women as well as men, then mother's
occupation should have a direct impact on educational aspirations for young women. Consequently, mother's occupational status will have an indirect influence on educational attainment via educational aspirations.

Correlated with this notion of novelty in occupations not typically held by women is the strength of the model presented to the children. Incumbents of atypical occupations may represent more powerful models than other female workers as a result of the competitive (against men) demands of the occupation. In this sense, one would expect that mothers who hold atypical occupations for women would have children (both male and female) who were more likely to develop the competitive skills advantageous to academic achievement.

Number of siblings is another measure of family background to occur with some frequency in models of educational attainment. Like other traditional background factors, it has been subject to various interpretations. One is that it affects the family economic resources available per child for continuation of education beyond high school. Another interpretation is that it represents a measure of parental time inputs per child. These interpretations are summarized in the notion that the smaller the family size, the more parental time and money available to the student.

In this paper, increasing family size is expected to have a negative impact on the family modelling environment of adolescents with respect to the availability of adults. That is, the larger the number of siblings, the less frequent (on the average) will be contact with
adult family members. Large numbers of siblings will therefore indirectly impact on educational attainment via lower achievement levels, but influence attainment directly by its effect on family economic resources.

Information on whether the respondent is first born will also be utilized in this paper. Independent of the number of siblings, being born first should have certain advantages from a modelling perspective compared to other birth order positions. Aside from the initial advantage of being born into a learning environment undiluted by the presence of other siblings, first borns may be subject to higher parental expectations with regard to educational and occupational goals. Thus, being first born should indirectly contribute to educational attainment by way of developing skills essential to educational achievement and directly exert its influence on attainment via increased parental encouragement to pursue post-secondary education.

III. Parental Encouragement and Educational Aspirations as Intervening Variables

The next category of variables to be discussed within a social learning theory framework will be those that intervene between family background and ultimate educational attainment. Of major importance in this regard is the influence of parental encouragement. Previous research generally has not separated the effects of maternal and parental encouragement. Again, to the extent that children are more sensitive to the behaviors, expectations, and verbalizations of same-sex adults, differential effects according to sex of child and sex of parent
need to be investigated. Parental encouragement is viewed in this study as a reflection and modification of parental values with regard to the worth of an extended education. These values are arrived at on the basis of the parents' own past experiences which include their education and commensurate degree of occupational success. These standards are re-evaluated with regard to the specific child in question, primarily on the basis of the child's ability level and achievements. Individual child characteristics such as sex and birth order may also make a difference.6

But most importantly, how parental encouragement impacts on educational attainment is based upon the degree of encouragement transmission perceived by the child. Thus the child mentally organizes a variety of parental behaviors and verbalizations into an average assessment of parental encouragement. It is this assessment that affects his or her educational attainment via educational aspirations.

That the child's perception of parental encouragement is a better predictor of educational outcomes than the parent's report of encouragement was tested and verified in a study by Acock and Bengston (1980). Upon further reflection, it is also not surprising that parental report and student perceptions can be quite different (as Acock and Bengston (1980) found) since the child may be referencing and inferring (or not inferring) encouragement from more (or fewer) behavioral/verbal points of parental actions than the parents themselves. This interpretation of the effects of parental encouragement upon educational attainment remains true to the social
learning theory framework in that cognitive influences can condition or intervene in the relationship between stimuli and response. Thus, cognition affects behavior by determining what is observed, stored, and retained over time.

While the influences of family background measures and parental encouragement on the educational attainment process are the primary focus of this paper, other variables can be encompassed by the theoretical framework. The amount of encouragement from teachers to pursue post-secondary education is one such variable. It should theoretically affect the development of educational aspirations in much the same way as does parental encouragement. Thus, it is hypothesized to have a positive and indirect effect on educational attainment through educational aspirations. To the extent that close ties to teachers are not as frequent as are similar relationships to family members, the magnitude of the effect should be smaller than for parental encouragement.

The influence that peers exert on a youth's educational aspirations is more difficult to specify. Assuming that the individual knows the college plans of his or her friends, the tendency to model their behavior will theoretically depend on his or her understanding of the motives behind the peer's educational values and peers' anticipated rewards for attaining certain levels of education. Statements about college intentions or actual college attendance indicate the value that peers attach to the pursuit of higher education. This value can reflect a number of different motives by the peer for attaining more education. For example, motives might include peer pressure to attend
college and retain status within the peer group, a desire to be successful in acquiring a good job, pleasing relatives, or pursuing higher education for its own sake. It is not sufficient for these motives to be attractive to the respondent in order for him or her to model peer intentions. Of equal importance in influencing the educational aspirations of the respondent is the idea that peers believe these outcomes to be possible and that college attendance is an acceptable and successful means for obtaining them. In this way, peers' college plans should theoretically be a positive influence on the educational aspirations of youth. Peers' influence on actual educational attainment will thus be indirect.

IV. Additional Control Variables

The last set of variables to be considered in this model of the educational attainment process are included primarily as controls. Characteristics of the area of residence of the respondent include a rural-urban variable and a measure of south-nonsouth region of residence. The rural-urban dimension controls for the availability of informational resources which facilitate awareness of job opportunities and commensurate educational requirements. It is presumed that respondents living in rural areas will be at a disadvantage in this regard as compared to students residing in urban areas. Physical accessibility to institutions of higher learning may also be more problematic in rural areas than in cities.

The south-nonsouth dimension is included for several reasons.
First, it controls for regional cultural differences, particularly with regard to the value of educational and occupational success for women. To the extent that it has taken longer for southern areas to discard the traditional sex-role stereotypes, higher education for women may not be as actively encouraged in these areas. Second, a south-nonsouth variable proxies for possible regional differences in the economic base. The lower availability of white collar jobs in the south (see Table 293 in U.S. Department of Commerce (1973)) may affect the average level of educational attainment as well as educational goals. In addition, the quality of education in the south has historically been inferior to Northern regions, thereby affecting overall achievement levels.

The individual's health status is another control variable included in the model. Obviously, a serious health condition would handicap an individual's ability to pursue post-secondary education. It potentially could have negative consequences not only for academic achievement, but for encouragement from significant others, educational aspirations, and peer associations as well.

Because racial differences in the process of educational attainment have been an issue in the literature for some time, consideration is also given to the potential effects of race in this model. It is clear that blacks, as compared to whites, begin with lower levels of socioeconomic resources in the attainment process. They are also disadvantaged relative to whites in the overall translation of these background resources and intervening achievement characteristics into educational and occupational attainment. To the extent that racial
discrimination plays a significant role in this process for blacks, it is important to control for racial characteristics. What consensus on racial differences that does exist in the literature seems to point to the importance of noninstitutionalized intervening factors such as the influence of significant others and educational aspirations in predicting black educational attainment. In contrast to the attainment process for whites, these variables appear to be more powerful than family background factors.

The next group of measures are life events which are potentially disruptive to the attainment process. These include marriage, childbearing, and military service. While marriage and childbearing should have negative consequences for both males and females, they should have particularly significant effects for females. This is due to the traditionally held views of roles appropriate to women as well as to the time costs involved in childcare.

Military service, on the other hand, is expected to have large negative consequences for men. How substantial this disruption will be should be related to whether the respondent enlisted or was drafted into military service. In terms of sheer numbers of years excluded from the educational attainment process due to military service requirements, one would expect that draftees would experience a lower negative effect than enlistees. In the past, draftees have generally served for only two years as compared to the enlistee's four. On the other hand, if one views enlistees as utilizing military service as a stepping stone to higher education and draftees as being involuntarily forced to interrupt
an educational career already in progress, then those men that are drafted may experience greater negative effects on educational attainment than enlisted men. What additionally complicates the interpretation of the military variables is that the time period under study (1966-1976) encompassed the Vietnam war. During this era it was not uncommon for potential draftees to enlist in order to escape active overseas duty or to have greater choice in the type of service or training in which they would be involved. This "contamination" of the enlistee category would give added power to the negative consequences of enlistment.

V. Variables Omitted from the Analysis

Before concluding this chapter it is important to note several measures which will not be included in the present model of educational attainment. Each has, at some point, been examined in earlier models of status attainment. The first is a measure of mental ability. In this paper, ability is viewed more as a physical constraint on the observer than as an achieved characteristic. That is, the observer is constrained by factors of heredity and by characteristics of the environment that affect physical development (such as nutrition). When an individual is observing the behavior of a model, this ability constraint helps to determine what is focused upon and what information is subsequently retained. It also affects the individual's capacity to later perform the behavior. As a constraining factor, ability will affect educational achievement and thus, will indirectly impact on
educational attainment.

Presumably, standardized IQ tests measure an individual's ability level at a given point in time. Unfortunately, no universal standardized test score is available for all students in the data set that is used in this study. As will be discussed in the next chapter, the achievement variable to be used in these models, to some extent, already incorporates a measure of ability.

Another set of variables excluded from the models are aggregate measures of school resources. Previous research has indicated that there is little effect of these measures on educational outcomes, although such models have generally been inadequately specified due to lack of important individual level data items. Nevertheless, it is still unclear whether measures of school resources would exert much impact in models more adequately specified. That is, while school resources may theoretically affect individual achievement by determining the quantity and quality of stimuli available to the student in the school environment, it is uncertain whether this effect will remain once parental status, teacher and peer influences, and area of residence are accounted for in the system. In addition, because such aggregate measures are usually obtained at the district wide level in this data set, their theoretical pertinence to individual attainment is skeptical. Even school-specific information would not relate to the modelling environment of the student's own classroom setting.

The methodological problems that omitted variables present in this analysis will be discussed in Chapter 4. The structural equations that
follow from the theoretical discussions of this chapter will also be presented in Chapter 4.
NOTES

1 For further discussion of Albert Bandura's social learning theory, see Shaw and Costanzo (1982), Chapter 3, pp. 53-67, and Franklin (1982), Chapter 4, pp. 161-166.

2 Indeed, Bannon and Southern (1980) suggest that it may be the case that it is the opposite-sex parent that reinforces the child for performing sex-appropriate behavior.

3 One could argue that the concept of occupational prestige engenders the notion of power and the more powerful the model, the more likely he or she is to be emulated. However, a measure of occupational prestige that is based on occupational status characteristics other than the education and income levels associated with each occupational category and that is based on contemporary (i.e., post 1960) occupational classifications is unavailable for these data sets.

4 Although sex of siblings and spacing between siblings could theoretically impact on the learning environment of youth, the disentangling of these effects along with number of siblings and birth order is beyond the scope of this paper.
A number of studies have shown that first-borns are more adult-oriented and are more sensitive to the social evaluation of their performance by others than are later-borns (see Adams (1972)). First-borns are also more likely to be given greater responsibilities, especially with regard to the care of younger siblings. Parents may therefore perceive that higher educational goals are more appropriate for their first-borns than their younger children given the greater maturity and other personality characteristics of the former. In addition, first-borns are a "test-case" with regard to potential educational attainment. Parents may be willing to invest more in terms of both monetary and emotional sacrifice with their first-borns since the return to their investment is an unknown quantity. On the other hand, the relative payoff to college education of first-borns may condition how much parental investment is made in the education of younger children.

In a study of interaction between parents and children, Ihinger-Tallman (1982) found that parents gave equal amounts of encouragement to sons and daughters during simulated games designed to assess the youth's relative motivation to attain various levels of education or occupational success. However, she found that the independent variables (mother's encouragement, father's encouragement, parental opportunity awareness and family affect) were twice as successful in explaining son's attainment values as compared to daughters. She suggests the possibility that parents have clearer images of the goals and oppor-
tunities for obtaining these goals with regard to sons. With daughters, they appear to be less sure, possibly because the goals of educational and occupational success have, until relatively recently, been predominantly male goals. In addition, parents may also be uncertain of the relationship of traditional female goals such as marriage and childbearing to the attainment of less traditional goals.
CHAPTER IV

The Data, Model and Methods

I. The Data Set

The data set to be used in this analysis consists of two cohorts from the National Longitudinal Surveys of Labor Market Experience (NLS). These data are collected by the U.S. Bureau of the Census, and the questionnaires are designed and the data are disseminated by the Center for Human Resource Research of The Ohio State University. These particular data sets, one of males 14-24 years of age in 1966 and one of females 14-24 years old in 1968, are nationally representative samples of youth for which a wealth of education, employment, demographic, and other related data have been collected for fifteen years. Each cohort consists of approximately 5,000 respondents.

The advantage of such a longitudinal data set, from the perspective of this paper, is that measures of variables can be picked up at survey points approximate to the causal sequence of the model. In addition, a span of at least ten years is allowed for educational completion. The actual sample for this analysis is comprised of boys of high school age in 1966 (ages 14-17) and girls of the same ages in 1968, who were also interviewed at the tenth-year survey. Further details on missing data
and other characteristics of the specific sample used are available in the last section of this chapter.

II. Variable Description and Measurement

This section will briefly summarize the proposed empirical measurement of the concepts discussed in Chapter III. The variables to be used in the analysis are grouped according to the general theoretical category of interest they represent. An overview of the entire structural system of equations will be presented in the next section of this chapter and will facilitate locating any specific variable within the system.

A. Educational Outcomes

In a theoretical sense these variables may represent either an intermediate or ultimate end product of the educational attainment process. As intervening variables, educational achievement and educational aspirations will be used as both independent and dependent measures within the system.

**Academic achievement** No measure of academic achievement such as grade point average, class rank, or a universally administered standardized test score is available in these data sets. A universal standardized test score would have been the preferred measure since these are national samples and items such as grade point average or class rank are more location specific. However, a standardized measure of "achievement" has been developed for these data sets by pooling
scores from a variety of aptitude, achievement, and intelligence tests. This construct has a mean of 100 and a standard deviation of 16. Data for this construct was obtained in 1968 from the last secondary school attended by the respondent. Further discussion of this variable is presented in Note 1 of this chapter.

**Educational aspirations** This variable represents a response to the question: "How much more education would you like to get?" measured as of the survey that the respondent reaches age 18. Years of additional education desired are added to present attainment to obtain a range of 0 to 18 years.

**Educational attainment** This concept is represented by the respondent's highest grade of schooling completed (0-18 years) as of the tenth survey (1976 for boys; 1978 for girls).

B. Family background factors

**Parental family income** Parental income in the base year (1966 for boys, 1968 for girls) is used to measure this factor. The dollar amount of family income is reported for the year preceding the interview date. Thus, income for families of the young men is for calendar year 1965 and for girls it is calendar year 1967.

**Parental education** Both father's and mother's education are represented here. Each is measured by the highest grade of schooling completed (0-18 years) by the parent as of the base survey year.

**Mother's employment characteristics** The first variable included under this category is the mother's employment status when the
respondent was 14 years old. This measure is a dummy variable coded 1 if the respondent's mother worked for pay when he or she was age 14 and coded zero otherwise. The second variable is a measure of the character of the mother's occupation when the respondent was age 14. This item is a continuous variable measuring the extent to which the respondent's mother's occupation (when the respondent was age 14) was atypical for women. Atypicality is defined as the difference between the percentage of women found in the mother's occupational category (measured as of the 1970 Census) and the percentage of women represented in the civilian labor force in 1970. The larger the positive value of the difference, the more typical is the occupation for women. Conversely, the more negative the difference, the more atypical the occupation for women. Since 38.1 percent of the civilian labor force in 1970 was female, the atypicality index has a theoretical range of +61.9 to -38.1.

**Family structure** This factor is captured by measures of the respondent's number of siblings and his or her position within the sibling order. The first item consists of a series of dummy variables representing the number of siblings in the base survey year. This series consists of three variables representing families where the respondent has zero, one, or two siblings. The first variable is coded 1 if the respondent has zero siblings and is coded zero otherwise. The second variable is coded 1 if the respondent has one sibling and the third variable takes the value of one if the respondent has two siblings. The reference group for this series of variables consists of families with four or more children. The second item is a dummy variable coded 1 if
the respondent is first-born and is coded zero otherwise.

C. Social-psychological intervening factors

**Parental influence** This factor is represented separately by the mother's and father's encouragement for the respondent to pursue post-secondary education. With reference to each parent separately, this variable represents the response to the question: "How much encouragement did your father (mother) give you to continue your education beyond high school?" The 1970 survey is referenced for boys and the 1971 survey for girls. The variable is entered as a dummy variable coded 1 if the respondent answered "much" and zero otherwise.⁴

**Peer influence** This factor is represented by the college plans of the respondent's peers. The variable reflects the respondent's response to the question: "How many of your friends plan to go to college or are actually attending college?" The reference survey is 1970 for young men and 1971 for young women. This measure is dichotomous and is coded 1 if the respondent answered "many" and coded zero otherwise.⁵

**Teacher influence** This concept is reflected in a measure of teachers' encouragement for the respondent to pursue post-secondary education. The variable represents a response to the question: "How much encouragement have (did) your teachers and other adults in your high school given (give) you to continue your education beyond high school?" The reference survey is 1970 for young men and 1971 for young women. This measure is dichotomous and is coded 1 if the respondent answered "much" and coded zero otherwise.⁶
D. Intermediate Life-Cycle Events

**Marriage** The effects of marriage upon the educational attainment process are captured by a series of dummy variables measuring age at the time of first marriage. The first variable is coded 1 if the respondent was married by age 18 and zero otherwise. The second variable is coded 1 if marriage occurred between the ages of 19 and 22. The reference group for this series of variables consists of respondents who married later than age 22 or who were never married by the time of the tenth year survey.7

**Children** The impact that the birth of a child exerts on the educational attainment process will be represented by a series of dummy variables measuring the respondent's age at the time of the birth of his or her first child. The first variable is coded 1 if the respondent had a child by age 18 and is coded zero otherwise. The second variable is coded 1 if the respondent was between the ages of 19 and 22 when the child was born. The reference group for this series of variables consists of respondents who had their first child later than age 22 or who had no children by the time of the tenth-year survey.8

**Military service** The potential influence that military service may have on the educational attainment of young men is captured by a series of dummy variables measuring type of military service by the tenth-year survey. The first variable is coded 1 if the respondent first entered the service by being drafted and the second is coded 1 if entrance was through enlistment. The reference group for this series of variables consists of respondents who did not serve in the military by 1976.
E. Additional control variables

Race This factor is represented by a dummy variable coded 1 if the respondent is black and coded zero otherwise.

Health status The health status of the respondent is represented by a dummy variable coded 1 if the respondent reports a health limitation of any kind in the base survey year and coded zero otherwise.

Area of residence Area of residence is represented by both its regional and urban-rural character. Region of residence is measured by a dummy variable coded 1 if the respondent lives in a Southern area of the United States in the base survey year and is coded zero otherwise. The urban-rural nature of the respondent's area of residence is captured by a series of dummy variables indicating type of urban residence. The first variable is coded 1 if the respondent lives in the central city of an SMSA in the base survey year and zero otherwise (hereafter termed "central city"). The second variable is coded 1 if the respondent lives in an SMSA in the base year but outside of the central city, and zero otherwise (termed "suburban"). The reference group for this series of variables consists of respondents residing outside of SMSAs.

III. A Structural Model of Educational Attainment

At this point, it is important to outline, in equation form, the causal model implicit in the theoretical discussion of the preceding chapter. This outline includes models of educational achievement, parental encouragement, educational aspirations, and ultimate
educational attainment. These models, which are estimated separately for boys and girls, are summarized in Table 1. This table explicitly indicates the independent and dependent measures used within the system and between equations. It should enable the reader to distinguish the order in which the equations will be estimated and the differences among them due to the inclusion or exclusion of various independent variables. A plus, minus or question mark in a cell indicates the expected direction of the effect for the relevant explanatory measures within each equation.

IV. Methods

The theoretical system of equations to be presented represents a recursive model. While each equation could be estimated separately using ordinary least squares regression (OLS) techniques, this procedure assumes that explanatory variables are uncorrelated with the disturbance terms in their respective equations. For equations 4 and 5 in Table 1, this assumption would likely be violated and thus the technique of two-stage least squares is more appropriate (see Kmenta (1971), p. 586 for a more detailed explanation).

Two-stage least squares first estimates any explanatory endogenous variables as a function of all of the exogenous variables in the system of equations. As a result, the predicted values of these endogenous variables are purged of their correlation to the error term of their original equation. Such correlations can arise from measurement error on the endogenous variable. Using these predicted values for the
Table 1  Summary of Equations and Anticipated Relationships

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Successive Dependent Variables (Equations)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td></td>
<td>Achievement</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<td></td>
<td>Educational aspirations</td>
<td></td>
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<td></td>
<td>+</td>
<td>**</td>
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<tr>
<td>Parental income</td>
<td></td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<td>Father's education</td>
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<td>+</td>
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<tr>
<td>Mother's education</td>
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<td>Mother worked when</td>
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<tr>
<td>R age 14</td>
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<td>Atypicality of mother's occupation when R was alive when R was age 14</td>
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<td>Zero siblings</td>
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<td>One sibling</td>
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<td>Two siblings</td>
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<td>First born</td>
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<td>Much paternal</td>
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<td>encouragement</td>
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<td>Much maternal</td>
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<td>encouragement</td>
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<td>Many peers plan college</td>
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<td>Married age 18</td>
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<tr>
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<tr>
<td>Military--enlist</td>
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<tr>
<td>Black</td>
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<td>Health problem</td>
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<tr>
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<tr>
<td>Central city</td>
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<tr>
<td>Suburb</td>
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<td>+</td>
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<td>?</td>
</tr>
</tbody>
</table>

*This variable is treated as endogenous.*
endogenous variables and the observed values for the exogenous variables, each equation in the original system of equations is then re-estimated using OLS. In this way, two-stage least squares provides consistent but not efficient estimates.

To get efficient estimates, three-stage least squares is recommended. This procedure corrects for possible correlations among the various disturbance terms between equations. Since, for theoretical reasons, the dependent variables are all measured at different points in time and as such take full advantage of the longitudinal nature of the data sets, systematic correlation of the error terms due to simultaneous time of measurement is ruled out. Furthermore, one problem with three-stage least squares is that the correction procedure involves the entire system of equations and any error in the specification of one equation spreads to other equations in the system.

The achievement equation is intentionally omitted from the two-stage system of equations for several reasons. First, the achievement measure is obtained by school report of test scores and is therefore subject to errors in reporting by school personnel as opposed to misreport by the respondent. In addition, test scores are likely to be affected by temporal conditions such as how well the respondent is feeling the day of the exam. This temporal aspect contrasts to the more permanent types of personal characteristics that may impinge on report of, say, mother's or father's education. Put most succinctly, the error in the achievement equation is assumed to be uncorrelated with errors in the other equations and thus efficient and consistent estimates can be
obtained for this equation simply by using OLS. Another argument for estimating the achievement equation separately is that the equation is misspecified with respect to the omission of a measure of mental ability. This problem would be particularly serious if three-stage least squares was used.

The omission of an ability measure (IQ) from the achievement equation could theoretically pose an estimation problem in that the resulting coefficients would be biased. However, the independent variables included in the model pick up the effect of excluded variables. It is the argument of this paper that the theoretical models of IQ and achievement are quite similar such that if, for example, mother's education is found to have a positive effect on achievement, the model is also picking up the extra and positive effect that mother's education has on IQ. Hence, in this model of achievement, IQ effects are seen as reinforcing. If, for example, family income does not affect achievement, this would mean that family income does not affect IQ. However, if income does affect achievement, one cannot be sure that the effect is on achievement or IQ, given the supposed admixture of the two in the dependent variable.

In this paper, mental ability is viewed as the physical capacity to mentally assimilate and organize learned information. From this viewpoint, the measure of achievement used here is most likely a true measure of achievement rather than mental ability. Any standardized test score, even one intended to measure "IQ," is contaminated by all of the knowledge and experience acquired by a person up to the point in
time at which the test is administered. This would be particularly true of tests given during the adolescent or adult years. In this sense, many tests purporting to measure mental ability are actually tests of achievement. Witness the problem that various ethnic groups have with standardized IQ tests. The context of these tests reflect knowledge of, or acculturation to, specific learning environments. Herriot and Kohen (1973) indicate that the particular tests involved in the development of this achievement measure, whether IQ tests or scholastic aptitude tests, are generally measuring the same types of things. While they label it mental functioning, this paper labels it educational achievement.

One methodological issue that still concerns researchers is the degree of measurement error involved in the constructs designed to test the attainment process. Campbell (1983) and Hauser, Tsai and Sewell (1983) discuss this issue at length. Measurement error could be most problematic for characteristics of the respondent's parents and for the perception of encouragement from significant others. These items are based on the youth's recall and judgments about individuals other than himself/herself. However, both the Hauser, Tsai and Sewell (1983) work and a study by Borus and Nestel (1973) using NLS data provide little support for the proposed discrepancies between parent and child report on background factors. It should also be emphasized that data on background characteristics (not the encouragement items) are collected concurrently. If the item references the period when the respondent was age 14, in no instance will this gap be more than three years given the age range of the sample. Furthermore, it should be reiterated that it
is the respondent's perception of encouragement that has meaning for the
analysis here, rather than the parent's.

Admittedly, measurement error is a problem common to much research
in general and this study will be no exception. Undoubtedly some
factors will not attain significance due to errors in measurement.
However, the highly technical solution to this problem suggested by
Hauser, Tsai and Sewell is impractical for this paper considering that
multiple indicators of concepts are unavailable for these data sets.

V. The Sample

This section describes the characteristics of the sample upon which
the model of educational attainment is empirically tested. This
involves a comparison of subgroups included and excluded from the
analysis as well as a comparison of sample characteristics to overall
population estimates. Evidence is presented in Tables 2 and 3 to
suggest that the sample differs minimally from the population it is
supposed to represent.

It should be noted that the original NLS samples were designed to
be representative of the civilian noninstitutionalized population of the
United States in the base survey year (1966 for young men and 1968 for
young women). In addition, the cohorts were over-sampled with regard to
blacks in order to ensure sufficient sample sizes for racial compar-
isons. In order to provide meaningful population estimates from the
sample, it was necessary to derive sampling weights. Each respondent
was therefore assigned a sampling weight designed to reflect his or her
<table>
<thead>
<tr>
<th>Variable</th>
<th>(1) Intact parental households: total (weighted)</th>
<th>(2) Non-intact parental households: total (weighted)</th>
<th>(3) Intact parental households: regression sample (unweighted)</th>
<th>(4) Intact parental households: respondents omitted from regressing sample (unweighted)</th>
<th>Number of Sample Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>0.088 (.283)</td>
<td>0.277 (.448)</td>
<td>0.089 (.286)</td>
<td>0.269 (.443)</td>
<td>1329</td>
</tr>
<tr>
<td>Parental Income</td>
<td>991.65 (6599.83)</td>
<td>625.93 (4864.73)</td>
<td>10646.1 (6611.35)</td>
<td>8536.36 (6340.15)</td>
<td>1274</td>
</tr>
<tr>
<td>Health problem</td>
<td>0.119 (.324)</td>
<td>0.128 (.334)</td>
<td>0.132 (.339)</td>
<td>0.111 (.315)</td>
<td>1320</td>
</tr>
<tr>
<td>Father's education</td>
<td>10.73 (3.56)</td>
<td>9.90 (3.70)</td>
<td>11.10 (3.43)</td>
<td>9.80 (3.62)</td>
<td>1258</td>
</tr>
<tr>
<td>Mother's education</td>
<td>10.92 (2.82)</td>
<td>10.14 (3.02)</td>
<td>11.38 (2.74)</td>
<td>10.17 (2.99)</td>
<td>1266</td>
</tr>
<tr>
<td>Mother worked when R age 14</td>
<td>0.517 (.500)</td>
<td>0.627 (.494)</td>
<td>0.510 (.500)</td>
<td>0.535 (.499)</td>
<td>1319</td>
</tr>
<tr>
<td>Atypicality of mother's occupation when R age 14</td>
<td>40.4 (27.6)</td>
<td>41.4 (26.9)</td>
<td>40.3 (27.5)</td>
<td>39.5 (28.7)</td>
<td>1307</td>
</tr>
<tr>
<td>Much paternal encouragement</td>
<td>0.575 (.494)</td>
<td>0.366 (.482)</td>
<td>0.581 (.494)</td>
<td>0.550 (.498)</td>
<td>869</td>
</tr>
<tr>
<td>Much maternal encouragement</td>
<td>0.622 (.485)</td>
<td>0.535 (.499)</td>
<td>0.628 (.484)</td>
<td>0.627 (.484)</td>
<td>865</td>
</tr>
<tr>
<td>Firstborn</td>
<td>0.363 (.467)</td>
<td>0.298 (.457)</td>
<td>0.397 (.490)</td>
<td>0.318 (.463)</td>
<td>1229</td>
</tr>
<tr>
<td>Zero siblings</td>
<td>0.047 (.211)</td>
<td>0.053 (.223)</td>
<td>0.043 (.203)</td>
<td>0.043 (.203)</td>
<td>1305</td>
</tr>
<tr>
<td>One sibling</td>
<td>0.196 (.397)</td>
<td>0.143 (.351)</td>
<td>0.204 (.403)</td>
<td>0.161 (.368)</td>
<td>1305</td>
</tr>
<tr>
<td>Two siblings</td>
<td>0.241 (.428)</td>
<td>0.163 (.369)</td>
<td>0.247 (.432)</td>
<td>0.205 (.604)</td>
<td>1305</td>
</tr>
<tr>
<td>Achievement</td>
<td>105.50 (14.48)</td>
<td>100.99 (16.66)</td>
<td>105.85 (15.43)</td>
<td>102.45 (15.14)</td>
<td>659</td>
</tr>
<tr>
<td>Educational aspirations</td>
<td>14.61 (2.50)</td>
<td>12.80 (3.05)</td>
<td>15.28 (2.12)</td>
<td>14.25 (2.80)</td>
<td>1029</td>
</tr>
<tr>
<td>Educational attainment</td>
<td>13.66 (2.30)</td>
<td>12.62 (2.49)</td>
<td>14.23 (2.10)</td>
<td>12.95 (2.44)</td>
<td>800</td>
</tr>
<tr>
<td>Married age 18</td>
<td>0.073 (.260)</td>
<td>0.104 (.305)</td>
<td>0.055 (.229)</td>
<td>0.079 (.270)</td>
<td>1096</td>
</tr>
<tr>
<td>Married age 19-22</td>
<td>0.387 (.407)</td>
<td>0.179 (.485)</td>
<td>0.390 (.488)</td>
<td>0.374 (.484)</td>
<td>738</td>
</tr>
<tr>
<td>Child age 18</td>
<td>0.032 (.176)</td>
<td>0.056 (.230)</td>
<td>0.030 (.172)</td>
<td>0.039 (.194)</td>
<td>1329</td>
</tr>
<tr>
<td>Child age 19-22</td>
<td>0.232 (.422)</td>
<td>0.252 (.434)</td>
<td>0.265 (.442)</td>
<td>0.276 (.418)</td>
<td>1329</td>
</tr>
<tr>
<td>South</td>
<td>0.320 (.466)</td>
<td>0.410 (.492)</td>
<td>0.281 (.450)</td>
<td>0.433 (.496)</td>
<td>1329</td>
</tr>
<tr>
<td>Central city</td>
<td>0.270 (.444)</td>
<td>0.344 (.475)</td>
<td>0.280 (.438)</td>
<td>0.399 (.626)</td>
<td>1319</td>
</tr>
<tr>
<td>Many peers plan college</td>
<td>0.498 (.500)</td>
<td>0.399 (.490)</td>
<td>0.533 (.499)</td>
<td>0.433 (.496)</td>
<td>959</td>
</tr>
<tr>
<td>Much teacher encouragement</td>
<td>0.448 (.497)</td>
<td>0.353 (.478)</td>
<td>0.488 (.500)</td>
<td>0.440 (.500)</td>
<td>959</td>
</tr>
<tr>
<td>Military--draft</td>
<td>0.084 (.277)</td>
<td>0.114 (.318)</td>
<td>0.077 (.267)</td>
<td>0.094 (.292)</td>
<td>827</td>
</tr>
<tr>
<td>Military--enlist</td>
<td>0.252 (.434)</td>
<td>0.290 (.454)</td>
<td>0.118 (.323)</td>
<td>0.319 (.466)</td>
<td>827</td>
</tr>
<tr>
<td>Total unweighted sample size</td>
<td>1888</td>
<td>765</td>
<td>559</td>
<td>1329</td>
<td></td>
</tr>
</tbody>
</table>

a Intact parental households refer to households in which both the respondent's mother and father were present in 1966 and when the respondent was age 14. Youth reporting a step-parent or any other living arrangement that did not include both parents at each point in time represent "non-intact" households.

b The sampling procedures used to define the original NLS cohorts, especially the oversampling of blacks, requires the application of weights in order to make the sample representative of the larger U.S. population. Here weights adjust the sample to reflect population estimates of the U.S. in 1966 (the base survey year) with respect to age, race and residence.
Table 3. Means and Standard Deviations of System Variables for Various Cohort Subpopulations: Young Women age 14-17 in 1968

<table>
<thead>
<tr>
<th>Variable</th>
<th>(1) Intact[a] parental households: total (weighted[b])</th>
<th>(2) Non-intact[a] parental households: total (weighted[b])</th>
<th>(3) Intact[a] parental households: regression sample (unweighted[b])</th>
<th>(4) Intact[a] parental households: respondents omitted from regression sample (unweighted[b])</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard deviation</td>
<td>Mean</td>
<td>Standard deviation</td>
</tr>
<tr>
<td>Black</td>
<td>.084</td>
<td>.277</td>
<td>.282</td>
<td>.450</td>
</tr>
<tr>
<td>Parental income</td>
<td>11058.6</td>
<td>7115.27</td>
<td>5832.11</td>
<td>4203.64</td>
</tr>
<tr>
<td>Health problem</td>
<td>.045</td>
<td>.207</td>
<td>.069</td>
<td>.254</td>
</tr>
<tr>
<td>Father’s education</td>
<td>11.12</td>
<td>3.54</td>
<td>10.10</td>
<td>3.55</td>
</tr>
<tr>
<td>Mother’s education</td>
<td>11.27</td>
<td>2.71</td>
<td>9.08</td>
<td>3.13</td>
</tr>
<tr>
<td>Mother worked when R age 14</td>
<td>.408</td>
<td>.491</td>
<td>.447</td>
<td>.497</td>
</tr>
<tr>
<td>Atypicality of mother’s occupation</td>
<td>46.5</td>
<td>22.9</td>
<td>41.0</td>
<td>26.1</td>
</tr>
<tr>
<td>Much paternal encouragement</td>
<td>.520</td>
<td>.500</td>
<td>.219</td>
<td>.414</td>
</tr>
<tr>
<td>Much maternal encouragement</td>
<td>.574</td>
<td>.495</td>
<td>.451</td>
<td>.498</td>
</tr>
<tr>
<td>First born</td>
<td>.324</td>
<td>.460</td>
<td>.270</td>
<td>.449</td>
</tr>
<tr>
<td>Zero siblings</td>
<td>.034</td>
<td>.181</td>
<td>.049</td>
<td>.216</td>
</tr>
<tr>
<td>One sibling</td>
<td>.179</td>
<td>.333</td>
<td>.124</td>
<td>.329</td>
</tr>
<tr>
<td>Two siblings</td>
<td>.244</td>
<td>.429</td>
<td>.163</td>
<td>.369</td>
</tr>
<tr>
<td>Educational aspirations</td>
<td>13.97</td>
<td>2.24</td>
<td>13.08</td>
<td>2.24</td>
</tr>
<tr>
<td>Educational attainment</td>
<td>13.19</td>
<td>2.37</td>
<td>11.87</td>
<td>2.64</td>
</tr>
<tr>
<td>Married age 18</td>
<td>.141</td>
<td>.348</td>
<td>.319</td>
<td>.466</td>
</tr>
<tr>
<td>Married age 19-22</td>
<td>.449</td>
<td>.497</td>
<td>.331</td>
<td>.471</td>
</tr>
<tr>
<td>Child age 16</td>
<td>.131</td>
<td>.338</td>
<td>.375</td>
<td>.404</td>
</tr>
<tr>
<td>Child age 19-22</td>
<td>.252</td>
<td>.434</td>
<td>.307</td>
<td>.461</td>
</tr>
<tr>
<td>South</td>
<td>.287</td>
<td>.452</td>
<td>.393</td>
<td>.489</td>
</tr>
<tr>
<td>Central city</td>
<td>.225</td>
<td>.418</td>
<td>.346</td>
<td>.476</td>
</tr>
<tr>
<td>Suburb</td>
<td>.369</td>
<td>.483</td>
<td>.254</td>
<td>.435</td>
</tr>
<tr>
<td>Many peers plan college</td>
<td>.498</td>
<td>.500</td>
<td>.303</td>
<td>.480</td>
</tr>
<tr>
<td>Much teacher encouragement</td>
<td>.525</td>
<td>.499</td>
<td>.384</td>
<td>.486</td>
</tr>
<tr>
<td>Total unweighted sample size</td>
<td>1371</td>
<td>598</td>
<td>528</td>
<td>843</td>
</tr>
</tbody>
</table>

[a] Intact parental households refer to households in which both the respondent’s mother and father were present in 1966 and when the respondent was age 14. Youth reporting a step-parent or any other living arrangement that did not include both parents at each point in time represent “non-intact” households.

[b] The sampling procedures used to define the original NLS cohorts, especially the oversampling of blacks, requires the application of weights in order to make the sample representative of the larger U.S. population. Here weights adjust the sample to reflect population estimates of the U.S. in 1969 (the base survey year) with respect to age, race, and residence.
age, race, and geographic area of residence. When discussing whether
the sample to be used in this analysis differs substantially from the
population it was designed to represent, the sample means are compared
to the weighted population means for the same characteristics. Thus,
Tables 2 and 3 allow comparisons of respondents included (col. 3) and
excluded (col. 4) from the regression sample as well as comparisons of
the regression sample (col. 3) to the total number of 14 to 17 year olds
from intact parental households (col. 1) of which it is a part.11

The regression sample for this analysis consists of all 14 to 17
year olds in the base survey year who were residing in intact parental
households (both father and mother present) not only in the base survey
year but also at the point when the respondent was 14 years old. This
restriction was necessary due to the problem of assigning parental
characteristics to a missing parent, particularly when some of the
emphasis of the analysis is upon cross-parental comparisons. In
addition, respondents missing data on any variable in the system of
equations are excluded from the sample. The sample for the achievement
equation will be somewhat larger since it is run separately.

As can be seen by examining these tables, the regression sample for
young women excludes a higher percentage of blacks than does the group
of respondents omitted from the regression sample. For young men the
exclusion ratio is three to one. This underrepresentation of blacks in
the regression sample should not necessarily present a problem if one
remembers that the original cohorts were oversampled for blacks. Indeed, for young men, the proportion of blacks in the regression sample
is quite similar to the proportion of all 14 to 17 year olds from intact parental households. For young women, however, some overrepresentation of blacks in the regression sample remains after comparison to the weighted population figures. In addition, while fewer respondents from southern regions and central city areas are found in the regression sample as compared to the omitted group, minimal differences exist between the weighted population figures and the means for the regression sample on these variables.

In terms of family background characteristics, the regression sample fares quite well. While those included reflect higher average levels of parental income and education than those respondents excluded, little difference exists between these characteristics for the regression sample and the total population of 14 to 17 year olds from intact families. This is true for both the male and female samples. In addition, little difference exists among either the included or excluded regression groups or the total population on any of the mother's work characteristics or on the parental encouragement measures.

While there appears to be minimal differences in the proportion reporting health problems among the various groups, a distinct difference is apparent between males and females. Young men are twice as likely to report they have a health problem than are young women. This may be due to the tendency of young men to report less serious but chronic health conditions than young women (e.g., those due to sports injuries) that restrict their activities. While it is important to note this difference, the frequency of reporting need not necessarily
present a problem in the regression analysis unless the relationships of health status to the dependent variables of interest differ substantially between boys and girls. In such an event, the interpretation of the health coefficient would be complicated due to whatever reasons underly the discrepancy in overall frequency of report.

Family structure variables based on numbers of siblings vary little across groups. However, it appears that the regression sample slightly over-represents first-borns when compared to both the excluded group and the total population.

While underachievers seem to be underrepresented in the regression sample when compared to the excluded group, not much difference in average achievement exists between the regression sample and the total population. The same is true with regard to average educational attainment with the exception that young men continue to exhibit higher average attainment in the regression sample as compared to the other universe groups. On the other hand, the regression sample does appear to give some slight preference to the selection of respondents of both sexes who have higher levels of educational aspirations. These higher average aspirations are also reinforced by the fact that both males and females in the regression sample report slightly larger proportions having many friends planning college educations and much encouragement from teachers.

For young men, the proportions represented in categories of the marriage and fertility variables vary minimally between groups. Young women, however, evidence some differences. Women who marry during the
college age years (ages 19-22) tend to be slightly underrepresented in the regression sample as are women who have a child during the high school years.

In regard to military service for young men, it should be acknowledged that the regression sample severely underrepresents men whose entrance into the military service was through enlistment. On the other hand, there appears to be little difference across groups with regard to men who were drafted into military service.

In summary, comparisons of the means and standard deviations for the various universe groups indicate that no serious bias exists in the regression sample with regard to major variables of interest. Background, achievement, and control variables differ minimally in their proportions when comparison is made between the regression sample and the weighted population estimates. Several exceptions to this generalization are in order and should be kept in mind when evaluating the results of the regression analysis. There is a slight tendency for the sample to overrepresent respondents with high average educational aspirations and (for males only) to include respondents who ultimately attain more years of education on the average. Furthermore, it is quite apparent that men whose entrance into the military was through enlistment are underrepresented in the sample.

The analyses to be conducted in this paper will be done on unweighted data. It has just been shown that the regression sample resembles the original cohort with respect to the majority of characteristics of interest and there is no reason to believe that the
relationships among these variables will necessarily differ between the sample and the larger population. It should also be noted that the original NLS sample weights were designed to compensate chiefly for the oversampling of blacks and to enable researchers interested in estimating population characteristics to weight up accordingly. Weighting on the basis of characteristics other than age, race and area of residence therefore is not an issue here, since the original cohort sampling design did not specifically aim at differentiating on other characteristics.

Much of the previous literature on educational attainment has been based on households where both father and mother were present or has not distinguished whether the youth under study come from intact or non-intact families. A relatively unexplored topic then involves comparisons of the attainment process for children from non-intact versus intact parental households, although such a focus is beyond the scope of this paper. However, to give a very general idea of how 14 to 17 year olds from intact as compared to non-intact parental households differ on the characteristics at issue in this paper, a short discussion will follow.

Data presented in columns (1) and (2) of Table 2 for young men and Table 3 for young women form the bases for these comparisons. It is clear from these tables that youth from broken homes exhibit distinct differences from other youth in terms of many of the variables hypothesized to affect the educational attainment process. These differences are especially notable for young women. Two to three times as
many black youth are from broken homes than are represented in intact families. Most likely related to the higher proportion of blacks represented in single-parent families is the greater likelihood that these families are located in the south or in central cities of SMSAs. These single-parent households also tend to have lower average family incomes. While mother's work characteristics appear to be similar between intact and non-intact households, paternal encouragement is obviously reduced in the latter due to the fact that the resident parent has a higher probability of being the mother. What psychological repercussions this difference in parental encouragement levels may generate for the attainment process needs to be given further research attention.

There is a slight tendency for youth from non-intact households to have lower mean educational achievement and attainment. Similarly, these youth tend to have fewer friends planning college and experience less encouragement from teachers. Again these trends are particularly noticeable for females.

While intervening life events seem to vary little in their proportions for males from intact as compared to non-intact families, for females the difference can be substantial. Young women from broken homes are much more likely to be married during the high school years and to bear a child at similar ages. The magnitude of the consequences of these events for the educational attainment process of girls from single-parent families could potentially be quite different from that of girls from intact families, particularly with regard to family support structures.
Thus, for both young men and young women, whether one comes from a family background characterized by one or two parents reflects certain differences with regard to the levels of variables hypothesized to affect the attainment process. These differences may hold considerable import for young women. Previous research has not shown substantial differences between young men and young women in the attainment process. It remains to be seen if such conclusions hold when analyses are limited to non-intact families. Furthermore, within sexes, whether and in what ways these differences by household structure in the level of measured characteristics impact on the attainment process certainly deserves further research attention.
NOTES

1 This measure was developed for the NLS data sets by R.E. Herriot and A.I. Kohen (1973). Their paper provides a detailed discussion of the variable's construction. Only a short summary will be provided here.

Due to the fact that the NLS samples are national in scope and contain respondents from all geographic areas of the United States, it is virtually impossible to obtain a universally administered test score for either mental ability or scholastic aptitude. A 1968 survey sent to each respondent's last high school requested the most recent scores on any available standardized test. In all, over 30 different tests were eventually collected in the sample. Less than 650 respondents had scores on any one test, making the pooling of test scores an attractive alternative to limiting sample sizes. Information on some test of mental ability (e.g., the California Test of Mental Maturity or the Henmon-Nelson Test of Mental Ability) was available for about one-half of the respondents for whom any test score was available. The other half had some measure of scholastic aptitude (such as Scholastic Aptitude Test or School and College Ability Test).

For the pooling of nonparallel tests (tests of different "functions") the authors assumed that each test, in some way, was a test of "mental functioning." They also assumed that all tests were equally reliable and perfectly correlated (since data on each test for the same
subsample was unavailable). However, they did correct for varying means and standard deviations on the different tests by converting the different metrics to standard Z-score form and then translating these to the most common metric (a mean of 100 and a standard deviation of 16).

The issue of how much error is tolerable when putting such a converted instrument into research practice was also addressed. The authors emphasized that research conducted with large data sets such as these would, in all likelihood, center upon estimation of measures of central tendency for groups or on assessing relationships among variables. Such estimates should be less affected by errors in the conversion process than would individual scores.

Comparing subsamples whose converted scores were generated from a particular test or group of tests, Herriot and Kohen investigated whether the effect of mother's education, father's education, and father's occupation would vary depending on the subsample used. Based on subsample means, they found that each test group reflected a somewhat different socioeconomic subpopulation. However, no differences in the relationships of these background variables to the converted test score was found between subgroups. This finding underscores the usefulness of using the pooled measure for data analysis.

2 This index is easily available for working mothers but presents some problems of construction for nonworking women. To determine an approximate value for housewives, the index's distribution for working mothers was first examined. The job of full-time homemaker was assumed
be a very typical occupation for women considering that only 38.1 percent of the civilian labor force in 1970 was female. The code of 581 (58.1 percent) was assigned to these nonworking women for three reasons. First, 75 percent of the sample who had working mothers had values on the index that fell below this number. Second, this value appeared with the greatest frequency in the sample (approximately 9 percent of working mothers fell in this category). And third, the value of 581 is uniquely attached to the Census three-digit occupation code of 804 representing Private Household Workers (N.E.C.)(U.S. Bureau of the Census (1960)). While housewives theoretically could have been assigned the highest value of the index (i.e., (100.0-38.1) or 61.9), the decision to use 581 seemed convenient for reasons cited above. In any event, since both numbers represent highly typical occupations for women, the overall relationships being tested in the models should remain unaffected by the choice of one value over the other.

3 The rationale for representing the sibling variable as a series of dichotomous variables rather than as a continuous measure is to assess the possibility of nonlinear effects.

4 Permitted responses to this question included "much," "some," or "none." Over 50 percent of the sample responded "much," while another 25 to 30 percent answered "some." Since the overwhelming majority of respondents perceived some degree of parental encouragement, an arbitrary decision was made to dichotomize the variable into those
respondents who perceived "much" encouragement versus all others.

As with parental encouragement, approximately 50 percent of the sample had "many" friends intending to pursue college careers while another one-quarter to one-third had "some" friends with post-secondary educational plans. Again, the decision was made to distinguish between those respondents who had "many" friends with college plans versus all others.

The distribution of responses on this variable is similar to that for parental encouragement and thus the variable is dichotomized in the same fashion.

Categorizing age at first marriage in such a manner allows one to measure the magnitude of the effect of marriage during the high school years as compared to marriage while in college.

Age at first birth is used in dummy variable form rather than as a continuous variable for reasons similar to that for age at first marriage (see note 7). Actual birth dates for children of the young men were unavailable so the age of the respondent at the first survey in which a son or daughter was reported in the household was used as a proxy. This measurement of the variable for young men may be more appropriate in real life circumstance. For men especially, a child may represent a constraint to attainment only if it is physically present in
the household.

9 The U.S. Department of Commerce (1961) considers the following states to be included in one of three southern geographic divisions: Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas.

10 The distinction between urban and rural as defined by residence within or outside of an SMSA is complicated by the fact that the definition of "urban" encompasses two quite different residential environments. For example, as compared to suburban youth, central city residents are more likely to live in impoverished areas with higher crime rates. But just as importantly, other significant changes in suburban as compared to central city areas have taken place in the last two decades which impact on the educational attainment process. Residential growth rates for central city areas have been declining relative to suburban areas for the last several decades (Mills and Hamilton (1984) summarize some of the major impacts of these changes). This decline has relatively reduced the tax base and resources available for support of inner-city schools, resulting in a reduction of the quality of schooling in central city areas as compared to suburban areas. In addition, recent trends for business and industry to relocate from central city to suburban locations have reduced the number of job opportunities available to inner city youth. Not only has the information
source with regard to types and contents of jobs (i.e., business and industry) been reduced, but the means to attain these occupational/educational goals (quality of schooling) have become severely limited. In this respect, the educational attainment process for inner-city youth becomes similar to that for rural rather than suburban youth.

On the other hand, while suburban youth may maintain an advantage in terms of educational quality, the increased availability of job opportunities in their areas may prove to be a "mixed" blessing. While more information is available in terms of the types of jobs in demand and their educational requirements, the easy proximity of employment may induce some adolescents to seek more immediate employment and to postpone or to abandon altogether the pursuit of additional education.

In this study "intactness" of parental household refers to the presence of the respondent's mother and father in the household in the base survey year as well as when the respondent was age 14. To a certain extent, "mother" and "father" are subjectively defined by the respondent as is the case in most social survey contexts. However, those youth who actually responded that they lived with a step-parent at either point in time or in any other household arrangement that did not include both their mother and father were considered to be living in "non-intact" family situations.

It should be noted that this sex difference in report of health limitations is somewhat contrary to other published data for individuals
aged 17 to 24. Young women generally experience more restricted activity days than young men (U.S. DHEW (1978a), p. 4) and a greater incidence of acute conditions (U.S. DHEW (1978b), p. 4). However, there is some evidence to suggest that young men under the age of 17 are more likely than their female counterparts to report an activity-limiting chronic health condition (U.S. DHEW (1977), p. 5). Unfortunately, data with finer age breaks is unavailable. Part of the discrepancy in this study between the different samples may be due to the additional probing for health limitations in the young men's questionnaire. They were separately asked about limitations that affected their school activities and conditions that either affected the amount or kind of work they could do. If they responded yes to any question in this series they are coded one on the health limitation variable for this study. Young women were asked only a single, more global question about their health but this question also had indirect reference to employment. Thus, it is possible that young women interpreted their question as pertaining chiefly to employment and as less relevant to their current circumstances (keep in mind the sample is school age) while for young men, their series of questions gave more opportunities to provide affirmative answers.

This may be due to selective attrition by the tenth-year survey. Respondents noninterviewed for two consecutive surveys were then dropped from the original cohort. Men whose service in the military encompasses four years would be particularly susceptible to
These similarities are especially noteworthy when considering that the major loss of sample cases derives from missing data on the achievement measure and on marriage and fertility variables as well as other variables measured at later points in the causal sequence for both males and females. Herriot and Kohen (1973) indicate that school non-report of achievement scores occurred with greatest frequency for urban schools (predominantly inner-city and black). Missing data on marriage and fertility variables, parental encouragement, aspirations and educational attainment is most likely related to the longitudinal nature of their construction and the problem of increasing cohort attrition over time. It is especially encouraging then that, despite the underlying nature of this sample loss, the proportion black in the regression sample remains similar to (if not greater than) the total population of families which it was originally intended to represent. In general, the same is also true for other characteristics including the proportions married and having children at various ages. Caveats regarding specific categories have been noted in the text.
Chapter V

Empirical Results and Conclusions

I. Empirical Results

This chapter evaluates the strengths and weaknesses of the structural model of educational attainment developed in preceding chapters by submitting the model to an empirical test. Discussion of the results will draw on earlier comments and discussions of previous research where relevant. Tables 4 through 8 present outcomes for the system of regression equations while Appendix tables A.1 and A.2 contain correlation matrices of system variables for young men and young women, respectively.

A. The Achievement Equations

Results of the educational achievement equations for both males and females are shown in Table 4. Despite the inclusion of other relevant family background and locational factors, it is clear that blacks, regardless of sex, continue to experience significantly lower academic achievement than whites. This finding suggests that there may be one or more aspects of the educational learning environment that differ substantially between racial groups but which are still not captured by traditional models of the achievement process.
Table 4  Achievement Equations for Young Men and Young Women: Ordinary
Least Squares Regression\(^a\)

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>Young Men</th>
<th></th>
<th>Young Women</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>t-value</td>
<td>Coefficient</td>
<td>t-value</td>
</tr>
<tr>
<td>Parental income(^b)</td>
<td>0.239</td>
<td>3.35***</td>
<td>0.192</td>
<td>2.34***</td>
</tr>
<tr>
<td>Health problem</td>
<td>-0.349</td>
<td>0.29</td>
<td>-1.645</td>
<td>0.68</td>
</tr>
<tr>
<td>Father's education</td>
<td>0.955</td>
<td>6.20***</td>
<td>0.155</td>
<td>0.80</td>
</tr>
<tr>
<td>Mother's education</td>
<td>0.358</td>
<td>1.84**</td>
<td>1.135</td>
<td>4.63***</td>
</tr>
<tr>
<td>Mother worked when R</td>
<td>-0.306</td>
<td>0.29</td>
<td>-0.719</td>
<td>0.58</td>
</tr>
<tr>
<td>age 14</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atypicality of mother's</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>occupation when R</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>age 14</td>
<td>-0.005</td>
<td>0.29</td>
<td>-0.003</td>
<td>0.12</td>
</tr>
<tr>
<td>First born</td>
<td>1.436</td>
<td>1.60*</td>
<td>0.659</td>
<td>0.61</td>
</tr>
<tr>
<td>Zero siblings</td>
<td>-1.767</td>
<td>0.86</td>
<td>4.304</td>
<td>1.55*</td>
</tr>
<tr>
<td>One sibling</td>
<td>2.654</td>
<td>2.40***</td>
<td>2.301</td>
<td>1.69**</td>
</tr>
<tr>
<td>Two siblings</td>
<td>2.022</td>
<td>2.00**</td>
<td>2.016</td>
<td>1.64*</td>
</tr>
<tr>
<td>South</td>
<td>-1.470</td>
<td>1.61*</td>
<td>-0.736</td>
<td>0.65</td>
</tr>
<tr>
<td>Central city</td>
<td>1.954</td>
<td>1.82**</td>
<td>-1.615</td>
<td>1.26</td>
</tr>
<tr>
<td>Suburb</td>
<td>2.119</td>
<td>2.16**</td>
<td>-0.960</td>
<td>0.84</td>
</tr>
<tr>
<td>Intercept</td>
<td>87.318</td>
<td>40.51</td>
<td>89.807</td>
<td>32.34</td>
</tr>
<tr>
<td>R^2</td>
<td>.279</td>
<td>.241</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample size</td>
<td>1089</td>
<td></td>
<td>705</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\)Universe limited to respondents in intact parental households at age 14
and in the base survey year.

\(^b\)Income reported in thousands of dollars.

*Significant at the .10 level for a one-tailed test.
**Significant at the .05 level for a one-tailed test.
***Significant at the .01 level for a one-tailed test.
That the way in which parental characteristics affect the individual's learning environment should be different between racial groups seems intuitively more unlikely than that uncaptured school and classroom characteristics are responsible for much of the difference. For example, perhaps the allocation of school resources is different among schools attended by predominantly white or black students. School districts with very limited budgets, a problem not unknown to many inner-city schools, may be unable to retain well-educated and effective teaching staffs due to low salaries and multiple teacher responsibilities. Such schools may also be less able to purchase teaching materials critical to fostering academic achievement.

While some previous research has incorporated aggregate differences in school characteristics into models of educational attainment, these studies have generally failed to uncover substantial school effects. Furthermore, these models have usually been tested on data only for white males. But, it is not simply the level of school resources that needs to be accounted for in separate attainment models for blacks and whites. Aggregate differences in school resources inevitably filter their impact to the individual's classroom setting and it is measurement of these environments which remain to be quantified in models of educational attainment. Student-teacher and student-peer interaction patterns, as well as specific teacher and peer characteristics, are aspects of the school learning environment which would better serve the social learning theory perspective but which are not available in this data set. Examination of racial differences in the effects of these
types of measures might provide valuable insights into the persistence of lower achievement levels for blacks.

As predicted by the social learning theory framework, parental income has positive and statistically significant effects on academic achievement for both young men and young women independent of other parental characteristics. There is also some evidence which suggests that the way in which parental education shapes the educational learning environment for children has some connection to the sex of the parent relative to the child. While father's education has a significant and positive impact on the achievement of young men, only mother's education has the same magnitude of influence on young women. Although mother's education is also of consequence to the achievement of young men, the size of this effect is one-third that for young women. Father's education seems to have little, if any, impact on the educational achievement of young women. Thus, while mother's education has importance for the achievement of both sexes, the education of the same-sex parent assumes prominence.

Contrary to expectations, mother's employment characteristics when the respondent was age 14 seem to have little relevance to the academic achievement of sons or daughters, holding constant other family background factors. As noted previously, it is possible that any benefits that mother's employment and occupational characteristics have for the learning environment of the adolescent may be counterbalanced by the costs associated with less time to spend in interaction with one's children. Together these forces could minimize the overall effect of
mother's employment characteristics.

Differences between males and females can also be seen in the effect of family structure variables on academic achievement. While the difference is not overwhelming, young men experience a significant advantage from being first born regardless of number of siblings, but young women do not. Rather, females seem to gain substantially from being an only child. It may be that girls, especially without competition from other siblings in general, and male siblings in particular, benefit to a much larger extent from parental and other inputs into their academic achievement than do young women who have a large number of siblings. The relative academic success of young women who are only children is particularly noticeable when compared to the absence of any difference between male only children and males from large families (4 or more children). In keeping with previous expectations, both male and female adolescents from relatively small families (two or three children) fare better in terms of academic achievement than do offspring from larger families (four or more children).

The absence of regional and metropolitan effects on achievement for young women also contrasts somewhat with the effects of these variables for young men. This result is not dissimilar to the findings of previous research highlighting the relative importance of family background factors to the attainment of young women and of intermediate achieved characteristics to the attainment of young men. It simply implies that factors outside of the family context, at least those
conceptualized and measured up to this point in time in the literature, seem to have little impact on the educational achievement of young women. In this particular instance, females appear to be unaffected by the local institutional opportunity structure or the availability of educational information and physical resources for which these geographic location variables proxy. On the other hand, the achievement of young men appears to be affected in predictable ways. Males located in southern areas of the country and/or who reside in rural communities experience lower achievement than their northern and/or more urban counterparts.

B. The Parental Encouragement Equations

Tables 5 and 6 present results for the paternal and maternal encouragement equations, respectively. Inspection of these results reveals as many similarities as differences between the sexes with regard to what influences their perception of parental encouragement. As expected, the coefficients of parental education and respondent's achievement are positive and significant for both males and females and of fairly equal magnitude between mother and father. The effect of parental income is also positive in all cases. Interestingly, however, income is only significant for young men in the paternal encouragement equation and for young women in the maternal encouragement equation. Though not contrary to the expectation that at higher income levels parents would encourage their children more to seek additional education, this finding suggests that at higher income levels they are
Table 5  Paternal Encouragement Equations for Young Men and Young Women: Ordinary Least Squares Regression\textsuperscript{a}

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>Young Men Coefficient</th>
<th>t-value</th>
<th>Young Women Coefficient</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>0.100</td>
<td>1.29*</td>
<td>0.312</td>
<td>4.37***</td>
</tr>
<tr>
<td>Parental income\textsuperscript{b}</td>
<td>0.005</td>
<td>1.34*</td>
<td>0.002</td>
<td>0.70</td>
</tr>
<tr>
<td>Health problem</td>
<td>-0.050</td>
<td>0.85</td>
<td>-0.176</td>
<td>1.54*</td>
</tr>
<tr>
<td>Father’s education</td>
<td>0.030</td>
<td>4.33***</td>
<td>0.038</td>
<td>5.42***</td>
</tr>
<tr>
<td>First born</td>
<td>-0.034</td>
<td>0.61</td>
<td>0.038</td>
<td>0.87</td>
</tr>
<tr>
<td>Achievement</td>
<td>0.005</td>
<td>3.61***</td>
<td>0.004</td>
<td>2.65***</td>
</tr>
<tr>
<td>South</td>
<td>0.072</td>
<td>1.52*</td>
<td>0.069</td>
<td>1.44*</td>
</tr>
<tr>
<td>Central city</td>
<td>0.043</td>
<td>0.78</td>
<td>0.024</td>
<td>0.43</td>
</tr>
<tr>
<td>Suburb</td>
<td>0.014</td>
<td>0.29</td>
<td>0.040</td>
<td>0.83</td>
</tr>
<tr>
<td>Intercept</td>
<td>-0.401</td>
<td>2.53</td>
<td>-0.488</td>
<td>2.67</td>
</tr>
</tbody>
</table>

\textsuperscript{a}Universe consists of all 14-17 year olds in intact parental households at age 14 and in base survey year.

\textsuperscript{b}Income reported in thousands of dollars

*Significant at the .10 level for a one-tailed test.

**Significant at the .01 level for a one-tailed test.
Table 6  Maternal Encouragement Equations for Young Men and Young Women: Ordinary Least Squares Regression\(^a\)

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>Young Men</th>
<th></th>
<th>Young Women</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>t-value</td>
<td>Coefficient</td>
<td>t-value</td>
</tr>
<tr>
<td>Black</td>
<td>0.104</td>
<td>1.34*</td>
<td>0.322</td>
<td>4.60***</td>
</tr>
<tr>
<td>Parental income(^b)</td>
<td>0.002</td>
<td>0.48</td>
<td>0.005</td>
<td>1.39*</td>
</tr>
<tr>
<td>Health problem</td>
<td>-0.043</td>
<td>0.73</td>
<td>-0.081</td>
<td>0.72</td>
</tr>
<tr>
<td>Mother's education</td>
<td>0.023</td>
<td>2.74***</td>
<td>0.035</td>
<td>3.82***</td>
</tr>
<tr>
<td>First born</td>
<td>-0.006</td>
<td>0.15</td>
<td>0.063</td>
<td>1.44*</td>
</tr>
<tr>
<td>Achievement</td>
<td>0.005</td>
<td>3.65***</td>
<td>0.005</td>
<td>3.22***</td>
</tr>
<tr>
<td>South</td>
<td>0.064</td>
<td>1.34*</td>
<td>0.054</td>
<td>1.13</td>
</tr>
<tr>
<td>Central city</td>
<td>0.097</td>
<td>1.77**</td>
<td>0.053</td>
<td>0.96</td>
</tr>
<tr>
<td>Suburb</td>
<td>0.0003</td>
<td>0.01</td>
<td>0.084</td>
<td>1.75**</td>
</tr>
</tbody>
</table>

|                |  |  |
| Intercept      | -0.274 | 1.67 | -0.546 | 2.93 |
| \(R^2\)        | .069  | .107 |
| Sample size    | 559   | 528  |

\(^a\)Universe consists of all 14-17 year olds in intact parental households at age 14 and in base survey year.

\(^b\)Income reported in thousands of dollars.

*Significant at the .10 level for a one-tailed test.

**Significant at the .05 level for a one-tailed test.

***Significant at the .01 level for a one-tailed test.
also likely to give this encouragement to children of the same sex as themselves.

Perhaps the most striking results to be found in these equations is that blacks are more likely to perceive encouragement from either parent, regardless of their own sex, than are whites. Furthermore, black young women as compared to white young women are three times more likely to perceive much parental encouragement than are black young men compared to white young men. This difference persists after parental education and income are controlled, suggesting that parents of black students may try to compensate for the institutional and attitudinal barriers to educational attainment that their children are likely to face by increased psychological support.

Being first born does not seem to give the expected advantage of increased parental encouragement with one exception. First born girls perceive more encouragement from their mothers than girls in other ordinal positions. If it is the case that boys retain a traditionally favored position in families because they are male, it is not surprising that ordinal position makes little difference to the amount of encouragement young men receive from either parent. For young women, the receipt of encouragement appears to be governed more by the operation of same-sex parental influences suggested by the social learning theory framework.

Included primarily as a control variable, health status generally seems to have little effect on achievement or on receipt of maternal encouragement. It does, however, make a significant difference for a
young woman's perception of paternal encouragement. If one speculates that the types of health conditions young women view as limiting to their activities are more severe in nature than those that young men report, then this finding becomes more understandable. Parents quite likely are guided in their allocation of family resources, including parental encouragement, by the expected return to their investment. Children with health limitations most likely represent greater risks to this investment. Similarly female children may represent even greater risks due to their potential for experiencing educational interruptions associated with marriage and childbearing. Traditional family concern with respect to the educational and occupational training of sons as well as possible parental unfamiliarity of opportunities for women may accentuate this double liability for unhealthy daughters, especially if fathers control the allocation of resources within the family. This notion is partially supported by the same-sex effects of family income on parental encouragement.

Other interesting effects of control variables should also be mentioned. Adolescents that reside in the South generally perceive more parental encouragement than those residing in northern areas. This is especially true with regard to receipt of father's encouragement and applies to both young men and young women. Again, one can only speculate that Southern families compensate for relative regional deficiencies in the educational environments outside of the home by increasing their psychological support to their children's educational goals.
In a somewhat different way, urban residence contributes to increased maternal encouragement but not paternal encouragement. Variation in this effect also occurs by sex of the respondent. While central city males perceive significantly more maternal encouragement than rural males, it is suburban females who perceive more encouragement from their mother than rural females.

C. The Educational Aspirations Equations

Table 7 will be the focus of a discussion on the determinants of educational aspirations. However, before devoting attention to this topic, mention should be made of the omission of the variable measuring the perception of teacher's encouragement from the model. When this variable is entered into the equation for aspirations, particularly in conjunction with the independent variable measuring peer influence, all influence of academic achievement on aspirations is eliminated. When a separate equation analyzing the determinants of teacher's encouragement is run (results not shown), the independent effect of the respondent's educational achievement dominates the model. While this finding is not entirely out of line with the importance past studies have attributed to achievement in influencing teacher encouragement (Alexander, Eckland and Griffin (1975); Sewell and Hauser (1975), pp. 104-105; Hauser, Tsai and Sewell (1983)), it does create problems when incorporating a variable for teacher's influence into the entire system of equations. For whatever the reason, academic achievement and teacher's encouragement appear to be synonomous in this data set thereby prohibiting the identification
Table 7  Educational Aspirations Equations for Young Men and Young Women: Two Stage Least Squares\textsuperscript{a}

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>Young Men</th>
<th></th>
<th>Young Women</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>t-value</td>
<td>Coefficient</td>
<td>t-value</td>
</tr>
<tr>
<td>Black</td>
<td>0.357</td>
<td>0.83</td>
<td>-0.104</td>
<td>0.19</td>
</tr>
<tr>
<td>Parental income\textsuperscript{b}</td>
<td>0.036</td>
<td>1.46*</td>
<td>-0.008</td>
<td>0.41</td>
</tr>
<tr>
<td>Health problem</td>
<td>0.258</td>
<td>0.77</td>
<td>0.404</td>
<td>0.58</td>
</tr>
<tr>
<td>Mother worked when R age 14</td>
<td>0.102</td>
<td>0.30</td>
<td>-0.042</td>
<td>0.13</td>
</tr>
<tr>
<td>Atypicality of mother's occupation when R age 14</td>
<td>0.003</td>
<td>0.60</td>
<td>0.009</td>
<td>1.16</td>
</tr>
<tr>
<td>Predicted paternal encouragement</td>
<td>0.979</td>
<td>0.27</td>
<td>4.312</td>
<td>1.52*</td>
</tr>
<tr>
<td>Predicted maternal encouragement</td>
<td>4.202</td>
<td>1.12</td>
<td>1.711</td>
<td>0.50</td>
</tr>
<tr>
<td>Achievement</td>
<td>0.029</td>
<td>2.87***</td>
<td>0.011</td>
<td>0.84</td>
</tr>
<tr>
<td>South</td>
<td>0.017</td>
<td>0.07</td>
<td>-0.308</td>
<td>1.10</td>
</tr>
<tr>
<td>Central city</td>
<td>0.210</td>
<td>0.59</td>
<td>-0.174</td>
<td>0.53</td>
</tr>
<tr>
<td>Suburb</td>
<td>0.290</td>
<td>1.05</td>
<td>-0.215</td>
<td>0.68</td>
</tr>
<tr>
<td>Intercept</td>
<td>8.170</td>
<td>8.31</td>
<td>9.889</td>
<td>8.41</td>
</tr>
<tr>
<td>(R^2)</td>
<td></td>
<td>.214</td>
<td>.152</td>
<td></td>
</tr>
<tr>
<td>Sample size</td>
<td></td>
<td>559</td>
<td>528</td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{a}Universe consists of all 14-17 year olds in intact parental households at age 14 and in base survey year.

\textsuperscript{b}Income reported in thousands of dollars.

*Significant at the .10 level for a one-tailed test.

***Significant at the .01 level for a one-tailed test.
of the independent effects of achievement upon aspirations. This result was considered unacceptable in light of previous research which highlights the relative independent importance of achievement in equations estimating educational aspirations (Sewell, Haller and Ohlendorf (1970); Wilson and Portes (1975); Marini and Greenberger (1978)) and the relative unimportance of teacher's encouragement.

A similar problem arises with the variable representing peer influence. It should be emphasized that peers' college plans also detracts from the measured influence of academic achievement on aspirations. Theoretically and intuitively, peers' college plans should be less affected by the achievement of the respondent than would teacher's encouragement, and indeed, when a separate equation predicting college plans of peers is run (results not shown here), the respondent's achievement level competes with other family background characteristics as a major influence.

An additional concern relates to the way in which peers' college plans influence educational aspirations. If friendships are formed on the basis of similar educational aspirations rather than being based on other characteristics of the friend and of the respondent, then in a case where there is no true peer influence, there will still be a correlation between the peer and the respondent's aspirations with no adequate resolution possible. However, if friendships form on the basis of other exogenous characteristics as well as peer aspirations, then one can hope to identify the independent effects of these variables on the educational aspirations of the respondent. This discussion
leaves the adequacy of the current measure of peer influence and similar measures used in previous studies open to question. For these reasons, the measure of peer influence was excluded from the present model of educational aspirations. Note 3 describes the differences that occur when peers' college plans are included in the equation.

As evidenced in Table 7, the equations estimating educational aspirations for both young men and young women are unimpressive. Little racial difference appears with regard to aspirations. Paternal encouragement is positive and significant (at a 10 percent level) only for young women indicating that, at least for black young women, the high levels of parental encouragement that they experience translate into higher educational aspirations.

Higher parental income, on the other hand, contributes little to higher aspirations for young women when controlling for parental encouragement and other background factors and only modestly affects higher aspirations for young men. Contrary to expectations, atypicality of mother's occupation and her employment status when the respondent was age 14, also have no effect on aspirations for either sex. Control variables for area of residence are also not significant.

Achievement seems to have no effect on the educational aspirations of young women but is positive and significant for young men. This relative difference between the sexes with regard to the effect of achievement on educational aspirations has also surfaced in previous studies of the status attainment process (Sewell and Shah (1967); Alexander and Eckland (1974); Marini and Greenberger (1978); Rosen and
Aneshensel (1978)).

In short, the aspirations equations as presented in this paper present various problems when analyzed within the social learning theory framework. First, the concepts representing the ways in which peers and teachers influence educational aspirations are not adequately measured using the current data set. Personal characteristics of friends and teachers and information concerning the development of friendships is unavailable. Furthermore, given that much previous research also has utilized measures of peer influences similar to that available in the present data set (Sewell, Haller and Portes (1969); Sewell, Haller and Ohlendorf (1970); Alexander and Eckland (1974); Alexander, Eckland and Griffin (1975); Hauser, Tsai and Sewell (1983)), it would behoove future researchers in this area to give more attention to the simultaneity of development of the respondents' and peers' aspirations. A better test of the aspirations' equation using the social learning theory framework would be to incorporate an equation for teacher and peer influence into the structural model. The independent variables for these equations would consist of the teachers' or peers' characteristics in addition to the respondents' background characteristics and achievement. In addition, the peer equation would also incorporate the respondents' educational aspirations. The predicted teacher and peer variables could then be entered into the equation for respondent's educational aspirations.
D. The Educational Attainment Equations

In contrast to the results for educational aspirations, the equations presented in Table 8 appear to be reasonably successful in explaining the educational attainment of young men and young women. Furthermore, they highlight substantial differences by sex in this process. Before emphasizing these differences, attention will be drawn to the similarities.

Despite the problems noted earlier with regard to the estimation of educational aspirations, both the respondent's educational aspirations and achievement have positive and significant effects on attainment for both sexes. It is also evident that race has little direct effect on educational attainment for either sex. However, it should be noted that black young women, but not black young men, indirectly realize higher educational attainment via the effects of parental encouragement and educational aspirations. Finally, variables controlling for area of residence have minimal direct effects on the educational attainment for both sexes.

Curiously, there appears to be no direct effect of the number of siblings on educational attainment once income is controlled except for young women who are only children. This suggests that family size operates more as an indirect constraint on parental inputs to the adolescent's educational achievement and less as a direct constraint on allocation of financial resources for education among the various family members. However, for young women with zero siblings, the combined effect of achievement advantages and no competition from siblings for
Table 8  Educational Attainment Equations for Young Men and Young Women: Two Stage Least Squares

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>Young Men</th>
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<th>Young Women</th>
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<td></td>
<td>Coefficient</td>
<td>t-value</td>
<td>Coefficient</td>
<td>t-value</td>
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<td>Black</td>
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<td>0.04</td>
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<tr>
<td>Zero siblings</td>
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<td>One sibling</td>
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<td>0.77</td>
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<td>0.178</td>
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<tr>
<td>Two siblings</td>
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<td>-0.141</td>
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<td>Achievement</td>
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<td>1.96**</td>
<td></td>
<td>0.024</td>
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<td>Predicted educational aspirations</td>
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<td>5.73***</td>
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<td>0.615</td>
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<td>Married age 18</td>
<td>-0.278</td>
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<td>-0.653</td>
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<td>Married age 19-22</td>
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<td>-0.550</td>
<td>3.73***</td>
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<td>Child age 18</td>
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<td>0.38</td>
<td></td>
<td>-0.597</td>
<td>1.93**</td>
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<tr>
<td>Child age 19-22</td>
<td>-0.270</td>
<td>1.62*</td>
<td></td>
<td>-0.670</td>
<td>3.26***</td>
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<td>0.123</td>
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<td>Central city</td>
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<td>Suburb</td>
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<td>Military-draft</td>
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<td>0.60</td>
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<tr>
<td>Military-enlist</td>
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<td>Intercept</td>
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<td>Sample size</td>
<td>559</td>
<td></td>
<td></td>
<td>528</td>
<td></td>
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</tr>
</tbody>
</table>

\(^a\)Universe limited to respondents in intact parental households at age 14 and in the base survey year.

\(^b\)Income reported in thousands of dollars.

* Significant at the .10 level for a one-tailed test.
** Significant at the .05 level for a one-tailed test.
***Significant at the .01 level for a one-tailed test.
family financial resources gives them a distinct advantage over other young women in terms of their ultimate educational attainment.

Other male-female differences in the determinants of educational attainment include a positive and significant direct effect of parental income for young women but not young men. This differential suggests that, even controlling for family size, the ability of young women to obtain additional education is constrained by the level of family financial resources available. Whether or not a young man will obtain higher levels of education appears to be unaffected by this issue. This finding is consistent with those of past research on sex differences in the attainment process which highlight the persistence of background effects on attainment for young women.

Again, the presence of a health limitation hinders the educational attainment of young women but not young men. As discussed previously, to the extent that young women are reporting more serious illnesses than young men, this result is understandable.

It is through the effects of the marriage and fertility variables that the most outstanding differences in the attainment process of males and females are evidenced. Clearly, the negative impact of marriage and/or childbearing during the high school and undergraduate college years is substantial for young women but not for young men. Marriage at early years has twice the negative effect on the attainment of young women as compared to young men. The presence of children only deters young men from obtaining more years of education if the child is born during his potential college undergraduate years. Marriage and
childbearing during the high school and college years clearly represent constraints to obtaining higher education for young women but represent only minor obstacles to the attainment of young men. Past research which has ignored these constraints has failed to uncover an important source of variation in the education attainment processes for young men and young women.

On the other hand, military service does represent an obstacle to higher attainment for young men, particularly if entrance into the service is through enlistment. Presumably this effect is due to the additional years of military duty that an enlistee must serve as compared to a draftee. However, a word of caution is warranted with regard to generalizing this effect considering that the regression sample underrepresented enlisted men to begin with. In any event, that being drafted into military service has no significant effect on educational attainment for these young men, men who served during a period of history when their term of duty had a high probability of taking place in combat, is an interesting finding in its own right.

II. Conclusion

This paper represents an attempt to incorporate the influence of family background factors on various aspects of the educational attainment process within a comprehensive theoretical framework. The framework utilized is the social learning theory perspective associated with the work of Bandura (1971) and Bandura and Walters (1963). The resulting theoretical model of educational attainment was empirically
tested on national samples of males and females to assess the fit of the model and to investigate possible sex differences in this regard.

In general, the influences of parental education and income predicted by the social learning theory framework have been supported by the empirical results. This includes support of the separation of both mother's and father's education and family income from a composite socioeconomic background measure in order to assess the various ways each can impact on the educational attainment process of youth. Similarly, the determinants of parental encouragement, have, in most instances, also behaved according to the theoretical predictions. On the other hand, mother's employment and occupational characteristics when the respondent was age 14 fail to exhibit much impact on the educational attainment process for males or females, even after simultaneously controlling on such background characteristics as family income, parental education, and geographic location. This finding is consistent with other research examining the impact of mother's work characteristics on a host of children's educationally related outcome variables, most of which have not been as firmly controlled (Etaugh (1974); Hoffman (1974); Hayes and Kamerman (1983)). Furthermore, this result is not entirely inconsistent with the possibility that the reduction in overall time available to working mothers to spend in interaction with their children counterbalances the predicted positive effects attributed to her employment and occupation characteristics. The net result is that these characteristics show no effect on educational achievement or aspirations.
One major weakness of the model of educational attainment offered here is with respect to the determinants of educational aspirations. The failure to adequately explain educational aspirations possibly reflects the incongruity between the empirical and theoretical concepts of peer and teacher influence. The data set used here does not provide information on the characteristics of peers and teachers, nor does it allow a sketch of the formation and development of friendships. Future models of the educational attainment process using this framework should allow for the simultaneity of the development of the respondent's and peers' aspirations and assess their mutual impact by incorporating equations representing peer as well as teacher influence into the system of structural equations.

It is clear that various sex and race differences occur in the attainment process. Analysis of separate models for each sex, but which contain similar variables, have permitted a more adequate examination of these differences than has previous research. Of critical importance is the significant obstacle that early marriage and childbearing present to the educational attainment of young women but not to young men. Previous research has not simultaneously controlled for these constraints in models for males and females and hence has overestimated the degree of similarity between the sexes in the attainment process.

Of additional interest is the significant advantage that blacks receive (especially black females) in the receipt of parental encouragement to continue their education beyond high school. This effect eventually translates into higher educational aspirations and
subsequent educational attainment for black young women but not black young men. These results suggest that parents of black students may try to compensate for the institutional and attitudinal barriers to educational attainment that their children are likely to face by increased psychological support. Thus, the results of this research have highlighted one particular factor that may distinguish the educational attainment process for blacks and whites. Future research should further investigate the function and consequences of this factor at various stages of the attainment process. Not only should separate comparisons of blacks to whites be made in this regard but special attention should be given to examining black male-female differences. For example, at what point in the attainment process does the benefit of parental encouragement break down for black males and what other factors, within and outside of the family, contribute to the inability of these young men to translate this resource into higher educational attainment.

Some mention should be made of the tendency for previous research to test models of the attainment process primarily on samples of youth from intact families. This study also has been unable to test the model on youth from non-intact families due to problems of missing data on parental variables of key theoretical interest. However, a brief comparison was done on available data for youth from both types of family backgrounds which highlights possible sources of variations in the model of educational attainment between the groups. Youth from non-intact families (i.e., homes where either mother or father or both are
not present) exhibit a number of differences from their counterparts in intact families, especially with regard to levels on variables traditionally and untraditionally included in models of educational attainment. This research also draws attention to possible differences in the relationship of parental encouragement to attainment of youth from different family backgrounds and to the likelihood that young women from broken homes may experience the attainment process in significantly different ways from their male counterparts.

In short, this study has shown the social learning theory framework to be a useful analytical tool for integrating and testing the various components of the educational attainment process. It has been especially fruitful in generating a priori hypotheses concerning the influence of family background factors and of significant others on educational achievement, aspirations and ultimate educational attainment. It is recommended that future testing of the model be pursued on data sets that incorporate more detailed information on the influence of significant others, particularly information on the context of social interaction.

The model presented here has been better equipped to test sex differences in the attainment process, particularly as they pertain to both family background factors and intervening life-cycle events—variables treated in a more meaningful way here or which were not considered in models for both sexes previously. Particularly noteworthy are the limitations that marriage and fertility events impose on the educational attainment of young women but not young men.
It is recommended that future research focus on developing separate attainment models for each race and gender group and that such models further investigate the impact of parental encouragement and what differences (similarities) in the process may be found for youth from intact versus non-intact families.

The sociological significance of these results extends beyond the confines of this particular study. To the extent that future increases in educational levels, labor force participation rates, and occupational differentiation occur faster for young women than young men, the effects witnessed in the current paper may be somewhat time bound to the cohort under study. Rising levels of maternal education and employment may lead to less traditional role relationships within the family and greater equalizing of parental time inputs. Higher levels on these maternal variables may also lead to greater familial awareness of the necessity for and variety of occupational goals available to sons as well as daughters. These trends may help to reduce the same-sex effect of parental education on achievement. Furthermore, rising levels of family income and overall reductions in family size may contribute to equalizing the effects of family resources on the attainment of sons and daughters. Future increases in ages at first marriage and first childbirth as well as increases in the dissemination and usage of contraception should also function to reduce the negative impact of marriage and childbirth on the attainment of young women as compared to young men.

Unfortunately, the relative gap between black young women and men in terms of educational attainment has fewer prospects for
diminishing. It is likely that black young men are more constrained in their achievement, both by socialization practices within the family, and by the larger society, because they pose more of a competitive threat to the white majority than do black women. If this is so, major changes in racial attitudes would be required in the future in order to produce similar impacts on black male attainment levels. If anything, the sex differential in attainment for blacks may even widen given the expected societal changes in female education and employment levels mentioned earlier. Thus, to the extent that the attainment gap between black men and women generates conflict within the family and is a major source of divorce and separation, the incidence of black female-headed households will continue to remain quite high.

In conclusion, it should be emphasized that the single-parent family is rapidly becoming a major form of the American family for whites as well as blacks. What theoretical implications this family lifestyle has for the attainment process of sons and daughters has yet to be examined. It may well be that societal trends toward equality between the sexes in both the home and the work place may minimize the sex-role significance of a missing parent but underscore the disadvantages of decreased interaction with adults. Other aspects of the nature and quality of parenting in one- as compared to two-parent families need to be investigated for their potential impact on the educational attainment process for youth.
NOTES

1 Indeed, it is quite possible that young men are reporting with greater frequency than young women such minor or temporary injuries as might be incurred while participating in sports activities. Allowance is made in the phrasing of the health questions for young men, but not for young women, for any health conditions that specifically affect school activities. These types of health conditions may be substantially different than those that affect a person's ability to work.

2 Cohen (1983) shows that once you control for aspirations at the beginning of friendship formation, the effect of peers' aspirations on subsequent aspirations is substantially reduced. They conclude that by not controlling for the possibility that friendships are formed on the basis of similar aspirations, previous studies have overestimated the effect of peer influence on aspirations by over 100 percent.

3 It is clear that the introduction of a variable measuring peer influence alters the model in a few unanticipated ways in addition to presenting itself as a powerful predictor of educational aspirations for both males and females. However, as expected, the introduction of peer influence substantially reduces the effect of achievement on the
aspirations of young men while the achievement factor remains insignificant for young women. When the peer variable is added to the equation for young men, the coefficient for health status increases in both magnitude and significance. For young women, the inclusion of a variable measuring peer influence produces a change in the coefficient for mother's employment status at age 14. In the "included" model, the coefficient of mother's work status is negative and significant at the .10 level. In addition, the magnitude of the paternal encouragement coefficient is reduced and its significance vanishes when the variable for peer influence is incorporated into the model.

4 Results for the attainment model in a system of equations including the peer variable are virtually identical and are therefore not presented.
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U.S. Department of Commerce

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Zajonc, R.B.
Zajonc, R.B. and G.B. Markus
Table A.1: Zero Order Correlations of System Variables: Young Men (N = 559)

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<th>Variable Description</th>
<th>Parental Income</th>
<th>Parental Sibling</th>
<th>Father’s education</th>
<th>Mother’s education</th>
<th>Mother worked when age 14</th>
<th>Agglutinative of identity</th>
<th>Marital age 18</th>
<th>Married age 19-22</th>
<th>Child age 18</th>
<th>Child age 22</th>
<th>Grand</th>
<th>Central city</th>
<th>Suburb</th>
<th>Many peers plan college</th>
<th>Many teachers encouragement</th>
<th>Military-dropouts</th>
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