Published in final edited form as:
Merrill Palmer Q (Wayne State Univ Press). 2009 July 1; 55(3): 250–284. doi:10.1353/mpq.0.0022.

A Developmental Process Analysis of Cross-Generational Continuity in Educational Attainment

Gregory S. Pettit,
Department of Human Development and Family Studies

Tianyi Yu,
Department of Psychology

Kenneth A. Dodge, and
Center for Child and Family Policy

John E. Bates
Department of Psychological and Brain Sciences

Abstract

In this prospective longitudinal study ($N = 585$) we examined intergenerational links in level of educational attainment. Of particular interest was whether family background characteristics, parenting in early childhood and early adolescence, and school adjustment and performance in middle childhood accounted for (i.e., mediated) continuity and amplified or attenuated (i.e., moderated) continuity. Family background data, including mother education level, were collected when the children were age 5 years; parenting was assessed at ages 5 and 12; and school adjustment data (behavior problems, peer acceptance, academic performance) were collected in the first four years of elementary school. Cross-generational continuity in educational attainment was moderate ($r = .38$) and largely indirect via children's academic performance in elementary school and mothers' academic involvement in early adolescence. Moderator analyses indicated greater cross-generational continuity in single-parent families; in families low in proactive teaching, monitoring, and academic involvement; and in families with lower-IQ children who performed poorly in school and were disliked by peers, These findings suggest that distal and proximal family and child characteristics may serve as crucial processes in the intergenerational transmission of low educational attainment.

This study is concerned with cross-generational links in level of educational attainment. Educational milestones such as completing high school, attending college, and graduating from college bear a strong relation to occupational status and economic well-being. Compared to their better-educated peers, poorly educated individuals experience more stress and adversity in their personal lives; find family life, including parenting, to be more challenging; and generally have difficulty making the transition to adult roles and responsibilities (Luster & Okagaki, 2005). Their children, in turn, show more adjustment problems, do more poorly in school, and are themselves less likely to complete formal schooling (e.g., Davis-Kean, 2005; Duncan & Brooks-Gunn, 1997). The sequelae of low educational attainment are thus well known, but the developmental processes through which such outcomes accrue as a consequence or by-product of education level are not well understood. A key to such understanding may lie in the identification of individual, family,

Correspondence concerning this article should be sent to Gregory Pettit, 203 Spidle Hall, Auburn University, AL 36849. gpettit@auburn.edu.

and sociocultural factors that account for these predictive links and the conditions and contexts in which continuities in educational attainment may be weaker or stronger.

Educational attainment measures essentially represent a social address, a broad and encompassing set of experiences and characteristics that are subsumed—much like socioeconomic status (SES)—under a rubric that sheds little light on patterns of adaptation across developmental contexts and across generations. In our effort to understand cross-generational continuity and discontinuity in educational attainment, we draw from two developmental perspectives. The first perspective is that parents' low educational attainment level, whether as a lead indicator of underlying adaptational deficits or as a socialization constraint, sets into motion a dynamic cascade of events and experiences that cumulate in their children's own low educational attainment level. Parents' education level, from this perspective, is a distal factor that is only indirectly related to children's subsequent education level. More proximal factors, including the quality of early parenting, children's behavior and performance in school, and parents' involvement in their children's academics and awareness of their activities and where-abouts, may serve as mechanisms through which educational attainment level is transferred across generations. These factors may themselves have both direct and mediated (through subsequent experiences) relations with youths' attainment level. We previously have documented this kind of cumulative developmental progression in the domains of substance abuse (Dodge et al., 2006) and romantic relationship violence (Pettit et al., 2006). To our knowledge, there has been no previous study testing this kind of developmental model, in an intergenerational context, for educational attainment.

Our framework for understanding the developmental processes linking mothers' and youths' educational attainment is informed by social-interactional theory. This seminal theory, originally conceived to account for the development of antisocial behavior across childhood and adolescence (e.g., Patterson, Reid, & Dishion, 1992), has been applied more recently to the study of other developmental products, including the failure to graduate from secondary school (Veronneau, Vitaro, Pedersen, & Tremblay, 2008). From this theoretical perspective, inept parenting is thought to foster the development of antisocial behavior through a failure to provide negative consequences for misbehavior and by providing a model of manipulation and power assertion. The child fails to acquire skills needed for relating to peers in constructive ways, and deviant peers assume a more prominent role in the child's socialization. Poor relationships with teachers, lack of support for academic accomplishment, and a general aversion to school undermines academic achievements. The parent-child relationship continues to deteriorate, and parents withdraw (rather than confront) and fail to provide needed support and supervision. One end product in this chain of events is academic failure and a lack of interest in, or capacity for, educational attainments.

The parenting and school-adjustment factors outlined in the social-interactional model are not the only relevant social-developmental experiences to have importance for educational attainment. Parents' beliefs about education, the kinds of educative experiences they provide for their children, and children's efficacy beliefs and commitment to education, among other factors, also clearly play important roles (Davis-Kean, 2005). But low parental education has been found to be associated with the kinds of parenting and school adjustment factors described earlier, and they likely represent at least one set of pathways through which cross-generational continuities in educational attainment operate.

The second developmental perspective informing the goals of this study is that of lawful discontinuity in the intergenerational transfer of low educational attainment. Children whose parents fail to complete normative educational milestones are at risk for a variety of negative

social-behavioral outcomes, as was noted earlier. But as is the case in children's exposure to other kinds of developmental risk factors, low parental educational attainment does not foreordain lack of educational accomplishment and school completion in late adolescence and early adulthood. The identification of factors that may decouple parents' educational attainment from their children's educational attainment could be important as a means of targeting preventive interventions for at-risk youths. Previous research on protective mechanisms (e.g., Criss, Pettit, Bates, Dodge, & Lapp, 2002) provides useful guidance in the selection of relevant constructs, which may be construed along a proximal-to-distal continuum. At the most proximal level are personal attributes of the individual, such as interpersonal competence and academic performance. These attributes may be rooted in early dispositions and proclivities and may be shaped by socialization experiences provided by parents. They also may stem in part from the educational milieu within which a school-aged child finds himself or herself. At a less proximal level is the kind of parenting that a child receives, with parenting quality in early childhood establishing the footing for preschool-to-school transitions (i.e., through proactive teaching and lack of punitiveness) and parenting quality in early adolescence reflecting adequate supervision and engagement with the child in matters of academic performance and constructive use of discretionary time. At the most distal level are social-context factors that may amplify or dampen the relative risk associated with low levels of parent education. Family structure and ethnicity comprise one such set of background characteristics. Because the presence of one (or more) risk factors has been shown to interact with other risk factors in a synergistic fashion (Dodge & Pettit, 2003), these child, family, and school characteristics were expected to increase the likelihood that low educational attainment levels would be transferred across generations.

Correlates and Predictors of Educational Attainment in Developmental Perspective

Contextual and family-process models of developmental pathways converge to suggest that (a) parental educational attainment is embedded in a broader matrix of family-ecological factors that co-occur with, but do not fully account for, the predictive link between educational attainment and subsequent child outcomes, and (b) these predictive associations between distal social-address markers and later outcomes likely operate through intervening experiences with parents, peers, and schools. This perspective is one of developmental mediation (Dodge & Pettit, 2003), whereby the effects of contextual experiences in early life are played out through successive experiences with major social agents in later life. In the context of parents' educational attainment and in line with the social-interactional perspective, this would be expected to be seen in parents' socializing behaviors and in children's behavior and performance in the early school years. The links between parents' education attainment and their children's school achievement (Davis-Kean, 2005; Havemen & Wolfe, 1995; Smith, Brooks-Gunn, & Klebanov, 1997) and their children's behavioral problems (Dearing, McCartney, & Taylor, 2001; Nagin & Tremblay, 2001) have been well established in the literature. Research on parenting has also shown that mothers' education attainment is associated with the quality of the home environment (Corwvyn & Bradley, 2002; Davis-Kean, 2005; Klebanov, Brooks-Gunn, & Duncan, 1994; Smith, Brooks-Gunn, & Klebanov, 1997). Other evidence in the literature suggests that highly educated mothers are more actively involved in and more knowledgeable about their adolescents' academic lives (Baker & Stevenson, 1986; Yonezawa, 2000).

Children's initial successes at school represent an intermediate point in the developmental sequence leading to educational attainment level. As noted by Stipek (1998), children's early academic achievement plays a critical role in the development of constructive academic attitudes and in facilitating school completion. Children's behavioral adjustment and social competence with peers likewise have been linked with both earlier parenting and

with children's subsequent educational attainments (e.g., Cowan & Cowan, 2005; Dubow, Boxer, & Huesmann, this issue; Kokko, Tremblay, Lacourse, Nagin, & Vitaro, 2006; Veronneau et al., 2008). And during the critical transition from elementary school to middle school, parents' active involvement in their children's schooling (Hill et al., 2004) and parents' monitoring and supervision of their children's activities and companions play important roles in fostering children's academic orientation and in lessening children's involvement with antisocial peers (Pettit, Bates, Dodge, & Meece, 1999). Collectively, then, accumulated evidence suggests that the impact of mothers' educational attainment likely exerts an indirect effect on their adult children's educational attainment, with early and later parenting and children's initial School adjustment serving as mediators. These mediated pathways were tested in the current research. To reduce the effects of preexisting (or at least co-occurring) factors that often are confounded with parent and child educational achievement and outcomes, we controlled for SES, ethnicity, family structure (intact vs. single-parent), gender, and childhood IQ in the key analyses.

Factors Contributing to Continuity and Discontinuity in Educational Attainment

A broad body of research has documented that the impact of family-ecological risk factors on developmental outcomes may be worsened (risk amplifiers) or lessened (protective factors) when certain interpersonal and intrapersonal characteristics and experiences are present (for reviews, see Luthar, 2006; Masten, Obradovic, & Burt, 2006). For example, in our own work we have found that the relation between low SES and child adjustment problems (Pettit, Bates, & Dodge, 1997) is stronger in the absence of positive parenting and that relations between family adversity (single-parent status, family stress, and low SES) and child adjustment problems (Criss et al., 2002) is stronger among children who experience peer rejection. Insofar as low educational attainment can be construed as a risk factor, risk and protective factors might moderate its relation with child and adolescent outcomes, including educational attainment outcomes. Whereas some prior work has considered a limited set of factors (mostly demographic variables) as possible moderators of the relation between parental education and children's academic outcomes (see Haveman & Wolfe, 1995), a broader range of child and family characteristics might plausibly be expected to serve in such a risk-amplifying or risk-attenuating capacity.

A relevant consideration, given the current study's focus on cross-generational links in education level, is evidence that intergenerational continuities and discontinuities in patterns of adaptation may be moderated by children's adjustment qualities and experiences at home and school. Few such studies have been conducted, but there are suggestions in the literature (Scaramella & Conger, 2003; Serbin & Karp, 2004; Smith & Farrington, 2004) that social and economic disadvantage and a history of interpersonal relationship difficulties may heighten the likelihood of the intergenerational transfer of maladaptation (e.g., antisocial behavior, harsh parenting). The manifestation of cross-generational maladaptation of interest in the present research was that of low educational attainment, and the expectation was that the same factors that were construed as possible mediators of the link between parents' and children's educational attainment would also serve as moderators of this link. That is, we expected more continuity (i.e., cross-generational links in low attainment would be stronger) when parents were low in positive parenting and high in negative parenting, when children performed more poorly academically, when children had lower levels of peer acceptance, when children had more behavior problems, and when parents were less involved in their children's schooling in early adolescence and were less knowledgeable about their children's whereabouts, activities, and companions. These moderated pathways were also tested for the background (control) variables of SES, ethnicity, family structure, gender, and childhood IQ.

In sum, in the current research we used prospective longitudinal data to examine mediators and moderators of cross-generational continuity and discontinuity in level of educational attainment. We expected the links between mothers' and children's educational attainment to largely be indirect, with early and later parenting and school adjustment serving as mediators. These same factors as well as family background characteristics were expected to moderate the degree of intergenerational continuity. Subsequent level of educational attainment was expected to be more similar across generations in families in which children experienced more family adversity, less optimal parenting, and more social and academic difficulties in their early schooling.

Method

Participants

The young adults and their families in this study are participants in the Child Development Project, an ongoing multisite longitudinal study of children's and adolescents' adjustment from kindergarten through early adulthood (see Dodge, Bates, & Pettit, 1990; Pettit et al., 1997). Participating families were recruited from three geographical areas (Nashville and Knoxville, Tennessee, and Bloomington, Indiana) in 1987 (Cohort 1) and 1988 (Cohort 2). Bloomington is a town of approximately 60,000 residents, many with Appalachian ancestry. Its neighborhoods range from trailer parks to planned developments. Knoxville is an Appalachian metropolitan area of approximately 200,000 residents with neighborhoods that range from rural to suburban. Nashville is a mid-South metropolitan area of over 1 million people with a broad economic base and neighborhoods that range from federally subsidized housing projects to affluent suburbs. Within each site, target schools were selected in consultation with local school administrations. These schools were chosen because they were judged to be broadly representative of the makeup of the schools in each district.

At kindergarten preregistration, parents were approached at random and asked if they would participate in a longitudinal study of child development. About 15% of children at the targeted schools did not preregister. These participants were recruited on the first day of school or by letter or telephone. Of those so contacted, approximately 75% agreed to participate.

The initial sample of 585 participants was diverse in terms of child gender (52% boys and 48% girls) and ethnicity (81% European American, 17% African American, and 2% other ethnic groups). Although the sample was predominantly middle class, as indicated by an average Hollingshead (1979) score of 40.4 (SD = 14), a range of SES were represented, with 9%, 17%, 25%, 33%, and 16% of the families classified in Hollingshead's five classes (from lowest to highest). The first data collection wave commenced in the summer prior to kindergarten, when most children were 5 years of age. Follow-up assessments of the families were conducted yearly. There has been 80–84% retention in the most recent data collection waves.

Local Institutional Review Boards approved all research measures and procedures. Before participating in the study, written informed consent was obtained from all participants older than age 18 (parents and adult offspring), and verbal assent was obtained from children younger than 18. Research assistants described to parents and children their rights as research participants and answered any questions.

Procedures

In assessments conducted in project year 1 (the summer prior to kindergarten), the family was visited in the home by a team of trained interviewers. Parents provided detailed information about their race/ethnicity, education, marital status, parenting behavior, and

current child behavior. Reliability of actual scores was assessed through independent ratings of 56 randomly selected families (9.6% of total) made by a second coder who sat in with the interviewer and scored the interview protocol in real time.

During the home visit, interviewers also had opportunities to observe the interactions between the mother and the child. Each interviewer independently completed a postvisit inventory to summarize his or her impressions of mother-child interactions. In kindergarten through grade 3 (ages 5 through 8, on average), children's peer acceptance was assessed via classroom sociometric interviews, and children's school behavior problems were assessed through teachers' reports. In addition, with parental permission, school records were viewed to obtain first- to third-grade achievement test scores and math and reading/English grades. Data on early adolescent parenting were collected from parents, teachers, and youths in the spring and summer of grades 6, 7, and 8 (approximate ages 11–13 years). These measures included parental monitoring and parental academic involvement. Participants were interviewed at ages 20–21 about levels of educational attainment.

Demographic Variables and Prekindergarten Parenting Measures

Mother educational attainment—Mothers were questioned about how many years of education they completed ($N = 562$; missing data are due to incomplete or inconsistent maternal reports). Mothers who reported that they had completed less than 12 years of education were classified as "not completing high school" (11.2%). Those who reported that they had completed exactly 12 years of education were classified as "graduate high school only" (38.8%). Those who reported that they completed 13 to 15 years of education were classified as "some college or technical school" (23.8%). Those who reported that they had completed 16 to 17 years of education were classified as "graduate college" (17.8%). And finally, mothers who reported that they had completed more than 18 years of education were classified as "postbachelor" (8.4%). These reports were rescaled on a 1-to-5 scale from lowest to highest level of completed education.

Family background and children's IQ—For this study, four variables were used to represent family background and demographic characteristics: child gender, family structure, child ethnicity, and child IQ. For child gender, males were given a code of 0 and females a code of 1. Based on mothers' reports of their marital status, family structure was coded as a dichotomous variable (0 = living with both biological parents and 1 = others). For child ethnicity, African American participants were coded as 1, and those of other races were coded as 0. Childhood IQ was assessed in the summer following grade 6 and was computed as the average of the Block Design and Vocabulary subtests on the WISC-R (Wechsler, 1974).

Proactive parenting—Parents were presented with five hypothetical situations from the Concerns and Constraints Questionnaire developed for this study (see Pettit et al., 1997) in which the child misbehaved in his or her reactions with peers (e.g., child refuses to relinquish a toy after a reasonable length of time). Parents were asked to describe ways in which the child may have been prevented from behaving in this way in the first place. Parents' responses were coded as "doing nothing (unpreventable)" (1); "after the fact (nonpreventive power assertion, punishment)" (2); "after the fact (reasoning, proactive guidance)" (3); "before the fact (preventive but vague and general)" (4); and "before the fact (preventive, situation and method specific)" (5). Parents who used either of the latter two categories were scored as 1; parents using any other categories were scores as 0. Interrater agreement on the number of times (0 to 5) that the mother suggested a proactive strategy, expressed as a correlation coefficient, was .56. Scores are summed across the five stories ($\alpha = .70$) to create a measure of proactive teaching. Analyses supporting the validity of this

measure as an index of positive parenting have been reported in a number of investigations (e.g., Pettit et al., 1997; Pettit et al., 2001; Pettit et al., 2007).

Involvement in the child's early peer experiences—As part of the in-home interview, parents were asked to describe their children's exposure to peers in each of the two developmental periods (age 12 months to 4 years and the past year). Interviewers asked the parent to identify the situations in which the child interacted with other children, whether the child had been around any children whom the parent considered aggressive, whether the child had any close friends that she or he talked about, and the extent to which the child had been involved in conflicts with peers. Based on the parents' responses, the interviewers rated the parent's awareness of and concern about the child's social experience and willingness to use such considerations to structure the child's experiences. The interviewer impressions were summarized on an extensively anchored 5-point rating scale in which a 1 indicated that the parent was unaware or uninterested in most of the child's peer experiences and a 5 indicated a very high level of parental interest and involvement. The correlation between independent raters was a modest $r = .32$, but the alpha coefficient ($\alpha = .90$) across eras was high. The ratings across two developmental periods were averaged to create an over-all positive involvement score.

Warmth to the child—After the home visit, each of the two home visitors completed a postvisit inventory in which they assessed the warmth of the parents' behavior toward the child by noting the occurrence (occurred = 1, did not occur = 0) of each of four behavioral events: "parent speaks to child with a positive tone," "parent expresses a positive attitude when speaking of child," "parent initiates positive physical contact with children," and "parent accepts positive physical contact from children." If a few items could not be coded due to insufficient information (e.g., if the child did not initiate any positive contact), it was coded as 0. The two visitors' agreement on the sum of the ratings was substantial ($r = .58$), so the eight items (four from each of the two visitors) were averaged to create a score for observed mother warmth to the child ($\alpha = .61$).

Harsh discipline—Harsh discipline was measured through three items. Two items were taken from the Concerns and Constraints questionnaire. The parent was asked what she or he would do if the child behaved a certain way. Free responses were solicited that could include multiple behaviors. The full response was coded as 1 if it included physical punishment and 0 if not. The responses were averaged across the five stories ($\alpha = .81$) to create a measure of physical punishment. The parent was also asked to rate whether she or he would punish the child and if so how much. Response options were "not at all" (1), "a little" (2), "moderately" (3), "somewhat" (4), and "very sternly" (5). The responses were averaged across the five stories ($\alpha = .76$) to create a measure of severity of discipline. The third item was taken from an interviewer rating of harsh discipline. During the interview, the mother was asked to respond in an open-ended fashion to each of the questions for each era: "What kinds of misbehavior over the past year did your child do that you had to deal with?" "What kinds of things did you have to do to deal with his/her misbehavior?" "How often did you have to physically punish your child, such as spank, grab, or shake?" "What was the most severe thing you had to do during this period?" The interviewer privately rated the parent's harshness of discipline on a 5-point scale ranging from "nonrestrictive, mostly positive guidance" (1) to "severe, strict, often physical punishment" (5). The ratings across two developmental periods were averaged to create an overall harshness of discipline score ($\alpha = .73$, inter-rater $r = .80$).

Elementary School Adjustment Measures

Externalizing problems—During the spring of each school year, the child's teacher completed the 113-item Child Behavior Checklist—Teacher Report Form (Achenbach, 1991). For each item the teachers note whether the statement is not true for the child (0), somewhat or sometimes true (1), or very often or often true (2). The 34 items in the externalizing behavior scale (e.g., whether the child gets in fights and is disobedient at school) were summed to create an index of children's externalizing behavior problems in each year.

Peer acceptance—In the first four years of data collection, sociometric interviews following the protocol described by Coie, Dodge, and Coppotelli (1982) were conducted in all classrooms (described in Criss et al., 2002; Dodge et al., 2003). Interviews were conducted individually and orally. Children were shown a class roster and were asked to rate on a 5-point scale how much they liked each other. Children then named up to three peers they especially liked and three peers they especially disliked. A peer acceptance score was created by taking the standardized difference between the standardized like-most nomination score and the standardized dislike-most nomination score.

School performance—Measures of child academic performance in elementary school were obtained from the school records from data collection years 2 to 4 (grade 1 to 3). Children's grade point average (GPA) and percentiles on standardized tests in reading, language, math, and battery norms were used to compute this variable. GPA was recoded based on child grades for each year on reading, math, language, spelling, social studies, and science. The mean GPA was computed as the average of GPAs from grade 1 to grade 3 (α = .80). And the mean score of standardized tests was computed as the average of scores on standardized tests from grade 1 to grade 3 (α = .86).

Early Adolescent Parenting Measures

Parental monitoring—Assessments of parental monitoring were obtained from mothers and adolescents. In the spring of the sixth grade, mothers were asked their awareness of their children's activities and companions, their beliefs about the difficulty of tracking their children's where-abouts, and their judgments of the extent to which other adults would be available to provide supervision while their children are away from home (Pettit et al., 2007). Mothers rated each item on a 5-point scale. The scale anchor points differed depending on the content of the item. Sample items included "When your child is not at home, do you know where he/she is?" and "How often do you talk with your child about what he/she does with his/her friends when he/she is away from home?" A 9-item composite scale was calculated with an internal consistency of .73.

During the summer preceding eighth grade, mothers and adolescents were interviewed separately in the home. Items describing parents' monitoring were included in the interviews (see Pettit et al., 2001; Pettit et al., 2007). Five items scored on a 3-point scale were embedded into the adolescent interview (e.g., "How much do your parents know about who your friends really are?" "How much do your parents know about where you are most afternoons after school?"). In the mother interview, monitoring was assessed through mothers' ratings of eight items on a 5-point scale (e.g., "When your child is at a friend's house, how often do you think that a parent or another adult is there?" "If your child played with children who get in trouble, how often would you know it?"). Adolescent-reported monitoring scores were computed as the means of the five-item responses (α = .65). Mother-reported monitoring scores were computed as the means of the eight monitoring item responses (α = .67).

Parental academic involvement—Assessments of parental academic involvement were obtained from teachers, adolescents, and mothers. In the spring of the seventh grade, teachers completed the 21 -item Parent-Teacher Involvement Questionnaire (Kohl, Lengua, & McMahon, 2000) using a 5-point scale. Sample items included "How often does the parent send things to school?" and "How well do you feel you can talk to and be heard by this parent?" Items were averaged to create a teacher report of parental academic involvement score (α = .91).

During the winter in the seventh grade, adolescents were asked eight questions about their parents' involvement in educational activities at home, awareness of school progress, and relationships with teachers. Sample items included "My parents know how I am doing in school" "My parents help me choose my classes in school," and "My parents talk to me about things related to what I am doing in school." Items were rated on 5-point scales and were averaged to create an adolescent report of parental academic involvement score (α = .67). Also during the seventh-grade interview mothers responded to two items assessing whether they or their partner had attended a PTA meeting (or similar parent-school group) or an open house (or other school event for parents) in the last year. A composite variable was created to reflect whether parents had been involved in 0,1, or 2 of these activities. The correlation between these two items was .48 (see Hill et al.,2004).

Late Adolescent Educational Attainment Measures

Participants were interviewed at ages of 20–21 about levels of educational attainment (N = 501). Educational attainment level was scored as follows: Participants who dropped out of high school and had not graduated were classified as "not having completed high school" (16.6%). Participants who had graduated were classified as "graduating high school only" (17.0%). Those who had enrolled in any form of college were classified as "some college" (66.5%). These reports were rescaled on a 1-to-3 scale from lowest to highest level of completed education.

Plan of Analyses

A principal goal of this study was to examine the extent to which early and later parenting and children's school adjustment accounted for the predictive relation between mothers' education and children's education. We addressed this issue by conducting a structural equation modeling (SEM) analysis in which we tested whether parent education attainment indirectly influences children's education attainment through prekindergarten parenting, children's school adjustment, and early adolescent parenting.

Before testing the fit of the hypothesized mediation model, we constructed latent variables for prekindergarten parenting (proactive teaching, parental involvement, and harsh discipline), school adjustment in kindergarten through grade 3 (externalizing behavior, peer acceptance, and school performance), and early adolescent parenting (monitoring and academic involvement). The measurement model in which the correlations among all of the latent variables were freely estimated indicated an acceptable model fit. All factor loadings between the measured indicators and their factors were significant (Table 1). SEM was then conducted to examine the fit of the mediation model in which parent education attainment indirectly influence children's education attainment through prekindergarten parenting, children's school adjustment, and early adolescent parenting. Family and child characteristic variables (child sex, family structure, child ethnicity, and child IQ) were treated as control variables. The model was estimated using the Amos 6.0 program. Amos uses full information maximum likelihood estimation (FIML) with missing data, which results in unbiased parameter estimates and appropriate standard errors when data are missing randomly (Arbuckle & Worthke, 1999). Even when the missing-at-random assumption is

not fully met, FIML estimates are generally better than estimates obtained with listwise deletion or other ad hoc methods (Schafer & Graham, 2002). Because the three latent variables of prekindergarten parenting (proactive teaching, parental involvement, and harsh discipline) are intercorrelated with each other, the residual factor variances of these factors were correlated with each other in the model. Similarly, the residual factor variances for three latent variables of school adjustment (externalizing behavior, peer acceptance, and academic performance) and two latent variables of early adolescent parenting (monitoring and academic involvement) were correlated with each other. Because of the possibility that other factors not explicitly included in the model may affect these endogenous variables and correlations among them, we allowed residual factor variances to be correlated (Hargens, 1988).

Missing Data and Attrition

There has been 80–84% retention in the most recent data collection waves with little new attrition. In earlier reports from this ongoing project we have contrasted attrited and retained participants in several different ways across a wide range of measures. Relatively few differences have emerged, and when they have it typically has been the case that the two groups differ principally with respect to demographic factors (e.g., participants dropping out of the study were lower in SES). In the current study, we contrasted participants with educational attainment scores who contributed data to at least two of the three developmental periods of interest (i.e., early childhood, middle childhood, early adolescence) to those participants who contributed data to only the first developmental period (*N*s = 455 and 46, respectively). Two significant differences were found: African American families and families with children high in kindergarten externalizing problems were more likely than European American families and families with children low in kindergarten externalizing problems to have dropped out of the study after the first data collection wave.

Results

Preliminary Analyses

Descriptive statistics and correlations among the variables in this study are shown in Table 2. Mother and child educational attainment scores were moderately correlated ($r = .38$, $p < .001$), which is comparable in magnitude to findings from other longitudinal studies (e.g., Boyle et al., 2007, report a correlation of .37 between mothers' and their adult children's years of education completed). A cross-tabulation of mothers' and children's level of education (Table 3) shows that prospective continuity was considerably greater than retrospective continuity. In this instance, prospective continuity refers to the number (or percent) of late adolescents who have completed education levels comparable to that of their mothers; retrospective continuity refers to the number (or percent) of mothers who have completed education levels comparable to that of their offspring. Of those mothers not completing high school ($N = 47$), 45% of their children also did not complete high school. But of those late adolescents not completing high school ($N = 79$), only 27% of their mothers had not completed high school. On the upper end of education level, of those mothers who had at least some college (some college + graduated college + post graduate; $N = 256$), 82% of their children also had at least some college. But of those late adolescents who had some college ($N = 325$), 65% of their mothers also had completed at least some college.

The correlations among background and mediator/moderator variables shown in Table 2 are generally consistent with expectation and prior research. Within-domain (family and child characteristics, early parenting, school adjustment, and later parenting) correlations were

modest to moderate in magnitude, with the strongest within-domain relations for school adjustment. In particular, teacher ratings of externalizing behavior were associated fairly strongly with lower levels of peer acceptance ($r = -.52$).

Mother educational attainment and child educational attainment were significantly correlated with every family-child background and mediator/moderator variable except for (as noted) child gender and adolescent-reported maternal monitoring. These correlations show a consistent pattern whereby lower education level was associated with more disadvantageous backgrounds, less optimal parenting, and poorer adjustment at school. These relationships were generally of a linear nature for mothers' education (i.e., with each increasing level of education there was a corresponding increase in more advantageous family background characteristics, parenting qualities, and school adjustment profiles). This was less so for children's education level, where the typical finding was that the "did not graduate from high school" group differed significantly from both the "high school graduate" group and the "some college" group; these latter two groups rarely differed from one another. These patterns of relations may be attributable to differences in the ranges of the two educational attainment categorical variables: mother education was scored on five levels, but child education was scored on only three levels.

Structural Analysis of Mediators of the Link between Mothers' and Children's Educational Attainment

The results of the SEM indicated that the data fit the model adequately: comparative fit index (CFI) = .96; root mean square error of approximation (RMSRA) = .028; χ^2 (398) = 549.93, $p < .001$; $\chi^2/df = 1.38$ (see Figure 1). CFI values greater than .90 and RMSEA values less than .05 indicate a good fit (McDonald & Ho, 2002). The chi-square test measures absolute fit but is sensitive to sample size and the complexity of the model (Byrne, 2001). Instead, the chi-square ratios (χ^2/df) between 1 and 3 indicate good fit (Arbuckle & Wothke, 1999).

For the sake of consistency with the preceding focus on low maternal education as a risk factor, coefficients will be interpreted as the reverse sign of what is shown in Figure 1. A lower level of maternal educational attainment was associated with less proactive teaching and parental involvement in children's peer experiences and more harsh discipline in prekindergarten. Low mother education attainment was also associated with poorer academic performance during elementary school and less parental academic involvement during early adolescent. Children's poorer academic performance in elementary school and lower parental academic involvement during early adolescence were associated with lower child education attainment at age 21, suggesting an indirect relation between mother education attainment and child education attainment through child academic performance and parental academic involvement. In addition, child's externalizing behavior problems in elementary school were associated with less child education attainment at age 21. There was no significant direct link between mothers' educational attainment and their children's educational attainment ($\beta = -.07$, p = ns). The model explained 47% of the variance in children's education attainment, with a substantial indirect effect ($\beta = .232$). However, the mediational model is not comparable to a more parsimonious model because the factor loadings would not be equivalent between models. Following the suggestions of Kenny (2006) regarding testing mediation in SEM analyses, the unmediated path between mothers' education attainment and their children's education attainment before the inclusion of prekindergarten parenting, children's school adjustment, and early adolescent parenting was estimated to be $\beta = .162$ (total effect = direct effect + indirect effect). Thus, including the prekindergarten parenting, children's school adjustment, and early adolescent parenting as mediators substantially reduced the association between mothers' education attainment and their children's education attainment. The results are consistent with the hypothesis that the

effects of mother education attainment on child education attainment were mediated by children's school adjustment and early adolescent parental involvement.

Moderators of Cross-Generational Continuity in Educational Attainment

The degree to which continuity in education attainment varied as a function of family and child characteristics was examined through regression analyses in which child educational attainment was the dependent variable. Each measured variable from the family and child background, prekindergarten parenting, school adjustment, and early adolescent parenting sets was tested in a separate analysis. To reduce the number of potential moderators and because cross-year correlations were high among the school variables (see Table 2), we averaged the four externalizing problems scores to create a single externalizing score and the four peer acceptance scores to create a single peer acceptance score. We also averaged the standardized scores of GPA and standardized test scores (these two also were highly correlated) to create a single variable indicative of academic performance; a cross-year average academic performance measure was then created.

All continuous variables were centered, and interaction terms were created by multiplying the moderator variable with the maternal education variable. Mother education and the moderator variable were entered first, followed by the interaction term. Of the 19 interactions tested, 7 were significant, for family structure, child IQ, parental warmth in prekindergarten, peer acceptance and school performance in elementary school, and parental academic involvement (as reported by teachers) and monitoring (as reported by youth) during early adolescence. These interactions were decomposed following the procedures recommended by Aiken and West (1991). As shown in Table 4, the link between mothers' and children's educational attainment (i.e., cross-generational continuity in low attainment) was stronger in single-parent families; in families that were low in parental warmth, monitoring, and academic involvement; and in families in which children performed more poorly in school, had lower levels of peer acceptance, and had lower IQ scores.

Discussion

The goal of this study was to examine the processes and contexts that account for and condition continuity in educational attainment across generations. Low level of parental education is a known risk factor for a wide variety of life-adjustment difficulties, and this risk is not explained by either low income or low occupational prestige (Boyle et al., 2007; Corwyn & Bradley, 2005; Davis-Kean, 2005). The children of less-educated parents tend to perform more poorly in school and complete fewer years of education compared to children of better-educated parents. Such was the case in the present study. How do we explain these cross-generational patterns? Under what circumstances might this cycle be broken? We applied a developmental-mediation model to address the first question and a model of lawful discontinuity (i.e., risk factor amplification and attenuation) to address the second question. Consistent with expectation, parenting in early childhood and early adolescence and school adjustment in middle childhood largely accounted for the continuity in education across generations. But the degree of continuity was dependent on the presence of several child, family, and school risk factors. Collectively, these findings speak to the critical importance of considering context and process in our efforts to understand the developmental significance of educational attainment.

Educational Attainment across Generations

Cross-generational continuity was moderately strong in this community sample with a correlation of .38 between mothers' attainment, assessed when their children were 5 years of age, and the children's subsequent attainment, measured 15 years later. Similar levels of

continuity in attainment have recently been reported in the literature (e.g., Boyle et al., 2007). A greater degree of continuity was seen prospectively than retrospectively; that is, the children of mothers who had completed comparatively low levels of education (for instance, not graduating from high school) likewise tended to not complete high school, but the mothers of children who failed to complete high school were just as likely to have attended college as to have dropped out of high school.

Mothers' and children's educational attainment scores were related to family structure and child characteristics in similar ways; that is, low attainment for both mother and child were associated with single-parent status and ethnic-minority status and with low child IQ. The overlap with background variables is consistent with other research (e.g., Boyle et al., 2007; Corwyn & Bradley, 2005) and illustrates that social-address, or marker, variables tend to covary. Such variables do not explain what transpires in the lives of children and families that engender adverse developmental outcomes, however. Developmental process analyses are needed to shed light on how and when social-address variables exert an impact over time.

It is not surprising that child IQ also is moderately strongly related to both mother and child educational attainment. IQ has a fairly strong heritable component, and IQ tends to correlate with school success and attainment (Dubow et al., this issue; Johnson, McGue, & Iacono, 2006). But much like a social-address variable, IQ does not explain how it is that educational attainment level is transferred across generations. By controlling for it (and other child and family background characteristics) in our structural analyses, we sought to delineate specific pathways through which mothers' education level contributes to their children's subsequent attainment levels, as is discussed in the following section.

Intergenerational Transmission Processes

Before turning to the findings bearing on developmental mediation, we consider first the parenting and school-adjustment correlates of educational attainment. Mother education level was linked either directly or indirectly with each of the early childhood and early adolescent parenting variables. In each instance, lower level of education attainment was associated with poorer-quality parenting (i.e., less proactive teaching and positive involvement and more harsh discipline in early childhood, less monitoring and academic support in early adolescence). Comprehensive models of parenting efficacy (e.g., Hoffman, 2003) suggest that parents' cognitive skills, expectations, and beliefs may all be influenced by parents' educational attainment. For example, some poorly educated parents may have unrealistic expectations for their child's behavior, may endorse power-assertion and punitive disciplinary practices, and may devalue children's academic accomplishments. Low levels of educational attainment also may influence parenting by limiting parents' willingness and ability to seek advice and guidance about child rearing.

The social-interactional perspective suggests that early negative parenting contributes to the development of antisocial behavioral tendencies that undermine children's subsequent adjustment and performance at school. The correlational findings in this study are consistent with this premise, with poorer-quality parenting predicting more behavior problems and lower peer acceptance and academic performance. In the structural analyses, however, none of the early childhood parenting variables were associated with school adjustment, and none of the school adjustment variables were associated early adolescent parenting. These analyses control for family background, child gender and IQ, and mothers' educational attainment. In the context of the overall model, then, there is little support for the developmental sequence postulated by the social-interactional perspective. It is worth noting that this is a very conservative test of the impact of early parenting, given the large number of variables in the model. Also, the overall model produced the unexpected negative path

between mothers' educational attainment and children's peer acceptance (i.e., low education was associated with high levels of peer acceptance). It is likely that this path is due to the fairly high negative correlation between two of the school adjustment measures (peer acceptance and externalizing problems) and the fairly large number of variables included in the tested model.

How then do these findings fit with a model of developmental mediation? From this perspective, relatively distal experiences and contexts, such as SES or parent education, exert an impact on important developmental outcomes through more proximal experiences and characteristics. Whereas mediated links from mothers' educational level to their offspring's educational level were not found for early childhood parenting, they were found for children's academic performance in the elementary school years and for mothers' academic involvement in early adolescence. These findings suggest that children's initial school adjustment and parents' subsequent academic involvement may represent distinct pathways through which the intergenerational transmission process operates. Both pathways are consistent with past research showing that initial school success is an important forerunner of academic orientation and outcomes (Stipek, 1998) and that parent involvement in their young adolescents' academic lives is a key factor in adolescent academic performance (Hill et al., 2004).

One additional path to late adolescent—early adulthood educational attainment was found: Externalizing problems in the elementary school years, as reported by teachers, predicted lower levels of subsequent attainment. This link is also consistent with past research documenting the negative impact on scholastic outcomes of aggressive and antisocial behavior (Dubow et al., this issue; Kokko et al., 2006). As noted by a number of scholars (e.g., Dubow et al., 2006; Stipek, 1998), social and behavioral adjustment problems in childhood impair subsequent achievement and educational attainment by creating impediments to effective learning.

Continuity and Discontinuity in Adaptation across Generations

As more ongoing longitudinal projects mature and follow their participants into adulthood, there increasingly have been opportunities for identifying factors that may uncouple the cross-generational transfer of patterns of maladaptation. In the present study we proposed that greater continuity in low education would be observed when risk factors from domains of family and child characteristics, early and later parenting, and school adjustment were present. Evidence was consistent with this expectation. Continuity was stronger in nonintact families in which parents were low in warmth, in families with children who are not well liked by their elementary school peers and who perform poorly on academic work and have low IQs, and for families in which parents provide little monitoring and show little interest in their early adolescents' academics. There is general support in the literature for the risk-altering effects (as risk amplifiers or risk attenuators) from these kinds of background characteristics and experiences (Luthar, 2006; Masten et al., 2006). The present study extends the application of these cross-domain risk factors to parent-to-child continuity in educational attainment. This is the first such study of which we are aware that has documented that pathways in educational attainment may be solidified or modified as a function of risk and protective factors.

It is unclear from these analyses whether these cycle-breaking variables operate exclusively or primarily in the domain of educational attainment or whether they would serve to attenuate cross-generational links in other risk-relevant domains, such as harsh parenting, romantic relationship violence, or low economic and occupational status. Whereas it seems reasonable that those variables bearing most directly on educational success—academic performance, parental involvement in academics, and child IQ—would serve as especially

potent moderators for educational attainment, additional research is needed to tease out the specificity versus generality of risk and protective factors across key domains of adjustment.

Limitations and Conclusions

As with any long-term prospective study, there are measurement and sampling issues that must be considered in interpreting findings. The present study focused solely on mothers' education as assessed at a single point in time. Research on the impact of parental education more commonly uses mothers' education level as the predictor (e.g., Haveman & Wolfe, 1995), but approaches that incorporate both mothers' and fathers' education level also are sensible and can be used to create indexes of highest level of completion within a family or similarity and dissimilarity of completion across parents. A possible reason for the reliance on mothers' education in past research is that mothers more often are the primary caregivers, and their characteristics therefore are presumed to have greater significance for children than fathers' characteristics. Another reason is that substantial numbers of children live in mother-headed single-parent families in which information on fathers' education is unknown (or irrelevant). In any event, greater attention to the measurement of educational attainment within and across different family configurations is warranted.

The static one-time assessment of educational attainment is also a limiting factor because there is evidence that mothers who return to school have children who show improvements in their academic functioning (see Magnuson, Sexton, Davis-Kean, & Huston, this issue). Whether these benefits are attributable to additional schooling for mothers or to endogenous factors that co-occur with mothers' decisions to return is not yet clear, nor is it clear to what extent the timing (e.g., very early childhood vs. later childhood) of mothers' return to school makes a difference in terms of the short- and longer-term impact on children's academic outcomes (Magnuson et al., 2007).

Data on educational attainment was not available for all mothers due to incomplete questionnaires or from all children due to attrition. Because participants who drop out of longitudinal studies have often experienced less advantageous rearing conditions and show higher levels of adjustment problems, it is likely that the lower end of child educational attainment is underrepresented in the current study. This would not be expected to bias the results, however, because a restricted range constrains rather than inflates the magnitudes of correlations.

Selection of mediator and moderator variables was guided by rational and theoretical considerations, but in a long-term project such as the Child Development Project there are always alternative and additional measures that might be included in model testing. Future research should consider different sets of variables drawn from the domains of interest here (family background, parenting, school adjustment) and from additional domains (e.g., beliefs and aspirations, teacher-child relationships, extracurricular activity involvement) to further develop and refine models of cross-generational transmission processes and factors that foster or inhibit inter-generational continuities. Furthermore, as a correlational study, the findings presented here do not provide conclusive evidence that the mothers' education attainment operates in a causal manner to influence their children's education attainment. It is possible that the associations found in this study between parents' and children's education attainment may be biased by endogenous factors and omitted variables. It also should be pointed out that variables were measured with differing levels of precision. Some measures were cross-year aggregates; others were cross-informant aggregates. Some constructs were measured with high reliability (school adjustment variables especially); others had modest to moderate reliability (early parenting). These variations in construct creation introduce sources of error that likely affected the structural and moderation analyses. It therefore is important—as is the case in any multiwave, multivariable inquiry—

to be circumspect in drawing conclusions about obtained patterns of findings. Replication in other data sets would lend confidence to the findings reported here.

In summary, we found substantial evidence of cross-generational continuity in educational attainment in the context of a prospective longitudinal study that spanned 15 years. A developmental-mediation model was applied and revealed that the link between mothers' educational attainment and their children's educational attainment largely was indirect, accounted for by children's behavior and performance in the early school years and parents' academic involvement in the later school years. The cycle of continuity in low educational attainment was strongest when family and child risk factors were present. These results highlight the importance of context and process in efforts aimed at tracking the intergenerational transmission of adjustment and well-being.

Acknowledgments

Support for these analyses was provided by the Center for the Analysis of Pathways from Childhood to Adulthood, funded by the National Science Foundation (Grant 0322356), for which we are grateful. The Child Development Project has been supported by grants from the National Institute of Mental Health (MH 42498, MH 56961, MH 57024, MH 57095), the National Institute of Child Health and Human Development (HD 30572), and the National Institute on Drug Abuse (DA 16903).

References

Achenbach, TM. Manual for the Teacher's Report Form and 1991 profile. Burlington, VT: University of Vermont, Department of Psychiatry; 1991.

Aiken, LS.; West, SG. Multiple regression: Testing and interpreting interactions. Newbury Park, CA: Sage; 1991.

Arbuckle, JL.; Wothke, W. Amos users' guide, Version 4.0. Chicago: Small Waters; 1999.

Baker DP, Stevenson DL. Mothers' strategies for children's school achievement: Managing the transition to high school. Sociology of Education. 1986; 59:156–166.

Boyle M, Georgiades K, Racine Y, Mustard C. Neighborhood and family influences on educational attainment: Results from the Ontario Child Health Study Follow-Up 2001. Child Development. 2007; 78:168–189. [PubMed: 17328699]

Byrne, BM. Structural equation modeling with AMOS: Basic concepts, applications, and programming. Mahwah, NJ: Erlbaum; 2001.

Coie JD, Dodge KA, Coppotelli H. Dimensions and types of social status: A cross-age perspective. Developmental Psychology. 1982; 18:557–570.

Corwyn, RF.; Bradley, RH. Unpublished manuscript. University of Arkansas; Little Rock: 2002. Family process mediators of the relation between SES and child outcomes.

Corwyn, RF.; Bradley, RH. Socioeconomic status, poverty status and childhood externalizing behaviors: Theoretical and methodological considerations within a structural equation modeling framework. In: Bengtson, V.; Acock, A.; Allen, K.; Dilworth-Anderson, P.; Klein, D., editors. Sourcebook of family theories and research. Thousand Oaks, CA: Sage Publications, Inc; 2005. p. 469-492.

Cowan, PA.; Cowan, CP. Five-domain models: Putting it all together. In: Cowan, PA.; Cowan, CP.; Ablow, JC.; Johnson, VK., editors. The family context of parenting in children's adaptation to elementary school. Mahwah, NJ: Lawrence; 2005. p. 315-333.

Criss MM, Pettit GS, Bates JE, Dodge KA, Lapp AL. Family adversity, positive peer relationships, and children's externalizing behavior: A longitudinal perspective on risk and resilience. Child Development. 2002; 73:1220–1237. [PubMed: 12146744]

Davis-Kean P. The influence of parent education and family income on child achievement: The indirect role of parental expectations and the home environment. Journal of Family Psychology. 2005; 19:294–304. [PubMed: 15982107]

Dearing E, McCartney K, Taylor BA. Change in family income matters more for children with less. Child Development. 2001; 72:1779–1793. [PubMed: 11768145]

Dodge KA, Bates JE, Pettit GS. Mechanisms in the cycle of violence. Science. 1990; 250:1678–1683. [PubMed: 2270481]

Dodge KA, Lansford JE, Burks VS, Bates JE, Pettit GS, Fontaine R, et al. Peer rejection and social information-processing factors in the development of aggressive behavior problems in children. Child Development. 2003; 74:374–393. [PubMed: 12705561]

Dodge, KA.; Malone, P.; Lansford, J.; Miller-Johnson, S.; Pettit, G.; Bates, J. Toward a dynamic developmental model of the role of parents and peers in early onset substance use. In: Clarke-Stewart, A.; Dunn, J., editors. Families count: Effects on child and adolescent development. New York: Cambridge University Press; 2006. p. 104-131.

Dodge KA, Pettit GS. A biopsychosocial model of the development of chronic conduct problems in adolescence. Developmental Psychology. 2003; 39:349–371. [PubMed: 12661890]

Dubow EF, Huesmann LR, Boxer P, Pulkkinen L, Kokko K. Middle childhood and adolescent contextual and personal predictors of adult educational and occupational outcomes: A meditational model in two countries. Developmental Psychology. 2006; 42:937–949. [PubMed: 16953698]

Duncan, G.; Brooks-Gunn, J., editors. Consequences of growing up poor. New York: Russell Sage Foundation; 1997.

Hargens, LL. Estimating multi-equation models with correlated disturbance terms. In: Long, JS., editor. Common problems/proper solutions: Avoiding error in quantitative research. Newbury Park, CA: Sage; 1988. p. 65-83.

Haveman R, Wolfe B. The determinants of children's attainments: A review of methods and findings. Journal of Economic Literature. 1995; 33:1829–1878.

Hill NE, Castellino DR, Lansford JE, Nowlin P, Dodge KA, Bates JE, et al. Parent academic involvement as related to school behavior, achievement, and aspirations: Demographic variations across adolescence. Child Development. 2004; 75:1491–1509. [PubMed: 15369527]

Hoffman, LW. Methodological issues in studies of SES, parenting, and child development. In: Bornstein, MH.; Bradley, RH., editors. Socioeconomic status, parenting, and child development. Mahway, NJ: Erlbaum; 2003. p. 125-145.

Hollingshead, W. Unpublished paper. Yale University; New Haven, CT: 1979. The Hollingshead Four Factor Index of Socioeconomic Status.

Johnson W, McGue M, Iacono WG. Genetic and environmental influences on academic achievement trajectories during adolescence. Developmental Psychology. 2006; 42:514–532. [PubMed: 16756442]

Kenny, DA. Mediation. 2006 Feb 7. Retrieved June 7, 2007, from http://davidakenny.net/cm/mediate.htm

Klebanov PK, Brooks-Gunn J, Duncan GJ. Does neighborhood and family poverty affect mothers' parenting, mental health, and social support? Journal of Marriage and the Family. 1994; 56:441–455.

Kokko K, Tremblay RE, Lacourse E, Nagin DS, Vitaro E. Trajectories of prosocial behavior and physical aggression in middle childhood: Links to adolescent school dropout and physical violence. Journal of Research on Adolescence. 2006; 16:403–438.

Kohl GO, Lengua LJ, McMahon RJ. Conduct Problems Prevention Research Group. Parent involvement in school: Conceptualizing multiple dimensions and their relations with family and demographic risk factors. Journal of School Psychology. 2000; 38:501–523. [PubMed: 20357900]

Luster, T.; Okagaki, L. Parenting: An ecological perspective. 2. Mahwah, NJ: Erlbaum; 2005.

Luthar, SS. Resilience in development: A synthesis of research across five decades. In: Ciclhetti, D.; Cohen, DJ., editors. Developmental psychopathology: Vol 3. Risk, disorder, and adaptation. 2. Hoboken, NJ: Wiley; 2006. p. 739-795.

Masten, AS.; Obradovic, J.; Burt, KB. Resilience in emerging adulthood: Developmental perspectives on continuity and transformation. In: Arnett, JJ.; Janner, JL., editors. Emerging adults in America: Coming of age in the 21st century. Washington, DC: American Psychological Association; 2006. p. 173-190.

McDonald RP, Ho MR. Principles and practices in reporting structural equation analyses. Psychological Methods. 2002; 7:64–82. [PubMed: 11928891]

Nagin DS, Tremblay RE. Parental and early childhood predictors of persistent physical aggression in boys from kindergarten to high school. Archives of General Psychiatry. 2001; 58:389–394. [PubMed: 11296100]

Patterson, GR.; Reid, JB.; Dishion, TJ. Antisocial boys. Eugene, OR: Castalia; 1992.

Pettit GS, Bates JE, Dodge KA. Supportive parenting, ecological context, and children's adjustment: A seven-year longitudinal study. Child Development. 1997; 68:908–923.

Pettit GS, Bates JE, Dodge KA, Meece DW. The impact of after-school peer contact on early adolescent externalizing problems is moderated by parental monitoring, perceived neighborhood safety, and prior adjustment. Child Development. 1999; 70:768–778. [PubMed: 10368921]

Pettit, GS.; Bates, JE.; Holtzworth-Munroe, A.; Marshall, AD.; Harach, LA.; Cleary, DJ., et al. Aggression and insecurity in late adolescent romantic relationships. In: Huston, AC.; Ripke, MN., editors. Developmental contexts in middle childhood. New York: Cambridge University Press; 2006. p. 41-61.

Pettit GS, Laird RD, Bates JE, Dodge KA, Criss MM. Antecedents and behavior problem outcomes of parental monitoring and psychological control in early adolescence. Child Development. 2001; 72:583–598. [PubMed: 11333086]

Pettit GS, Keiley MK, Laird RD, Bates JE, Dodge KA. Predicting the developmental course of mother-reported monitoring across childhood and adolescence from early proactive parenting, child temperament, and parents' worries. Journal of Family Psychology. 2007; 21:206–217. [PubMed: 17605543]

Scaramella LV, Conger RD. Intergenerational continuity of hostile parenting and its consequences: The moderating influence of children's negative emotional reactivity. Social Development. 2003; 12:420–439.

Schafer JL, Graham JW. Missing data: Our view of the state of the art. Psychological Methods. 2002; 7:147–177. [PubMed: 12090408]

Serbin LA, Karp J. The intergenerational transfer of psychosocial risk: Mediators of vulnerability and resilience. Annual Review of Psychology. 2004; 55:333–363.

Smith CA, Farrington DP. Continuities in antisocial behavior and parenting across three generations. Journal of Child Psychology and Psychiatry. 2004; 45:230–247. [PubMed: 14982238]

Smith, JR.; Brooks-Gunn, J.; Klebanov, PK. Consequences of living in poverty for young children's cognitive and verbal ability and early school achievement. In: Duncan, GJ.; Brooks-Gunn, J., editors. Consequences of growing up poor. New York: Russell Sage Foundation; 1997. p. 132-189.

Stipek, DJ. Pathways to constructive lives: The importance of early school success. In: Bohart, AC.; Stipek, DJ., editors. Constructive and destructive behaviors: Implications for family, school, & society. Washington, DC: American Psychological Association; 1998. p. 291-315.

Veronneau MH, Vitaro F, Pedersen S, Tremblay RE. Do peers contribute to the likelihood of secondary school graduation among disadvantaged boys? Journal of 'Educational Psychology. 2008; 100:429–442.

Wechsler, D. Manual for the Wechsler Intelligence Scale for Children-Revised. San Antonio, TX: Psychological Corporation; 1974.

Yonezawa, S. Unpacking the black box of tracking decisions: Critical tales of families navigating the course of placement process. In: Sanders, MG., editor. Schooling students placed at risk: Research, policy, practice in the education of poor and minority adolescents. Mahwah, NJ: Erlbaum; 2000. p. 109-140.

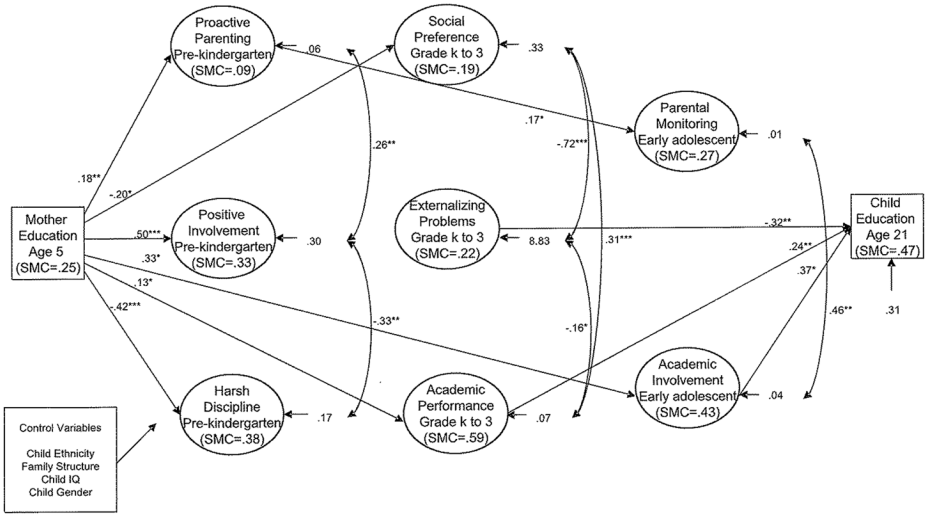

Figure 1.

Structural equation model testing prekindergarten parenting, children's school adjustment, and early adolescent parenting as mediators of the association between mothers' education attainment and children's education attainment ($N = 501$). Only significant paths are shown. Numbers in parentheses refer to unstandardized path coefficients. Fit indices χ^2 (380) = 526.80, $p < .001$, CFI = .96, RMSEA = .028.

Merrill Palmer Q (Wayne State Univ Press). Author manuscript; available in PMC 2012 July 19.

Table 1

Standardized Factor Loadings for Measurement Model Using the Full Sample

Latent Constructs	Child Age	Items	Indicators	Reporter	Factor Loadings	α
Prekindergarten parenting						
Proactive teaching	5	1	Concerns and Constrains Questionnaire Story 1	Interviewer	.49	
	5	1	Concerns and Constrains Questionnaire Story 2	Interviewer	.48	
	5	1	Concerns and Constrains Questionnaire Story 3	Interviewer	.65	
	5	1	Concerns and Constrains Questionnaire Story 4	Interviewer	.55	
	5	1	Concerns and Constrains Questionnaire Story 5	interviewer	.63	
Parental involvement	1–4 & 5	2	Parent Involvement in Peer Contacts	interviewer	.76	.90
	5	8	Warmth to the Child	interviewer	.30	.61
Harsh discipline	5	5	Concerns and Constrains Questionnaire: Physical Punishment	interviewer	.52	.81
	5	5	Concerns and Constrains Questionnaire: Severity of Discipline	mother	.57	.76
	1–4 & 5	2	Harshness of Discipline	interviewer	.52	.73
School adjustment						
Externalizing problems	5	34	Teacher Report Form grade K	teacher	.42	.94
	6	34	Teacher Report Form grade 1	teacher	.75	.95
	7	34	Teacher Report Form grade 2	teacher	.77	.96
	8	34	Teacher Report Form grade 3	teacher	.78	.96
Peer acceptance	5	1	Sociometric interview grade K	peer	.66	
	6	1	Sociometric interview grade 1	peer	.72	
	7	1	Sociometric interview grade 2	peer	.64	
	8	1	Sociometric interview grade 3	peer	.70	
School performance	6–8	3	GPA grades 1–3	school	.99	.80
	6–8	3	Standardized Test Scores grades 1–3	school	.77	.86
Early adolescent parenting						
Parental monitoring	11	9	Parent interview grade 6	mother	.77	.73
	13	8	Parent interview grade 8	mother	.65	.67
	13	5	Adolescent interview grade 8	adolescent	.35	.65
Academic involvement	12	21	Teacher Rating grade 7	teacher	.44	.91
	12	2	Parent interview grade 7	mother	.47	.48
	12	8	Adolescent interview grade 7	adolescent	.42	.67

Note. All factor loadings were significant. All the latent variables correlated with each other. Model fit index: $\chi^2 = 532.02$, $df = 292$, $p < .001$, $\chi^2/df = 1.82$, CFI = .90, RMSEA = .041.

Merrill Palmer Q (Wayne State Univ Press). Author manuscript; available in PMC 2012 July 19.

Table 2

Descriptive Statistics and Correlations among Mother Education, Child Education, Parenting, Child School Adjustment, and Demographics

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
1. Mother education	2.8 (1.1)																											
2. Child education	.38****	1.5 (.76)																										
3. Child sex [1]	−.11*	.07	.50 (.50)																									
4. Family structure [2]	−.31****	−.31****	.01	.34 (.47)																								
5. Ethnicity [3]	−.25****	−.20****	.04	.27****	.15 (.36)																							
6. Child IQ	.45****	.39****	−.14***	−.24****	−.41****	99 (16)																						
7. Proactive parenting	.22****	.12***	−.01	−.10**	−.13***	.21****	2.3 (1.7)																					
8. Involvement in peer contact	.35****	.23****	−.03	−16****	−.18****	.14***	.21****	3.3 (1.0)																				
9. Warmth to the child	.16****	.20****	.00	−.15***	−.16****	.11**	.04	.23****	.82 (.21)																			
10. Harshness of discipline	−.31****	−.31****	−.10**	.13***	.18****	−.25****	−.08*	−.22****	−.12**	2.7 (.88)																		
11. Physical punishment	−.27****	−.19****	−.03	.14***	.14***	−.19****	−.02	−17****	−.13***	.25****	.06 (.12)																	
12. Severity of discipline	−26****	−.19****	−.02	.09*	.24****	−.21****	−.03	−.15***	−.05	.30****	.32****	2.5 (.89)																
13. Externalizing, grade K	−.07	−.13****	−.09*	.10**	.05	−.11**	.00	−.04	−.03	.10**	.11**	.11**	5.2 (8.3)															
14. Externalizing, grade 1	−.07	−.33****	−.21****	.24****	.01	−.19****	−.11**	.00	−.04	.14***	.10**	.08*	.36****	6.3 (9.5)														
15. Externalizing, grade 2	−.20****	−.36****	−.16****	.28****	.18****	−.21****	−.08*	−.07	−.14***	.19****	.13***	.07	.30****	.57****	6.4 (9.8)													
16. Externalizing, grade 3	−.18****	−.38****	−.19****	.24****	.25****	−.25****	−.05	−.06	−.11**	.17****	.04	.09*	.34****	.59****	.61****	6.1 (9.3)												
17. Peer acceptance, grade K	.02	.28****	.18****	−.14***	−.04	.13***	.02	.09**	.08	−.14***	−.10**	−.00	−.25****	−.42****	−.34****	−.38****	.19 (.96)											
18. Peer acceptance, grade 1	.08	.29****	.11**	−.15***	−.09*	.19****	.04	.12**	.09*	−.19****	−.14***	−.14***	−.15***	−44****	−.38****	−.39****	.50****	.25 (.89)										
19. Peer acceptance, grade 2	.06	.24****	.10**	−.16***	−.07	.13**	.03	.07	.09*	−.18****	−.08	−.06	−.11**	−.39****	−.40****	−.36****	.39****	.44****	.19 (.95)									
20. Peer acceptance, grade 3	.12**	.24****	.14***	−.19****	−.07	.12**	.02	.07	.13**	−.15***	−.07	−.10**	−.23****	−.32****	−.34****	−.42****	.42****	.48****	.49****	.10 (.93)								
21. GPA, grades 1–3	.40****	.49****	.12**	−.30****	−.29****	.50****	.08*	.18****	.12**	−.31****	−.21****	−22****	−.08	−.25****	−.34****	−.33****	.31****	.37****	.29****	.34****	3.1 (.51)							
22. Test scores, grades 1–3	.47****	.44****	.07	−.30****	−.37****	.65****	.10***	.20****	.17****	−.28****	−.27****	−.26****	−.11**	−.23****	−.28****	−.32****	.22****	.30****	.20****	.22****	.76****	66 (23)						
23. Monitoring, grade 6 mother	.22****	.19****	.16***	−.21****	−.23****	.25****	.15***	.15***	.13***	−.21****	−.05	−.17***	−.11**	−.15***	−.25****	−.21****	.20****	.17****	.18***	.22****	.25****	.22****	4.6 (.36)					
24. Monitoring, grade 8 mother	.08	.17****	.14***	−.15***	−.12**	.13***	.16***	.06	.07	−.09*	.06	−.05	−.10**	−.15***	−.24****	−.19****	.08	.12**	.21****	.15***	.16***	.19****	.51****	4.3 (.47)				
25. Monitoring, grade 8 adolescent	.04	.13***	.03	−.05	−.14***	.09*	.09*	−.02	.01	.00	.05	.00	−.02	−.11**	−.09*	−.12**	.10*	.10*	.16***	.15***	.06	.02	.25****	.24****	2.6 (.36)			
26. Academic involvement, teacher	.24****	.21****	−.09*	−.19****	−.14***	.18***	.05	.05	.14***	−.09*	−.17***	−.11**	.04	−.04	−.08	−.11**	.19****	.12**	.12**	.10*	.21***	.23****	.19****	.13**	.06	1.6 (.56)		
27. Academic involvement, child	.08	.12**	.01	−.08	−.02	.05	.03	.09*	.02	−.05	.01	−.03	−.01	−.10*	−.16****	−.08	.04	.01	.13**	.06	.08	.09*	.19****	.13**	.19****	.21****	3.5 (.70)	
28. Academic involvement, mother	.29****	.32****	.04	−.21****	−.09*	.17***	.09*	.16***	.18****	−.09*	−.06	−.07	−.03	−.10**	−.21****	−.16***	.13***	.07	.12**	.17***	.22****	.17***	.21****	.16***	.05	.17***	.17***	1.4(.75)

Note. Numbers on the diagonal refer to the mean and standard deviation (in parentheses).

[1] Child gender is coded as male = 0 and female = 1.

[2] Family structure is coded as intact family = 0 and nonintact family = 1.

[3] Ethnicity is coded as European American = 0 and African American = 1.

* $p < .1$,

** $p < 05$,

*** $p < .01$,

**** $p < .001$.

Table 3

Cross-Tabs of Frequencies of Mother and Child Education

	Child Education (Categorical)				
Mother Education	**Not Graduate HS[a]**	**Graduated HS[a]**	**Some College**	**Total**	**Chi-Square**
Mother education (categorical)					
Did not graduate high school	21	13	13	47	
Graduated high school	32	49	101	182	
Some college	21	13	80	114	
Graduated college	4	5	89	98	
Postgraduate	1	1	42	44	
Total	79	81	325	485	
Chi-square					96.33 *

Note.

[a]High school,

* $p < .001$.

Merrill Palmer Q (Wayne State Univ Press). Author manuscript; available in PMC 2012 July 19.

Table 4

Regression Slopes for Moderators of the Link between Mothers' Educational Attainment and Children's Educational Attainment

Moderators	Slopes	*SE*	*t*
Family and child characteristics			
Family structure[1] (*F*[1, 481] = 4.47**)			
Nonintact families	.30****	.05	5.57
Intact families	.17****	.03	5.44
Child IQ (*F*[1, 394] = 6.78**)			
Low	.26****	.03	8.10
Mean	.18****	.03	5.66
High	.10***	.03	3.21
Prekindergarten parenting			
Parental warmth (*F*[1, 476] = 8.52**)			
Low	.31****	.04	7.61
Mean	.24****	.03	7.46
High	.16****	.04	3.82
School adjustment (grades K–3)			
Peer acceptance (*F*[1, 477] = 6.65**)			
Low	.31****	.04	7.82
Mean	.24****	.03	7.65
High	.18****	.04	4.48
School performance (*F*[1, 400] = 4.27**)			
Low	.20****	.05	4.08
Mean	.13****	.03	4.20
High	.06	.05	1.36
Early adolescent parenting			
Academic involvement[2] [*F*[1, 392] = 2.82*)			
Low	.27****	.04	6.11

Merrill Palmer Q (Wayne State Univ Press). Author manuscript; available in PMC 2012 July 19.

Moderators	Slopes	*SE*	*t*
Mean	.22****	.03	6.89
High	.17****	.04	3.80
Parental monitoring[3] (*F*[1, 390] = 6.02**)			
Low	.32****	.04	7.20
Mean	.24****	.03	7.72
High	.17****	.04	3.75

Notes.

[1] Family structure is coded as intact family = 0 and nonintact family = 1.

[2] Academic involvement was reported by teachers.

[3] Monitoring was reported by adolescent on grade 8.

* $p < .1$,

** $p < .05$,

*** $p < .01$,

**** $p < .001$.

Merrill Palmer Q (Wayne State Univ Press). Author manuscript; available in PMC 2012 July 19.