The Long-Term Effects of Seventh-Grade Ability Grouping in Mathematics

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Few definitive answers exist as to the implications of ability grouping for children's development. Perhaps the most significant source of this inconclusiveness has been the absence of a longitudinal perspective and long-term studies of the effects of ability grouping on children's development. To address this need, this study examined the long-term correlates of being placed in an ability-grouped mathematics class on entry into junior high school. Results revealed some negative and no positive correlates at the tenth-grade level for low-ability students placed in low-ability classrooms compared with their peers placed in ungrouped classrooms. Conversely, a number of positive correlates of ability grouping were found for medium- and high-ability students. Discussion focuses on the role of ability grouping in junior high school as a sorting event which sets youths on different trajectories that have implications for their later academic, career, and personal development.

Ability grouping, one of the oldest and most contentious issues in American education, has recently reemerged as a focal point in the debate over

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school reform. Although ability grouping has been practiced in the United States since the 19th century, and studies of its effectiveness have been conducted for over 50 years, very few definitive answers exist as to the implications of its use for children's development. Reasons for this inconclusiveness include the possibility that the effects of ability grouping may vary as a function of both the outcome being examined and the ability level of the students. However, perhaps the most significant source of the confusion has been the distinct absence of a longitudinal perspective and long-term studies of the effects of ability grouping on children's development. Longitudinal investigations of this issue are critical to discover possible delayed or cumulative effects of being ability grouped. To address this need, this study examined the long-term effects of being placed in an ability-grouped mathematics class on entry into junior high school. We take the perspective that academic ability-grouped placement in junior high school acts as a punctuated event in the lives of early adolescents, placing them on particular developmental paths or trajectories that have important implications for their future academic and occupational achievement, as well as their overall psychological and behavioral development. Long-term effects of ability grouping likely result from the accumulation of different experiences over time that are linked to initial group placement.

In their publication *Turning Points: Preparing American Youth for the 21st Century* (1989), the Carnegie Council on Adolescent Development placed the elimination of ability grouping as one cornerstone of their recommendations for American middle school reform. However, although the issue of ability grouping has emerged anew, the arguments for and against ability grouping remain essentially the same as they were at the beginning of this century. Those that support the council's recommendation suggest ability grouping is an archaic educational practice. They argue the custom denies low-grouped students a challenging education, damages them psychologically, and channels them at an early age away from an equal opportunity in later education and employment. On the other hand, proponents of ability grouping believe it is the best way to meet the individual needs of all students. They assert that ability grouping allows those with high ability to be sufficiently challenged, and those with lower ability to get the attention and work pace they require.

Much of the heat in arguments over ability grouping comes from the apparent lack of conclusive research findings about the effects of ability grouping on children. Some studies have suggested positive outcomes, others have suggested negative outcomes, and still others have indicated a lack of significant effects. One reason for the discrepancy is due to the fact that some studies compare ability-grouped students with those placed in heterogeneous classes, whereas others compare students in high-ability classes with those in low-ability classes. As discussed by Slavin (1990), the latter type of study is not an effective test of the effects of ability grouping because it does not control for the effects of each student's ability level. Comparisons of high-grouped students with low-grouped students are also comparisons of high-ability students with low-ability students. Slavin (1990) argued that these differences in ability level can be so large that statistical controls are often not enough to remove the influence of ability level or prior performance. A more direct test of the effects of ability grouping is a comparison of grouped students with non-grouped students of the same ability level. However, there is a relative paucity of these types of comparisons. Therefore, we will have to discuss both types of studies to provide a backdrop for our study. We will point out when we are discussing high-grouped versus low-grouped studies, and the reader should keep in mind the limitations of these types of comparisons.

Another reason for the lack of conclusive findings is that the effects of ability grouping likely vary according to the particular outcome being assessed. For example, recent attempts at synthesizing the diverse findings regarding the effects of ability grouping on secondary school students find few, if any, overall effects of ability grouping on students' achievement (Kulik, & Kulik, 1982; Kulik, & Kulik, 1987; Slavin, 1990). However, Kulik and Kulik (1982) did find that grouping clearly had a positive effect on students' attitudes toward specific subjects, and a smaller effect on their attitudes toward school as a whole and on their self-concept. In addition, based on a review of high-group versus low-group studies, Dawson (1987) suggested that ability grouping is associated with lower educational aspirations and narrower vocational choices for students in low-ability classes. Clearly, any true understanding of the implications of ability grouping for children's development must include its effects on a wide range of outcomes.

A third reason for the seemingly inconclusive body of research is that the effects of ability grouping may vary as a function of the ability-grouping level. Kulik and Kulik (1982, 1987) and Slavin (1990) found no real differential effect of grouping on achievement according to ability-grouping level in their reviews. However, the conclusions of these two reviews should be considered in light of the fact that the authors used meta-analytic techniques to conduct their reviews, which strive to collapse a wide range of results into a single value of effect size. Therefore, even considering their conclusions, there remain a number of studies that do find a differential effect of ability grouping based on students' ability grouping level. For example, in their analyses of the *High School and Beyond* data set, Gamoran and Mare (1989) found that even after controlling for prior levels of achievement, higher mathematical achievement in 12th grade and probability of high school graduation was associated with placement in a college group, but not with placement in a noncollege group. A recent study by Hoffer (1992), in which grouped and ungrouped schools are compared, found that whereas high-group placement tended to have a weak positive effect on achievement, low-group placement had a stronger negative effect. In addition, Oakes (1985) found that students placed in higher group classes tended to have higher educational aspirations than those placed in lower group classes. However, Oakes (1985) did not compare grouped students with ungrouped students.

A fourth and perhaps more significant source of confusion about the effects of ability grouping is that most investigations have examined only ability grouping and its effects over a short period of time. Reviews of research on ability grouping have noted the significant lack of longitudinal investigations (Dawson, 1987), too few to reach any conclusions. For example, the Slavin (1990) review included only a few multiyear investigations. In one of those studies, a 2-year, randomized experimental study, Marascuilo and McSweeney (1972) found a clear differential effect of ability grouping according to ability level. Placement in high-group classes resulted in slightly higher achievement, and placement in medium- and low-group classes resulted in lower achievement than placement in heterogeneous ability-level classes. However, the few other multiyear studies did not have similar results. Long-term studies reaching beyond the ninth grade are so rare that Slavin (1990) concluded "above the ninth grade the evidence is too sparse for firm conclusions" (p. 484).

Longitudinal investigations of ability grouping are critical because the final effects may not be readily apparent within a year of the initial group placement, and the patterns of effects may change over time. For example, Reuman, Mac Iver, Eccles, and Wigfield (1987) found that placement in a low-ability math class on entering junior high school led to an increase in the students' self-concept of math ability and a decrease in their math test anxiety; however, the same pattern of change was not evident for low-ability students placed in heterogeneous classes. In contrast, work by Oakes (1985) suggested that high school students in a low group have more negative views of their academic ability and themselves in general, and have lower educational aspirations than those in a high group (Oakes only compared high-group with low-group students). Therefore, although the initial impact of ability grouping on the self-concept and motivation of low-ability students in junior high may be positive, the long-term effects may be more negative. Reuman et al. (1987) argued that the initial impact of ability grouping would be influenced by social comparison processes: low-performing adolescents should feel better about their competence if the average level of performance of their classmates is close to their own than if the average level is higher than theirs.

However, ability-grouped placement has a number of other consequences as well, which are linked to its sorting function. Being placed in a particular class or group on the basis of one's ability on entry into junior high school is likely to be a critical event in the lives of adolescents. Such placement may be one of those powerful events that set youths on different developmental trajectories or pathways which, in turn, can have profound implications for their overall development (Rutter, 1989), especially if such events occur during major transitional periods of development. Ability-grouped placement may be one important event that influences how individuals negotiate the transition to adolescence and eventually adulthood. It also may influence their subsequent educational experiences.

Considering ability grouping as a sorting event means that instead of considering placement in ability-grouped classrooms as a single event that may have a direct and immediate effect on achievement and other outcomes, it should be seen as an environmental change that sets off chains of events and settings that predispose adolescents to a particular set of environments, experiences, and consequential developmental outcomes. For example, initial placement in an ability-grouped math class often increases the likelihood of being enrolled in other ability-grouped classes targeted for the same "level" of ability (Oakes, 1985). Students quite literally come to follow a particular "group" of course work geared to a particular level ability, resulting in a significant narrowing of the different academic experiences they will encounter during their schooling. At the extreme, ability grouping in math may be the gateway to curricular tracking with the students placed in low-ability classes being predisposed to the vocational track in high school, and the students placed in the high-ability class being predisposed to end up in the college preparatory track.

In addition, the quality and type of instruction students receive is likely to be affected by their ability-group placement. Teachers generally pay less attention to low achievers, provide less accurate and detailed feedback to them, and require less work and effort of them, especially if they are in ability-level sorted groups or classes (Good, 1981; Eccles & Wigfield, 1985). Oakes (1985) found that quality of instruction generally mirrored level of group placement: high-quality instruction was found in high-grouped classes, whereas more inferior methods were found in low- grouped classes. Studying the impact of ability grouping over a long period of time could reveal the possible cumulative effects of factors such as these on students' later achievement, self-concept, aspirations, and other achievement-related outcomes.

The current study took this perspective and examined the long-term effects of between-classroom ability grouping on the adolescent development of junior high school math students. To directly assess these effects, we compared students who were grouped at seventh grade with students of the same ability level who were not grouped at seventh grade. Based on previous research on ability grouping, six groups of tenth-grade outcomes were selected to assess the long-term correlates of being grouped in mathematics in the seventh grade: (a) mathematics achievement, value, and self-concept; (b) mathematics class enrollment; (c) general achievement-related self-concept; (d) future educational expectations; (e) deviant behavior, and (f) peer associations.

Mathematics achievement was selected as an outcome for obvious reasons. The main premise of grouping students by ability is so that instruction may be geared to the ability levels of the individual students. High-ability students can receive instruction at a faster, more challenging pace, whereas low-ability students may work at their own level without falling behind instruction pitched at a level too high for them. In his review, Slavin (1990) concluded ability grouping has no notable effects on students' achievement. However, Kulik and Kulik (1982) suggested ability grouping may have positive effects on students' achievement for high-ability and gifted groups. Overall, research suggests no significant effect for average- and low-ability groups.

Aside from Oakes's (1985) research and a study by Hallinan (1991), few studies have examined the impact of ability-grouped placement on later mathematics class enrollment. We selected class enrollment to examine whether ability grouping during junior high school does act as a "sorting" event with long-term consequences. If it does place students on different educational trajectories, we would expect placement during junior high school to affect the types of math classes students enroll in during high school.

Self-concept has been a frequent outcome in previous studies of ability grouping. In their meta-analytic review, Kulik and Kulik (1982) found few significant effects of ability grouping on self-concept. Similar conclusions were reached by Dawson (1987) in her review. However, work by Byrne (1988) has shown students in a low group having lower academic, English, and mathematics self-concepts than higher group students. They did not, however, have lower general self-concepts. However, the use of the Byrne and the Dawson conclusions are limited because they did not reflect a comparison of grouped students with nongrouped students.

Educational expectations was selected as another outcome to test the charge that ability grouping channels students into academic paths that remain rigid even after graduation from secondary school. Studies in this area largely have been comparisons of high-grouped with low-grouped students. As discussed previously, Oakes (1985) found that students in a low group had lower educational aspirations than did high-grouped students. In addition, Dawson (1987) concluded that "educational aspirations are lowered and vocational choices are narrowed for students placed in low ability classes" (p. 350).

Peer association and deviant behavior were chosen as outcomes to address the issue of the social context into which ability grouping places students. Ability-grouped placement can influence peer group affiliations (Alexander & McDill, 1976; Ianni, 1989). In addition, work by Kandel and Lesser (1972) has highlighted the impact the nature of one's peer group can have on students' involvement in deviant behavior as well as their educational aspirations. These two outcomes, peer association and deviant behavior, were selected to determine if peer group stratification continues in the long term, and whether such stratification is associated with ability-grouping differences both in deviant behavior and future educational expectations.

Sample

The data used in this study were collected as part of a large-scale longitudinal study of adolescent development (the Michigan Study of Adolescent Life Transitions—MSALT), under the direction of Eccles at the University of Michigan. The students attended schools in six predominantly White, lower-middle to middle income school districts in southeastern Michigan. Approximately 55% of students' mothers graduated from high school, 20% attended some college, 20% graduated from college, and 5% received some form of graduate training. All districts had a

K-6, 7-9, and 10-12 grade configuration. The sample used in this study includes 1139 students from whom data were collected during their sixth, seventh, and tenth grades.[1] The sample was fairly evenly divided by gender (female: 53%; male: 47%).

Procedure

Predictor Measures

The two main predictors used were *ability level* in mathematics at sixth grade, and *ability grouping* in mathematics at seventh grade.

Ability level in mathematics at sixth grade was a composite score of teachers' ratings of students' math talent and performance, students' year-end grade in mathematics, and their score on a statewide, criterion-referenced test in mathematics that was taken in the first month of the seventh grade. This last item was included as an objective measure of math ability, and the students took the test early enough in the seventh grade (mid-September) so that their performance was unlikely to have been influenced by their classroom experiences that year. A student's math ability score was computed by taking the mean of their standardized scores on each item. Reliability analyses indicated this measure of ability level had a high internal consistency (*alpha* = .87).

Ability grouping in mathematics at the seventh-grade level was determined from teachers' reports of whether the students' math classes were grouped by ability *between* classrooms and, if so, the ability level of the math class: low, medium, or high. Table 1 shows the final groupings of students based on *ability level* and ability grouping.[2] As indicated in Table 1, a number of students were placed in a grouped classroom inconsistent with their ability-level classification. This was because of variations among schools in grouping practices. Only one school used low-ability classes, a number of schools used only medium-and high-ability classes, and some schools had most of their students in ungrouped classes and very few in high-grouped classes. Therefore, low-ability students were placed in medium-grouped classes because of the absence of low-grouped classes at their schools. In addition, high-ability students were placed in medium-grouped classes because of the limited sizes of the high-grouped classes at their schools. Although potentially problematic from an analytic standpoint, these phenomena afforded the chance to determine the effects of a variety of grouping practices on students' long-term outcomes. However, it is critical to stress that these variations in placement represent a between-school effect and do not reflect some unmeasured student characteristics that would lead the school to put a particular student in a class level that was inconsistent with their ability-level classification.

Each student's socioeconomic status (SES) was also measured to determine whether the effects of ability level or ability grouping varied according to students' SES. Socioeconomic status was measured by students' reports of their mothers' educational level. Each student's SES was classified as low if their mother had a high school education or less, and high if their mother attended school beyond high school.

Outcome Measures

Mathematics achievement in tenth grade was assessed using students' performance on a statewide, criterion-referenced test in math. Math course grade in tenth grade was not used due to the noncomparability of the same grade across different levels of high school mathematics classes.

Class enrollment in mathematics at the ninth-grade level was gathered from students' official school records. Enrollment was classified into three categories: low, regular, and high. Classes classified as low included remedial-type courses and courses below the level appropriate for students' year in school. Classes categorized as regular included courses such as prealgebra and algebra. Classes classified as high included advanced, honors, and college placement courses.

Mathematics self-concept and value, career-related self-concept, future educational expectations, involvement in school-related deviant activities, and peer association were determined from students' self-report on a questionnaire administered during school hours in their tenth-grade year.

Mathematics *self-concept* was assessed by asking students to respond on a 7-point scale to the following three items: (a) "How good at math are you?"; (b) "If you were to rank all the students in your math class from the worst to the best in math, where would you put yourself?" and (c) "Compared to most of your other school subjects, how good are you at math?" *Intrinsic value* of mathematics was measured with the following two items: "In general, I find working on math assignments [very boring—very interesting]"; and "How much do you like doing math?" Both scales are reliable (self-concept alpha = .86; intrinsic value alpha = .91), and have been used and validated in previous studies (e.g., Eccles [Parsons], 1983; Eccles, Adler, & Meece, 1984).

TABLE 1: Means, Standard Deviations, and Ranges of Tenth-Grade Outcomes

	Category		
Outcome	$\bar{X}$	SD	*Range*
Mathematics achievement, self-concept and values			
Mathematics achievement	23.61	5.11	1-28
Math self-concept	4.68	1.33	1-7
Intrinsic value of math	3.71	1.82	1-7
Achievement-related self-concept			
Self-concept of leadership	4.75	1.11	1-7
Self-concept of intelligence	5.09	1.30	1-7
Educational expectations			
Expect to attend 4-year college	5.30	2.07	1-7
Deviant behavior and peer association			
Deviant behavior	1.80	0.92	1-7
Achievement oriented peers	3.52	0.69	1-5

To assess general achievement-related self-concept, students were presented with a list of skills and abilities and asked to indicate on a seven-point scale how good they were at each (1 = *a lot worse than others*, 7 = *a lot better than others*). Using factor analyses, two scales were created. The first, leadership, consisted of four skills and abilities: supervising others, public speaking, organizational ability, and being a leader. The second, intelligence, consisted of two skills: logical, analytical thinking and intelligence. Both general achievement-related self-concept scales were found to be reliable (leadership alpha = .76; intelligence alpha = .72).

Students' future educational expectations were determined by asking them to indicate on a 7-point scale how likely they thought it would be that they would graduate from a 4-year college (1 = *very unlikely*, 7 = *very likely*).

To assess involvement in school-related deviancy, students were presented with a list of deviant behaviors and were asked to indicate how often they engaged in these behaviors in the last 6 months. The list included punching or pushing another student, writing or drawing on school property, skipping school, and bringing alcohol or drugs to school. A measure of school-related deviant behavior was created by taking the mean of these four items. Analysis of internal consistency showed it to be reliable (alpha = .69).

For peer association, students were asked to indicate what percentage of their friends could be described in terms of a number of characteristics. Using factor analyses, a measure called association with *achievement-oriented peers* was created. It included the characteristics of ambitious, hardworking, doing well in school, and planning to go to college. Analysis of internal consistency showed it to be reliable (achievement-oriented: *alpha* = .72).

Table 2 presents the mean, standard deviation, and range of all of the outcome variables.

School Effects

In any study that involves students attending multiple schools, the question arises as to whether the main effects being studied are confounded with, or moderated by, school effects. This question arose in this study in two ways. First, we wanted to determine whether the effects of ability grouping depended on the school students attended. By and large ability grouping was a between-school phenomenon in this sample: five of ten schools either ability-grouped their students or did not group their students. Whereas the remaining five had both types of classes, three of these had 85%-96% of their students in ungrouped classes. Only two of ten schools had a fairly even distribution of grouped and ungrouped classes. Using those two schools, a three-way (Ability Level × Ability Grouping × School) ANOVA was conducted with tenth-grade mathematics achievement as the dependent variable. School did not show any significant interactions with ability grouping in effecting achievement. Even more important, however, the ability level by ability grouping interactions were consistent with the results reported for the entire sample. Therefore, although ability grouping was primarily a between-school variable, comparable effects emerged in the schools that had both ability-grouped and nonability-grouped math classrooms.

The second question regarding school effects was whether students' ability levels depended on the school they attended. Not surprisingly, this was indeed the case. In fact, the students' average ability level within a particular ability group varied from school to school. For example, students in medium-grouped classes in some schools had higher mean ability levels than students in medium-grouped classes in other schools. In addition, among students classified as low ability, those attending schools that

TABLE 2: Breakdown of Sample According to Ability Level by Ability Grouping

	Ability Grouping				
Ability Level	*None*	*Low*	*Medium*	*High*	*Total*
Low	46	47	36	0	129
Medium	336	22	305	97	760
High	100	0	35	115	250
Total	482	69	376	212	1139

did not use ability grouping had a higher mean ability level than those attending a school that placed them in a low-group classroom. Although this was indeed a problem analytically, it is hard to imagine how it could be avoided in research that attempts to use a large sample size. To address this problem, we controlled for each student's ability level by treating it as a continuous variable in all the analyses to be described. This was considered the best way to control for the differences in ability across schools.

Plan of Analysis

Analyses of variance were conducted in which the main effects of ability grouping and ability level, as well as the interactive effects of Ability Grouping × Ability Level, Ability Grouping × Gender, and Ability Grouping × SES (mother's education) on all outcomes were tested.[3] As stated previously, ability level was treated as a continuous variable in analyses. The interaction of Ability Level × Ability Grouping was determined by comparing the regression slopes of ability level within each ability group. In addition, preability grouping levels (sixth and early seventh grade) of mathematics achievement, self-concept and value, and deviancy were controlled for in the analyses of these particular outcomes.[4]

After these overall analyses, the measure of ability level was then broken down into three categories: low, medium, and high. Students classified as medium ability fell within plus or minus one standard deviation of the group mean on their ability score, those classified as low had scores greater than one standard deviation below the mean, and those classified as high ability had scores greater than one standard deviation above the mean. Contrasts of ability group means of all outcomes were then conducted within each ability-level category. These means were adjusted for earlier levels of the outcomes when appropriate, and for ability level. We controlled for ability level even after breaking down ability level into different categories because of the school variations in ability level that were described earlier.

Contrasts of group means within each ability level category were conducted even if the ANOVA did not indicate a significant interaction between ability level and ability grouping. This was done because the large majority of medium- and high-ability students in the overall sample could have resulted in significant main effects of ability grouping that, when examined more closely, were really only significant for these two groups and not for low-ability students. Bonferroni adjustments were made for the number of contrasts for each outcome; setting the familywise alpha level at .10 resulted in an alpha level of .014 for each contrast.

To gauge the size of the effects, the proportion of variance accounted for by each effect (partial η^2) was computed for each univariate effect. In addition, estimates of the magnitude of the differences between contrast groups were expressed in standard deviation units by *d*. Small, medium, and large differences are conventionally defined as .2, .5, and .8 of one standard deviation, respectively (Rosnow & Rosenthal, 1989). Considering the magnitude of the differences is especially important when comparing the contrasts conducted within each ability level. The much larger sizes of the medium- and high-ability groups, compared with the low-ability group, provided greater statistical power for differences to attain significance within these groups.

Chi-squares were conducted to determine the effects of ability grouping, within each ability level, on ninth-grade enrollment in mathematics classes. The same was done separately for each gender and SES level. Log-linear analyses were not conducted because of the low cell sizes and empty cells that would result from including many effects in a single model.

RESULTS

Mathematics Achievement

Analysis of variance was used to assess the effect of ability grouping on tenth-grade mathematics achievement. Results indicated that the main effects of ability level and ability grouping were significant (ability level: $F(1, 1042) = 102.62$, $p < .001$, $\eta^2 = .09$; ability grouping: $F(3, 1042) = 3.64$, $p < .02$; $\eta^2 = .01$). Ability level and ability grouping also significantly interacted in affecting students' performance, $F(3, 1042) = 7.88$, $p < .001$, $\eta^2 = .02$).

As shown in Table 3, contrasts of the adjusted means within each ability level revealed important differences in the effects of ability grouping. For low-ability students, those placed in a low-grouped class performed worse than those placed in an ungrouped class, although the difference did not attain significance. Low-ability students placed in a medium-grouped class, however, performed better than those placed in an ungrouped class, although not significantly. Medium-ability students placed in medium-grouped classes did not perform much better than those placed in ungrouped classes, but those placed in high-grouped classes performed significantly better than those in ungrouped classes. Medium-ability students placed in low-grouped classes performed significantly worse than those placed in ungrouped classes. High-ability students placed in high-grouped classes performed better than those placed in ungrouped classes. It should be noted that the size of the effect for high-ability students may be truncated because of a ceiling effect on the mathematics test, as indicated by the relatively small standard deviations for high-ability students.

Mathematics Class Enrollment

Because class enrollment was a categorical variable, chi-square analyses were conducted instead of ANOVAs. As Table 4 suggests, separate analyses within ability levels indicated that low-ability students placed in low-ability classes in seventh grade were more likely to enroll in remedial classes than those placed in nongrouped classes. Among medium-ability students, placement in medium-grouped classes resulted in little difference in class enrollment than did placement in a nongrouped class. Placement in a low-grouped class, however, resulted in a greater likelihood of enrollment in remedial classes. Placement in a high-grouped class, in turn, resulted in a greater likelihood of enrollment in an advanced mathematics class. High-ability students who were placed in high-ability classes were more likely to enroll in advanced classes than were those placed in ungrouped classes, whereas those placed in medium-grouped classes were more likely to enroll in regular classes.

TABLE 3: Observed and Adjusted Group Means and Standard Deviations of Tenth-Grade Mathematics Achievement

	Ability Grouping								*Contrasts*		
	None		*Low*		*Medium*		*High*		*L v N*	*M v N*	*H v N*
Sample	$\bar{X}$	(SD)	$\bar{X}$	(SD)	$\bar{X}$	(SD)	$\bar{X}$	(SD)	d	d	d
Low ability											
Observed	16.82	(6.24)	14.35	(6.01)	19.03	(4.85)	—	—			
Adjusted	16.66	—	14.95	—	18.50	—	—	—	–.33	.36	—
n	38		40		34		—				
Medium ability											
Observed	23.30	(4.54)	16.46	(5.37)	23.70	(4.48)	26.52	(1.98)			
Adjusted	23.38	—	19.10	—	23.90	—	25.01	—	–.84*	.10	.32*
n	300		22		291		93				
High ability											
Observed	26.25	(1.99)	—	—	26.70	(1.47)	27.08	(1.80)			
Adjusted	26.23	—	—	—	26.92	—	27.03	—	—	.14	.16*
n	93		—		33		112				

NOTE: L v N = low group vs. no grouping; M v N = medium group vs. no grouping; H v N = high group vs. no grouping.
Adjusted means have been adjusted for ability level and scores on a similar test of mathematics achievement taken early in the seventh grade. Adjusted means based on overall grouping: ungrouped: 23.34; low: 19.59; medium: 24.09; high: 24.47.
*$p < .014$; familywise: $p < .10$.

TABLE 4: Enrollment in Ninth-Grade Mathematics Classes: Ability Level by Ability Grouping

Ability Level	*Class Type*			
Ability Grouping	*Remedial*	*Regular*	*Advanced*	χ^2
Low				
None	28 (68.3) 32.7	13 (31.7) 8.3	0 (0.0) 0	
Low	43 (91.5) 37.5	4 (8.5) 9.5	0 (0.0) 0	7.45*
Medium	28 (77.8) 28.7	8 (27.2) 7.3	0 (0.0) 0	
Medium				
None	73 (22.6) 69.1	228 (70.6) 227.4	22 (6.8) 26.5	
Low	18 (81.8) 4.7	4 (18.2) 15.5	0 (0.0) 1.8	11.91**
Medium	64 (21.1) 64.8	234 (77.2) 213.3	5 (1.7) 24.9	
High	4 (4.2) 20.3	57 (60.0) 66.9	34 (35.8) 7.8	
High				
None	3 (3.0) 2.0	54 (54.5) 41.9	42 (42.4) 55.1	
Medium	1 (2.9) 0.7	28 (80.0) 14.8	6 (17.1) 19.5	31.93***
High	1 (0.9) 2.3	23 (20.2) 48.3	90 (78.9) 63.4	

NOTE: Cell percentages are in parentheses; expected frequencies are directly below observed frequencies.
*$p < .05$; ***$p < .001$.

Mathematics Self-Concept and Value

Analyses of covariance were used to assess the relation of ability grouping with tenth-grade mathematics self-concept and values. Identical measures of self-concept and values taken at the sixth-grade level were used as covariates to control for pregrouping levels of these outcomes.

Not surprisingly, sixth-grade level of self-concept in mathematics had a significant relation with tenth-grade self-concept, $F(1, 1099) = 50.23$, $p < .001$, $\eta^2 = .04$. However, as shown in Table 5, results did not show a significant relation with ability grouping, $F(3, 1099) = 0.85$, n.s., $\eta^2 = .00$. There was no significant relation with ability level, $F(1, 1099) = 1.79$, n.s., $\eta^2 = .00$, and the interaction of Ability Grouping × Ability Level was not significant, ($F(3, 1099) = 0.75$, n.s., $\eta^2 = .00$.

Similar results were found for intrinsic value of mathematics (Table 6). Sixth grade levels of those values significantly predicted tenth-grade levels, $F(1, 1104) = 128.94$, $p < .001$, $\eta^2 = .10$. However, the relations with ability level, $F(1, 1104) = 3.13$, n.s., $\eta^2 = .00$, and ability grouping, $F(3, 1104) = 1.10$, n.s., $\eta^2 = .00$, did not reach significance. The interaction of Ability Grouping × Ability Level also was not significant, $F(3, 1104) = 1.19$, n.s., $\eta^2 = .00$.

Career-Related Self-Concept

To assess the effects of ability-group placement on students' career-related self-concept, analyses of variance were performed. Results indicated that ability grouping did not have an overall significant effect on self-concept of leadership, $F(3, 1067) = 1.30$, n.s., $\eta^2 = .00$. The main effect of ability level was significant, $F(1, 1067) = 6.15$, $p < .05$, $\eta^2 = .01$, although the interaction effect of ability grouping by ability level was not significant, $F(3, 1067) = 1.43$, n.s., $\eta^2 = .00$.

As shown in Table 7, contrasts of adjusted means within ability level indicated that among low-ability students, there were no significant differences between those placed in low-grouped, medium-grouped, and ungrouped classes in terms of their self-concept of leadership. Among medium-ability students, however, those place in medium-grouped classes had a significantly higher self-concept of leadership than those placed in ungrouped classes. Likewise, among high-ability students, those placed in high-grouped classes had significantly higher self-concepts of leadership at the tenth-grade level than those placed in ungrouped classes.

For self-concept of intelligence, the effect of ability grouping again was not significant, whereas the effect of ability level did emerge as significant (grouping: $F[3, 1063] = 1.98$, n.s., $\eta^2 = .00$; level: $F[1, 1063] = 10.18$, $p < .001$, $\eta^2 = .01$). The interaction of Ability Grouping × Ability

TABLE 5: Observed and Adjusted Group Means and Standard Deviations of Tenth-Grade Self-Concept in Mathematics

	Ability Grouping				*Contrasts*		
	None	*Low*	*Medium*	*High*	*L v N*	*M v N*	*H v N*
Sample	$\bar{X}$ (SD)	$\bar{X}$ (SD)	$\bar{X}$ (SD)	$\bar{X}$ (SD)	d	d	d
Low ability							
Observed	3.82 (1.24)	3.67 (1.62)	3.70 (1.21)	— —			
Adjusted	3.81 —	3.70 —	3.66 —	— —	–.08	–.11	—
n	44	46	33	—			
Medium ability							
Observed	4.32 (1.35)	4.25 (1.45)	4.16 (1.35)	4.58 (1.31)			
Adjusted	4.32 —	4.29 —	4.23 —	4.36 —	–.02	–.07	.03
n	330	20	299	97			
High ability							
Observed	4.93 (1.02)	— —	4.30 (1.24)	4.93 (1.23)			
Adjusted	4.93 —	— —	4.43 —	4.91 —	—	–.38	–.02
n	99	—	33	113			

NOTE: L v N = low group vs. no grouping; M v N = medium group vs. no grouping; H v N = high group vs. no grouping.
Adjusted means have been adjusted for ability level and mathematics self-concept at sixth grade. Adjusted means based on overall grouping: ungrouped: 4.40; low: 4.35; medium: 4.24; high: 4.45.
*$p < .014$; family-wise: $p < .10$.

TABLE 6: Observed and Adjusted Group Means and Standard Deviations of Tenth-Grade Intrinsic Value of Mathematics

	Ability Grouping				Contrasts		
	None	*Low*	*Medium*	*High*	*L v N*	*M v N*	*H v N*
Sample	$\bar{X}$ (SD)	$\bar{X}$ (SD)	$\bar{X}$ (SD)	$\bar{X}$ (SD)	d	d	d
Low ability							
Observed	2.89 (1.46)	2.98 (1.78)	3.36 (1.65)	— —			
Adjusted	2.94 —	3.89 —	3.42 —	— —	.03	.26	—
n	46	46	33	—			
Medium ability							
Observed	3.56 (1.87)	3.95 (1.45)	3.39 (1.79)	3.59 (1.97)			
Adjusted	3.54 —	3.79 —	3.48 —	3.42 —	.14	–.03	–.07
n	329	21	300	97			
High ability							
Observed	3.87 (1.82)	— —	3.06 (1.50)	4.08 (1.79)			
Adjusted	3.83 —	— —	3.40 —	4.02 —	—	–.23	.10
n	100	—	34	113			

NOTE: *L v N* = low group vs. no grouping; *M v N* = medium group vs. no grouping; *H v N* = high group vs. no grouping.
Adjusted means have been adjusted for ability level and intrinsic value of mathematics at sixth grade. Adjusted means based on overall grouping: ungrouped: 3.54; low: 3.50; medium: 3.48; high: 3.61.
*$p < .014$; family-wise: $p < .10$.

TABLE 7: Observed and Adjusted Group Means and Standard Deviations of Tenth-Grade Self-Concept of Leadership

	Ability Grouping								*Contrasts*		
	None		*Low*		*Medium*		*High*		*L v N*	*M v N*	*H v N*
Sample	$\bar{X}$	(SD)	$\bar{X}$	(SD)	$\bar{X}$	(SD)	$\bar{X}$	(SD)	d	d	d
Low ability											
Observed	4.02	(1.10)	3.71	(1.01)	3.94	(1.28)	—	—			
Adjusted	4.02	—	3.71	—	3.94	—	—	—	–.28	–.08	—
n	43		38		34		—				
Medium ability											
Observed	4.16	(1.08)	3.68	(0.95)	4.41	(1.16)	4.47	(1.31)			
Adjusted	4.17	—	3.91	—	4.42	—	4.34	—	–.24	.23*	.15
n	323		19		284		93				
High ability											
Observed	4.52	(1.08)	—	—	4.43	(1.17)	4.92	(0.95)			
Adjusted	4.51	—	—	—	4.48	—	4.92	—	—	–.03	.36*
n	98		—		35		114				

NOTE: *L v N* = low group vs. no grouping; *M v N* = medium group vs. no grouping; *H v N* = high group vs. no grouping.
Adjusted means have been adjusted for ability level. Adjusted means based on overall grouping: ungrouped: 4.23; low: 4.08; medium: 4.41; high: 4.53.
*$p < .014$; family-wise: $p < .10$.

Level, however, did have a significant effect on tenth-grade self-concept of intelligence, $F(3, 1063) = 2.70, p < .05, \eta^2 = .01$.

As shown in Table 8, contrasts of adjusted means within ability level indicated that among low-ability students, there were no differences between those placed in low-grouped, medium-grouped, and ungrouped classes in terms of their self-concept of intelligence. There were also no significant grouping differences among medium-ability students. Among high-ability students, however, those placed in high-grouped classes had higher self-concepts of intelligence at the tenth-grade level than those placed in ungrouped classes.

Educational Expectations

Analyses of variance were also performed to assess the effects of ability grouping on students' educational expectations (Table 9). Results indicated that both ability level and ability grouping had significant effects (level: $F[1, 1082] = 27.42, p < .001, \eta^2 = .02$; grouping: $F[3, 1082] = 4.04, p < .01, \eta^2 = .01$). The interaction of Ability Grouping × Ability Level, however, was not significant, $F(3, 1082) = 1.25$, n.s., $\eta^2 = .00$.

Contrasts of adjusted group means within ability level indicated that among low-ability students, those placed in medium-ability classes had greater expectations of graduating from a 4-year college than did those placed in ungrouped classes. Among medium-ability students, those placed in medium-ability classes had greater expectations of graduating from a four-year college than did those placed in ungrouped classes. For high-ability students, those placed in medium- and high-grouped classes had greater expectations than did those placed in ungrouped classes.

School-Related Deviant Behavior

Analyses of covariance were performed to assess the effects of ability grouping on tenth-grade school-related deviant behavior. Similar measures of deviancy at the seventh-grade level were used as covariates. Although earlier levels of deviancy had a significant effect, $F(1, 1032) = 13.42, p < .001.$; $\eta^2 = .01$, results presented in Table 10 show that neither ability grouping, $F(3, 1032) = 1.77$, n.s., $\eta^2 = .00$, nor ability level, $F(1, 1032) = 1.36$, n.s., $\eta^2 = .00$, had significant effects on involvement in deviant behavior. The interaction of ability level and ability group was not significant, $F(3, 1032) = 1.99$, n.s., $\eta^2 = .00$.

TABLE 8: Observed and Adjusted Group Means and Standard Deviations of Tenth-Grade Self-Concept of Intelligence

	Ability Grouping								*Contrasts*		
	None		*Low*		*Medium*		*High*		*L v N*	*M v N*	*H v N*
Sample	$\overline{X}$	(SD)	$\overline{X}$	(SD)	$\overline{X}$	(SD)	$\overline{X}$	(SD)	d	d	d
Low ability											
Observed	4.28	(1.45)	4.18	(1.25)	4.21	(1.05)	—	—			
Adjusted	4.28	—	4.19	—	4.20	—	—	—	–.06	–.06	—
n	43		38		33		—				
Medium ability											
Observed	4.66	(1.34)	3.89	(1.10)	4.89	(1.28)	5.22	(1.27)			
Adjusted	4.68	—	4.20	—	4.91	—	5.03	—	–.37	.18	.27
n	322		19		282		93				
High ability											
Observed	5.20	(1.20)	—	—	5.11	(1.35)	5.73	(1.06)			
Adjusted	5.20	—	—	—	5.16	—	5.72	—	—	–.03	.40*
n	98		—		35		114				

NOTE: *L v N* = low group vs. no grouping; *M v N* = medium group vs. no grouping; *H v N* = high group vs. no grouping.
Adjusted means have been adjusted for ability level. Adjusted means based on overall grouping: ungrouped: 4.75; low: 4.67; medium: 4.91; high: 5.22.
*$p < .014$; family-wise: $p < .10$.

TABLE 9: Observed and Adjusted Group Means and Standard Deviations of Tenth-Grade Expectations to Graduate From a 4-Year College

	Ability Grouping								Contrasts		
	None		Low		Medium		High		L v N	M v N	H v N
Sample	$\bar{X}$	(SD)	$\bar{X}$	(SD)	$\bar{X}$	(SD)	$\bar{X}$	(SD)	d	d	d
Low ability											
Observed	3.84	(2.21)	4.05	(2.16)	5.09	(2.16)	—	—			
Adjusted	3.84	—	4.03	—	5.10	—	—	—	.09	.61*	—
n	44		44		35		—				
Medium ability											
Observed	4.86	(2.17)	4.45	(2.80)	5.60	(1.91)	5.54	(1.99)			
Adjusted	4.90	—	5.16	—	5.64	—	5.14	—	.13	.36*	.11
n	319		20		290		96				
High ability											
Observed	5.57	(1.81)	—	—	6.24	(1.44)	6.29	(1.45)			
Adjusted	5.54	—	—	—	6.41	—	6.25	—	—	.42*	.34*
n	99		—		34		115				

NOTE: *L v N* = low group vs. no grouping; *M v N* = medium group vs. no grouping; *H v N* = high group vs. no grouping.
Adjusted means have been adjusted for ability level. Adjusted means based on overall grouping: ungrouped: 4.90; low: 5.16; medium: 5.64; high: 5.14.
*$p < .014$; family-wise: $p < .10$.

TABLE 10: Observed and Adjusted Group Means and Standard Deviations of Tenth-Grade School-Related Deviant Behavior

	Ability Grouping								Contrasts		
	None		Low		Medium		High		L v N	M v N	H v N
Sample	$\bar{X}$	(SD)	$\bar{X}$	(SD)	$\bar{X}$	(SD)	$\bar{X}$	(SD)	d	d	d
Low ability											
Observed	1.79	(1.03)	2.09	(1.13)	1.94	(0.90)	—	—			
Adjusted	1.78	—	2.13	—	1.91	—	—	—	.38	.14	—
n	41		28		28		—				
Medium ability											
Observed	1.89	(1.00)	2.04	(1.46)	1.69	(1.05)	1.70	(1.01)			
Adjusted	1.88	—	1.92	—	1.69	—	1.75	—	.04	–.21*	–.14
n	320		17		276		95				
High ability											
Observed	1.86	(1.13)	—	—	1.54	(0.80)	1.71	(0.90)			
Adjusted	1.82	—	—	—	1.56	—	1.71	—	—	–.33	–.17
n	98		—		34		110				

NOTE: *L v N* = low group vs. no grouping; *M v N* = medium group vs. no grouping; *H v N* = high group vs. no grouping.
Adjusted means have been adjusted for ability level and school-related deviant behavior at sixth grade. Adjusted means based on overall grouping: ungrouped: 1.87; low: 1.97; medium: 1.69; high: 1.74.
*$p < .014$; family-wise: $p < .10$.

Peer Association

Analyses of variance were used to assess the effects of ability grouping on tenth-grade peer association. Results indicated that ability grouping had a significant effect on association with achievement-oriented peers, $F(3, 836) = 3.78, p < .01, \eta^2 = .01$. Neither ability level, $F(1, 836) = 2.16$, n.s., $\eta^2 = .00$, nor the interactive effect of ability grouping by ability level was significant, $F(3, 836) = 0.27$, n.s., $\eta^2 = .00$.

Contrasts of adjusted group means within ability level indicated that there were no significant effects of group placement on association with achievement-oriented peers for low-ability students (Table 11). Among medium-ability students, however, those placed in medium-ability classes tended to have a higher percentage of achievement-oriented peers than did ungrouped students. The same was true for high-ability students: those placed in medium-ability classes tended to have a higher percentage of achievement-oriented peers than did those placed in ungrouped classes.

DISCUSSION

Results of this study indicate that the long-term impact of ability grouping in mathematics at the seventh-grade level on students' achievement and on other outcomes at tenth-grade depends on both the students' ability levels and the ability group into which they were placed. In terms of ability level, there were no positive long-term effects for low-ability students being placed in a low-grouped math classroom when they were compared with low-ability students placed in a nongrouped classroom; in fact, in some instances, those placed in a low-grouped classroom appeared to fare worse. For medium- and high-ability students, however, group placement at the seventh-grade level generally was associated with more positive outcomes at the tenth-grade level than was heterogeneous class placement. In terms of ability-group level, results also showed that being placed in a grouped classroom at a level higher than one's ability resulted in some positive tenth-grade outcomes both for low- and medium-ability students.

The clearest differential effect of ability grouping appeared on a statewide test for tenth-grade mathematics achievement. Even after controlling for performance on the seventh-grade version of the test, placement in a grouped math class was associated with higher scores for medium-

TABLE 11: Observed and Adjusted Group Means and Standard Deviations of Tenth-Grade Association With Achievement-Oriented Peers

	Ability Grouping								Contrasts		
	None		Low		Medium		High		L v N	M v N	H v N
Sample	X̄	(SD)	X̄	(SD)	X̄	(SD)	X̄	(SD)	d	d	d
Low ability											
Observed	3.00	(0.77)	2.78	(0.55)	3.17	(0.99)	—	—			
Adjusted	3.00	—	2.78	—	3.16	—	—	—	–.32	.23	—
n	31		18		18		—				
Medium ability											
Observed	3.01	(0.75)	3.20	(0.45)	3.29	(0.77)	3.17	(0.79)			
Adjusted	3.02	—	3.21	—	3.29	—	3.16	—	.28	.39*	.21
n	287		5		207		81				
High ability											
Observed	3.14	(0.70)	—	—	3.56	(0.76)	3.29	(0.67)			
Adjusted	3.14	—	—	—	3.55	—	3.29	—	—	.58*	.21
n	92		—		32		93				

NOTE: *L v N* = low group vs. no grouping; *M v N* = medium group vs. no grouping; *H v N* = high group vs. no grouping.
Adjusted means have been adjusted for ability level. Adjusted means based on overall grouping: ungrouped: 3.05; low: 2.99; medium: 3.32; high: 3.19.
$p < .014$; family-wise: $p < .10$.

and high-ability students, and lower scores for low-ability students placed in a low-grouped class when compared with peers placed in a heterogeneous classroom. Low-ability students placed in a medium-grouped class, however, showed higher performance on the test, as did medium-ability students placed in a high-grouped class. Considering the gains for students in medium- and high-grouped classes, these results indicate benefits of ability-group placement in mathematics. It appears that all students may gain if they received the type of instruction typically found in higher ability grouped classrooms. However, when the negative impact of ability grouping on the achievement of students placed in low-grouped math classrooms is considered also, the apparent benefits become more muted. The statewide test used in this study was based on the mathematical knowledge the state felt students should possess at the tenth-grade level. Although an oft-cited benefit of ability grouping for slower students is that it allows them to learn at their own pace, it appears that low-ability students placed in low-grouped classrooms had a more difficult time acquiring this basic mathematical knowledge than did even their low-ability counterparts placed in ungrouped classrooms. These findings are consistent with the evidence reported by Oakes (1985) and by Good (1981), indicating that teachers provide less instruction to low-ability students in low-ability classrooms.

Results suggest no long-term effects of ability grouping on students' mathematics self-concept or intrinsic valuing of mathematics at the seventh-grade level. In an earlier study of these same students, there was an initial increase in math self-concept among low-performing students within the first couple of months after being placed in a grouped class (Reuman et al., 1987). This increase persisted throughout the school year. However, judging from these new results, it appears these gains attenuated by the tenth grade. In contrast, in the Reuman et al. (1987) study there was an initial decline in the math self-concept among the high-performing students placed in a high-ability math class. For these students too, this initial difference had disappeared by the tenth-grade. These null findings could reflect the fact that students in the heterogeneously grouped math class in the seventh-grade were likely to end up in ability-segregated math classrooms at either Grade 8 or 9, and would likely adjust their self-concepts accordingly. Self-concept may be more affected in the short term by events such as group placement, whereas other outcomes, such as achievement, may be more affected by the cumulative effects of ability grouping at the seventh-grade level.

It is important to note that being placed in a low-ability math class did not have a long-term effect on the low-ability students' self-concepts as would be predicted by social labeling theories. Although there are ability-level differences in self-concept of one's math ability, these differences were unaffected by the initial ability-grouping experience and the subsequent correlated course enrollment patterns. This pattern of results indicate that self-concept of ability is affected by more absolute indicators of performance and immediate, within-classroom social comparison processes rather than by the labeling associated with between-classroom, ability-grouping experiences. In fact, results reported by Reuman et al. (1987) have indicated that within-classroom ability grouping may have a more insidious effect on low-achieving students than does between-classroom ability grouping.

Ability grouping appeared to have a positive impact on medium- and high-ability students' career-related self-concepts and future educational expectations. The grouped youth considered themselves as being higher in intelligence and leadership than did their ungrouped peers, and they were more likely to plan on attending a 4-year college. No effects were found for low-ability students, except for those placed in medium-grouped classrooms. They, along with medium-ability students placed in high-ability classrooms, had higher educational expectations than did their same-ability peers placed in a lower ability classroom. These findings are consistent with those discussed by Oakes (1985). It appears that being placed in medium and higher tracks is associated with students having positive views of themselves as intelligent, achieving individuals, and with planning to continue their education in 4-year college settings. It seems likely that this upward placement has its effect through the mechanisms we have discussed as being associated with alternative trajectories. Being placed in a higher group increases the chance that one will end up in a college preparatory program and be exposed to better teaching and, perhaps, to more encouraging academic counseling.

It is also likely that the effect of ability grouping on future educational plans is related to the impact of ability grouping on later peer association. Ability grouping at the seventh grade level seems to predispose medium- and high-ability students to associate with a more achievement-oriented peer group. The same is not true for low-ability students placed in low-ability classes. As shown by Kandel and Lesser (1972), having friends who plan to attend college increases adolescents' likelihood to have similar plans. Therefore, these results indicate that the effects of ability grouping on future educational plans may be mediated by its effects on peer-group stratification.

However, the significance of the effects of ability grouping must be considered along with the magnitude of the effects. For all outcomes, the effect size of ability grouping was very small, especially when compared with ability level. The main and interactive effects never accounted for more than 2% of the variance in the entire sample. Within-group analyses indicated that, generally speaking, effect sizes were small to moderate. However, the small magnitude of these effects should not be surprising. We tested the effects of ability grouping in a single junior high school class on outcomes 3 years later in high school. Ability grouping in junior high school, therefore, should be considered as a distal variable that can set off a chain of events. The sizes of the effects of these events may therefore be larger because of their more proximal nature.

In addition, although for many outcomes the effect of ability grouping was significant for medium- and high-ability students but not for low-ability students, the magnitudes of the effects did not differ significantly. This may be because the number of lower ability students was much lower than the number of medium- and high-ability students, resulting in higher standard errors of the estimates for low-ability students than for other students. Because of these results, the relatively higher number of positive effects for medium- and high-ability students compared with the lack of effects for low-ability students should be interpreted with caution. These results also further point out the rather small sizes of the effects of ability grouping.

Because ability grouping is primarily a between-school effect, it is possible that the ability grouping effects reported in this paper are actually within-school effects. This alternate explanation seems especially likely in the case of subsequent enrollment and achievement levels. For example, the fact that schools decide to ability group in math at the seventh-grade level could reflect a more general attitude toward high- and low-ability students—an attitude that leads to greater discrepancy in the educational opportunities provided for these two groups as they pass through the secondary school system. If this is true, then the presence or absence of ability grouping at Grade 7 is actually a marker variable for a much more systematic set of influences. This possibility clearly needs to be studied more carefully to understand the specific set of mechanisms responsible for the associations found between ability grouping and tenth-grade student outcomes. But, it should be noted that this alternate explanation is consistent with our view that ability grouping is a pivotal event that has its primary influence through its impact on the subsequent types of experiences the students have as a consequence of being ability grouped in the seventh grade.

Taken together, these results indicate that although the magnitude of the effects are small, placement in an ability grouped classroom during junior high school does act as a sorting event that sets youths on different developmental trajectories. Such placement can set off a chain of events and settings that cumulatively, over time, have a significant effect on adolescents' development. If these effects are cumulative, they would not be revealed in studies focused on a short time frame. Longer term longitudinal investigations would be needed to demonstrate the effect. Some of the results found in this study may reflect the cumulative impact of just such chains of events and settings over time. As discussed earlier, examples of the kinds of chains of events and settings group placement in junior high school may set off include instructor quality, class selection, curricular placement, and peer group association. Although this study did not directly measure these chains of events and settings, the evidence we report is consistent with this hypothesis. Subsequent research should assess the role of these life-path mediators directly.

NOTES

1. Of the original sample in junior high school, approximately 30% of the students moved away in the 3-year span between the seventh and tenth grades. Another 10% of students were either absent the days questionnaires were administered or chose not to participate.

2. Table 1 shows that the distribution of ability level at tenth grade is no longer 17%, 66%, and 17%, indicating that sample attrition from seventh to tenth grades was disproportionately greater for low-ability students. It appeared that most of the disproportionate attrition was due to a greater number of low- ability students leaving the districts between junior high and high school.

3. Although the interactions of Grouping × Gender and Grouping × SES were analyzed, their specific results are not presented for reasons of clarity. Results indicated that grouping significantly interacted with gender only once: boys placed in ungrouped classes tended to have a greater involvement in deviant behavior than boys placed in high-level classes, whereas the difference between these two groups among girls was nonsignificant. Grouping significantly interacted with SES a few times; results indicated that although the directions of the effects were always the same, the effects of ability grouping were greater for high-SES students than for low-SES students.

4. *N*s will vary slightly for each analysis because of missing data. The larger reduction in *N* for peer association is due to the fact that these questions were located toward the end of the questionnaire, and students in some schools did not have enough time to complete the entire questionnaire.

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