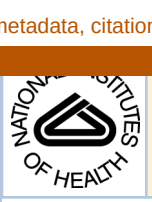

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The Development and Correlates of Academic Interests from Childhood through Adolescence

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Abstract

Study goals were to assess: (1) the development of academic interests from middle childhood through late adolescence, (2) the degree to which junior high and high school transitions, parents' educational expectations, interests, and education, were related to changes in academic interests, and (3) the longitudinal links between youth's academic interests and school grades. Participants were mothers, fathers, and two siblings from 201, White, working and middle class families who were interviewed in their homes on up to 9 annual occasions. Multi-level model analyses revealed overall declines in youth's interests over time, with boys showing more rapid decline than girls. Mothers' educational expectations were positively related to youth's interests, and youth's interests declined less when fathers had more education. The transition to junior high, but not high school, was linked to decline in interests, but this was buffered by mothers' academic interests. Declines in youth's academic interests were linked to declines in school grades.

Keywords

Academic achievement; achievement motivation; interests; school transitions; longitudinal

A recent report indicated that 47% of high school dropouts cited boredom and lack of interest in their classes as a major reason for leaving school (Bridgeland, DiJulio, & Morison, 2006). Statistics like these have directed the attention of researchers and practitioners to students' interest in academics as an important component of academic motivation that facilitates learning (Eccles, Wigfield, & Schiefele, 1998). Given previous research showing declines in academic interests over time (Eccles, Wigfield, & Schiefele, 1998) and links between interests and school drop out, understanding the correlates of academic interests is an important area of research. Prior work suggesting that school transitions contribute to declines in motivation and achievement-related outcomes (Seidman,

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Aber, & French, 2004) provided the basis for our focus in the present study on school transitions as a predictor of declines in academic interests. Additionally, previous studies have shown that parents play a key role in their offspring's achievement-related beliefs and academic outcomes (Eccles-Parsons, Adler, & Kaczala, 1982; Linver & Davis-Kean, 2005; Wentzel, 1998). We extended this work by examining whether parents' own academic interests, expectations for their offspring's educational attainment, and education levels buffered declines in adolescents' academic interests from middle childhood through adolescence. Finally, to illuminate the potential implications of declines in academic interests, we assessed whether *changes* in academic interests were related to *changes* in school grades.

Changes in Academic Motivation and Achievement

Researchers have documented substantial declines in academic motivation and achievement across adolescence (Barber & Olsen, 2004; Eccles, Midgley, & Adler, 1984; Epstein & McPartland, 1976). Although some of this work relies on cross-sectional data, comparing youth of different ages, or short-term longitudinal designs, only a few studies have used longitudinal data to chart (within-individual) changes over time. Fredricks and Eccles (2002) for example, examined changes in students' interest in math across grades 1 through 12. The researchers asked youth to rate how interested they were in math and how much they liked doing math and found that math interests declined significantly over time. Crosnoe (2001) studied changes in adolescents' academic orientations during the high school years using a measure that tapped students' interest (e.g., "I'm losing interest in school because my teachers keep going over the same thing" "Most of my classes are boring") and values (e.g., "Success in life does not have much to do with the things studied in school") regarding school. Results indicated that, although students began high school with moderate levels of academic orientation, they experienced significant declines in academic orientation over time.

In a related line of study, Jacobs, Lanza, Osgood, Eccles, and Wigfield (2002) examined gender differences in changes in youth's subjective task values for math and language arts from 1st grade through 12th grade. Subjective task values refer to youth's reports of how fun math and language arts are, how interested they are in math and language arts, the importance of math and language arts skills, and the utility of math and language arts. They found that girls had higher task values in language arts, but there were no gender differences in math values. Further, boys' and girls' subjective task values declined significantly over time, and there were no gender differences in the rate of decline. In the present study, we focused on interests in academic subjects as one component of achievement motivation and examined changes in youth's interests from about age 7 to about age 18. The present study expands on the work of Jacobs et al. (2002) by examining school transitions and parent characteristics as predictors of changes in academic interests.

Although school transitions are normative for students in the United States, many students experience difficulty during the junior high and high school transitions. The transition to junior high or middle school alters adolescents' social ecology through changes in both the school setting and the student role (Bronfenbrenner, 1979). For example, the school setting changes from the task-oriented, more personalized elementary school to an achievement-oriented, impersonal, and departmentalized junior high or middle school (Blyth, Simmons, & Carlton-Ford, 1983). Regarding the student role, teacher expectations and grading practices change with junior high school teachers using stricter and more social comparison-based standards than elementary school teachers (Eccles & Midgley, 1990). Investigators have pointed to the nature of the new school context in explaining declines in academic functioning: The stage-environment fit theory (Eccles & Midgley, 1989) posits that junior high and middle class classrooms are not developmentally appropriate educational

environments for young adolescent students, and as a result of a poor "fit", youth experience declines in academic functioning. In one study Eccles, Lord, and Buchanan (1996) compared the self-esteem, preparedness, and attendance of eighth graders in K-8 school system versus those of youth in either K-6, 7-9 or K-5, 6-8 school systems. They found that the eighth graders in the K-8 system scored higher than the eighth graders in the other two systems on self-esteem, preparedness, and attendance.

Additional explanations of declines in academic functioning across the junior high transition have focused on developmental timing and occurrence of multiple changes. For example, some adolescents experience the junior high transition and pubertal development at approximately the same time. Examining the impact of cumulative change in early adolescence, Simmons et al. (1987) found that as the number of life changes increased (school transition, pubertal development, early dating behavior, residential mobility, and family disruption), GPA decreased.

Although there is less research regarding the transition to high school, the consensus is that this transition may also be marked by decreases in academic functioning (Seidman, Aber, & French, 2004). High schools tend to be larger and even more bureaucratic than junior high schools (Eccles, Wigfield, & Sciefele, 1998). In many schools, there is little opportunity for students to form close relationships with teachers and little effort to make instruction relevant to the students. As such, students' academic motivation may be undermined (Eccles, Wigfield, & Sciefele, 1998). With one notable exception (Barber & Olsen, 2004), however, researchers have not examined both junior high and high school transitions in the same students. Barber and Olsen (2004) found that adolescents had lower grades compared to the previous year following the transition to middle school when youth were in sixth grade, but that they did not have significantly lower grades compared to the previous year following the high school transition, when youth entered in ninth grade.

In the present study, we expanded in several ways upon previous research on the role of junior and senior high school transitions in youth's academic adjustment. First, most work on school transitions has focused on mean level differences between groups of youth who transitioned versus those who did not, or on mean level changes over time. In contrast, the present study examined changes in youth's academic interests and grades across both the junior high and high school transitions using a multilevel modeling approach, an analytic strategy that allowed us to chart within-individual change in youth who were followed over a 9-year period. Previous research on school transitions has highlighted the negative implications for youth's academic functioning. In this study we also expanded on prior work by examining potential protective factors that may buffer youth from the negative effects of school transitions. Specifically, as we elaborate below, we investigated whether parents' characteristics, namely, expectations for their offspring's school achievement, interest in academics, and their education levels protected youth from exhibiting the expected declines in academic interests across the junior high and senior high transitions.

The Role of Parental Characteristics in Academic Motivation

A growing body of literature supports the idea that parents play an important role in students' academic motivation and achievement (Davis-Kean, 2005; Eccles, Adler, & Kaczala, 1982; Jacobs, et al. 2005; Jacobs & Eccles, 2000). For example, Jacobs and Bleeker (2004) examined parents' math-promotive behaviors and found that mothers who purchased more math and science toys and were more involved in their children's math and science activities had children who reported greater interest in math six years later. *Parental expectations* also have been positively related to youth's academic motivation and achievement (Chen & Stevenson, 1995; Davis-Kean, 2005; Patrikakou, 1997). Davis-Kean (2005) for example, asked parents how much schooling they expected their offspring to

complete. Results showed that children had higher reading and math achievement scores when their parents expected them to go farther in school.

From an observational learning perspective (Bandura, 1986) parents also serve as role models of behaviors and values within the academic domain. One study found that parents' reports of their own participation in math, science, and computer activities were positively associated with their children's participation in these same activities (Simkins, Davis-Kean, & Eccles, 2005). Parents may also model achievement-related motivation or behaviors via their *interest* in academic subjects. In the present study we examined the extent to which mothers' and fathers' self-rated interest in academics predicted youth's level interest in academics as well as changes in youth's academic interests from middle childhood through late adolescence.

Findings regarding gender differences in parental academic socialization are mixed and depend, in part, on how parental socialization is measured. For example, Jacobs and Bleeker (2004) found that mothers were more likely to purchase math and science toys for sons than for daughters. In contrast, mothers and fathers were more likely to be involved in daughters' math and science activities than sons' activities. Regarding parents' expectations for educational attainment, Davis-Kean (2005) found no evidence of gender differences. There is very little work on gender differences in parents' academic behaviors, and to our knowledge, previous work has not examined the relation between parents' interests in academics and those of their offspring. In the present study, we examined mothers' and fathers' educational expectations and academic interests in addition to sons' and daughters' academic interests. Our goal was to determine whether parent or child gender moderated the links between these parent socialization factors and youth's academic interests.

According to Eccles' and colleagues' (1983) model of parental influences on youth's academic motivation and achievement, both parents' socialization practices and their *education levels* are important for youth's academic motivation and achievement. There is a substantial body of literature that links the educational status of parents and youth's academic motivation and achievement (Alexander & Entwisle, 1988; Chen & Stevenson, 1995; Davis-Kean, 2005; Kohn, 1969; Linver & Davis-Kean, 2005;; Marjoribanks, 1979). Indeed, parental education has been found to predict more of the variance in student achievement than other family background characteristics (Heyns, 1978). Most research documents positive associations between parental education and adolescents' achievement. For example, Byrnes (2003) found that parents' education was closely related to adolescents' math proficiency. Using a multi-ethnic sample, Chen and Stevenson (1995) showed that adolescents whose fathers had a postgraduate degree scored 10 points higher on a math achievement test than adolescents whose fathers had junior high school educations or less. Davis-Kean (2005) also found that parents' education was positively related to their offspring's reading and math achievement. Accordingly, we also examined parents' education as a predictor of adolescent's interest in academics.

Research Goals

The first goal of the present study was to chart the developmental changes in academic interests (language arts, math, science, reading, and writing) from middle childhood (about age 7) through adolescence (about age 18). As previous research has documented declines in several components of achievement motivation during adolescence, we predicted that interest in academics would decline over time. Our second goal was to explore the correlates of changes in academic interests, specifically, the role of school transitions and parental characteristics. Toward this end, we studied the extent to which transitions to junior high and high school predicted declines in academic interests, and we also tested whether parents' expectations for achievement, parents' own interest in academics, and parents'

education levels predicted youth's overall level of academic interest as well as changes in their academic interests from middle childhood to late adolescence. We hypothesized that school transitions would be related to declines in academic interests and that parental socialization would be positively related to interest in academics. To further understand the role of parent characteristics in youth academic adjustment, we also examined whether parents' expectations, parents' academic interests or parents' education level moderated the potential effect of school transitions on decline in academic interests. That is, we were interested in whether the benefits of coming from a family in which parents had high expectations for educational attainment, interest in academics, and high levels of education would protect youth from declines in academic interests during times of school transition. Finally, in order to explore the potential implications of declines in academic interests, we studied the links between changes in academic interests and changes in school grades. Based on research and theory about the connections between achievement motivation and academic performance, we predicted that declines in academic interests would be related to declines in school grades.

Methods

Participants

Data were drawn from a longitudinal study of families that explored the interconnections between family dynamics and gender development across middle childhood and adolescence. The goals of the original study were such that the sample included families with two always married parents with at least two children (see McHale, Crouter, & Tucker, 1999). Participants were recruited from school districts via letters sent home from schools to families of fourth and fifth graders living in rural and small urban school districts of a northeastern state. These letters described the study and criteria for participation in the larger investigation, and interested families returned a self-addressed postcard. Of those families who returned postcards and who met study criteria, over 90% agreed to participate.

Data collection began in 1995/1996, and follow-up data collection was conducted each year. The data for the current study includes nine phases of measurement. Originally, 203 families were recruited; two families that dropped out of the study after the first phase were excluded from the analyses. The present analyses focused on the remaining 201 families. Participants were mothers, fathers, and first- and second-born offspring from working and middle class families residing in small cities, towns, and rural areas. Reflecting the demographic composition of the geographic area in which they resided, all families were European-American. In year 1, first-born youth (51% female, 49% male) averaged 10.87 years of age (*SD* = .54), and second-born youth (50% female, 50% male) averaged 8.26 years of age (*SD* = .93). In year 1, the average mother and father had completed some college or post-high school training, *M* = 14.57, *SD* = 2.15; *M* = 14.67, *SD* = 2.43 years of education, for mothers and fathers, respectively (12= high school graduate; 16= college graduate), and all fathers and approximately 90% of mothers in the sample were employed for pay.

Procedures

In years 1, 2, 3, 6, 7, 8, 9 mothers, fathers, and both offspring were interviewed separately in their homes about their personal qualities and family relationships and in years 4 and 5, families completed mailed surveys. Informed consent was obtained from each family member, and the family was compensated with $100 for their participation in years 1, 2, 3, 4, and 5 of the study and $200 in years 6, 7, 8, and 9. The home interviews were about two hours long and consisted of semi-structured questionnaires some of which were read aloud and responses recorded by the interviewer and others in which the participants completed on their own.

Measures

School transitions were assessed each year via mother reports of whether youth had changed schools during the past year. The transition to junior high was coded as 0 for no change and 1 for change. The transition to high school was coded as 0 for no change and 1 for change.

Parental education was obtained during the home interview at years 1, 2, 3, 6, 7, 8, and 9. Both mothers and fathers reported their highest level of education obtained (12 = *high school degree*, 16 = *college degree*). There was very little change over time in mothers' or fathers' education levels (the average stability coefficient was .97 for mothers and .93 for fathers), thus the means of mother's and father's education levels across the seven time points were used.

Youth's grade point average (GPA) assessed each year was operationalized as the average of grades in four subject areas, English, math, science, and social studies, obtained from report cards. Letter grades were converted into numerical scores such that higher scores signified higher grades (A = 4.0, B = 3.0, C = 2.0, D = 1.0, E = 0).

Parents' expectations for their children's educational attainment were assessed via mothers' and fathers' reports of how many years of education they would like their children to obtain. Parents' expectations were obtained during year 2.

Parents' interest in academics was assessed as part of a larger interest inventory (Huston, McHale, & Crouter, 1985). For our purposes here we used mothers' and fathers' ratings of interest in academic activities, including reading, writing, language arts, math, and science. Specifically, mothers and fathers were each asked, "How interested are you in (domain)" for each of the five academic domains. Interests were rated using a 4-point Likert-type scale ranging from 1 (*not at all interested*) to 4 (*very interested*). A principal components analysis of these items yielded a one factor solution indicating one general construct. All items loaded positively on this factor and factor loadings ranged from .30 to .85. The sum of the four academic activities was used to reflect *parents' interest in academics*. Parents reported their interest in academics in years 1 and 6 (which were correlated .52 for mothers and .70 for fathers) and the mean across these two measurement occasions was used in the analyses. Cronbach's alphas ranged from .59 to .69, indicating adequate internal consistency.

Youth's interest in academics was assessed at each time point using a measure that paralleled the parent report (Huston, McHale, & Crouter, 1985), in which youth rated their interest in academic activities including reading, writing, language arts, math, and science. Specifically, youth were asked, "How interested are you in (domain)" for each of the academic domains. Interests were rated using a 4-point Likert-type scale ranging from 1 (*not at all*) to 4 (*very interested*). A principal components analysis of these items yielded a one factor solution. All items loaded positively on this factor, indicating that interest in academics, as measured in the current study, was one general construct. The sum of the five academic activities was used to reflect *youth's interest in academics*. Cronbach's alphas across the 9 phases of measurement ranged from .55 to .74, indicating adequate internal consistency. Cross-time correlations ranged from .48 to .77.

Results

Preliminary Analyses

We first examined means of and correlations between the parent predictors. As Table 1 shows, on average, both mothers and fathers expected their offspring to obtain some college education. Further, mothers and fathers scored slightly above the midpoint on interests in academics, and mothers reported greater interest in academics than fathers. On average,

mothers and fathers completed some post-high school education. Correlations between parents' expectations, interests, and education were low to moderate for mothers and fathers (see Table 1). The means and standard deviations in academic interests at each time point are presented in Table 2. All variables used in the analyses were normally distributed.

Analysis Plan

To examine changes in adolescents' academic interests as a function of age, youth, and parent characteristics, we used a multilevel modeling (MLM) strategy. This approach was chosen because of the nested nature of the data (time within individuals; siblings within families). MLM is also appropriate when data are unbalanced. That is, individuals need not be assessed at the same point in time, and measurement spacing does not have to be equal across participants. There are several different ways of coding time in MLM (Singer & Willet, 2003). Using occasion of measurement (e.g., year, phase, wave of data collection) reflects the study design, but has no substantive meaning. Chronological age, reflecting the subject's actual age (to the day) on each occasion can also be used and is the best available marker of development, the focus of this study. In contrast, the use of occasion of measurement as the index of time would obscure the normative developmental patterns of interest. Thus, in the present study, we used age as the index of time in our MLM analyses.

We estimated a series of three-level models using the MIXED procedure in SAS version 9.1 (SAS Institute Inc., Cary, NC) to examine changes in youth's academic interests as a function of age, gender, school transitions, mothers' and fathers' interests, mothers' and fathers' expectations, and mothers' and fathers' education. The three-level model extends the two-level models used when data are nested in naturally occurring hierarchies such as students within classes or children within families or to estimate individual growth models, which explores longitudinal data nested within individuals nested within groups. The three-level model is appropriate for our data, in which individuals within groups (i.e., families) are tracked over time (for further information on studying individual change nested within groups also known as clustered longitudinal model, see Raudenbush & Bryk, 2002; Snijders & Bosker, 1999).

At level 1 (within-individuals over time; $n = 2,693$ observations), we included age polynomials (linear, quadratic, and cubic terms) to describe patterns of change in academic interests from middle childhood through adolescence. Two time-varying covariates, transition to junior high and transition to high school, were also included at level 1. In order to separate within and between person effects from the time varying covariates of school transitions, we included the time-varying effect for whether or not the junior or high school transition occurred each year and controlled for the level 2 between person effect, whether or not there was *ever* a transition to junior high or high school. At level 2 (between-siblings, within-families; $n = 402$ observations), we included individual-level time invariant characteristics: adolescent birth order and gender. The reference group for adolescent gender was male, and the reference group for birth order was second-born. Mothers' and fathers' expectations for educational attainment were also included at level 2 because expectations were unique to each sibling. At level 3 (between-families; $n = 201$), we included family level variables: mothers' and fathers' education, and mothers' and fathers' interest in academics.

What is the Developmental Trajectory of Academic Interests?

To address the first goal of this study, to chart changes in academic interests from middle childhood through adolescence, we evaluated both fixed and random age effects by estimating a series of unconditional growth models. In these growth models, we tested whether the overall trajectory was best characterized by linear, quadratic, or cubic patterns

of change and whether each coefficient should be treated as random or fixed. We used deviance tests to determine the statistical significance of variance components as recommended by Raudenbush & Bryk (2002). This approach is based on estimating two models that differ only in the random effect of interest. For each model a deviance statistic is computed that is equal to -2 log likelihood for that model. The difference between the deviances is computed. This value is distributed as chi-square with degrees of freedom equal to the difference in the number of parameters estimated. Youth's age was centered at age 13 (the mean age across all youth, across all times of measurement).

Based on a series of deviance tests, a model with a random quadratic term and a fixed cubic term was chosen as a final growth model for academic interests (see Table 3). The intercept (at age 13) was 2.57, the midpoint on the interest scale, which indicates that youth were "somewhat interested" in academics. Youth's academic interests declined over time as indicated by the significant linear term, $\gamma = -.12$, $SE = .01$, $t = -13.74$ $p < .001$. In addition, the significant quadratic term $\gamma = .01$, $SE = .01$, $t = 5.28$ $p < .001$ showed that the decline in academic interests decelerated in later adolescence. Adolescents also showed some "recovery" in academic interests as indicated by a significant cubic term, $\gamma = .002$, $SE = .01$, $t = 4.71$ $p < .001$: By age 18 academic interests began to increase. Although we were not substantively interested in the effects of birth order, we included this as a control because first- and second-borns represent two cohorts. A significant birth order effect, $B = 0.15$, $SE = .04$, $t = 3.75$, $p < .001$ indicated that first-borns reported significantly greater interest in academics than second-borns. Thus, birth order was included as a control in all subsequent analyses.

Next we examined whether the pattern of change in academic interests was the same for boys and girls. A significant main effect for gender indicated that at age 13, girls had greater interest in academics than on average than boys, $B = .25$, $SE = .04$, $t = 5.72$, $p < .001$. There were also significant interactions between gender and the linear and quadratic age terms indicating that boys' academic interests declined more than girls' did and that the rate of decline was faster for boys than for girls (see Figure 1). There was not a significant interaction between gender and the age cubic term, which indicated that the "recovery" pattern observed in the unconditional growth model was the same for boys and girls. At age 18, however, boys had significantly lower interest in academics than girls, $t = 5.72$, $p < .001$.

Predictors of Change in Academic Interests

The second goal of this paper was to identify the correlates of individual differences in changes in academic interests (see Table 4). We began by examining the extent to which the transitions to junior high school and high school were related to changes in academic interests. In these models, the level 1 (within-person) and level 2 (between-person) effects of the junior high and high school transitions were entered into the model described previously. After accounting for the age-related changes in academic interests and controlling for birth order and the level 2 between-person effects the junior high and high school transitions, we found, as expected, that the transition to junior high was associated with a significant decline in academic interests. Specifically, this transition was associated with an additional .13 unit decline in academic interests beyond the decline associated with age. No gender differences were evident in the relation between the junior high transition and changes in academic interests. Further, the transition to high school was unrelated to changes in academic interests, and there were no gender differences in the relation between the high school transition and changes in academic interests.

We also evaluated the effects of three parent predictors on changes in academic interests (see Table 4). As noted, we examined the effects of parents' expectations, parents' own interests in academics, and parents' educational levels on the level and slope of youth's

academic interests. We estimated three models: a model with mothers' predictors, a model with fathers' predictors and a model that included both predictor variables for parents. Because including predictors for both parents in the same model did not suppress effects for either parent, we present only the final model that included both parents' predictors.

Mothers' expectations were associated with level but not change in academic interests: When mothers held high expectations for their offspring's educational attainment, their offspring had higher average levels of academic interests. Contrary to our hypothesis, mothers' expectations did not predict change in academic interests, and fathers' expectations were not related to youth's academic interests at either the intercept or slope. Mothers' and fathers' own academic interests were not associated with level or change in adolescents' academic interests. Further, when we examined whether these associations differed for boys and girls, we found no evidence of gender differences. Consistent with our hypothesis, however, fathers' education level was associated with changes in academic interests such that when fathers had higher levels of education, their offspring's academic interests declined less over time.

As a next step, we examined whether parental socialization factors moderated the effect of the junior high transition on academic interests. That is, we were interested in whether parents' expectations, parents' own interest in academics, or parents' education level buffered declines in academic interests during the junior high transition. A significant interaction emerged for mothers' interest in academics: When mothers' own interests in academics were low, adolescents showed declines in academic interests across the junior high transition. However, when mothers' interests in academics were high, adolescents did not exhibit a significant decline in academic interests across the junior high transition (see Figure 2).

Are Changes in Academic Interests Related to Changes in Grades?

The final goal of this paper was to examine the links between declines in academic interests and changes in youth's school grades. We began by estimating an unconditional growth model for youth's grade point average and evaluated both fixed and random effects of time. Deviance tests were conducted to determine whether each coefficient should be treated as random or fixed and if the patterns of change in academic interests should include polynominal terms. The time variable (i.e., youth's age) was centered at age 13 (the mean age across all youth, across all times of measurement). Based on a series of deviance tests, a model with a random linear term and a fixed cubic term was chosen as a final model for grade point average. The intercept (at age 13) was 3.37, which indicates that youth earned about a B+ average in the 7^{th} grade, and the significant linear term, γ = -.09, *SE* = .01, *t* = -11.45, $p < .001$, indicated that youth declined at a rate of .09 points per year from elementary school through the end of high school (see Figure 3). Additionally, the significant quadratic term, γ =.004, *SE* = .01, *t* = 2.66, $p < .01$, indicated that the decline in grades decelerated near the end of high school, and the significant cubic term γ = .002, *SE* = .01, *t* = 4.12, $p < .001$, indicated that grade point average was on the rise by the end of high school (see Figure 3). Again, we examined whether there was a birth order effect given that first- and second-borns represent two cohorts. Because the birth order effect was non-significant, *B* = -.05, *SE* = .04, *t* = -1.19, *p* = .25, we did not include it in subsequent models.

Next we examined whether the pattern of change in grade point average was the same for boys and girls. A main effect for gender was significant which indicated that at age 13 (the intercept) girls had higher grade point averages (mean = 3.45) than boys (mean = 3.29), *B* = .15, *SE* = .05, *t* = 3.20, $p < .01$. There were no gender interactions for the age polynomial terms (linear, quadratic, cubic), suggesting that the pattern of change did not differ for boys and girls.

Using an MLM approach to test whether declines in academic interests were related to declines in grade point averages, the time-varying predictor, academic interests, was included at level 1. At level 2, the cross-time mean of academic interests, (e.g. the mean across time points) was included as a control so that we could separate within-person from between-person effects. As expected, we found that academic interest was a significant time-varying covariate at level 1: As academic interests decreased over time, so too did grade point average, $B = .08$, $SE = .02$, $t = 4.33$, $p < .001$. Further, the significant main effect for gender on grades became non-significant when academic interest was entered into the model. We also examined whether the link between changes in academic interests and changes in grade point average was the same for boys and girls. A significant gender X academic interests interaction emerged indicating that changes in academic interests were linked more strongly to changes in grade point average for girls as compared to boys, $B = .08$, $SE = .03$, $t = 2.18$, $p < .05$.

Discussion

Recent research highlights the importance of interest in academics as a key component of achievement motivation. In the present study, we charted changes in academic interest from middle childhood through adolescence. In addition, we examined school transitions and parent characteristics as predictors of changes in academic interests. Finally, we explored whether changes in interest in academics were related to changes in school grades over time.

The overall pattern of change in academic interests was one of decline, although there was some recovery in interests near the end of high school. The pattern of change also differed somewhat for boys and girls. For example, there were no gender differences in levels of academic interest at the beginning of the study, but by age 13, girls had significantly higher interest in academics than did boys. There were also differences in the rate of change for boys and girls such that boys showed greater decline in academic interests and their decline occurred at a faster rate than did girls. By age 18, both boys and girls showed some recovery in interest in academics, but girls still had significantly higher interest in academics than boys. In interpreting these findings, it is also important to note that these data were collected only through grade 12 and did not include post high school grades and that there were no high school drop-outs in our sample. Thus the recovery pattern in academic interests cannot be attributed to students going to college or to uninterested students leaving school.

The pattern of decline in academic interests that we observed is similar to what others have found in the domains of math and language arts (Fredricks & Eccles, 2002; Jacobs et al. 2002;) however, our results revealed gender differences in both the extent and rate of change. This is an important finding considering the current trends in college enrollment for males and females. In the 1970s, men made up 55% of first year college students; today men account for 45% of college enrollment (American Council on Education, 2006). Our results suggest that the origins of this gender gap may begin in the primary school when boys' interest in academics begins to decline. In the past researchers and teachers have been concerned with declines in girls' achievement motivation and participation in math and science (AAUW, 1992), but our results indicate that attention must also be paid to boys' general lack of interest in academics.

One possible explanation for the gender difference in rate of decline in interest in academics may have to do with the different learning styles of boys and girls. To the extent that boys prefer a hands-on-learning approach and that this classroom strategy becomes less common across the junior high and high school years, boys' interest in academics may decline more rapidly because of the disconnect between learning preference and teaching style. Given that lack of interest in school is a common reason for dropping out, as well as our findings of

links between declines in academic interests and declines in academic performance, an important direction for researchers and educators is to find ways to keep boys interested in school; part of this agenda may be to promote the “masculine” valence of the academic domain.

Turning to correlates of change in academic interests, we found that the transition to junior high was a significant predictor of decline in academic interests. This finding is consistent with previous research on the negative effects of the junior high transition and adds to this body of work by focusing on within-individual change. Contrary to our expectations, the transition to high school was not related to declines in academic interests. One reason why the high school transition did not have an effect on academic interests may be that this transition is less disruptive than the junior high transition. The transition to high school is not as closely associated with biological, cognitive, and social changes that characterize early adolescence, when the transition to junior high typically occurs, which may make this transition to high school easier. Additionally, having already experienced the junior high transition, students may be more prepared for the high school transition. Finally, older adolescents are more mature, better at problem solving and have greater social-emotional competence which means they may be better able to handle the change.

Our findings regarding parental socialization support Eccles’ model of parental influences, which emphasizes both parental socialization and parental education in youth’s academic motivation and achievement. We found that fathers’ education level and mothers’ education expectations were important predictors of adolescents’ interest in academics. Specifically, when adolescents had more educated fathers, they declined less in their academic interests. Additionally, when mothers had higher expectations for their offspring’s educational attainment, youth had higher overall levels of academic interests. The differential effects of these parent characteristics may have to do with the different roles of fathers and mothers within the family. By virtue of their educational status and occupational prestige, fathers may determine the family’s social class more so than mothers and social class is an important correlate of achievement and motivation. Mothers on the other hand, are often directly involved in their children’s school and engage in more monitoring of their children’s daily experiences. It may be that mothers’ involvement in these ways makes their expectations for their offspring’s achievement more salient than are fathers’ expectations.

We also found that mothers’ interest in academics buffered the effect of the junior high transition on declines in academic interests. This is an important finding given that previous work regarding the junior high transition has documented its negative effects, but not yet examined protective factors. Some researchers have called for school reform to alter the structural characteristics of junior high schools; however, our results show that another avenue of prevention is through parents. One possible explanation for the buffering effect we observed is that when mothers’ own interest in academics is high, they are more likely to take an interest in and be involved in the academic success of their children. Many parents are aware of the difficulty that youth may encounter during the junior high transition, but they might not know ways that they can help their offspring through this period, including fostering their own interests in academics.

Our final goal was to examine whether changes in academic interests were linked to changes in grade point average. Previous theoretical and empirical work links achievement motivation to academic performance; however, other studies have not examined whether *changes* in academic interests are related to *changes* in performance. Consistent with our hypothesis, we found that declines in academic interests were related to declines in grade point averages. In addition, this link was stronger for girls than for boys indicating that girls’ academic performance may be more tied to academic interest than boys. Although theories

of achievement motivation posit that motivation precedes performance, it is important to remember that our data are correlational and the causal direction of the links between in interests and grades cannot be inferred. It is likely that interest in academics and school grades have a reciprocal relation such that performance also affects interest. Not only can interest in academics make one want to perform well in school, but school performance can also serve to maintain interest in academics. Future research might utilize path analytic techniques to explore additional variables such as self-efficacy or personality that may explain the link between academic interests and school performance.

A limitation of the present study was its focus on a relatively homogenous sample of European American youth and their families. We found that parents played an important role in changes in youth's academic interests; however, this finding may vary across family types because parents in different circumstances may view their role in their offspring's education differently. In addition, some researchers have suggested that normative school transitions in early adolescence are particularly problematic for poor urban youth. Thus, there may be additional factors that can buffer the negative effects of school transitions for youth in these kinds of settings.

An additional limitation of this research was that we were unable to examine domain differences in academic interests due to our conceptualization and measurement of academic interests. Our measure of academic interests included one item for each academic subject and we created an index of interest by summing across these domains to reflect a general interest in academics. However, this decision means that our measure is unable to capture potential nuances in patterns of academic interests. For example, Gottfried, Fleming, and Gottfried (2001) found that the decline in intrinsic motivation was modified by subject area, such that the greatest decline occurred in math, followed by science and reading. Given that the results of our study showed differences in the rate of change in academic interests for boys and girls, a direction for future research is to examine whether domain differences in declines are the same for boys and girls.

In the face of these limitations, we found robust effects indicating that interest in academics declined from middle childhood through late adolescence. Our findings show that school transitions and parent characteristics are both important correlates of changes in academic interests. In addition, the combination of these factors are important for preventing declines in academic interests, which is necessary given its link to school grades and decisions to drop out of school.

Appendix

Equations for predicting youth's academic interests from time, school transitions, and parent characteristics.

Level 1 (*n* = 2693 observations):

$$\text{Youth's academic interests}=\pi_0+\pi_1(\text{age})+\pi_2(\text{age})^2+\pi_3(\text{age})^3+\pi_4(\text{junior high transition})+\pi_5(\text{high school transition})+\varepsilon$$

Level 2 (*n* = 402 observations):

$$\pi_0=\beta_{00}+\beta_{01}(\text{mean junior high transition})+\beta_{02}(\text{mean high school transition})+\beta_{03}(\text{youth gender})+\beta_{04}(\text{birth order})+\beta_{05}(\text{father's expectations})+\beta_{06}(\text{mother's expectations})+r_0$$

$$\pi_1=\beta_{10}+\beta_{11}(\text{youth gender})+r_1$$

$$\pi_2=\beta_{20}+\beta_{21}(\text{youth gender})+r_2$$

$$\pi_3=\beta_{30}$$

$$\pi_4=\beta_{40}$$

$$\pi_5=\beta_{50}$$

Level 3 (*n* = 201 observations):

$$\beta_{00}=\gamma_{000}+\gamma_{001}(\text{father's interests in academics})+\gamma_{002}(\text{father's education})+\gamma_{003}(\text{mother's interests in academics})+\gamma_{004}(\text{mother's education})+u_{00}$$

$$\beta_{01}=\gamma_{010}$$

$$\beta_{02}=\gamma_{020}$$

$$\beta_{03}=\gamma_{030}$$

$$\beta_{04}=\gamma_{040}$$

$$\beta_{05}=\gamma_{050}$$

$$\beta_{06}=\gamma_{060}$$

$$\beta_{10}=\gamma_{100}+\gamma_{101}(\text{father's education})$$

$$\beta_{11}=\gamma_{110}$$

$$\beta_{20}=\gamma_{200}$$

$$\beta_{21}=\gamma_{210}$$

$$\beta_{30}=\gamma_{300}$$

$$\beta_{40}=\gamma_{400}$$

$$\beta_{50}=\gamma_{500}$$

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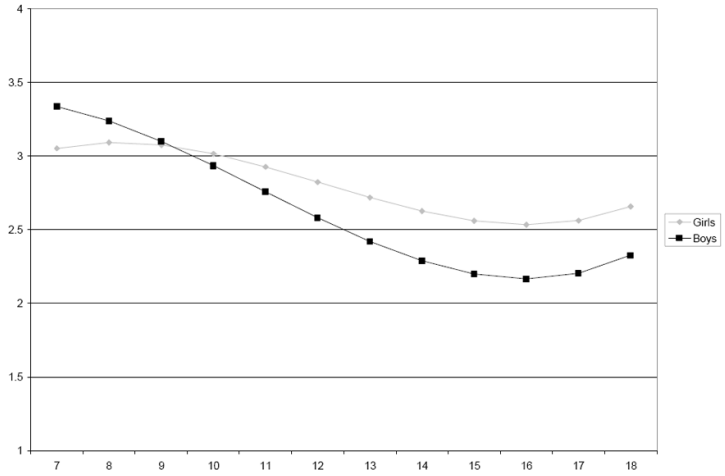

Figure 1.
Growth Curve of Changes in Academic Interests by Gender

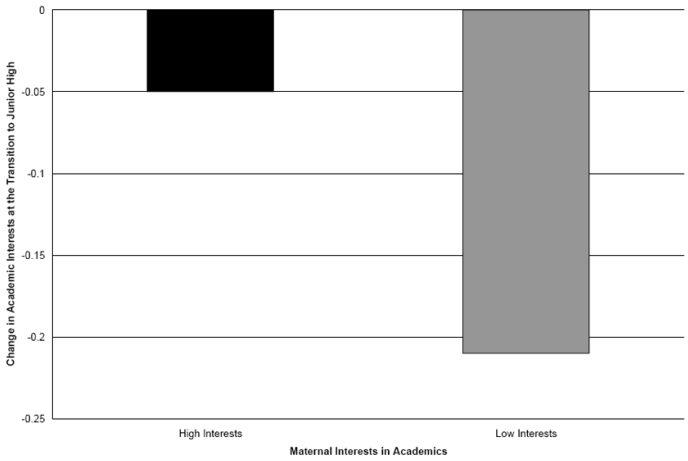

Figure 2.
Change in Academic Interest as a Function of Junior High Transition and Mothers' Academic Interest

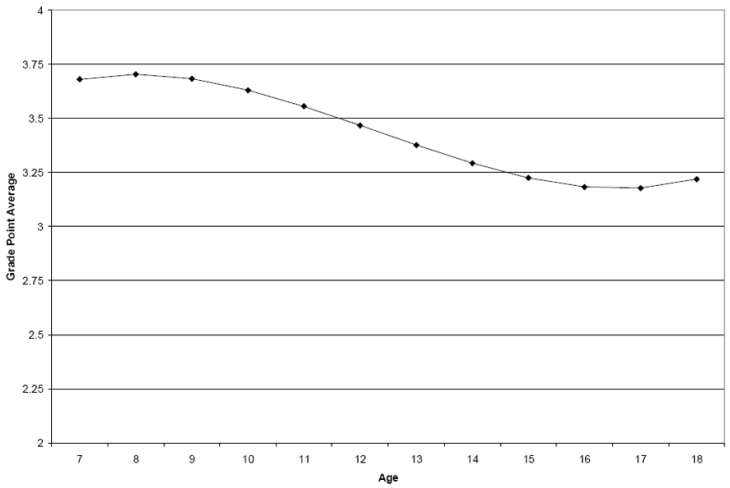

Figure 3.
Growth Curve of Changes in GPA

Table 1

Correlations among parental socialization predictors

Variables	1	2	3	4	5	6	7	8
1. Father-FB[a] expectations	–							
2. Father -SB[b] expectations	.61***	–						
3. Father Interests	.27***	.28***	–					
4. Father Education	.42***	.45***	.39***	–				
5. Mother-FB expectations	.55**	.30***	.20**	.32**	–			
6. Mother -SB expectations	.33***	.42**	.22**	.39**	.62***	–		
7. Mother Interests	.18**	.13	.22**	.24**	.09	.26***	–	
8. Mother Education	.26*	.39***	.28***	.55***	.30***	.42***	.31***	–
M	15.77	15.64	2.34	14.62	15.71	15.63	2.50	14.63
SD	1.22	1.32	0.60	2.39	1.29	1.25	0.51	2.12

[a] FB = first-born,

[b] SB = second-born

* $p < .05$;

** $p < .01$;

*** $p < .001$

Table 2

Descriptive Statistics for Academic Interests

	Year 1 Mean (SD)	Year 2 Mean (SD)	Year 3 Mean (SD)	Year 4 Mean (SD)	Year 5 Mean (SD)	Year 6 Mean (SD)	Year 7 Mean (SD)	Year 8 Mean (SD)	Year 9 Mean (SD)
1. First-born girls	3.24 (0.54)	2.64 (0.58)	2.70 (0.60)	2.68 (0.68)	2.53 (0.60)	2.63 (0.61)	2.61 (0.62)	2.65 (0.60)	2.50 (0.66)
2. First-born boys	3.09 0.59	2.62 (0.68)	2.53 (0.62)	2.21 (0.70)	2.08 (0.71)	2.25 (0.72)	2.28 (0.69)	2.29 (0.73)	2.20 (0.68)
3. Second-born girls	3.16 (0.58)	2.93 (0.69)	2.86 (0.58)	2.66 (0.60)	2.62 (0.63)	2.56 (0.65)	2.52 (0.71)	2.56 (0.64)	2.61 (0.59)
4. Second-born boys	3.12 (0.63)	2.85 (0.70)	2.73 (0.65)	2.49 (0.64)	2.26 (0.72)	2.36 (0.68)	2.22 (0.66)	2.28 (0.63)	2.22 (0.66)

Table 3

Unconditional Growth Model

Parameter	Interest in Academics		
	Estimate	SE	p value
Fixed Effects:			
Intercept	2.57	0.03	< .001
Slope Linear	-0.12	0.01	< .001
Slope Quadratic	0.01	0.01	< .001
Slope Cubic	0.00	0.01	< .001
Variance Components:			
Residual Variance	0.20	0.01	< .001
Intercept Variance	28.28	3.94	< .001
Intercept-Linear Covariance	-0.28	1.54	0.86
Linear Variance	3.31	1.08	< .001
Intercept-Quadratic Covariance	-0.12	0.24	0.63
Linear-Quadratic Covariance	-0.50	0.17	< .01
Quadratic Variance	0.10	0.03	< .001
Model Fit:			
REML Deviance	4409.30		
AIC	4425.30		
BIC	4451.70		
Number of Parameters	10		

*** $p < .001$;

** $p < .01$;

* $p < .05$

Table 4

Coefficients, Standard Errors, and T-Ratios for Changes in Academic Interests

	B	SE	*t*-ratio
Fixed Effects			
Intercept	2.41***	0.07	36.11
Level 1			
Age (Linear)	-0.13***	0.01	-10.22
Age^2 (Quadratic)	0.01***	0.00	4.74
Age^3 (Cubic)	0.01***	0.00	3.93
Junior High	-0.13***	0.04	-3.45
High School	0.04	0.03	1.24
Age*Sex	0.04***	0.01	4.29
Age^2*Sex	-0.01**	0.00	-2.62
Age* Father's Education	0.01**	0.00	2.79
Level 2			
BP Junior High	0.15**	0.05	2.81
BP High School	0.04	0.05	0.83
Gender	0.29***	0.05	6.34
Birth Order	0.14***	.04	3.75
Father's Expectations	-0.03	0.02	-1.26
Mother's Expectations	0.07*	0.02	3.56
Level 3			
Father's Interests	0.05	0.04	1.08
Father's Education	0.03**	0.01	1.99
Mother's Interests	0.09†	0.05	1.75
Mother's Education	0.00	0.01	-0.64
	Variance	*SD*	
Variance Components			
Residual	0.20***	0.01	
Intercept	0.07***	0.02	

[a]Between-Person junior high and high school transitions were included as covariates to capture within-person differences beyond between-person effects.

*** $p < .001$;

** $p < .01$;

* $p < .05$;

† $p < .10$