Gender Differences in Academic Attitudes Among Gifted Elementary School Students

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A number of studies have documented gender differences in the academic attitudes of gifted adolescents, but few studies have investigated these differences among students younger than age 12. Very few studies explore the age at which the differences emerge. The present study investigated four questions: Are gender differences in attitudes toward academic subjects evident among gifted 3rd through 6th graders? Do the students' attitudes toward school subjects vary according to grade level? Do gender differences become more or less pronounced from 3rd to 6th grade? Are attitudes toward academic areas related to students' ability in those areas? To address these questions, 2,089 gifted 3rd- through 6th-grade children rated their liking for 11 academic areas. Observed gender differences were consistent with those found in research with older students participating in talent-search programs. Grade-level differences suggest that attitudes toward several academic areas become more negative with age. Attitudes were not related to tested academic ability.

It has been observed that both gifted and average-ability girls experience declines in self-esteem and self-confidence during adolescence (American Association of University Women, 1991; Kerr, 1997; Sadker & Sadker, 1994; Silverman, 1993). A survey conducted by the American Association of University Women suggested a relationship between this decrease in self-esteem and the increasingly negative attitudes toward mathematics and science observed as girls move into and through high school. Studies of several variables that relate to academic attitudes have documented gender differences during adolescence, even among gifted students. Among the variables studied are course-selection patterns (Grossman & Grossman, 1994; Olszewski-Kubilius & Yasumoto, 1995; Stocking & Goldstein, 1992; Wilson, Stocking, & Goldstein, 1994), students' ratings of the *fun* involved in various academic areas (Middleton,

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Littlefield, & Lehrer, 1992), and responses to surveys asking about interest in various careers (e.g., Jensen & McMullen, 1995) and academic areas (Terwilliger & Titus, 1995; Wilder, Mackie, & Cooper, 1985).

Research on course-selection patterns indicated that, among members of the general population, girls take fewer advanced math, science, and computer programming courses than boys do (Grossman & Grossman, 1994). Similar results were obtained in studies involving gifted middle school and high school students who participated in accelerated summer academic programs. In these programs, verbally oriented courses were more popular among girls than boys, whereas science and math courses were more popular among boys than girls (e.g., Olszewski-Kubilius & Yasumoto, 1995; Stocking & Goldstein, 1992; Wilson et al., 1994). In studying gifted third through seventh graders' perceptions of the fun associated with various academic areas, Middleton et al. (1992) found that boys were more likely than girls to identify physical education, technology, and computers as fun; whereas girls were more likely than boys to identify art and spelling as fun. (Note that this discussion does not include nonacademic elements of school, such as lunch, that were sometimes listed as fun.) The overall pattern was consistent across these studies: Boys' interests tended to be in mathematical and scientific areas, whereas girls' interests tended to be verbally oriented.

Although we do not provide a comprehensive review of the literature on career interests here, it is worth noting that the pattern of gender differences in this area is similar to that found for academic interests and attitudes; boys have expressed more interest than girls in math and science (e.g., Feldhusen & Willard-Holt, 1993; Grossman & Grossman, 1994; Jensen & McMullen, 1995). Recently, some authors have suggested that, while gender differences in career interests still exist, they may be decreasing (Kelly, 1993; Kerr, 1997). Unfortunately, as Kerr (1997) noted, some gifted girls may "feel pressure to be highly achieving and work-oriented" (p. 484), even if they do not really aspire to such goals. Such response biases may hinder researchers' ability to assess real gender differences in career interests, especially among the gifted.

Adding yet another requirement to their criteria for research participants, Terwilliger and Titus (1995) studied junior high school students who were not only gifted (based on high standardized-test scores) but who were also motivated (based on persistence in an accelerated mathematics program over a two-year period). Despite their highly selective sample, these authors found that there had been gender differences in math-related attitudes at the start of the

program, when boys reported more persistence in the face of difficult math problems, more confidence in their math ability, and greater interest in the accelerated math program than did girls. These gender differences were even more pronounced at the end of two years of program participation, despite the fact that a specific effort was made "to provide an atmosphere which supports and encourages girls" (Terwilliger & Titus, p. 34).

Research through the Study of Mathematically Precocious Youth (SMPY), which has focused on academically talented junior high school students who are identified via talent-search procedures, has documented gender differences in high school course taking, particularly with regard to calculus and physics (Benbow, 1988; Benbow & Minor, 1986; Benbow & Stanley, 1982b, 1984). Such findings were consistent with studies showing that, among academically talented students participating in summer programs sponsored by talent searches at Northwestern and Duke Universities, boys took more math and science courses than girls did (Olszewski-Kubilius & Yasumoto, 1995; Stocking & Goldstein, 1992; Wilson et al., 1994). It is interesting to note, however, that SMPY research found only small gender differences in stated attitudes toward math and various sciences among talent-search participants (Benbow; Benbow & Minor; Benbow & Stanley, 1980, 1982a, 1982b, 1983, 1984). When gifted students' ratings of their own liking for these subject areas were compared by gender, statistically significant differences were often found; but nearly all of them were characterized by small effect sizes. (The one medium effect size obtained was for physics; see Benbow and Minor, 1986.)

Thus, gifted males and females stated similar levels of liking for mathematics and science, but course-selection patterns, as well as some other measures, indicated that boys were more involved than girls in these fields. One possible explanation for these apparently contradictory findings is that girls' relatively lower level of participation in math/science was due *not* to girls being substantially less interested than boys in math/science but to girls being *more* interested than boys in verbal areas (Benbow, 1988; Benbow & Stanley, 1982b). Girls' wider ranging interests may have made a greater variety of activities attractive to them (see also Benbow & Lubinski, 1993; Eccles & Harold, 1992).

Because most studies of gifted students' academic attitudes have focused on students at the junior high level or above, it is difficult to know whether any differences that may exist are present at earlier ages. Some characteristics of gifted children (particularly gifted girls) might lead one to expect them to experience academic-attitude

changes earlier than their average-ability counterparts. For instance, it has been noted that gifted children tend to prefer friendships with older individuals (Janos & Robinson, 1985), which may expose them to sex-role-based norms at relatively early ages. Advanced social cognition (Janos & Robinson) and a strong desire to fit in with others (Kerr, 1997; Silverman, 1993) may also attune gifted children to gender norms and prompt them to modify behavior at an early age. Indeed, Silverman noted that even very young gifted girls have been known to alter their behavior according to the behavior and expectations of others. Bell (1989) stated that decreased confidence and increased conformity to sex-role stereotypes were evident by the time girls were in the fourth grade. Given these types of changes in gifted girls who were preadolescent or younger, it is possible that changes in academic attitudes also occur before adolescence. Lubinski and Benbow (1992) specifically indicated that "For the most able students . . . preference profiles are in place *before* high school" (p. 65; italics in original). Unfortunately, few studies have investigated gender differences in academic attitudes and interests among preadolescent students.

Wilder et al. (1985) surveyed nearly all kindergarten through 12th-grade students in one school district and found that boys expressed more positive attitudes than girls toward mathematics only when students reached the high school level; in the earlier school years, there was no significant difference by gender. In other academic areas, gender differences were apparent at all grade levels. Specifically, boys had more positive attitudes than girls toward computers and science; whereas girls had more positive attitudes than boys toward writing. Thus, for computers, science, and writing, gender differences were demonstrated before adolescence. It is important to note, however, that the participants in this study were drawn from a wide range of ability levels; and the findings for gifted students may have differed.

Studies of gifted students younger than the seventh grade are rare and yield inconsistent results. Eccles and Harold (1992) surveyed gifted students in grades 2, 3, and 5 and found gender differences favoring boys in a liking for mathematics and a perception of its usefulness. Jensen and McMullen (1995) surveyed gifted fifth and sixth graders regarding their career interests and found that boys expressed more interest than girls in math and science—but only once students reached the sixth grade. In contrast, Middleton et al. (1992) studied gifted third through seventh graders and found no age-related effects for perceptions of the fun associated with various academic areas.

There are a number of reasons why, at present, it is difficult to draw a clear picture of the development of gender differences in gifted

students' academic attitudes and interests. First, the body of literature from which to draw information is small. A number of studies of gifted students have documented existing gender differences, but very few studies have explored the age at which the differences emerge. Second, operational definitions of giftedness have varied from students who were enrolled in gifted pullout programs in their local schools (Middleton et al., 1992) to high-scoring, talent-search participants who were enrolled in very challenging, accelerated, summer academic programs (Olszewski-Kubilius & Yasumoto, 1995; Stocking & Goldstein, 1992; Terwilliger & Titus, 1995). Third, the operationalization of *academic attitudes and interests* has varied greatly, as indicated above.

The current study addresses four main questions:

1. Are gender differences in self-reported liking for academic subjects evident among gifted students as early as elementary school (i.e., grades 3 through 6)?
2. Does elementary school students' liking for academic subjects vary according to grade level when boys and girls are considered together?
3. Do gender differences in liking for academic areas (if any) become more or less pronounced from the third to the sixth grade?
4. Is liking for academic areas related to tested ability in those areas?

Method

Participants

Third through sixth graders who score at or above the 95th percentile on at least one section of an in-grade standardized test (taken as part of their school's regular testing program) may participate in the Elementary Student Talent Search. Participants take the EXPLORE (ACT, 1997) as an above-level test to obtain a more accurate assessment of their academic ability than is possible using in-grade achievement tests (see ACT, 1996; Carnegie Mellon Institute for Talented Elementary Students, C-MITES, 1998; Colangelo, Assouline, & Lu, 1994; Lupkowski-Shoplik & Swiatek, 1999). Participants for the current study were drawn from students who participated in the Elementary Student Talent Search programs sponsored by C-MITES in 1997 and 1998.

There were 3,104 individuals (1,693 boys and 1,411 girls) who were first-time registrants for the C-MITES Elementary Student

Table 1

Number (Percentage) of Talent Search Participants by Grade Level and Gender

Gender	Number at grade level									
	3[a]		4		5		6[b]		Total	
Girls	50	(43%)	510	(47%)	346	(47%)	67	(44%)	973	(47%)
Boys	67	(57%)	568	(53%)	395	(53%)	86	(56%)	1116	(53%)
Total	117	(6%)	1078	(52%)	741	(35%)	153	(7%)	2089	

[a] C-MITES suggests that third graders have scores at the 95th percentile or higher on all subtests of the in-grade qualifying test, rather than the one subtest that is required formally, before registering for the Talent Search. [b] Sixth graders were included in the C-MITES Elementary Student Talent Search for the first time in 1998.

Talent Search in 1997 or 1998; nearly all of them were from the Commonwealth of Pennsylvania. Of these registrants, 2,926 (94%) attended a C-MITES testing session and took the EXPLORE test. At the beginning of the testing session, all students were asked to answer 11 questions regarding attitudes toward various academic subjects (see below for information about these items). Only the 2,089 individuals who answered all 11 questions (71% of the test takers) were included as participants in the current study as the multivariate analysis of variance (MANOVA) used to analyze the attitude data required a complete data set.

An inspection of Table 1, which provides a gender breakdown of the number of participants at each grade level, indicates that relatively few third and sixth graders participated in the study. C-MITES's policies explain this inequality in numbers across grade levels. Few third graders participate in the talent search because C-MITES suggests that third graders have scores at the 95th percentile or higher on *all* subtests of the in-grade qualifying test, rather than only the one subtest that is required formally, before registering for the talent search. Although this is not an absolute requirement, one can assume that many families follow this advice and wait until fourth grade to enter a child in the talent search. The small number of sixth graders in the sample is due to the fact that sixth graders were not invited to be involved in the talent search in 1997; they were added to the pool of potential test takers in 1998.

Table 2

Correlations Among Academic Attitude Items (N = 2,089)

Academic area	Academic area									
	S	M	E	W	SS	Sci	L	A/M	R	PE
M	.23[d]									
E	.35[d]	.02								
W	.31[d]	.06[b]	.41[d]							
SS	.25[d]	.11[d]	.20[d]	.11[d]						
Sci	.14[d]	.09[d]	.11[d]	.06[b]	.21[d]					
L	.23[d]	.08[c]	.25[d]	.25[d]	.18[d]	.06[b]				
A/M	.28[d]	.05[a]	.27[d]	.29[d]	.11[d]	.14[d]	.25[d]			
R	.30[d]	.08[c]	.36[d]	.32[d]	.22[d]	.11[d]	.25[d]	.27[d]		
PE	.12[d]	.15[d]	.04	.04	.16[d]	.09[d]	.06[b]	.02	.03	
C	.13[d]	.13[d]	.07[b]	.06[b]	.12[d]	.17[d]	.06[c]	.08[d]	.07[c]	.13[d]

Note. S = School in general; M = Mathematics; E = English/language arts; W = Writing; SS = Social studies (includes hist., geog., etc.); Sci = Science; L = Foreign languages; A/M = Art/music; R = Reading; PE = Physical education; C = Working with computers.

[a]$p < .05$. [b]$p < .01$. [c]$p < .005$. [d]$p < .001$.

Instrumentation

Elementary Student Talent Search participants reported their gender and grade level when they registered for the talent search. At the EXPLORE test administration, but before taking the EXPLORE itself, participants were asked to answer 11 questions concerning their attitudes toward various aspects of school (i.e., "How do you feel about" school in general, mathematics, English/language arts, writing, social studies, science, foreign languages, art/music, reading, physical education, and working with computers). Responses were given by marking A (*I love it*), B (*I like it*), C (*I don't like it*), or D (*I don't like it at all*) on a special section of the answer sheet.

The EXPLORE (ACT, 1997) is made up of four subtests: English (40 items), Reading (30 items), Mathematics (30 items), and Science Reasoning (28 items). Thirty minutes are allotted for the completion of each subtest. ACT reports three scores for each subtest: a raw

score (number of items correct), a percentile rank (ranging from 1–99 and based on the performance of eighth graders), and a scaled score (ranging from 1–25). Scaled scores are used in the current study.

Procedure

For the purposes of statistical analysis, students' responses to the academic-attitude items were coded numerically, from 1–4, such that 1 = "I don't like it at all" and 4 = "I love it." Therefore, higher numbers always indicate more positive attitudes.

The correlations among the 11 academic-attitude items are shown in Table 2. Correlations range from .02 to .41 and, given the large number of participants, it is not surprising that most of the correlations are statistically significant at the .05 level. The first three research questions are addressed using MANOVA to determine the effects of gender and grade level (and their interaction) on responses to the 11 attitude items. It is important to note, however, that the distributions of responses on the attitude items are negatively skewed and that the sample sizes across grade levels are unequal. Pillai's criterion was used in multivariate tests of significance because it is robust against violations of assumptions (see Tabachnick & Fidell, 1989), but results should still be interpreted cautiously.

To address the fourth research question, correlations between students' scaled scores on the major EXPLORE subtests (i.e., English, mathematics, reading, and science reasoning) and their reported academic attitudes were examined to determine whether liking for academic areas is related to tested ability in those areas. This analysis was conducted both for the participant group as a whole and for each gender separately to determine whether the relationship (or lack thereof) is similar for girls and boys.

Results

Attitudes toward the various academic areas were generally positive. The MANOVA for gender and grade-level effects on liking for these academic areas yielded significant multivariate main effects for both independent variables ($F = 27.97$, $p < .001$ for gender; $F = 3.44$, $p < .001$ for grade level); the interaction of gender and grade level was not significant. The results of univariate tests for gender effects are summarized in Table 3.

Gender explains 6% or less of the variance in academic-attitude responses (see the column headed "Eta^2"), but statistically significant

Table 3

Univariate Tests of Academic Attitudes by Gender

Academic area	Mean (*SD*) Girls	Mean (*SD*) Boys	*F*	Eta^2	*d**
School	3.18 (0.51)	3.01 (0.58)	22.19[d]	.011	.31
Math	3.24 (0.76)	3.37 (0.74)	5.75[a]	.003	-.17
English	3.01 (0.70)	2.67 (0.77)	51.78[d]	.024	.46
Writing	3.24 (0.77)	2.77 (0.87)	73.68[d]	.034	.57
Social studies	3.02 (0.83)	3.22 (0.77)	7.57[b]	.004	-.25
Science	3.37 (0.68)	3.51 (0.68)	6.85[b]	.003	-.21
Languages	3.15 (0.77)	2.73 (0.90)	54.93[d]	.026	.50
Art/music	3.66 (0.56)	3.23 (0.78)	112.65[d]	.056	.63
Reading	3.58 (0.62)	3.31 (0.75)	44.44[d]	.021	.39
Phys. ed.	3.36 (0.75)	3.61 (0.65)	17.70[d]	.008	-.36
Computers	3.71 (0.50)	3.82 (0.44)	6.27[a]	.003	-.23

[a]$p < .05$. [b]$p < .01$. [c]$p < .005$. [d]$p < .001$.

$$*d = \frac{M_{girls} - M_{boys}}{\sqrt{\frac{(SD_{girls})^2 + (SD_{boys})^2}{2}}}$$

gender differences were found for every one of the 11 attitude items. Effect sizes (*d*) were calculated for the difference between girls' and boys' ratings, such that positive values indicate more positive attitudes among girls, whereas negative values indicate more positive attitudes among boys. These effect sizes range from negligible to medium in magnitude (see Cohen, 1988). Small (*d* between .20 and .49) and medium (*d* between .50 and .79) effect sizes indicated that girls expressed more positive attitudes than boys toward school in general, English/language arts, writing, foreign languages, art/music, and reading. Small effect sizes were found for differences favoring boys in attitudes toward social studies (including history, geography, and so forth), science, physical education, and working with computers. The gender difference favoring boys in liking for mathematics was of negligible effect size (*d* = .17) and, therefore, will be disregarded.

Statistically significant grade-level differences were found for eight of the attitude items, with grade level explaining 2% or less of the variance in responses (see Table 4). The data indicate that attitudes

become more negative with age for school in general, working with computers, reading, mathematics, writing, and art/music. For science and physical education, there were significant effects by grade level; but the pattern of change was not consistent. There were no significant differences by grade level for English, social studies, or foreign languages. Effect sizes were calculated for the difference between the ratings made by sixth graders and those made by third graders; negative values reflect a decrease in liking for the subject in question (see Table 4). These effect sizes help to determine which age-related decreases are sizable enough to merit further consideration. Medium effect sizes document a decrease between third and sixth grade in liking for computers and for school in general. Small effect sizes indicate decreases in liking for math, writing, art/music, and reading. The effect sizes for decreases in liking for English, social studies, science, languages, and physical education were negligible and are, therefore, considered unimportant.

Scheffe post hoc tests provide some insight into the pattern of changes for those academic areas in which attitudes became more negative over time. Attitudes toward school in general and working with computers declined significantly from grade 3 to grade 4, remained essentially stable from grade 4 to grade 5, and then declined significantly again from grade 5 to grade 6, yielding medium effect sizes for the change between grades 3 and 6. Attitudes toward mathematics were significantly more negative among fifth and sixth graders than they were among third and fourth graders; the effect size for the difference between third and sixth graders was small. Attitudes toward reading dropped significantly between grades 5 and 6. Attitudes toward writing and art/music were significantly more negative among sixth graders than they were among third graders; however, no one year accounted for the change in either area, and both effect sizes were small.

Although many of the correlations between EXPLORE scaled scores and academic attitudes are statistically significant due to the large number of participants, nearly all of them are of negligible effect size (< .10 as per Cohen, 1988; see Table 5). Very similar results were found for each gender separately.

Discussion

Question 1: Gender Differences

The results of the present study suggest that gender differences in academic attitudes are discernible among gifted elementary school stu-

Table 4

Univariate Tests of Academic Attitudes by Grade Level

Academic area	Mean (SD) Grade 3		Grade 4		Grade 5		Grade 6		F	Eta^2	d^*
School	3.29	(0.56)	3.11	(0.54)	3.06	(0.54)	2.89	(0.61)	12.55[d]	.018	-.68
Math	3.51	(0.71)	3.34	(0.74)	3.25	(0.74)	3.19	(0.78)	5.88[c]	.008	-.43
English	2.84	(0.74)	2.85	(0.75)	2.81	(0.76)	2.73	(0.79)	0.82	.001	-.14
Writing	3.08	(0.86)	3.04	(0.85)	2.95	(0.88)	2.77	(0.85)	4.87[c]	.007	-.36
Social Studies	3.08	(0.90)	3.13	(0.81)	3.14	(0.79)	3.12	(0.81)	0.16	.000	.05
Science	3.40	(0.73)	3.48	(0.66)	3.42	(0.70)	3.33	(0.71)	3.04[a]	.004	-.10
Languages	3.03	(0.98)	2.92	(0.89)	2.90	(0.83)	2.97	(0.81)	1.23	.002	-.07
Art/music	3.52	(0.61)	3.47	(0.69)	3.38	(0.75)	3.24	(0.83)	6.35[d]	.009	-.38
Reading	3.53	(0.68)	3.49	(0.68)	3.40	(0.70)	3.22	(0.82)	7.80[d]	.011	-.41
Phys. Ed.	3.39	(0.80)	3.51	(0.69)	3.51	(0.71)	3.36	(0.76)	2.95[a]	.004	-.04
Computers	3.91	(0.32)	3.78	(0.47)	3.76	(0.48)	3.64	(0.55)	7.51[d]	.011	-.60

[a] $p < .05$. [b] $p < .01$. [c] $p < .005$. [d] $p < .001$.

$$^*d = \frac{M_{\text{grade 6}} - M_{\text{grade 3}}}{\sqrt{\frac{(SD_{\text{grade 6}})^2 + (SD_{\text{grade 3}})^2}{2}}}$$

Table 5

Correlations Among Academic Attitudes and EXPLORE Scaled Scores for All Participants (N = 2,089)

Academic area	EXPLORE scaled score			
	English	Math	Reading	Science reasoning
School	-.05[a]	-.05[a]	-.01	-.03
Math	-.06[c]	.10[d]	-.06[a]	.01
English	.04	-.03	.06[b]	.02
Writing	.02	-.08[c]	.04	-.01
Social studies	.05[a]	-.07[c]	.09[d]	.08[d]
Science	.01	-.02	.01	.05[a]
Languages	.05[a]	.00	.07[c]	.02
Art/music	.01	-.09[d]	.02	-.03
Reading	.15[d]	-.03	.20[d]	.13[d]
Phys. ed.	-.06[b]	.00	-.06[b]	-.02
Computers	-.05[a]	-.05[a]	-.05[a]	-.02

[a]$p < .05$. [b]$p < .01$. [c]$p < .005$. [d]$p < .001$.

dents. Gender accounts for only a small portion of the variance; but, with the exception of liking for mathematics, the effect sizes associated with the gender differences in academic attitudes are not negligible. Because the pattern of differences (i.e., boys having more positive attitudes than girls toward such subjects as science and computers; girls having more positive attitudes than boys toward such subjects as English, writing, and reading) is very similar to that found among older students, the modest gender differences among elementary school students may indicate the beginning of a trend that becomes more pronounced as students grow older. Previous documentation of gender differences among elementary-level gifted students is very limited because research has focused almost exclusively on individuals who are at or above the junior high school level.

One of the few studies to include elementary school students was reported by Wilder et al. in 1985. Some of the gender differences they found among students from a wide range of ability levels are replicated in our gifted sample. Specifically, girls have more positive attitudes than boys toward writing; and boys have more positive attitudes than girls toward computers and science. Another similarity between the studies is that neither yields a meaningful difference between boys' and girls' attitudes toward mathematics during the

elementary school years. Our study suggests gender differences in attitudes toward a number of academic areas that were not discussed by Wilder and her colleagues, however. We found that girls have more positive attitudes than boys toward school in general, English, foreign languages, art/music, and reading. We also found that boys have more positive attitudes than girls toward social studies and physical education.

In many ways, our findings parallel those in studies of older gifted students' academic attitudes and interests. Girls show more positive attitudes toward verbally oriented areas (English, writing, foreign languages, and reading in this study; see Middleton et al., 1992; Olszewski-Kubilius & Yasumoto, 1995; Stocking & Goldstein, 1992; Terwilliger & Titus, 1995; Wilson et al., 1994) and toward school in general (Benbow & Stanley, 1982a), whereas boys show more positive attitudes toward computers and science (Grossman & Grossman, 1994; Olszewski-Kubilius & Yasumoto; Stocking & Goldstein; Wilson et al.). Areas covered in our survey that do not fit into these categories include art/music (toward which girls report more positive attitudes) and social studies and physical education (toward which boys report more positive attitudes).

A closer inspection of the effect sizes suggests another interpretation, however. The effect size of the gender difference in liking for math, which might be expected to favor boys, is negligible and, therefore, should be disregarded. Further, all of the nonnegligible gender differences favoring boys are characterized by small effect sizes. In contrast, several of the gender differences favoring girls are of medium effect size (i.e., liking for writing, foreign languages, and art/music). Even among the small effect sizes, those favoring girls are based on larger values of *d* than those favoring boys (with the exception of liking of physical education). Therefore, it appears that the gender differences are most pronounced in those subjects toward which girls express greater liking than boys do. This observation is consistent with the suggestion put forth by SMPY researchers (Benbow, 1988; Benbow & Stanley, 1982b) that the key issue is not that girls like math/science less than boys do, but that they like verbal areas more than boys do. Such consistency may be expected, given that the participants in the current study, although younger than SMPY participants, were identified as gifted using the same talent-search model.

Question 2: Differences by Grade Level

The MANOVA main effect for grade level indicates that attitudes toward several academic areas become more negative over time.

This finding also is consistent with those obtained by other authors. For example, Wilder et al. (1985) found decreases over time in liking for math and computers among both male and female students. Terwilliger and Titus (1995) documented a decline in various aspects of attitudes toward mathematics even though they studied highly motivated participants in an accelerated math program. Our results also indicate declines in attitudes toward several academic areas in addition to math and computers: school in general, writing, art/music, and reading.

Question 3: Changes in Gender Differences Over Time

We found no significant interaction between gender and grade level in responses to the academic-attitude items. Apparently, over time, both girls and boys develop slightly more negative attitudes toward a number of academic areas; but the gender differences in attitudes remain consistent. The SMPY research, which has focused on academically talented seventh graders who were identified by the same talent-search method as was used with our third through sixth graders, has documented gender differences in attitudes toward math and science that are similar in magnitude to those we found. Therefore, it appears that these gender differences are unlikely to increase as students move into junior high school.

Question 4: Relationship Between Tested Ability and Academic Attitudes

Also consistent with SMPY's results (Benbow & Stanley, 1982a) is our finding that tested ability is not related to liking for academic subjects. Benbow and Stanley (1982a) found only negligible to small correlations between tested ability (i.e., above-level Scholastic Aptitude Test scores) and liking for either mathematics or school in general. Similarly, we found negligible effect sizes in the correlations between above-level EXPLORE scores and liking for the 11 academic subjects included in our study. Apparently, participants' reports of liking for various subjects reflect more than just their tested ability level in those areas.

Conclusion

The participants in our study were a select group of individuals, all of whom scored in the top 5% of students their age on in-grade stan-

dardized achievement tests. EXPLORE scores (and other types of above-level testing) provided a way to assess the ability distribution within this select group (e.g., ACT, 1996; Assouline & Lupkowski-Shoplik, 1997; Lupkowski-Shoplik & Swiatek, 1999; Lupkowski-Shoplik & Assouline, 1993). These scores are not related in a meaningful way to the academic attitudes of either girls or boys in our sample, but it is possible that academic ability would be related to attitudes if a wider range of ability were considered.

It is important to keep in mind that this study was based on a very brief survey asking students to rate how much they like various academic areas. Much more may be learned from research using more sophisticated measures. The current study suggests, however, that gender differences in academic attitudes may start early, at least among gifted students. The common concern that girls fall far behind boys in their interest in math/science is not strongly supported by the small effect sizes for gender differences in these areas, however. The hypothesis that is better supported by our data is that girls pull ahead of boys in their interest in verbal areas.

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