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The Role of Participation in In-School and Outside-of-School Activities in the Talent Development of Gifted Students

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Based on survey responses from 230 students enrolled in a summer gifted program at a university, this study gives a description of gifted students' participation in extracurricular activities in and outside of school. Findings show that gifted students were more involved in competitions, clubs, or other extracurricular activities in mathematics than in other subject areas and were the least involved in computer science activities. Sports were the most frequent extracurricular and outside-of-school activities, as well as playing and working with computers. The data reveal some gender-stereotypical tendencies regarding participation in and outside-of-school activities and gender-typical patterns of support from parents. Grade and course differences were also found. Contributions this study makes to the existing literature are to assess the consonance of children's participation in outside-of-school and extracurricular activities with their talent area and to document empirically parental involvement and independent home study for gifted adolescents.

The development of any talent requires considerable nurturing (Gruber, 1982) and involves various factors such as ability, motivation to achieve, societal support and appreciation of the talent area, environmental supports and opportunities, and even chance or luck (Csikszentmihalyi, Rathunde, & Whalen, 1997; Gagné, 1995; Tannenbaum, 1986). Supportive experiences, whether at school, in the community, or at home, have been noted as significant catalysts in facilitating the transition of raw aptitude into field-relevant talents (Gagné, 1995). For example, Csikszentmihalyi and his colleagues pinpointed the importance of both short-term, immediate enjoyment of classes and activities, as well as long-term goals in keeping students engaged and committed to their talent areas during critical periods of development, such as adolescence.

The role of outside-of-school and extracurricular school activities in talent development is worthy of study for several reasons. First, gifted and talented teens' motivation and desire to experience challenge draws them to these activities and opportunities (Amabile, 1989; Fredricks, Alfeld-Liro, Hruda, Eccles, Patrick, & Ryan, 2002; Renzulli, 1978; Sternberg, 1991), and participation in them is both a venue for recognition of the gifted and talented who are apt to be excluded from the identification procedure when typical psychometric measures are used (Milgram, 1989, 1990) and predictive of later adult creative accomplishment and occupational choice (Hong, Milgram, & Whiston, 1993; Hong, Whiston, & Milgram, 1993). Secondly, retrospective studies of eminent individuals indicate that outside-of-school learning through mentors, organized activities, or parental enrichment and teaching often play a more pivotal role in talent development than school-based programs. Thirdly, research suggests that children's participation in extracurricular and outside-of-school activities fosters and augments parents' social networks and contacts, which aids parents in obtaining appropriate educational resources and additional opportunities for their children (Horvat, Weininger, & Lareau, 2003). Thus, participation in outside-of-school and extracurricular activities

has both direct and indirect effects on the talent development of gifted children. A more complete picture of gifted children's participation in school-sponsored or community-sponsored academic or nonacademic activities and what they do at home with parents would begin to elucidate the role that these activities play in talent development.

Positive effects of out-of-school and extracurricular activities on overall educational attainment for heterogeneous groups of students is supported by research (Camp, 1990; Eide & Ronan, 2001; Hébert, 2002; Pierce, Hamm, & Vandell, 1999; Perry, Teague, & Frey, 2002; Shumow, 2001), particularly for children from low-income, urban, or high-risk circumstances (see McCarthy, 2000; McNeal, 1998; Posner & Vandell, 1999; Shumow, 2001). However, few studies have empirically documented the participation of gifted students or the effects of these types of activities despite their proposed potential contributions to talent development.

Similarly, the positive effect of parental support for achievement through provision of educational resources and enrichment in the home, direct teaching, help with homework, and other assistance to students has also been discussed in literature on talent development (Gottfried, Gottfried, Bathurst, & Guerin, 1994; Kulieke & Olszewski-Kubilius, 1989; Lee, 2002b; Olszewski-Kubilius & Grant 1996; Piirto, 1998; Subotnik & Steiner, 1994; VanTassel-Baska, 1989). Although it is assumed that parents of gifted children do provide a great deal of direct educational assistance, the specific type and amount of supports have not been well documented by research (Kulieke & Olszewski-Kubillius; Olszewski, Kulieke, & Buescher, 1987) other than during early childhood (Gottfried et al.). Retrospective studies of eminent individuals indicate that direct teaching by parents was often done in the earlier years and was important in promoting a child's enthusiasm for the talent area (Bloom, 1985a, 1985b; Piirto, 1998) and that parents played a more distanced, yet strong facilitative role in later years by arranging lessons, finding teachers, and monitoring practice.

This study investigated how gifted students' involvement in extracurricular and outside-of-school activities and parental involvement and direct teaching relate to children's abilities and talents. The literature below reviews research about why children participate in extracurricular and outside-of-school activities, what patterns of participation exist for heterogeneous groups of children and gifted children, and the effects of participation on educational outcomes for both gifted and heterogeneous groups of children. In addition, because previous research suggests that parental teaching and assistance and parent-guided home study may be particularly important for gifted children, this body of research is reviewed, as well.

Literature Review

Participation in Extracurricular and Outside-of-School Activities

Why do children participate in extracurricular or outside-of-school activities? What goes into their decisions to do so, the choices they make from an array of activities, and the factors associated with continued participation over time? Fredricks, Alfeld-Liro, Hruda, Eccles, Patrick, and Ryan (2002) have proposed a complex model to account for adolescents' decisions to participate in extracurricular activities, which includes individual factors such as motivation and a desire to satisfy needs (e.g., a need for competence or a need for connectedness through social interaction) and contextual factors such as the school environment. Their research also suggests that adolescents persist in extracurricular activities if they experience challenge, particularly if challenge is not available through academic classes. Also, they seek a level of challenge they can handle, but quit when the challenge is too great. Some adolescents experience such emotional satisfaction and enjoyment from the activity that it becomes central to their identity and they pursue the area as a career. Adolescents use extracurricular activities to find friends and feel connected to their school. Some also report that they learn time management and other skills from these activities, which helps them in other areas of their lives (Fredricks et al.). Hanks and Eckland (1976) suggested that participation in extracurricular activities is one of the pathways for transmitting parental values and cultural assets in high socioeconomic families and may be why parents encourage participation.

Types of Extracurricular and Outside-of-School Activities

What do children do during after school hours? They may participate in school- sponsored activities, typically deemed "extracurricular" activities, or programs through their park district or community center. In today's society, participation in these kinds of activities by children is common. Horvat et al. (2003) reported that middle-class third-grade children participate in an average of five "organized" activities at one time. Eide and Ronan (2001) found that most high school students in the U.S. engage in at least one school-sponsored extracurricular activity, with varsity sports being the most popular.

After-school programs are operated by various groups and have many different sponsors, including schools, community organizations, church groups, and government agencies. The philosophy, goals, and components of the programs may vary as much as the supporting groups (Shumow, 2001). According to Hofferth and Jankuniene (2001), who studied several types

of after-school activities for students from kindergarten to seventh grade, children who are at home after school engage in different types of activities compared to children who attend after-school or daycare programs. For example, students enrolled in after-school or daycare programs spend more time in structured activities such as sports and youth organizations than in activities such as watching television and reading books.

In a longitudinal study of low-income children's activities during after school hours, Posner and Vandell (1999) found that the most common after-school activities for third to fifth graders, whether enrolled in an after-school program or not, were watching television (20%), transit-related activities (15%), or academics (14%), while the least common were extracurricular school activities (4%), chores (4%), and coached sports (4%). Also, these children spent almost 10% of their after-school time in outside unstructured activities. The third and fifth graders who attended after-school programs, however, spent more time on academic and extracurricular school activities compared to children who did not attend such programs and less time on nonsports activities, outside unstructured activities, watching television, and daily chores.

McNeal (1998) found that high-ability students (e.g., as determined by higher standardized test scores) were more likely to be involved in a variety of high school extracurricular activities compared to students with lower test scores, with the exception of athletics, cheerleading, and vocational activities. Other research on gifted children suggests that some children engage in a great deal of independent activity in their talent field outside of school in relatively unstructured settings such as the home—perhaps in the form of hobbies. This may include tinkering with mechanical objects (Bloom, 1985b), voracious reading (Piirto, 1994, 1998; Simonton, 1992) on a wide range of topics, journaling or creative writing (Piirto, 1998, 1999), drawing, and playing or writing music (Winner, 1996). Parents typically facilitate this independent exploration and learning by providing materials and resources. Winner referred to the need of talented children to draw or play music constantly or "mathematize" the world as a "rage to master," a characteristic of highly gifted children.

Grade and Gender Differences in Participation in Extracurricular and Outside-of-School Activities

Grade differences. Children's participation in extracurricular and outside-of-school activities changes over time. Specifically, there is generally a decline in participation in any type of organized, structured activities during adolescence (Fredricks et al, 2002). There are also developmentally related changes in more specific types of activities. Posner and Vandell (1999) found that both African American and Caucasian third through fifth graders spent less time in outside unstructured activities as they moved into the higher grades and that the amount of time African Americans spent on nonsport extracurricular activities increased across the grades.

Gender differences. Research suggests that, overall, athletics is preferred more by boys than by girls (Hofferth & Jankuniene, 2001; McNeal, 1998; Posner & Vandell, 1999). McNeal found that males were more likely to participate in high school athletics than females, although females were involved in various other types of school extracurricular activities more than males. Posner and Vandell also found that boys played coached sports more than girls, while girls were more involved in academics clubs and activities, arts, and socializing with friends. Similar findings were found in Hofferth and Jankuniene's research; boys in fourth to seventh grades were more likely to play sports than girls of the same age, while girls more than boys tended to do household work, visit friends, and engage in art activities. Academically gifted children were similar in that gifted males also spent more time in sports than gifted girls (Dauber & Benbow, 1990). Gifted girls spent more time in a variety of activities related to arts and crafts, domestic skills, and drama than gifted boys, while gifted boys spent more time working with machines and tools and in science- or math-related activities or electronic hobbies than gifted girls (Dauber & Benbow; Fox, 1976).

Effects of Extracurricular and Outside-of-School Programs on Students

Participation in extracurricular activities has been found to have a positive influence on many aspects of children's development, including academic achievement (Camp, 1990; Eccles & Barber, 1999; McCarthy, 2000; Perry, Teague, & Frey, 2002; Shumow, 2001), self-esteem (Eccles & Barber, 1999; Yarworth & Gauthier, 1978), school dropout rate (Mahoney & Cairns, 1997; McNeal, 1995), peer interactions (Fredricks et al, 2002; Lee, 2002a), and social adjustment (Brown, 1999; Chung, 2000; Pettit, Laird, Dodge, & Bates, 1997; Pierce, Hamm, & Vandell, 1999; Posner & Vandell, 1994). Positive effects for participation in extracurricular activities are present for all levels of schooling, even the college level (LeBard, 1999). The specific ways in which participation provides positive effects are varied, but include increased self-confidence for adolescents via recognition received from important adults for achievements in athletics and the arts and a reduction in the time adolescents spend on risky behaviors such as alcohol use (Fredricks et al.).

For top math or science graduate students, commitment to extracurricular activities such as participation in math or science clubs or other programs facilitates the development of mathematical or scientific talent through high school

(Lubinski, Benbow, Shea, Eftekhari-Sanjani, & Halvorson, 2001). Specifically, Lubinski et al. found that, compared to other gifted students, graduate students who were admitted to the top math/science graduate institutions in the U.S. had participated more frequently in math/science competitions and math/science activities before college. Subotnik, Miserandino, and Olszewski-Kubilius (1996) found that participation in mathematical Olympiad competitions provided gifted and talented students with opportunities to meet with, compete against, and compare themselves to other talented peers, thereby giving them social support and a more realistic picture of their abilities.

Piirto's (1998) study of creative individuals supports the importance of competitions in creative accomplishment. She found that some famous writers and other creators (e.g., Marilyn Shrude, Julliard students, Bill Gates, Warren Buffett) enjoyed having their work recognized by their peers and were driven to compete and perform to win awards. Piirto (1999) found that successful female creative writers exhibited a pattern of participation in writing competitions and early publication, often unrelated to school. The support and recognition that come from participation in competitions and other types of activities may be particularly important for gifted adolescents who are vulnerable to peer pressure due to their superior abilities (Clasen & Clasen, 1995; Davis & Rimm, 1998) or in schools where an anti-intellectual atmosphere is prevalent (Cramond & Martin, 1987; Lee, Cramond, & Lee, 2004; Subotnik, Miserandino, & Olszewski-Kubilius, 1996; Tannenbaum, 1962).

The Family's Role in Talent Development

The family's role in talent development is crucial. Parents affect children by the values they verbally espouse, as well as by their actions, such as role modeling (Kulieke & Olszewski-Kubilius, 1989). VanTassel-Baska's (1989) research on gifted learners who were economically disadvantaged confirms the crucial role of a supportive family that provides an inner sense of direction, which ultimately results in successful accomplishment. Parents provide direct support by finding a quiet place for a child to study, accessing lessons and appropriate teachers, and driving children to activities. Parents of gifted children direct their children's interests and activities along certain paths and into particular domains and disciplines, which they value and in which they think their child has talent (Kulieke & Olszewski-Kubilius).

Lam and Wong (1997) found that parents reported that they were in favor of extracurricular activities for their children, although they were more willing to invest money than time in promoting them. In contrast, Bloom's (1985a, 1985b) study showed that parents served often as the first teachers, introducing the child to the talent area and making the talent area—whether music, science, or a sport—a vital part of family life through activities, family excursions, and direct teaching. Lee (2002b) found that fathers' involvement in various outside-of-school activities, including sports, arts, music, and field trips, served to channel their elementary-school-aged daughters into certain talent areas. Gottfried et al. (1994), in a prospective study that began in infancy, found that parents whose children were labeled gifted at age 8 had provided an enriched home environment and were more involved and nurturing of their children's academic endeavors. Specifically, parents made more trips to the library; spent more time on directly teaching academic skills; provided more learning materials such as books, computer software, learning aids, and magazines; and read more to their child. These authors found that the actual amount of time parents spent with children did not differentiate the gifted from the nongifted, but direct involvement in academic and cultural activities did.

Parent roles change as children mature and develop. They may no longer be able to serve as the primary teacher for a child and will assume a more supportive role, such as sitting in on lessons, tapping into community resources, or identifying a new teacher. On the other hand, parents may begin to share their adult areas of expertise with their children when the children are older, introducing them to the world of work, fostering work-related skills, or actually teaching content not learned in school.

Purpose of This Study

While there is research on the participation of children in extracurricular and outside-of-school activities, relatively little of it has focused specifically on gifted children. The purpose of this study was to gain a more complete picture of gifted children's participation in organized activities (both extracurricular and outside of school), their independent study and work at home, and their parents' involvement in their academic pursuits. The following questions were the focus of the study:

1. In what kinds of in-school and outside-of school activities do gifted students participate?
2. How does participation relate to students' talent areas? Do students use outside-of-school and extracurricular programs to further development in a talent area or to obtain a broad, well-rounded exposure to various fields? Does this vary for middle school versus high school students?
3. How are parents involved in supporting their children's academic achievement and talent development during the middle and high school years?

Method

Participants

Two hundred and forty-seven students who participated in a 3-week-gifted summer program at a local university were the subjects of the study. They were all identified as gifted according to the following criteria: For fourth- through sixth-grade students, the 95th percentile or above on a math or verbal composite or subtest of a nationally normed, standardized achievement test was required. Both 7th- through 9th-grade and 10th- through 12th-grade students met minimum ACT or SAT requirements (9th through 11th graders had to obtain these scores when they participated in the talent search as 7th and 8th graders), which varied according to subject areas. A minimum score of SAT-V 470 to 510 or ACT-Reading 21 to 24 for verbal courses was required. A minimum score of SAT-M 520 to 540 or ACT-Math 19 to 21 for math (and some science) classes was required. A minimum score of ACT-Science Reasoning 21 to 22 for science courses was required. Also, students who did not have test scores or whose scores were lower than the minimum submitted an alternate admissions portfolio including letters of recommendation from teachers, a copy of their latest grade report, a teacher-graded copy of an essay or piece of creative writing, or an expanded admission essay.

In June 2002, a questionnaire was sent out to 1,469 4th to 11th graders who were registered for the summer program either in the first or second session (each session was 3 weeks in duration). A total of 247 students completed and returned the survey (total response rate = 16.8%). Despite the low response rate (due to the length of the questionnaire, see below), the respondents were fairly similar to the larger pool of summer program participants on key demographic variables. There was approximately an equal number of males (49.0%) and females (51.0%) among the survey respondents. Compared to the numbers of males (50.7%) and females (49.3%) who initially registered for the summer program, the return rate from females slightly surpassed males. More than half (52.8%) of the students were in the 8th through 12th grades, and 46.0% were in the 4th through 7th grades during the past academic year (no response 1.2%).

The majority (65%) of survey participants were Caucasians, followed by Asians or Pacific Islanders (22%). Two percent of the respondents were African American or Hispanic American. The respondents mirrored the ethnic/racial makeup of the larger group of summer program participants (Caucasians = 51.4%; Asians or Pacific Island = 37.1%; multiracial = 3.9%; African Americans = 3.5%; and Hispanics = 2.1%).

More than half of the respondents had fathers who were employed in professional positions (53.1%), followed by executive, administrative, or managerial positions (31.6%). Likewise, almost half of their mothers were employed in professional positions (42.2%), followed by unemployed stay-at-home mothers (23.6%) and mothers in executive, administrative, or managerial jobs (15.2%). Eighty-six percent of the fathers and 82.5% of the mothers held bachelor's degree or above. Seventy-two percent of the students came from families with $100,000 family income per year.

The students took one class during the 3-week program and were in class 5 hours per day. Classes were either enrichment or accelerative in nature (e.g., Algebra for sixth and seventh grades). Almost all of the students participated in one 3-week session only.

Instrumentation

The Summer Questionnaire for Parents and Students was developed to assess gifted students' talent development activities in and outside of school, parental involvement and support, and school experiences and classes. This is a 16-page questionnaire with 190 items. There is a section for parents to complete, which asks about their goals for their child and some history of the child's development (e.g., favorite toys). The majority of the questionnaire consists of questions for students.

In this study, a portion of the questionnaire consisting of 11 items about mathematics and science activities, 17 items on computer science, 26 items on language arts, and 7 items on outside-of-school activities were used and analyzed. Most responses yielded categorical-type data along with a few open-ended items. Examples of the items include participation in competitions and extracurricular activities such as clubs in mathematics, science, computer science, or language arts (e.g., "How many years have you participated in math clubs or other extracurricular math activities?"; "In how many science competitions have you participated?"). See Appendix A for the survey items.

In addition to the common items across different subject areas, students responded to several items developed specifically for each subject area. For instance, in language arts, students were asked about the types of writing they do for fun (See Appendix A).

Data Collection and Analyses

Data were collected during the entire session of the summer program from July through August 2002. Data were analyzed using the computer software program SPSS (Statistical Packages for Social Sciences) Version 10.0. The questionnaires were sent to the students' home in a mailing along with their dorm assignment for the summer program. Students could either return the questionnaire by mail or bring it with them

to the summer program and hand it in to a residential staff member.

For analysis, 230 of 247 student respondents (16 fourth graders and 1 missing case were excluded from analysis) from 5th through 11th grades were included. Comparisons were made by gender (males = 106, females = 112, missing cases = 12), grade (middle school = 131, high school = 89, missing cases = 10), and summer course choice; a total of 119 students enrolled in verbal (n = 69, 30.0%) or social science (n = 50, 21.7%) courses, while 111 students enrolled in math (n = 50, 21.7%) or science courses (n = 61, 26.5%). The responses of the students who chose verbal courses (e.g., literature, language, creative writing, etc.) or social science courses (e.g., politics, journalism, etc.) were compared with the students who chose math (e.g., math, algebra, etc.) or science courses (e.g., chemistry, biology, physics, computer science, etc.). In addition, the students enrolled in the verbal courses only were compared with the students enrolled in the math/science courses and to the students in math only courses, respectively. The math students were also compared with the science students. Descriptive statistics were computed and chi-square tests in two-way contingency table analysis using crosstabs were conducted to compare proportions by grade, gender, and course choice and to find whether statistical relationships existed between the variables (either nominal or ordinal).

Results

Research Question 1: Students' Participation in School-Sponsored Extracurricular Activities

Students were asked about the type of extracurricular school activities in which they had participated. Sports (72.3%), band/orchestra/jazz group (67.0%), and academic clubs (55.5%) were the three preferred activities, in which more than half of the students had been engaged. As to the number of years of participation, more than 60% of the students reported between 2 and 5 years of involvement in academic clubs (66.6%), band/orchestra/jazz group (64.8%), and sports (62.9%). In contrast, less than 10.0% of students participated in cheerleading/pep club (4.5%), photography (6.9%), and political organizations (9.9%). See Table 1 for more information.

More males (63.4%) than females (48.1%) participated in academic clubs, while females were more involved in drama/theater (females 43.4%, males 30.9%) and cheerleading/pep club (females 7.6%, males 1.1%) than were males. These differences between males and females were all statistically significant ($p < .05$). For other gender differences, see Table 2.

Table 1

Percentages for Participation in Extracurricular and Outside-of-School Activities (N = 230)

	Number of Years				
Activities	1	2–3	4–5	6–7	8+
Extracurricular activities through school					
Sports	14.5	37.7	25.2	11.9	10.7
Academic clubs	27.4	52.1	14.5	4.3	1.7
Yearbook	64.7	32.4	2.9	0.0	0.0
Literary clubs	47.5	40.0	10.0	2.5	0.0
Drama/Theatre	36.0	42.7	17.3	2.7	1.3
Debate	87.0	13.0	0.0	0.0	0.0
Political organizations	50.0	35.0	10.0	0.0	5.0
Photography	33.3	53.3	6.7	6.7	0.0
Studio arts	26.1	26.1	17.4	13.0	17.4
Dance	37.5	31.3	18.8	6.3	6.3
Cheerleading/ Pep club	72.7	27.3	0.0	0.0	0.0
Band/Orchestra/ Jazz group	23.2	39.4	25.4	9.9	2.1
Other	27.7	46.2	12.3	4.6	9.2
Outside-of-school activities through community					
Sports	6.6	26.5	25.8	16.6	24.5
Dance	19.2	36.5	21.2	5.8	17.3
Theater Group	30.2	36.8	23.7	2.6	2.6
Choir	24.1	33.3	13.0	9.3	20.4
Music lessons/ Orchestras	5.1	23.4	24.8	24.8	21.9
Art classes	30.6	38.7	17.7	3.2	9.7
Scouting/4H	7.1	40.0	29.4	16.5	7.1
Church/Synagogue with groups	14.3	31.0	13.1	9.5	32.1
Political groups	66.7	26.7	6.7	0.0	0.0
Volunteer work	35.0	36.9	19.4	3.9	4.9
Other	27.3	18.2	27.3	0.0	27.3

Note. A total number of responses for each response rate might vary according to the number of respondents who participated in each of the activities.

Some grade differences were present. More high school than middle school students responded that they were involved in academic clubs ($\chi^2 = 12.12$, $p < .001$), debate ($\chi^2 = 5.85$, p

Table 2

Chi-Squares for Extracurricular and Outside-of-School Activities by Gender

	df	χ^2	*p*	Diff.
1. Hours/week spent on computer game.	5	33.05	.000**	F < M
2. Write for own pleasure	3	22.67	.000**	M < F
3. Hours/week spent on writing for pleasure	6	22.73	.001**	M < F
4. Academic clubs participated in at school	1	4.89	.027*	F < M
5. Dance participated in at school	1	9.08	.003**	M < F
6. Number of years participated in sports through community	5	15.90	.007**	F < M

Note. M = Male (n = 106); F = Female (n = 112). 12 cases were missing. * $p < .05$. ** $p < .01$.

< .05, and political organizations ($\chi^2 = 5.61$, $p < .05$).

School clubs. In regard to length of involvement in clubs, students had more years of participation in mathematics (M = 2.73 years), about three times as much, compared to other areas, in which less than 1 year of involvement was typical. For mathematics clubs and activities, almost 70% of students participated 1 year or more, and 40.6% participated 5 years or more. For science and computer science clubs and activities, 36.3% and 24.1% of students respectively participated at least 1 year, but less than 10% of the students participated 5 years or more. Similar figures were obtained for students' involvement in language arts clubs and group activities (see Table 3). Thus, across various academic domains, there was greater sustained involvement in mathematics clubs and activities than in other areas.

Most students spent between 1 and 3 hours weekly on clubs and activities in reading/literature (84.5%), foreign language (76.9%), computer science (69.8%), writing (69.6%), and science (68.8%). However, a fair number of students spent more than 3 hours per week in math clubs and activities (54.5%) and oral expression clubs or group activities such as debate and speech (40.4%). The only significant gender difference found was for science. More males than females participated in science clubs or other science-related extracurricular activities ($\chi^2 = 17.84$, $p < .01$). Also, middle and high school students were significantly different in only one area: Middle school students were likely to spend a greater amount of time on foreign language clubs or group activities than were high school students, which was somewhat surprising ($\chi^2 = 24.96$, $p < .01$) given that many middle schools do not even offer study of a foreign language.

Competitions. Participation was greater in math competitions than any other type. Gifted students in this study were more likely to have participated in at least one competition in mathematics (53.5%) than in science (37.6%) and the language arts area (30.0%), and hardly any at all participated in computer science competitions (6.2%), which probably reflects availability of competitions (see Table 4).

Table 3

Percentages for Participation in School Clubs/Group Activities

	Number of Years					
Subject area	0	1	2	3	4	5+
1. Mathematics	30.4	5.8	10.3	8.5	4.5	40.6
2. Science	63.7	16.1	8.1	4.5	1.8	5.8
3. Computer Science	75.9	8.9	5.8	2.7	0.9	5.8
4. Language Arts						
Reading/Lit.	76.1	16.8	5.8	0.9	0.0	0.4
Writing	71.6	20.4	5.3	2.2	0.4	0.0
Oral expression	62.6	26.9	8.4	0.9	0.0	1.3
Foreign lang.	64.1	30.9	3.6	0.0	0.0	1.3

Note. Response rates were based on a total of 230 participants.

In language arts, students participated in writing competitions more than other types in the verbal area (refer to Table 4 for summary). A grade difference was found only for spelling competitions in that more middle school (23.1%) than high school students (4.6%) participated in competitions one to four times ($\chi^2 = 20.28$, $p < .01$). No significant gender differences were found for these items.

Research Question 1: Students' Independent Learning Outside of School

Science. A fairly high percentage of students (63.5%) reported that they had read science magazines or articles on their own during the past year. Visiting science Web sites (36.5%) and using a science kit to conduct experiments

Table 4

Percentages for Participation in Competitions

	Number of Competitions						
Subject area	0	1–2	3–4	5–6	7–8	9–10	11+
1. Mathematics	46.5	22.1	15.5	4.4	1.7	3.6	6.2
2. Science	62.4	24.7	8.0	1.8	1.8	0.4	0.8
3. Computer Science	93.8	4.4	0.9	0.9	0.0	0.0	0.0
4. Language Arts (during the past 2 years)							
Creative Writing/Poetry	60.6	26.1	8.9	3.4	0.5	0.5	0.0
Oral Contest/Debates	72.9	17.1	5.0	1.5	0.5	0.5	2.5
Foreign Language	78.0	16.0	3.0	2.5	0.5	0.0	0.0
Spelling	67.8	24.3	4.0	1.5	1.0	0.0	1.5

Note. Response rates were based on a total of 230 participants.

(31.3%) were other activities that a fair amount of students used for their independent study of science outside of school.

Math. Sixty-four percent of the students responded that they studied math or read math books on their own at home, and 35.6% responded that they did not.

Computer use. With respect to the amount of time spent using a computer for any purpose, 30.8% of students responded that they did so 6 to 10 hours weekly, while another 26.0% spent 1 to 5 hours weekly. However, 13.2% of students spent more than 20 hours weekly using the computer. Forty-four percent (44.3%) of students said that they were conversant with some computer programming language. Twenty percent (20.4%) and 19.6% knew HTML and Basic, respectively, followed by C++ (5.2%) and Java (5.2%). Most students spent between 1 and 5 hours per week on each of several computer activities, including sending or reading e-mail (76.1%), completing school-related research (73.9%), browsing the Internet (71.0%), and playing computer games (56.4%). In contrast, students were less engaged in live chat on the Internet (less than 1 hour per week 48.5%; 1–5 hours per week 38.2%) and spent little time on shopping and computer programming (less than 1 hour per week shopping 84.6%; less than 1 hour per week computer programming 80.0%).

Almost all the students (96.5%) considered their computer knowledge to be self-taught, rather than acquired in school or from parents. A gender ($\chi^2 = 33.05$, $p < .001$) and a grade difference ($\chi^2 = 12.07$, $p < .05$) were found for computer games; both males and middle school students were more likely to spend time on computer games compared to their female and high school counterparts. Grade differences were also found in relation to browsing the Internet and engaging in live chat. Compared to high school students, middle school students spent more time browsing the Internet, but less time than high school students on live chat. Another example of grade difference was found for computer games owned by the family: Middle school students had more computer games in their families than high school students. See Table 5 for more data about grade differences.

Writing and reading. Thirty-five percent of students said that they write for their own pleasure either daily (10.6%) or several times a week (24.7%). Males and females were different in that more males than females "rarely" wrote for their own pleasure (males 19.2%, females 8.0%) or write only several times a week (daily: males 2.7%, females 8.0%; several times a week: males 8.0%, females 16.5%). A sizeable percentage of students (more than 50%) reported that they spent between 1 and 4 hours weekly writing for pleasure (1–2 hours 44.3%; 3–4 hours 11.8%). On a weekly basis, males and females were significantly different in that the latter tended to spend more time writing for pleasure than the former ($\chi^2 = 22.73$, $p < .01$). Also, males and females were significantly different in their preferences for the types of writing they pursued independently ($\chi^2 = 9.22$, $p < .05$). Both preferred fiction (males 19.8%; females 20.9%) over nonfiction (males 14.5%; females 11.0%), but females were more likely to write poetry than males ($\chi^2 = 9.22$, $p < .05$; females 9.9%; males 2.9%). Most students (82.0%) did not submit their writing for publication.

In terms of reading for pleasure, fiction (69.6%) was the favorite genre for both genders compared to nonfiction (4.8%) and poetry (0.9%). The majority of students (59.2%) spent between 1 and 6 hours weekly reading for pleasure (1–2 hours 18.4%; 3–4 hours 21.1%; 5–6 hours 19.7%). Middle school students spent more hours per week reading for pleasure than

Table 5

Chi-Squares for Extracurricular and Outside-of-School Activities by Grade

	df	χ^2	*p*	Diff.
1. Number of spelling competitions	5	20.28	.001**	HS < MS
2. Hours/week spent on computer game	5	12.07	.034*	HS < MS
3. Hours/week spent on "live" chat	5	18.77	.002**	MS < HS
4. Number of computer games at home	4	9.81	.044*	HS < MS
5. Academic clubs participated in through school	1	12.12	.000**	MS < HS
6. Debate participated in through school	1	5.85	.016*	HS < MS
7. Sports participated in through community	1	8.67	.003**	HS < MS
8. Playing a musical instrument	1	8.16	.004**	HS < MS
9. Number of years playing the major instrument	3	17.66	.001**	MS < HS

Note. MS = Middle School (n = 131); HS = High School (n = 89). 10 cases were missing. *p < .05. **p < .01.

high school students (χ^2 = 13.04, p < .05), probably due to lighter course loads and homework. Students read between one and six books monthly for pleasure (1–2 books 32.1%; 3–4 books 25.8%; 5–6 books 14.5%).

Research Question 1: Students' Participation in Outside-of-School Organized Activities

Students were asked about the type of activities in which they have participated through their communities. Sports (72.7%), music lessons/orchestras (69.3%), volunteer work (49.8%), and church/synagogue youth groups (43.8%) were the most frequently selected community activities. Political groups (6.5%), theater groups (19.3%), choir (22.7%), and dance (25.6%) were community activities in which students were least involved. Regarding the number of years of involvement in community activities, most students responded between 1 and 5 years. However, a considerable percentage of students was involved 8 years or more in church/synagogue youth groups, sports, music lessons/orchestras, or choir (see Table 1).

Males and females were significantly different in participation in community-based dance, choir, and art classes, with females participating more than males (dance χ^2 = 13.05, p < .05; choir χ^2 = 9.17, p < .01; and art classes χ^2 = 6.63, p < .05). However, males were involved in sports and dance longer than females (sports 4 years and above: males 37.8%, females 29.0%, χ^2 = 15.90, p < .01; dance 4 years and above: males 40.3%, females 3.8%, χ^2 = 13.05, p < .05); while most male students were not involved in dance, those who were tended to pursue dance for years.

Grade differences were found for political groups and volunteer work. High school students were more involved in both activities compared to middle school students (political groups χ^2 =5.41, p < .05; volunteer work χ^2 = 14.76, p < .001). The difference was larger for volunteer work (high school 65.9%; middle school 38.3%) than for political groups (high school 12.0%; middle school 3.4%).

Almost half of the students (45.4%) responded that they had participated in school- or community-based plays and theater more than 1 year (1–3 years 39.1%; more than 3 years 5.9%). More middle school students were engaged in community-based plays and theater than high school students (1–3 years: middle 29.1%, high school 10.0%; more than 3 years: middle 5.0%, high school 0.9%), and these differences were statistically significant (χ^2 = 23.33, p < .01). Lastly, the majority of students (83.2%) played a musical instrument, with more middle school students playing than high school students (middle school students 88.5%; high school students 73.6%; χ^2 = 8.16, p < .01). Most students had played their major instruments between 3 and 5 years (38.7%) or between 6 and 8 years (32.3%).

Research Question 2: Differences in Participation by Talent Area

Students were compared on the basis of the course they took in the summer program. Course choice reflected interest and talent domain since students had to qualify on the basis of test scores and previous achievement. We examined the data to see if participation in outside-of-school and extracurricular activities and independent study at home was consistent with talent area.

Compared to 119 students enrolled in verbal (n = 69) or social science (n = 50) courses, 111 students in math (n = 50) or science (n = 61) courses participated more years in math

Table 6

Chi-Squares for Extracurricular and Outside-of-School Activities by Talent Area

	df	χ^2	*p*	Diff.
1. Number of years in math clubs or other extracurricular math activities	5	15.22	.009**	VSS < MTS
2. Studying mathematics or read mathematics books at home	1	12.65	.000**	VSS < MTS
3. Number of involved reading/literature clubs or group activities	4	9.75	.045*	MTS < VSS
4. Frequency of time spent on writing for own pleasure	3	14.93	.002**	MTS < VSS
5. Hours/week spent on writing for own pleasure	6	12.82	.046*	MTS < VSS
6. Number of books reading for pleasure for month	8	17.85	.022*	MTS < VSS

Note. MTS (n = 111): Math (n = 50) + Science (n = 61); VSS (n = 119): Verbal (n = 69) + Social Science (n = 50). *p < .05. **p < .01.

clubs or other extracurricular math activities (1 year or above: math/science 77.6%, verbal/social science 60.2%) and more frequently studied math on their own or read math books at home (math/science 75.7%, verbal/social science 53.3%). The science (69.6%) students were more likely to participate in school-based academic clubs than the verbal (39.3%) or math (42.6%) students. These differences were statistically significant (science vs. verbal χ^2 = 10.79, p < .01; science vs. math χ^2 = 7.66, p < .01). Alternatively, students enrolled in verbal and social science courses participated in reading/literature clubs or groups activities more than students enrolled in math and science courses (1 year or above: verbal/social science 30.3%, math/science 17.0%). Compared to students in math and science courses, the verbal/social science students also wrote more frequently for their own pleasure (daily: verbal/social science 16.3%, math/science 4.5%; several times a week: verbal/social science 28.5%, math/science 21.4%; sometimes: verbal/social science 35.0%, math/science 36.6%; rarely: verbal/social science 20.3%, math/science 37.5%) and read more books for pleasure per month (three or above: verbal/social science 71.2%, math/science 58.6%). All these differences were statistically significant (see Table 6).

When asked about whether they had someone at home with whom they converse in a language other than English, more students enrolling in math and science (52.7%) than verbal and social science (35.6%) courses responded "yes" (χ^2 = 6.79, p < .01). Correspondingly, math students spent significantly more time compared to verbal students conversing in a language other than English at home (χ^2 = 8.45, p < .05), and a similar result was also found when comparing the math students to the science students (χ^2 = 10.21, p < .05). Likewise, the math/science students spent more hours per week participating in foreign language clubs or group activities than the verbal/social science group (χ^2 = 19.33, p < .05). They also spent more time weekly on computer programming compared to the verbal students (χ^2 = 8.28, p < .05). The results suggest a strong connection between math ability and interest and early continued exposure to a foreign language at home and possibly to a computer language.

The groups were significantly different in their participation in outside-of-school activities through their communities. Students in verbal and social science courses, compared to students in math and science courses, were more likely to participate in dance (verbal/social science 20.4%; math/science 10.1%; χ^2 = 4.17, p < .05), theater groups (verbal/social science 25.0%; math/science 12.5%; χ^2 = 5.07, p < .05), choir (verbal/social science 29.0%; math/science 16.8%; χ^2 = 4.15, p < .05), and do volunteer activities (verbal/social science 55.8%; math/science 40.4%; χ^2 = 4.98, p < .05) through their communities. Also, more verbal (26.7%) than math (9.8%) students participated in community-based theater groups (χ^2 = 4.39, p < .05). Thus, students' patterns of participation, with the exception of math students' involvement in foreign language clubs, mirrored their talent area and interest as determined by their summer course choice.

Research Question 3: Parental Involvements in Educational Activities

Parents were more involved in their children's language arts and mathematics activities than science activities and least engaged in computer science activities. Although 80.1% and 79.0% of students got help for their language arts and mathematics homework from their parents, respectively, most of these got help only infrequently (mathematics 49.8%; language arts 36.3%). Compared to high school students, middle school students reported that their parents more often helped them with math (daily or weekly: middle school 25.2%, high school 8.9%) and language arts homework (daily or weekly: middle school 30.5%, high school 10.0%). Similar trends were found for parental help with homework in other subject areas.

Students sought help from their parents more often in mathematics (76.9%) and language arts (78.9%) than in sci-

Table 7

Chi-Squares for Parental Involvements by Grade

	df	χ^2	*p*	Diff.
1. Parental help with math homework	6	27.67	.000**	HS < MS
2. Parental help with language arts homework	6	19.44	.003**	HS < MS
3. Parental help with math in unassigned homework	6	33.97	.000**	HS < MS
4. Asking parents for help with mathematics homework	6	24.66	.000**	HS < MS
5. Asking parents for help with language arts homework	6	13.82	.032*	HS < MS
6. Parental instruction in computer activities	6	16.28	.012*	HS < MS

Note. MS = Middle School (n = 131); HS = High School (n = 89). 10 cases were missing. *p < .05. **p < .01.

ence (53.7%) and computer science (17.7%). They were least likely to seek help from their parents in computer science (82.3% never asked for any parental help).

Grade differences were found in both mathematics and language arts; middle school students asked their parents for help with their homework more often than high school students (math daily or weekly: middle school 22.9%, high school 10.0%; language arts daily or weekly: middle school 27.9%, high school 10.0%).

Regarding whether their parents taught them content that was not assigned homework, more than half of the students responded "yes" in mathematics (65.1%), computer science (59.0%), and science (58.6%). Grade differences were found, in that parents were more likely to teach their middle school than their high school child unassigned content in math (daily or weekly: middle school 21.4%, high school 3.3%) and computer activities (infrequently or never: middle school 77.3%, high school 94.2%; see Table 7). No significant gender difference was found for the parental instruction across the subject areas.

Fathers were more likely to help students with homework in mathematics (χ^2 = 38.46, p < .001) and science (χ^2 = 14.47, p < .01), and mothers are more likely to help in language arts (χ^2 = 92.60, p < .001), while in computer science, someone else besides parents was more likely to help with homework. (χ^2 = 8.49, p < .05).

Students reported that their fathers more than mothers taught them mathematics (χ^2 = 57.02, p < .001), science (χ^2 = 35.05, p < .001), and computer science content outside of assigned homework (χ^2 = 44.37, p < .001). Gender differences were found only for computer science activities (χ^2 = 9.74, p < .05); more males than females responded that their fathers, rather than their mothers, taught them computer science content (males: father 51.8% vs. mother 12.0%; females: father 42.4% vs. mother 31.8%). Figures 1 and 2 present the results for parent involvement and support for unassigned content.

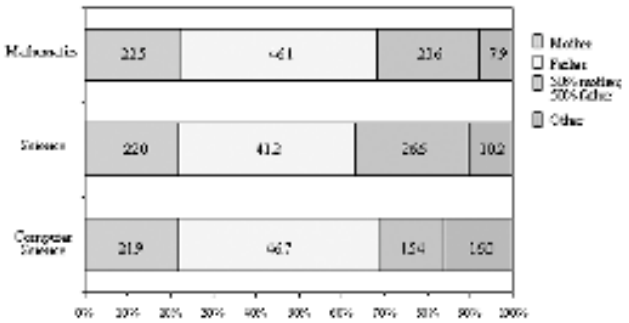

Figure 1. Parental instruction in unassigned content (N = 230)

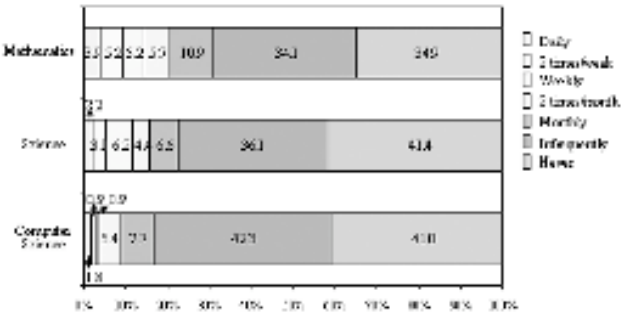

Figure 2. Frequency of parental instruction in unassigned content (N = 230)

Summary and Discussion

Overall, gifted students in this study were more involved in competitions, clubs, or other extracurricular activities in mathematics than in any other subject area. Computer science was the area where the students were the least involved in terms of competitions and extracurricular activities, which probably reflects the fact that there are few competitions

available. There may be more contests in this area in the future.

This study found sports to be the most frequent extracurricular activity for middle school and high school gifted students, which is consistent with other research (Eide & Ronan, 2001). However, gender differences were not found for participation in sports, which is inconsistent with previous research on gifted children, as well as previous research on heterogeneous groups of students (Dauber & Benbow, 1990; Hofferth & Jankuniene, 2001; McNeal, 1998; Posner & Vandell, 1999). It is not clear whether gifted girls participated to a greater extent in sports or gifted boys less, compared to heterogeneous groups of students; data across students were not comparable. A fair number of students in this study were engaged in band/orchestra/jazz group and academic clubs as their preferred school-based extracurricular activities, while sports and music lessons/orchestras were the two activities most frequently engaged in by students through their "communities." Clearly, sports and music engage a significant number of these students.

Other major community-based activities for the students included volunteer work and participation in religious groups and churches. Ten to 20% of students were involved in church activities for 10 years or more. This represented the most sustained level of involvement that we observed among the students studied. Obviously, church activities offered the students benefits that encouraged their persistent participation, and these benefits probably include emotional and psychological support from adults and peers, guidance, opportunities for social interaction, opportunities for leadership, comraderie, and so forth. This finding is encouraging given that previous research (see Olszewski, Kulieke, & Buescher, 1987) indicated that families of gifted children are not very religious. Church activities may be particularly stable ones for a family, and thus may have a significant impact on a child's life in multiple and important ways. Our study found that a surprising number of students (around 50%) were doing volunteer work in their community and about half (45%) of students participated in community theater. Volunteer work may be related to children's involvement in church groups, as these may be organized through the churches (we did not ask about this specifically). The level of involvement in community theater may be indicative of both the interest of students, particularly middle school students, in acting and drama, and the unavailability of these programs through school.

Students enjoyed playing and working with computers. They spent a considerable amount of time—6 to 10 hours weekly—on computer-related activities, but the time spent on the computer was more likely to be without the involvement of their parents. Additionally, students' knowledge in computer science was mostly self-taught, rather than acquired in school or from parents. Computers were primarily used for communication (i.e., e-mails), school-related work, and computer games, but were rarely used for chatting and shopping. Especially for science, computers were one of the tools used by students to search for new science content information on Web sites and served as a learning opportunity or resource outside of school. Mayer, Schustack, and Blanton (1999) found that educational computer programs promote children's problem-solving abilities, including knowledge about computer literacy, comprehension skills, planning skills, and basic academic skills. However, students in this study were not acquiring advanced levels of computer programming languages such as C++ and Java through independent learning despite the significant use of computers.

Writing and reading for pleasure were also activities that students pursued a great deal on their own. A sizeable proportion of students, particularly females, wrote for pleasure at least several times a week, spending 4 to 5 hours weekly doing so. This writing included journaling and creative writing. This finding is consistent with enrollment patterns in the summer program: Creative writing classes are among the most frequently chosen by summer students. Writing is evidently a creative outlet for these students, although creative writing is typically given short shift by both middle and high schools.

This study revealed some gender-stereotypical tendencies regarding participation in school and outside-of-school activities for the gifted students involved in the study. More males than females were engaged in science clubs, science-related extracurricular activities, and academic clubs, whereas females participated more in drama/theater, dance, and cheerleading/pep clubs compared to males. Similar to school-based extracurricular activities, gifted females participated more in community-based dance, choir, and art classes than gifted males. These findings are somewhat consistent with Hofferth and Jankuniene's (2001) research that girls tend to participate more in art and passive leisure activities than boys outside of school. In contrast, previous studies also showed that girls are more engaged in reading, studying, or academic clubs in comparison to boys, who are more involved in coached sports (see Hofferth & Jankuniene; Posner & Vandell, 1999), but these differences among heterogeneous groups of students were not found in the present study.

Also, our study suggests differences in parental involvement in males' and females' activities according to the subject area. Students got assistance primarily from their fathers in mathematics and science and their mothers in language arts, and this pattern is consistent with previous research on gifted children (Raymond & Benbow, 1989). Lubinski et al. (2001) found that, for academically precocious students, gender differences in educational-vocational profiles begin to stabilize around the age of 13. Benbow and her colleagues (2000) found

similar gender differences in ability and preferences of gifted males and females; males were invested in inorganic sciences and engineering, while females were more interested in the medical arts, biological science, social science, and humanities. Gifted females tend to prefer verbal classes and subjects, while males prefer science and math, and this is true even for gifted females who are very mathematically talented (Olszewski-Kubilius & Turner, 2002). The present study supports that gender-typical patterns of expertise (fathers in math and science, mothers in language arts) are present in gifted children's home and perceived by them to be operative (i.e., children go to their mothers for assistance with language arts and to their fathers for assistance with mathematics). These patterns are likely to reinforce gender-stereotypical choices for verbal versus math and science courses among gifted adolescents.

Significant grade differences found include that high school students were more engaged in volunteer work and political groups than middle school students, while middle school students were more engaged in community activities related to music and scouting. These findings mirror opportunity structures for these activities and differences in motivations to participate in extracurricular or outside-of-school activities. High school students may be choosing activities to enhance their attractiveness as a college candidate or to explore career options, for example. Middle school students sought and got help from their parents with their homework in mathematics and language arts more than did high school students. although, generally, parents were more involved in children's activities in language arts and mathematics than science and computer science.

More than 50% of the student respondents reported that their parents, mostly their fathers, taught them content material outside of what they were learning in school in science and math, although it predominantly occurred infrequently. This is another example of significant learning experiences in content areas occurring outside of school. We typically think of parents as providing direct teaching only to very young children, but our results suggest that parents are also doing this with middle school students and high school students, although less often for their high school children. This finding needs further investigation. For example, what is the impetus for this teaching? Are parents supplementing school instruction because they perceive that it is inadequate? Are they responding to children's requests for enrichment? Are parents using purchased materials, or are they teaching children concepts that they know? Parents, however, were not typically a resource for assistance with or teaching particularly about computer skills or knowledge regardless of children's age or grade levels.

This study suggests that overall, math and verbal students indicate similar patterns of involvement in numerous extracurricular and outside-of-school activities; however, the courses taken by students in the summer program, to some extent, reflect and are consistent with their participation in extracurricular and outside-of-school activities. For instance, as expected, compared to students enrolling in math courses, students enrolling in verbal courses were more involved in reading/literature clubs and literature-related group activities and more frequently read and wrote for their own pleasure, while students in math courses were more engaged in math-related and foreign language activities. Thus, there is consistency in students' selection of courses and extracurricular activities, both driven by interests and ability. The question remains as to how these activities enhance students' talents and abilities. One of the most significant findings of this study is that students got help relatively "infrequently" from their parents across the subject areas. Clearly, participation in extracurricular activities, as well as related summer courses, gives students multiple opportunities to gain skills, content knowledge, and support beyond what is available through their basic school courses. A great deal of learning is occurring outside of school and will likely contribute significantly to these students' level of talent development and ultimately affect their occupational pursuits in adulthood (Hong, Milgram, & Whiston, 1993; Hong, Whiston, & Milgram, 1993).

In summary, our results show that gifted adolescents are very involved in a range of school-based extracurricular activities and community-sponsored activities. Gifted students in this study found ways to involve themselves in independent, enriching, talent developing activities at home particularly in the areas of science, reading, writing, and drama. Extracurricular activities at the secondary level are often considered dispensable and vulnerable to being eliminated whenever budgets are cut (Fredricks et al., 2002). Schools, but also communities, can play a pivotal role in the talent development of gifted students by providing varied, challenging educational opportunities commensurate with their exceptionally high abilities (Csikszentmihalyi, Rathunde, & Whalen, 1997; Felhusen, 1998, 2001; Feldhusen & Wood, 1997; Pleiss & Feldhusen, 1995). For gifted adolescents, competition with and emotional support from other talented peers obtained from extracurricular activities are also crucial to fulfilling their gifted potential, especially after moving away from their initial supporters, their parents, in childhood (Bloom, 1985a, 1985b; Davis & Rimm, 1998; Lee, 2002b; Piirto, 1998; Sosniak, 1985; Subotnik, Miserandino, & Olszewski-Kubilius, 1996). Involvement in talent-related extracurricular activities can enhance the development of gifted children not only in academic fields, but also in nonacademic disciplines (Freeman, 2001; Hong, Whiston, & Milgram, 1993). In-school and outside-of-school activities after school can be a good venue for gifted students to identify their talent areas and develop their abilities with other talented peers through competition, challenge, and enjoyment.

Limitations and Future Research

The present study did not delve into who or what contribute to getting children involved in certain types of in-school and outside-of-school activities. Do interests drive selection? To what extent do parents make decisions about what activities a child gets involved in? What is the basis for parents' decisions? A desire to have their child advance? A desire to help their child find peers? A desire to help their child nurture a talent or develop well-roundedness? Participation in extracurricular or community-based activities may be influenced by parents and requires parental assistance, but reading or journaling or story writing do not. These are activities children do "on their own time" and are probably most predictive of later choices regarding college major, hobbies, or even career. We do not know how typical these patterns are for other groups of talented students (e.g., artistically, musically, or athletically) and, particularly, academically gifted students from low-income families. This requires further research about direct parental teaching, including both what is taught and the motivation for it. Also, comparisons between gifted children and heterogeneously grouped/average-level students need to be explored. Our sample was biased towards high SES, including parental education, income, and racial/ethnic background. These variables were not included for analysis due to the homogeneity of the students regarding them. It will be important to continue to investigate what motivates or influences gifted students with a variety of socioeconomic and racial/ethnic background to be engaged in various extracurricular activities and how participation affects their subsequent talent development.

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Appendix A: List of Questions

1. Number of competitions participated in: (a) math (e.g., MathCounts, Math Olympiads); (b) science (e.g., Science Olympiads); (c) computer (e.g., programming, design); (d) writing (e.g., creative writing/poetry); (e) oral (e.g., oratorical contests/ debates); (f) foreign language (e.g., German); (g) spelling
2. Number of years participated in and hours per week spent on such as clubs or other extracurricular activities in (a) math; (b) science; (c) computers; (d) reading/literature (e.g., great books, discussion clubs); (e) writing (e.g., school paper, journalism club, writing workshop); (f) oral expression (e.g., debate, dramatics, theater class); (g) foreign language clubs or other extracurricular activities
3. Parental involvement (e.g., help with and instruction in) in homework/unassigned content in: (a) math; (b) science; (c) computer science; (d) English, spelling, writing, reading or literature, or foreign language
4. How often study math on one's own or read math books at home
5. Types of science activities (e.g., read science magazine or articles, visited science websites, used science kit to conduct experiments, build models) doing on one's own during the past year

6. Degree to which computer knowledge is self-taught
7. Types of computer languages (e.g., Basic, Pascal, Java, C++, HTML, Logo) knowledgeable enough to program with
8. Number of computer games at home
9. Hours spent/week using a computer for any purpose
10. Hours spent/week on various types of computer activities (e.g., computer games, programming, emails, "Live" chat, school-related research or projects)
11. Hours/week spending alone at the computer
12. Types of foreign languages knowledgeable enough to read or speak fluently
13. Having someone at home with whom conversing in a language other than English
14. Types of writing doing for fun
15. Submit writing for publication
16. Hours/week spent on reading and writing for pleasure
17. Types of writing and reading for pleasure (e.g., non-fiction, fiction, poetry)
18. Number of books read per month for pleasure
19. Number of times participating in school-or community-based plays
20. Types of extracurricular school- or community-based activities and number of years of participation (e.g., sports, academic clubs, yearbook, literary clubs, drama/theater, political organizations, scouting/4H, church/synagogue youth groups, volunteer work)
21. Number of years played musical instruments