

Do Students Turn Off to Math in Junior High School?

Jacquelynne S. Eccles
Department of Psychology
University of Michigan

A paper presented in conjunction with a symposium on Early Adolescence: Attitudinal and Environmental Changes - AERA, New Orleans, April 1984

This paper is adapted from Eccles, J., Midgley, C. & Adler, T., in Nicholls, J. H. (Ed.), The Development of Achievement Motivation, in press.

In the late elementary school grades we begin to see evidence of a period of decline in both children's self-evaluations and their attitudes toward school, and an increase in their level of anxiety regarding their school performance (Blumenfeld and Pintrich, 1982; Harter, 1980; Hill, 1977, 1980). For example, in a series of studies using a variety of self-concept/self-esteem measures, Simmons and her colleagues have found consistent evidence of a decline in academic self-esteem (Rosenberg, 1979; Simmons, Blyth, Van Cleave, & Bush, 1979; Simmons, Rosenberg, & Rosenberg, 1973). This decline was especially marked among seventh graders, particularly for females. Furthermore, for some of the measures the decline was remarkably strong; e.g., among students who valued being smart, the percent rating themselves favorably dropped from 26% among 8-11 year olds to 9% among the 12-14 year olds and to 5% among the 15-18 year olds. Similarly, in studies of children ranging from fifth to twelfth grades, both Brush (1980) and Parsons, Adler, Futterman et al. (in press) found a marked decline in students' estimates of their math ability in the early secondary school years. The decline found by Parsons, Adler, Futterman et al. (in press) was especially marked between grades six and seven (see Figure 1). Finally, Piers and Harris (1964) found that sixth graders have lower general self-concepts than either third or tenth graders.

O'Connor (1978) studied the relationship between children's self-concept and ideal self-concept in grades four, five, and six. Fourth and fifth grade children had very similar discrepancy score means. Sixth graders, who had just moved to the middle school environment, had the highest discrepancy scores and also perceived their teachers as having more negative feelings toward them.

Children's increasing negativism is also apparent on their responses to questions regarding what motivates them. Harter (1980) developed three scales to tap children's intrinsic versus extrinsic orientation toward school work. She found a shift on all three scales toward an increasingly external orientation from grades three to nine. Once again the shifts were most marked between grades six and seven. Similarly, Gottfried (1981) found a sharp drop in intrinsic motivation toward several academic subjects from grade six to seven. DeCharms (1980) reported a similar shift toward an external (pawn) orientation toward achievement as children move into junior high school.

Looking at indices of negative motivation, a similar pattern emerges for children in grades three to twelve. Both the levels of test anxiety and the debilitating effects of test anxiety on performance increase with age (Hill, 1980). Perception of the difficulty of academic subjects increase with age (Parsons, Adler, Futterman et al., in press). Learned helpless responses to failure increase with age (Rholes et al., 1980). Finally drop out rates, absenteeism, and general school alienation increase with age, especially as students move into junior high school

(Rosenbaum, 1976).

All of these changes are well illustrated by the results of a study we have been conducting over the last several years involving over 1,200 students in grades 5 to 12, their parents, and their teachers (see Parsons, Adler, Futterman et al., in press). In order to investigate changes in children's attitudes toward math and English, we developed measures to assess (a) students' self-concept of their math and English abilities, (b) perceptions of the effort necessary to do well on each subject, (c) perceptions of the importance or value of math and English, and (d) a variety of other attitudes toward math including perceptions of their parents' and teachers' beliefs, and how much they liked their math teacher. The developmental results were rather striking. (See Figure 1 for the results associated with measures a, b and c). Grade effects were both more numerous and, in general, stronger than sex effects. Children became more pessimistic and negative about math from fifth to tenth grade with the low point occurring during the junior high school years. Some positive recovery, however, was evident in the last two years of high school. The older children had lower expectancies for both their current and future math performance, rated both their math ability and math performance lower, saw both their present and future math courses as more difficult, thought their parents shared these pessimistic views of their ability and performance potential, were less interested in math activities in general, liked their math teachers less, and rated the utility of advanced math courses lower than did the younger children. For most of these variables, there was a consistent downward trend as a function of grade with the girls preceding the boys.

Insert Figure 1 About Here

These results are especially interesting given the nature of our sample. Since poorer math students do not take as much high school math as the better math students, our older sample included an over-representation of better students enrolled in advanced level, elective math courses. Thus, the general increase in negativism toward academic achievement summarized thus far is even characteristic of the better students in junior and senior high school.

It is clear from the studies reviewed thus far that children's achievement and school-related attitudes decline with age at least until the last two years of high school. In addition, several studies suggest that the magnitude of this decline varies across grade level. In a series of large scale population studies, Simmons, Rosenberg, and their colleagues have focused on this second transition (Rosenberg, 1979; Simmons et al., 1973, 1979; Simmons & Rosenberg, 1975). By comparing the effects of different school experiences on children of equivalent age, they have investigated the relative contribution of age and

maturation versus transition into junior high school to the grade-related decline in the children's self-evaluations. The results of their studies, involving more than 1000 children, suggest that the transition to junior high school is the primary cause of the decline in self-concept among early adolescents. They argue that major transitions, such as the movement into junior high school, can precipitate a reappraisal of oneself. When this transition coincides with another major transition, such as puberty, then the likelihood of reappraisal is increased. While they do discuss briefly the fact that the junior high school environment is different than the elementary school environment, they are not specific about these differences and they do not suggest that the nature of the junior high school environment is a critical variable. Instead, they attribute the decline in students' attitudes at age 12 to the fact that society forces the average 12 year old to make two major transitions simultaneously. While in basic agreement with their suggestion that the timing of the transition is important, we also think that there are specific classroom processes characteristic of the typical junior high school environment that exacerbate the problem.

Figure 1 illustrates the third general pattern apparent in the results of the studies summarized in Table 1; namely, that the negative decline varies across domains. While few studies have actually measured attitudes across domains, in those that have, the decline in attitudes is more characteristic of the academic achievement domain. For example, Epstein and McPartland (1976) constructed a self report measure (the Quality of School Life Scale-QSL) to assess three aspects of student reactions to school. The Satisfaction subscale measures general reactions to school as a social environment; the Commitment subscale measures level of interest in assignments and academic work, and long range achievement-related life plans; and the Reactions to Teachers subscale measures students' reactions to their teachers. Based on a longitudinal study of over 4,000 students in grades 4, 5, 6, 8, and 11 (year 1) and 5, 6, 7, 9, and 12 (year 2) they concluded that the decline in attitudes was most marked on the Commitment subscale. Furthermore, their longitudinal analyses showed a consistent pattern of decreasing satisfaction with school work over time. In contrast, the students' reactions to school as a social environment remained fairly stable across these grades.

Comparable results have been reported in other studies. For example, Prawat, Grissom, and Parish (1979) measured need achievement, locus of control, and global self-esteem. Only the need-achievement scores declined with age. Similarly, while Simmons et al. (1973) found the decline on most of their attitudinal measures, when they analyzed their results in more detail they found no major decline in children's estimates of their skill at either sports or making jokes and no decline in global esteem. The declines were the most extreme for academic achievement beliefs and socially prescribed behavior (such as

being well behaved and helpful). Finally, in a study of upper elementary school and early secondary school students' anxiety and concerns over performance, Buhrmester (1980) found the highest levels of anxiety associated with cognitive and school-related tasks. The children expressed much less anxiety over athletic and social competence. Thus, studies which have measured students' motivational orientations in different domains suggest that the decline in attitudes and beliefs is most marked for the academic domain.

Several studies, including our own, have found that even within the academic achievement domain the decline in beliefs and motivation varies across subject area. As is clear in Figure 1, we found the decline to be characteristic only of students' beliefs regarding mathematics and not of their beliefs regarding English. Similarly, Brush (1980) found that students' confidence in their math abilities dropped significantly more than their confidence in their language arts abilities. Gottfried (1981) found that the decline in intrinsic motivation also varied across subject areas. However, she found the biggest declines in reading and science. Though attitudes toward math did decline, they declined less than did the attitudes toward reading and science. It is unclear, however, how she defined reading; therefore direct comparison of results across these three studies is difficult.

What is clear from these studies is that the decline in students' attitudes varies across subject areas and, in some studies, across the social and achievement domains. This fact, coupled with the grade level variations discussed earlier, suggests that the decline in students' achievement beliefs and attitudes does not reflect a general cognitive maturational process but rather is the result of changes in social experience (Higgins & Parsons, in press). In support of this interpretation, Brush (1980) found students to be quite vocal about why they liked their current math classes less than their previous math classes. They indicated they did not like the use of public drill, frequent testing, grading on a curve, competition, and the emphasis on being right or wrong rather than on exploring the processes associated with math. Furthermore, they felt that these teaching practices were used more frequently in junior and senior high school math courses than in earlier grades. In contrast, they reported that these practices had decreased in frequency in their English classes. Their English teachers emphasized group discussion and exploration of the meaning of the readings; the English teachers encouraged students to give their opinions and did not compare the students' opinions in terms of correctness. The essence of these teaching style differences has been linked to variation in student motivation. For example, Nicholls (1979) has argued that achievement environments which focus attention on the assessment of one's ability rather than on the task itself have a debilitating effect on most children's motivation. According to his hypothesis, practices such as competitive grading and drill with public

evaluative feedback should undermine and change the quality of many students' motivation.

MATH

ENGLISH

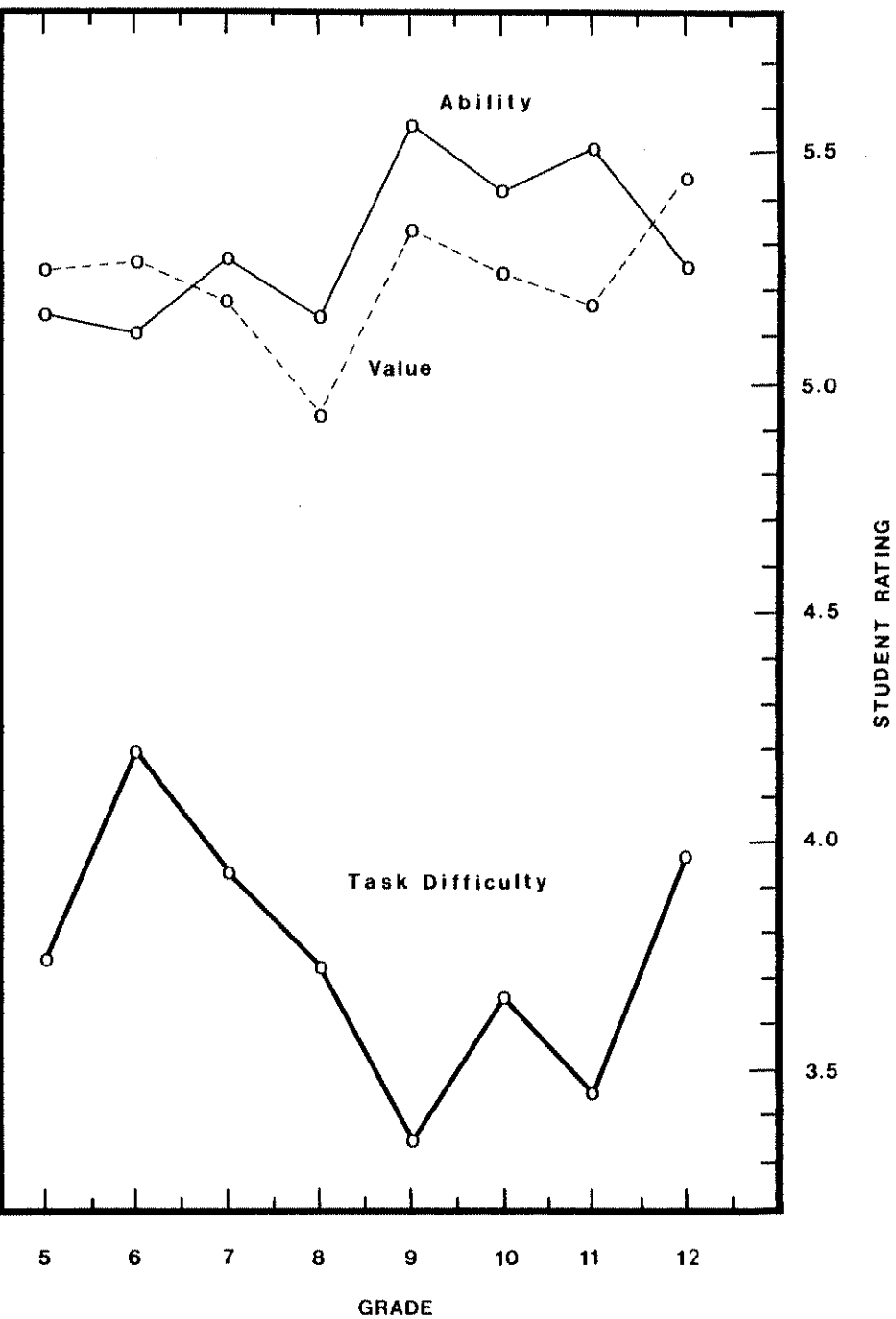
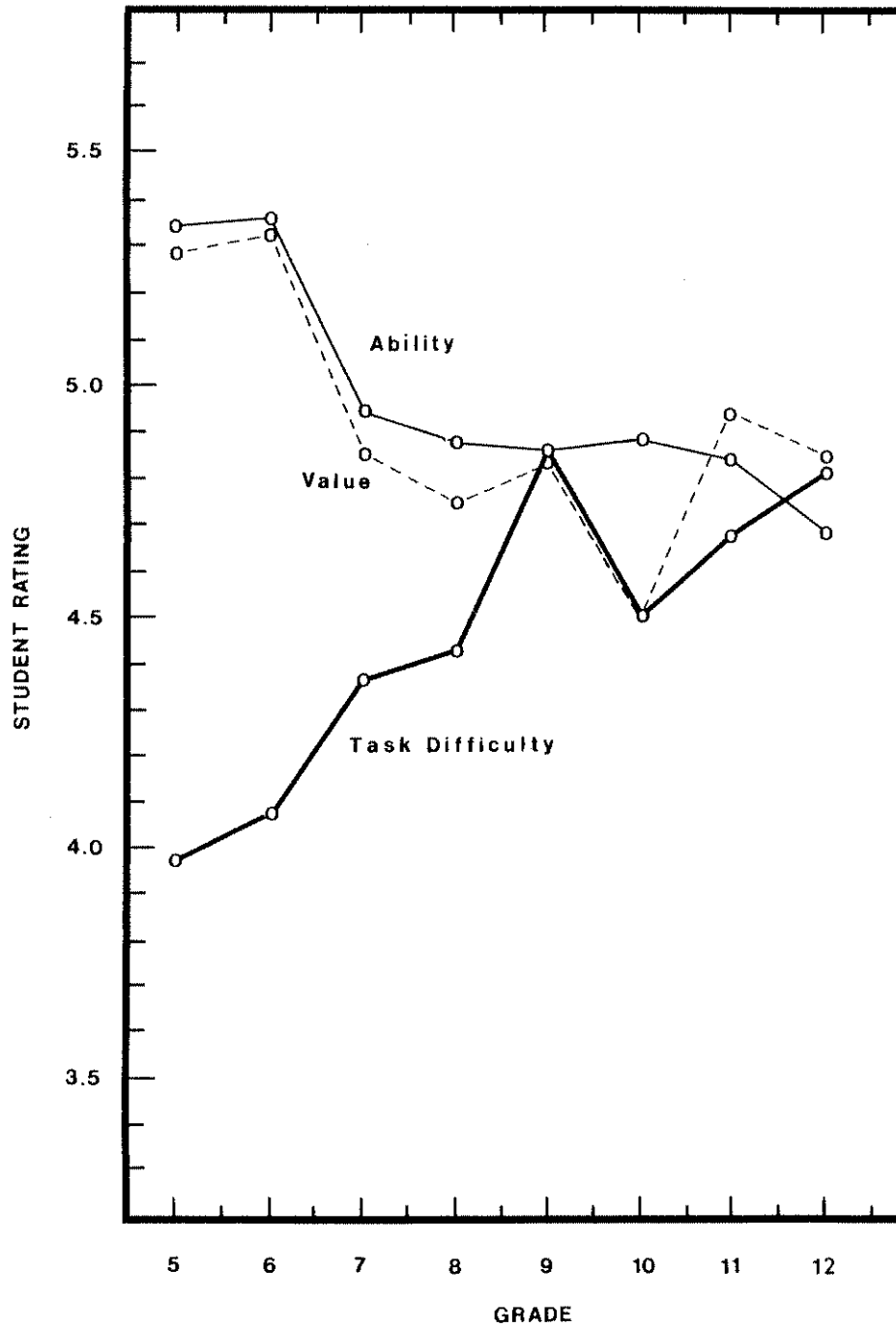


TABLE 1

SUMMARY OF RESULTS OF REPRESENTATIVE STUDIES

<u>Authors</u>	<u>Measure</u>	<u>Subjects</u>	<u>Developmental Pattern</u>
Brush (1980)	Attitudes toward math and English (including confidence in one's ability and subjective value of subject matter)	6 - 12: grades (cross-sectional; longitudinal)	Drop in attitudes toward math but not English.
Connell (1978)	Perception of control	3 - 9: grades (cross-sectional)	Increase in known vs. unknown source of control until grade 6; dramatic decrease at grade 7; subsequent increase.
Crandall, Katkovsky, & Crandall (1965)	Intellectual achievement responsibility (locus of control)	3 - 12: grades (cross-sectional)	Increase in internality for failure (girls only).
deCharms (1980)	Origin versus pawn orientation	5 - 11: grades (longitudinal)	Decline; drop begins between grades 6 and 7.
Dusek & Flaherty (1981)	Global self-concept scales (semantic differential format)	11 - 18: years 5 - 12: grades (cross-sectional; longitudinal)	No consistent pattern.
Entwistle & Hayduk (1978)	Predicted grade in math and English	1 - 2: grades (longitudinal)	No consistent pattern.
Epstein & McPartland (1976)	Attitudes toward school in general, commitment to schoolwork, and attitudes toward teachers.	6 - 12: grades (cross-sectional)	Decline in commitment to schoolwork.
Gottfried (1981)	Academic intrinsic motivation for reading, math, social studies, and science	4 - 17: grades (cross-sectional)	Decline in intrinsic motivation at 7th grade for all subjects, but especially for reading and science.

TABLE 1
(continued)

SUMMARY OF RESULTS OF REPRESENTATIVE STUDIES

<u>Authors</u>	<u>Measure</u>	<u>Subjects</u>	<u>Developmental Pattern</u>
Haladyna & Thomas (1979)	Attitudes toward school in general and toward seven primary subject areas	1 - 8: grades (cross-sectional)	Decline in attitudes toward school and toward math, physical education, art, music, and science. Drop most marked from grades 6 - 7 for subjects and from grades 4 - 5 for school in general.
Harter (1980)	Classroom motivational orientation (intrinsic - extrinsic)	3 - 9: grades (cross-sectional)	Decline; two of three measures show marked drop from grades 6 - 7.
Harter (1982)	Perceived Competence Scale (Four scales: cognitive, social, physical, and general), achievement test scores	3 - 9: grades (cross-sectional)	No shift in absolute levels. Decline in relation between perceived cognitive competence and achievement test scores at grade 7.
Hill (1980)	Test anxiety and test performance	4 - 11: grades (cross-sectional)	Increase in both test anxiety and negative relation of test anxiety to test performance. Shift is especially marked in minority populations.
Neale & Proshok (1967)	Evaluative attitudes toward people, self, aspects of school, and behavioral standards. (semantic differential format)	4 - 6: grades (cross-sectional)	Decline in evaluation of teachers classroom, self, schoolbooks, following rules, doing math, talking in front of class, and having to keep quiet.
Nicholls (1978)	Self-concept of attainment in reading	5 - 13: years (cross-sectional)	General decline; most extreme between ages 6 and 7 and between ages 8 and 9.
O'Conner (1978)	Perceptions of self, ideal self, and teachers' feelings	4 - 6: grades (6th grade in middle school) (cross-sectional)	6th graders had largest self-ideal discrepancy and perceived teachers as being most negative about them.

TABLE 1
(continued)

SUMMARY OF RESULTS OF REPRESENTATIVE STUDIES

<u>Authors</u>	<u>Measure</u>	<u>Subjects</u>	<u>Developmental Patterns</u>
Parsons, Adler, Futterman, Goff, Kaczala, Meece, & Midgley (in press)	Ability self-concepts for math and English, perceptions of task difficulty for math and English, and perceived value of math and English	5 - 12: grades (cross-sectional; longitudinal)	Decline in attitudes toward math marked drop from grade 6 - 7. No drop for English.
Parsons (1982) Parsons & Ruble (1972)	Expectancies for success following failure on lab task	3 - 12: years (cross-sectional)	Marked drop between ages 6 and 7 followed by gradual decline.
Piers & Harris (1964)	General self-concept	3, 6, 10: grades (cross-sectional)	Children in grade 6 have lower self-concept than children in grades 3 and 10.
Prawat, Grissom, & Parish (1979)	Locus of control, achievement motivation, global self-esteem	3 - 12: grades (cross-sectional)	Drop in achievement motivation only during middle school years.
Rholes, Blackwell, Jordan, & Walters (1980)	Behavioral measure of learned helplessness; assessments of one's ability and effort	K, 1, 3, 5: grades (cross-sectional)	Decline in ability and effort ratings in failure condition learned helpless response seen only at grade 5.
Simmons, Blyth, & Carlton-Ford (1982)	Specific and global self-esteem, perceptions of opinions of others, and self-consciousness	6 - 10: grades (longitudinal)	Decline in self-esteem at 7th grade among females in junior high school as compared to K - 8 grouping.
Simmons, Rosenberg, & Rosenberg (1973)	Specific and global self-esteem scales, perceptions of opinions of others, and self-consciousness	8 - 18: years (cross-sectional)	Decline; marked drop between grades 6 and 7.
Yamamoto, Thomas, & Karns (1969)	Evaluative attitudes toward teacher, self, parents, and peers; Attitudes toward social studies, language, science, and math (semantic differential format)	6 - 9: grades (cross-sectional)	Decline in attitudes toward teacher and parent and in confidence for science and math. Boys also decline for language. Most marked declines occur either in grades 6 - 7 or grades 6 - 8.

TABLE 1
(continued)

SUMMARY OF RESULTS OF REPRESENTATIVE STUDIES

<u>Authors</u>	<u>Measures</u>	<u>Subjects</u>	<u>Developmental Patterns</u>
Yarborough & Johnson (1976)	I.Q. and achievement tests; Attitudes toward school, subject matter, home, self, others (semantic differential format); measure of self-reliance, adjustment, locus of control, and several components of the self-concept	7 (fall and spring); grades (experimental group - nongraded elementary; control group- graded elementary) (cross-sectional; longitudinal)	Cognitive measures equal for both groups: lower I.Q. children in experimental and higher I.Q. children in control experienced higher affective benefits. In grade 7, general decline in attitudes and affect measures in both groups.