

Long-Term Effects of Acceleration on the Social-Emotional Adjustment of Mathematically Precocious Youths

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The Study of Mathematically Precocious Youth (SMPY) identified over 2,000 12-14 year-olds who scored as well as a random sample of high school females on the College Board Scholastic Aptitude Test. SMPY encouraged these students to accelerate their education; over 50% did. Their social development at age 18 and at age 23 was then assessed. We investigated the effects of amount and type of educational acceleration (grade skipping and subject matter) on psychosocial indices (self-esteem, locus of control, self-acceptance/identity, and social interaction). No gender differences were significant. Accelerants as well as nonaccelerants reported high self-esteem and internal locus of control. Acceleration did not affect social interactions or self-acceptance/identity and it also did not relate to social and emotional difficulties.

Educational acceleration of intellectually advanced students is often used in American schools. Clear benefits are noted for both short-term and long-term academic performance (e.g., Benbow, 1983; Brody & Benbow, 1987; Daurio, 1979; Feldhusen, 1989; Janos, 1987; Janos & Robinson, 1985b; Kulik & Kulik, 1984; Robinson, 1983). Primarily because of these positive evaluations, acceleration of gifted students is widely endorsed (e.g., Cox, Daniel, & Boston, 1985; Elkind, 1988; Feldhusen, 1989; U.S. Department of Education, 1986). Unfortunately, parents and educators are often skeptical about acceleration because of concerns about the social and emotional development of accelerated youths (Southern, Jones, & Fiscus, 1989). Using data from a 10-year longitudinal study of over 1,200 intellectually talented students who had been encouraged to accelerate their education, we address the validity of these concerns.

The basic premise underlying the use of acceleration is that the pacing of educational programs must be responsive to the capacities and knowledge of individual children (Robinson, 1983); that is, effective teaching involves "the problem of the match"—students should attempt new learning at a level slightly exceeding that already mastered. Acceleration, which involves the adaptation of curricula designed for older students for use with younger gifted students, is one productive and practical means of solving the problem of the match for gifted students (Benbow & Stanley, 1983; Robinson, 1983). In addition, acceleration should enhance gifted students'

achievement motivation. Growth in achievement motivation arises out of the challenge and satisfaction gained while mastering tasks that "match" capabilities (Dweck & Elliott, 1983; Heckhausen, 1982).

In spite of strong evidence for the academic benefits of acceleration, educators and psychologists have found its use to be controversial. Resistance to acceleration is often based on preconceived notions (Daurio, 1979). Well-meaning concern about the deleterious effects of acceleration on social and emotional development is repeatedly expressed. This concern is difficult, however, to reconcile with what is known about the social and emotional development of the gifted. Intellectually advanced children exhibit advanced social maturity (for reviews, see Janos & Robinson, 1985a; Schneider, 1987), and they often seek older friends.

Logically, therefore, it would appear that acceleration should be beneficial to gifted students, not only on educational and motivational grounds, but also on social grounds. The existing evidence does suggest that acceleration has at least no detrimental effects on social and emotional development (Brody & Benbow, 1987; Daurio, 1979; Janos, 1987; Pollins, 1983; Robinson & Janos, 1986). Three limitations temper this conclusion, however: (a) Many studies have failed to report the amount and/or type of accelerative method used; (b) there is low consensus among researchers as to what constitutes good social and emotional adjustment; and (c) most studies lack appropriate reference groups, that is, equally gifted nonaccelerants (Pollins, 1983).

The purpose of this study is to provide empirical data on social and emotional development from a 10-year longitudinal study of intellectually talented students, some of whom were accelerated in elementary or secondary school. All students in this study exhibited intellectual abilities at the level of students 4 to 5 years older. They were accelerated by different amounts and in different ways. Some opted for no acceleration. Four generally-agreed upon parameters of social and emotional functioning were evaluated. Our (null) hypothesis was that acceleration, regardless of type and amount, is not related to social and emotional development at age 23.

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Moreover, it was predicted that most social or emotional difficulties reported at age 18 would be temporary. Because this 10-year longitudinal study involved 1,247 students in a test of our null hypothesis, it has considerable statistical power. It also counters most of the limitations of previous studies.

A further unique aspect of our study is that it evaluates acceleration by examining students both during and near the end of their formal educations. Intellectually talented students were studied at high school graduation and again a year beyond typical college graduation age (i.e., age 23). The latter time point is a minimum of 5 years after any acceleration took place. Because most disadvantages associated with acceleration are usually temporary in nature (Fund for the Advancement of Education, 1957; Pressey, 1967; Terman & Oden, 1947), this is an appropriate time point for an evaluation.

Lastly, our study investigated whether acceleration affected male and female students differently, particularly with respect to psychosocial indices. Although gifted male and female students tend to be alike in self-concept and self-esteem (Brody & Benbow, 1986; Fox, 1977), previous studies have suggested that gender differences may exist. Solano (1987) has reported that gifted boys tended to be better accepted than gifted girls; Kelly and Colangelo (1984) have reported that effects of special program participation differed for gifted boys and girls. Schneider, Clegg, Byrne, Ledingham, and Crombie (1989) obtained slightly different results, however. Yet Fox (1977) reported that female students avoided acceleration because of fears of negative consequences on their peer interactions.

Method

Subjects

We investigated students in Cohort 1 of the Study of Mathematically Precocious Youth's (SMPY) longitudinal study (Benbow, 1983). Cohort 1 students had taken part in SMPY's first three talent searches (i.e., in 1972, 1973, or 1974). In those, 7th/8th graders in Maryland were eligible to participate if they had scored in the upper 5% (in 1972) or upper 2% (in 1973 and 1974) nationally on any mathematics achievement subtest. Qualified students took the College Board Scholastic Aptitude Test-Mathematics (SAT-M), and those in 1973 also took the SAT-Verbal (SAT-V). The SAT is designed to measure developed mathematical and verbal reasoning ability of high school 11th and 12th graders. Although the extent to which the SAT is a measure of achievement for high school students has not been established, we have argued that the SAT is a more potent measure of reasoning for 7th/8th graders than for 11th/12th graders (Stanley & Benbow, 1986).

Students had to score at least 390 on SAT-M or 370 on SAT-V for entry into Cohort 1 of the study. These SAT criteria selected students who, as 7th or 8th graders, scored as well as the average high school female student. We estimated that Cohort 1 represented the top 1% in ability. Mean 8th-grade SAT scores of Cohort 1 (7th-grade scores had been grade-adjusted) were 556 ($SD = 73$) on SAT-M and 436 ($SD = 85$) on SAT-V for male students and 519 ($SD = 59$) on SAT-M and 462 ($SD = 88$) for SAT-V for female students.

Participants came from families where parents typically were highly educated and fathers held high-status jobs (Keating, 1974). Partici-

pants held positive attitudes toward mathematics, science, and school and had good school performance. SMPY showed these students how to use acceleration to make their educational experiences more appropriate and urged them to accelerate.

After-College Questionnaire

Two questionnaires (an after-high school and an after-college questionnaire) were the sources of data for this study. The after-high school questionnaire is described in Benbow (1983). The 24-page, printed after-college questionnaire, which was the primary source of data, sought information on students' educational and career achievements, decisions, and aspirations; employment history; interests and activities; accomplishments; attitudes and life-style expectations; family encouragement and characteristics; social and emotional development; and evaluation of SMPY. For comparability and validity purposes, and whenever possible, we used items from Project Talent's questionnaires or the sophomore questionnaire of the High School and Beyond National Longitudinal Study (NLS). NLS is conducted by the National Center for Education Statistics. A draft of our questionnaire was critiqued by several experts in the field and was revised accordingly. Then we pilot tested the questionnaire: Graduate students in the mathematical sciences at Johns Hopkins University were paid to complete the survey and to provide comments on the effectiveness of the questionnaire. This led to further revisions.

From this lengthy after-college questionnaire, items that related to self-acceptance/identity, social interaction, self-esteem, and locus of control were selected as indices of social-emotional development (see Appendix). Items from the self-esteem and locus of control measures were the same as those (with minor modification) used in the NLS questionnaire (Conger, Peng, & Duntzman, 1976; Peng, Fetters, & Kolstad, 1981).

Questions relating to the four psychosocial indices were combined into scales; the Appendix lists the actual questions used and how they were grouped into scales. All four scales were subsequently analyzed for internal reliability by using Cronbach's coefficient alpha. The four-item self-acceptance/identity and social interaction scales were found to have alpha coefficients of .85 and .76, respectively. Alpha coefficients for the six-item self-esteem and six-item locus of control scales were .80 and .59, respectively.

Two acceleration variables also were computed for every student. (Those not accelerating were given a value of zero.) *Grade acceleration* was the number of grades in school skipped, which included early entrance to school. *Subject-matter acceleration* was the number of Advanced Placement (AP)¹ and/or college courses enrolled in while in high school.

Procedure

All students (100%) completed a basic background questionnaire before they took the initial SAT in a talent search. SMPY has now surveyed students in Cohort 1 twice: first at their expected date of high school graduation (91% response rate; Benbow, 1983; Benbow & Stanley, 1982) and then 5 years later at age 23. The second follow-up survey occurred 1 year after expected college graduation date. The procedures were the same as those used in the first follow-up survey (Benbow & Stanley, 1982), except that no monetary incentive was provided in the second follow-up. Initial response rate to the second follow-up was 65%. Because viability of a longitudinal study depends

¹ Advanced Placement (AP) courses are geared at the college freshman level but are offered in high school. Depending on test results, students may receive credit and/or advanced standing in college for such work.

on retaining a large proportion of the original sample, we surveyed nonrespondents by telephone with 20 critical questions. This increased the response rate to over 70%. Our sample included 786 male and 461 female students.²

A discriminant analysis was performed by sex to see if nonrespondents differed from respondents on the basis of 8th-grade SAT-M score, high school SAT-M and SAT-V, college attendance, quality of college attended, parental educational levels, number of siblings, and fathers' occupational status. Respondents and nonrespondents did not differ significantly.

Results

Data on the scales measuring the effects of acceleration on social interaction and self-acceptance/identity were obtained at age 23. Only individuals who had accelerated their education provided responses.³ The means and standard deviations on the social interaction and self-acceptance/identity variables (0 to 4 point scale—from *strongly unfavorable effect* to *strongly favorable effect*) indicated slightly positive effects of acceleration on social and emotional development (see Table 1). There were no statistically significant sex differences.

The zero-order correlations among social interaction and self-acceptance/identity scales and amount of grade acceleration or subject-matter acceleration were not statistically significant, except for one (see Table 1). For females, the correlation between subject matter acceleration and social interaction was significant ($p < .05$). The differences in r s between male and female students were not significant.

Both accelerants and nonaccelerants responded to the items included in the self-esteem and locus of control scales. Results indicated that the students at age 23 felt good about themselves and felt in control of their lives (Table 1). There were no statistically significant gender differences.

Acceleration of either type, which included no acceleration, did not relate to locus of control, as tested by Pearson r s (Table 1). Although not statistically significant except in one case, the relations between self-esteem and grade or subject-matter acceleration were consistently negative. The relations were not substantial, however. Moreover, when only those students who skipped a grade were studied, there was also no relation between amount of acceleration and self-esteem. The relations between acceleration and self-esteem or locus of control did not vary as a function of sex.

Two multivariate analyses of variance (MANOVA) were then calculated between grade and subject-matter acceleration and the psychosocial indices. Scores on the scales measuring the perceived effects of acceleration on self-acceptance/identity and social interaction were available only for individuals who had accelerated. The MANOVA relating these two variables with the two acceleration variables was not significant. The canonical r equaled .11.

Locus of control and self-esteem scores were available for all students regardless of whether they had or had not accelerated. Those scores were related to the two acceleration variables by a MANOVA. The MANOVA was significant, $F(4, 1824) = 3.41, p < .01$. The canonical r was .12, which is hardly substantial. Amount of acceleration related negatively to self-esteem only.

We had predicted that there would be gender differences in both the amount and the effects of acceleration. Gender differences were found in subject-matter acceleration, with results favoring male students (50% male vs. 43% female, $p \leq .05$) but not in grade acceleration (17.2% male vs. 16.2% female, *ns*; also see Table 1). Moreover, when we compared female students with male students, twice as many of the r s reported in Table 1 indicated a slightly negative relation between acceleration and the psychosocial indices for female students. That is, for female students, 6 out of the 8 r s were negative, whereas for male students only 3 of the 8 were. This trend in the data was not statistically significant by a sign test. Moreover, all r s were negligible. Thus, these findings indicate that gifted female students as well as gifted male students do not perceive their acceleration to have negative effects on their social and emotional development.

Long-Term Effects of Acceleration

At age 18, a few of the accelerated students (6.4%) had reported detrimental effects from acceleration on their social and emotional development. In comparison, only about one-half (3.3%) of the accelerants reported at age 23 distinctly negative effects of acceleration on self-acceptance/identity or social interaction (i.e., scale scores ≤ 1). This represented a reduction, over time, in the number of accelerants reporting negative effects (termed "negative accelerants").

We also assessed whether negative accelerants at age 18 would evaluate at age 23 the effects of acceleration differently than the other accelerated students. Thus, the scores on the four psychosocial scales were broken down according to the rated effect of acceleration on social and emotional development at age 18 (Table 2). That is, scale scores are reported separately for accelerants who rated at age 18 the social and emotional effects of acceleration: (a) to be negative, (b) to have no effect, or (c) to be positive. Results indicate that for those who at age 18 had reported negative effects from acceleration on social and emotional development, their self-esteem, locus of control, self-acceptance/identity, or social interactions generally were slightly negatively affected at age 23.

We tested these relations with an analysis of variance (ANOVA).⁴ Separate ANOVAs were performed on the four scales by gender and by rated effect of acceleration at age 18 (negative,

² Complete data were not available for all subjects.

³ Grade and subject-matter acceleration related to ability on SAT-M and SAT-V in 7th/8th grade (r s ranged from .15 to .41 for male and female students). Grade acceleration was not consistently or even moderately related to any other background or student attitude variable. Subject-matter acceleration did relate modestly to parents' educational and occupational status and students' attitude toward school ($r < .2$). Most of the subject-matter acceleration was in the math/science areas, but there was diffusion (Benbow, 1983; Benbow & Stanley, 1982).

⁴ The pattern of unequal N s in the subgroups resulted in nonorthogonal ANOVAs. Although discarding observations would artificially balance the design, it would also decrease power. Therefore, we followed the four-step procedure outlined by Appelbaum and Cramer (1974) to handle the problems resulting from nonorthogonality.

Table 1
Descriptive Statistics for the Psychosocial Indices and Their Correlation With Acceleration Measures by Sex

Variable	N	M	SD	r with acceleration	
				Grade	Subject matter
Social interaction					
Male	381	2.28	0.60	-.01	-.02
Female	211	2.44	0.66	.04	-.16
Self-acceptance/identity					
Male	373	2.51	0.73	.06	.05
Female	209	2.62	0.77	-.05	-.01
Self-esteem					
Male	655	3.20	0.62	-.09	-.06
Female	391	3.15	0.68	-.08	-.06
Locus of control					
Male	652	3.03	0.50	.02	.01
Female	398	3.09	0.49	-.03	.02
Grade acceleration					
Male	787	0.22	0.53		.24
Female	461	0.18	0.45		-.02
Subject-matter acceleration					
Male	688	1.42	2.00		
Female	415	0.91	1.36		

Note. See Appendix for coding format of psychosocial variables, which were on a 0- to 4-point scale from negative to positive (2 = neutral).

none, or positive). No significant effects were found for the locus of control measure. The main effect for how acceleration was previously rated to affect social and emotional development was statistically significant for self-esteem, $F(2, 701) = 8.23, p < .001$; self-acceptance/identity, $F(2, 451) = 17.66, p < .001$; and social interaction, $F(2, 455) = 8.80, p < .001$. Students who reported no effect or positive effects from their acceleration had higher self-esteem, self-acceptance/identity, and levels of social interaction. The results did not differ as a function of gender, however.

Discussion

We had predicted that amount and/or type of educational acceleration (including no acceleration) of gifted children

would not relate to social and emotional development at age 23. Thus, we tested the null hypothesis. Our data, based on 1,247 gifted students, provided support for the null hypothesis. Most students in our sample reported high self-esteem and internal locus of control; the accelerants as well as the nonaccelerants appear to feel good about themselves and feel they have control over their lives. Their sense of self-efficacy was strong. Moreover, SMPY students who had considered themselves to be educationally accelerated reported no detrimental effects overall from acceleration. In fact, they may have felt that their social and emotional adjustments were positively affected. Greater amounts of acceleration were not related to greater amounts of social and emotional difficulties. This study is therefore consistent with the prevailing view in the literature that concerns about possible social and emo-

Table 2
Means and Standard Deviations, at Age 23, Broken Down by Rated Effect of Acceleration on Social and Emotional Development at Age 18

Rated effect of acceleration at age 18	Self-esteem			Locus of control			Self-acceptance/identity			Social interaction		
	M	SD	N	M	SD	N	M	SD	N	M	SD	N
Negative												
Male	2.89	0.59	34	2.90	0.61	33	1.91	0.65	19	1.93	0.34	20
Female	2.47	0.45	5	3.17	0.53	5	0.50	0.35	2	1.50	0.35	2
None												
Male	3.17	0.69	115	3.00	0.45	117	2.45	0.62	74	2.21	0.51	73
Female	3.11	0.62	68	3.23	0.38	71	2.36	0.81	36	2.22	0.51	34
Positive												
Male	3.25	0.61	306	3.08	0.50	301	2.65	0.73	202	2.36	0.66	207
Female	3.24	0.65	174	3.09	0.49	173	2.66	0.73	119	2.46	0.67	120

Note. See Appendix for coding format of psychosocial variables, which were on a 0- to 4-point scale from negative to positive (2 = neutral).

tional maladjustment resulting from acceleration are unfounded.

We had predicted that the effects of acceleration on the psychosocial indices would differ as a function of sex. This prediction was not supported by the data. Moreover, Fox (1977) had concluded that female students appeared to be fearful of acceleration because of possible reduced standing within the peer group. Such fears appear to be unfounded. Accelerated gifted female students reported slightly favorable effects of acceleration on their social interactions.

There was one exception to the otherwise consistent set of positive findings. Grade acceleration related weakly but negatively ($-.09$) to self-esteem. A negative relation has also been reported for participation in segregated (i.e., enrichment) programs for the gifted. Such studies have noted that self-concepts of gifted students tended to decline when the students were placed in special classes for the gifted (Coleman & Fufts, 1982, 1985; Kulik & Kulik, 1982; Maddux, Scheiber, & Bass, 1982; Schneider et al., 1989). Thus, the negative relation between acceleration and self-esteem may not be due to acceleration. Rather, these findings may reflect changes in the social comparisons being made by the accelerants. Being placed in a higher grade with older students or in segregated classes for the gifted may result in gifted students' comparing themselves with other gifted or advanced students. Self-concepts are predicted to decline in such instances (Festinger, 1954).

Although psychosocial adjustment of intellectually talented children is at least comparable to those not so designated, students with extremely high abilities, especially in verbal areas, tend to experience difficulties and these difficulties increase with age (e.g., Brody & Benbow, 1986; Freeman, 1979; Gallagher, 1958; Hollingworth, 1942; Janos & Robinson, 1985a; Schneider, 1987; Terman & Oden, 1947). Because it is also the most extremely talented students who should and do accelerate their education, this may explain why parents and educators believe—despite all evidence to the contrary—that acceleration is detrimental to social and emotional development (Southern et al., 1989). Acceleration may be blamed for psychosocial difficulties that are not associated with acceleration but rather with extreme intellectual talent per se. Ability within our talented group did relate to use of acceleration and to psychosocial indices (except for locus of control). The relations were less than $.41$ for acceleration and greater than $-.20$ for the three psychosocial indices. The magnitude of these correlations was greater than those correlations we reported for acceleration and the psychosocial indices (see Table 1).

The number of students who reported negative effects from acceleration decreased by about one-half from age 18 to age 23. Less than 3.5% of the accelerated students reported at age 23 negative effects on self-acceptance/identity or on their social interactions. Possible reasons for this attitudinal change include: (a) viewing negative experiences more positively as one ages; (b) feeling more accepted in college and thus having negative effects diminish; or (c) negative experiences fading with the passage of time. Interestingly, negative effects were rarely reported for social interactions, which is contrary to the widely held belief that students' social interactions suffer from acceleration. Thus, few students who accelerated their

educational progress in grades K–12 felt several years later that this acceleration had a distinctly negative effect on their social and emotional development.

This study is limited by reliance on self-report data. Self-report measures seemed appropriate, however, because the subjects' feelings about themselves were the major concern. More lengthy and complex scales would probably have increased the validity of the findings, but, due to the comprehensive nature of the assessment, would have rendered the 24-page questionnaire even more lengthy and thus less likely to be returned. The inclusion of items from other longitudinal studies was intended to increase the validity of the scales and findings. Finally, although we studied amount and type of acceleration, we did not attempt to investigate whether age at acceleration related to psychosocial outcomes. Given the consistent set of null results, this approach did not appear fruitful.

Several important implications of this study can be noted. Acceleration as an educational option for the intellectually precocious is a viable alternative on both academic and psychosocial grounds. The common belief in negative effects of acceleration on psychosocial development may have resulted because those students for whom acceleration is most appropriate are generally those who are also at greater risk for psychosocial problems. Age, not acceleration, exacerbates these problems. It also seems apparent that the female students' fear of acceleration, because of its possible effect on peer interactions, is unwarranted. Almost as many female as male students engaged in grade acceleration; no differential effects of acceleration (grade or subject matter) on social-emotional adjustment were found. This points to the importance of counseling the gifted female student to encourage her to consider acceleration, especially subject-matter acceleration in which gender differences were noted, as a means to provide educational challenge commensurate with her abilities. Finally, the number of students who reported at age 23 negative effects from acceleration had declined from the already low level at age 18, which suggests that perceived benefits of acceleration may increase with the passage of time. SMPY's continued follow-up of these students into their adult years should provide an interesting look at this trend. Meanwhile, this study lends more support to the tenet that appropriate educational acceleration does not result in social or emotional maladjustment; rather, acceleration may even enhance social and emotional adjustment.

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Appendix

Questions Used in the Study and Their Coding

After-college survey (age 23)					
Self-esteem scale^a					
<i>How do you feel about each of the following statements?</i>					
4 = Strongly agree	1 = Disagree				
3 = Agree	0 = Strongly disagree				
2 = No opinion		4	3	2	1 0
a. I take a positive attitude toward myself.		0	0	0	0 0
b. I feel I am a person of worth, on an equal plane with others.		0	0	0	0 0
c. I am able to do things as well as most other people.		0	0	0	0 0
d. On the whole, I'm satisfied with myself.		0	0	0	0 0
e. At times I think I'm no good at all.		0	0	0	0 0
f. I feel I do not have much to be proud of.		0	0	0	0 0
Locus of control scale					
<i>How do you feel about each of the following statements?</i>					
0 = Strongly agree	3 = Disagree				
1 = Agree	4 = Strongly disagree				
2 = No opinion		4	3	2	1 0
a. Good luck is more important than hard work for success.		0	0	0	0 0
b. Every time I try to get ahead, something or somebody stops me.		0	0	0	0 0
c. Planning only makes a person unhappy, since plans hardly ever work out.		0	0	0	0 0
d. People who accept their condition in life are happier than those who try to change things.		0	0	0	0 0
e. What happens to me is my own doing.		0	0	0	0 0
f. When I make plans, I am almost certain I can make them work.		0	0	0	0 0
Social interaction scale					
<i>Indicate the degree to which your total acceleration (kindergarten to present) has affected you overall in each of the following areas. If you did not accelerate, please skip question.</i>					
4 = Strongly favorable effect	1 = Moderately unfavorable effect				
3 = Moderately favorable effect	0 = Strongly unfavorable effect				
2 = No effect		4	3	2	1 0
a. Ability to get along with age mates		0	0	0	0 0
b. Ability to get along with mental peers		0	0	0	0 0
c. Ability to get along with adults		0	0	0	0 0
d. Social life		0	0	0	0 0
Self-acceptance/identity scale					
<i>Indicate the degree to which your total acceleration (kindergarten to present) has affected you overall in each of the following areas. If you did not accelerate, please skip question.</i>					
4 = Strongly favorable effect	1 = Moderately unfavorable effect				
3 = Moderately favorable effect	0 = Strongly unfavorable effect				
2 = No effect		4	3	2	1 0
a. Acceptance of abilities		0	0	0	0 0
b. Acceptance of self		0	0	0	0 0
c. Self-awareness/sense of identity		0	0	0	0 0
d. Emotional stability		0	0	0	0 0
After-high-school survey (age 18)					
<i>If you accelerated, "how do you feel your social/emotional development has been affected by this acceleration? (Check one.)"</i>					
—Much for the better	—Negatively				
—Positively	—Much for the worse				
—No influence					

^a When creating the scales, the numerical coding was reversed for Items e and f in the self-esteem and locus of control scales.

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