The Academic, Socialization, and Psychological Effects of Acceleration: Research Synthesis

Karen B. Rogers
University of St. Thomas, College of Education, Leadership, and Counseling, Minneapolis, Minnesota

Abstract

In the last decade, educators and policymakers have demonstrated an increased acceptance of academic acceleration as a viable evidence-based practice in schools. The purpose of this chapter is to determine if the increased attention on academic acceleration has been supported by well-designed studies. The author synthesizes the results and draws conclusions from a large number of studies on the variety of forms of academic acceleration. The research investigates whether or not the various forms of academic acceleration resulted in improved academic, social, and psychological outcomes for gifted students; if the continued use of acceleration options since earlier meta-analyses are supported with similar effects; and which forms of academic acceleration show the greatest promise in the current educational environment.

As demonstrated by the results of these research syntheses, academic acceleration produces notable academic gains for students with gifts and talents. Additionally, academic acceleration produces small-to-moderate social-emotional gains for these students. This research provides educators and educational decision makers with a large, research-supported menu of accelerative options that may result in substantial academic achievement for gifted learners. This information may help to overcome the myths of social maladjustment and psychological problems that seem to be a concern of educators and parents faced with a decision about acceleration.

Introduction

In *A Nation Deceived: How Schools Hold Back America's Brightest Students* (Colangelo, Assouline, & Gross, 2004), academic acceleration was defined as a series of options falling into two general categories of instructional management: (a) *subject-based acceleration*, options that expose the learner to advanced content, skills, and understandings before expected age or grade level in a specific content area or areas; and (b) *grade-based acceleration*, options that shorten the number of years a learner remains in the K-12 school system before entering a university or other postsecondary training. Several authors in the publication (e.g., Brody, Muratori, & Stanley, 2004; Colangelo, Assouline, & Lupkowski-Shoplik, 2004; Lubinski, 2004: Robinson, 2004; Rogers, 2004) argued that the category of accelerative options that will be most successful with an individual learner with academic gifts and talents depends upon the interaction of the learner's cognitive functioning levels, learning strengths, personal characteristics, interests inside and outside school, and general attitudes toward learning and school. A learner **without** the positive catalysts described will not likely be "cured" academically by shortening his/her years in the K-12 system (grade-based acceleration), no matter what his or her level of ability may be. On the other hand, this same learner might improve in academic achievement overall if provided with direct daily challenge beyond grade level in his/her specific academic talent area (subject-based acceleration). Likewise, a learner who is self-directed, motivated to learn new things, and working well beyond grade level in most academic areas might benefit equally well from more than one accelerative option in either category of academic acceleration (Rogers, 2002).

Since the 2004 publication of *A Nation Deceived*, there has been increased attention on viewing academic acceleration as an intervention and educator acceptance of acceleration as a viable evidence-based practice in schools. In recent *State of the States* reports (NAGC & CSDPG, 2009, 2013), there has been an increase in the number of states mandating ac-

celeration as a state-wide practice. Minnesota, for example, has mandated that every district will include in their gifted program policy a statement of the forms of acceleration (i.e., early entrance to kindergarten, grade-skipping, concurrent enrollment) the district provides. But if the increase in attention and acceptance has been shown, what is not known is (a) whether the research that has followed this increase in attention has been positive and robust, and (b) whether or not there is general acceptance that academic acceleration must be individually considered, child-by-gifted-child, in its use. The argument for an idiosyncratic approach to accelerative decision-making for the gifted learner is most certainly enhanced by the large body of informative studies that support a variety of accelerative forms from which to choose. Understanding and being able to interpret the general academic effects of these accelerative forms and treating them as a menu of management options can be an effective first step in determining the "best" form (or forms) of academic acceleration for individual learners with gifts or talents. Instruments such as the *Iowa Acceleration Scale* (IAS) (Assouline, Colangelo, Lupkowski-Shoplik, Lipscomb, & Forstadt, 2009) have proven viable and valid in predicting the success of an individual acceleration decision. For example, the IAS was reported to predict substantial academic, socialization, and motivational improvements when students recommended in the "excellent" and "good" categories of the instrument were followed up in their schools after an acceleration decision had been made (Forstadt, Assouline, & Colangelo, 2007).

The purpose of this chapter is to determine if the increased attention on the variety of forms of academic acceleration has been supported by well-designed studies on the direct effects of practice implementation upon learners with gifts and talents. To be answered are the following questions:

1. Have the more recent research studies of academic acceleration contributed new data on the most viable forms of acceleration for learners with gifts and talents?
2. Have new forms of academic acceleration provided by states and schools resulted in improved academic, social, and psychological outcomes for learners with gifts and talents?
3. Has the continued use of acceleration options since Rogers' (1992) initial meta-analysis been supported with equivalent effects?
4. Which forms of academic acceleration show greatest promise in the current learning environments in this nation's schools?

Methodology

Rationale for the Current Study

In this update of acceleration practices, the results of six previous meta-analyses or best-evidence syntheses are the foundation for the research synthesized. As indicated in Table 1, there has been a fairly consistent set of conclusions from each of these syntheses, even though the selection details for each synthesis differ. For example, Rogers (1992, 2004) analyzed each form of acceleration separately, based only on those studies of each respective form of accelerative option, whereas Steenbergen-Hu and Moon (2011) considered the form of accelerative option a moderating variable. Nevertheless, the first conclusion across these syntheses is that academic acceleration produces notable academic gains for students with gifts and talents, regardless of the category of acceleration or actual acceleration option provided. The second conclusion is that academic acceleration produces small-to-moderate social-emotional gains for these students, for most categories of acceleration option provided. It is important to note that this table combines little of the sophisticated analysis conducted by these meta-analysts, and it is important to go directly to the source for the study authors' more sophisticated analyses than reported in this table.

In 2006, a research grant from the Institute for Policy and Research on Acceleration (IRPA; renamed Acceleration Institute) at the University of Iowa's Belin-Blank Center allowed for an update to the meta-analyses previously conducted by Rogers (1992, 2004). A brief synopsis of this research was reported in the *IRPA 2008 Wallace Symposium Proceedings* (Rogers, 2010). The updated report presented in the following pages provides the details of that analysis, beyond the 2008 Wallace presentation, and includes additional studies that have been conducted for each of the accelerative options.

Procedure for Current Study Update

In the effort to collect all publications on the forms of acceleration, seven database searches were undertaken to cover the years 1990 through 2013. Citations produced from *ERIC, PsychINFO, Dissertations and Theses, Sociological Abstracts, Child Development & Adolescent Studies, Education FullText,* and *Academic Search Premier* were collected. The general descriptors for "gifted education" and for "academic acceleration" listed for each database, as guided by its respective thesaurus, included all keywords involving the acceleration provisions practiced in the field of gifted education. The publications were categorized by type of

Table 1: Summary of Meta-Analytical Synthesis 1984-2010

Study	Methodology	Number of Studies	Academic Effect Size	Social-Emotional Effect Size	Study Types Included
Kulik & Kulik, 1984	Analysis of comparison studies of accelerants (As) and non accelerants (NAs)	26	0.88	0.03 Popularity -0.03 Adjustment 0.07 School Attitude -0.02 Subject Attitude 0.17 Vocation -0.13 Extracurricular participation (inconsistency among studies of each S-E factor)	Published, unpublished; did not include pre-experimental case studies or correlational studies.
Rogers, 1992	Analysis of all studies of gifted accelerants 1862-1990	380	0.50 grade-based; 0.46 subject-based	0.14 grade-based 0.21 subject-based	Published, unpublished; including case studies, correlational
Kent, 1992	Analysis of studies that focused on social-emotional issues in elementary gifted learners, 1928-1987	23	Not Reported	0.13 short-term 0.28 longitudinal 0.15 telescoping 0.14 early entrance 0.12 grade-skipping	Published, unpublished; including case studies, correlational
Kulik & Kulik, 2004	Analysis of comparison studies of accelerants with same age or older age like ability peers	26	0.80 same age NA peers; -0.04 older age NA peers	0.28 same age NAs on school motivation -0.17 same age NAs on self-acceptance 0.29 older age NAs on school motivation -0.38 older age NAs on self-acceptance	Published, unpublished; did not include pre-experimental case studies or correlational studies
Rogers, 2004	Analysis of all quantitative studies of gifted accelerants, accelerative option by accelerative option	103 grade-based 205 subject-based	0.40 grade-based options combined; 0.38 subject-based options combined	None reported in this analysis	Published, unpublished; including case studies, correlational
Steenbergen-Hu & Moon, 2011	Analysis of comparison studies 1984-2008 for high-ability accelerants	38	0.40 comparisons with same age high ability peers	0.14 comparisons with same age high ability peers	Published, unpublished; did not include case study effects (pre-post, pre-experimental)

publication, form of accelerative option, whether or not the "study" was research or non-research, type of research design, sample sizes of comparison groups, and research question(s) asked about the acceleration practice. Not included in this study collection were evaluation studies of gifted curriculum, such as the William & Mary language arts, mathematics, social studies, and science units, which are not specifically instructional management options that require subject or grade-based acceleration to take place consistently; although this curriculum may make it possible for subject acceleration to occur. Between 1990 and 2008, a total of 22 forms of acceleration had been quantitatively researched during the period (Rogers, 2010), with an additional 42 studies found since the 2010 IRPA meta-analysis report. The data reported here as Table 2 include both sets of studies covering this period, 1990 – 2013. Because a preliminary report was provided as part of the *2008 Wallace Symposium Proceedings* (Rogers, 2010) and no other publication was pursued following that report, the two sets of data have been combined.

In order to be included as a research study in the current synthesis, the manuscript, published or unpublished, had to report the author's method for systematically collecting quantitative data about the purpose described in the study. Second, each report had to describe a recognizable study design, but designs were not limited to experimental and quasi-experimental studies only; case study observations with pre-and post-data, pre-experimental design, as well as correlation, regression, causal-comparative, and survey designs were included. No studies were eliminated because of methodological flaws, if a recognizable research design was evident. Third, to be included as research, each study had to yield dependable, quantitatively summarized results, either descriptive or inferential. Fourth, if several publications described the same research data, the most complete report was used for further analysis. When a single study reported findings from several different instruments or samples, separate effect sizes were first computed for each outcome, followed by a mean effect size estimate across all academic or social/emotional effects in that study, respectively. In cases where the findings of several instruments described a single outcome, such as mathematics achievement, the results were pooled to compute a composite effect size result. The method recommended by Strube (1991) was followed in this calculation of a composite effect size. When a study collected data from more than one accelerative option type or used more than one distinct comparison group, the report was counted as a distinct study under each acceleration option. Finally, the accelerative option described in each study had to have been used with gifted learners, with specifications included as to how the subjects were identified.

The majority of the qualifying studies reported quantitative results that could be reduced to the metric of effect size (ES). In general, calculating an effect size requires the subtraction of the mean achievement of the control group from the treatment group's mean achievement. This difference is divided by the pooled standard deviation of the two groups, i.e.,

$$ES = \frac{M_{\text{experimental group gain}} - M_{\text{control group gain}}}{SD_{\text{pooled}}}$$

(Glass, McGaw, & Smith, 1981). For studies reporting correlations, effect size was calculated by dividing the square root of $1\text{-}r^2$ into $2r$. As each study's effect sizes were combined to one median effect, Hedges' g (Hedges, 1981) was used to combine the composite effect sizes across studies for a single overall effect size for academic, social, and emotional, respectively, because it weights for sample size (Hedges, 1981; Hedges & Olkin, 1985; Hedges, Shymansky & Woodworth, 1989). Correspondingly, a chi square analysis indicates whether the combined effect sizes differ significantly from each other or act as outliers among the studies. This analysis was the final step in the combination process.

Effect size can be interpreted in a variety of ways. In general, most meta-analysts recognize an effect size of .30 or higher as being of practical significance to classroom practice. According to Glass, McGaw, and Smith's (1981) interpretation, an effect size of .30 would suggest the grade equivalent improvement in a given outcome for one group of about three additional months of achievement of the experimental group over the control group or to suggest that the experimental group was that much further into the school year's teaching efforts. This could suggest that were the current teaching effort to continue for three years, the experimental students would be a full school year ahead of their equally able controls. When effect sizes are reported for social or emotional outcomes, it is often more understandable to interpret effect size in terms of how much additional growth was found on the measure of a social or emotional factor. For example, if a learner had scored a 50 on the initial measure (e.g., measure of social maturity) an effect size of .10 reported would indicate improvement of score to 54, an effect size of .30 would suggest a score of 62, and an effect size of 1.00 would suggest a score of 84 (Coe, 2002).

The Effects of Acceleration Options

Rogers (2010) identified 12 forms of subject-based acceleration and six forms of grade-based acceleration. Subject-based

acceleration allows gifted learners to flexibly progress through the general K-12 curriculum or exposes these learners to knowledge, skills, and understandings beyond expected age or grade levels. Grade-based acceleration allows gifted learners to progress more quickly through the general K-12 curriculum, leaving the system anywhere from one to four years earlier than the normal age/grade lockstep system provides. Since 2010, the number of forms of acceleration has increased. The forms[1] are listed below and Table 2 provides a summary of the available research-based effects, i.e., effect sizes, for most of the forms.

- **Accelerated/Honors High School Classes:** Advanced students are grouped together for curriculum that extends and moves more rapidly through general or advanced education outcomes. These courses may also be offered as *College-in-the-Schools* programs, college coursework offered on the high school site (usually by a local university), utilizing either a high school teacher trained to offer this course or a college faculty member, and giving credit for successful completion of the course, usually restricted to the university that provides the instruction.
- **Accelerated Residential High School:** Programs are provided on a university campus as a residential program or as a Governor's School, for which students can complete both high school requirements and college courses as part of their program of study.
- **Advanced Placement (AP) Courses:** Students take AP classes in specific content areas and take external national exams to attain scores that qualify for advanced standing in those content areas at selected universities.
- **Compacted Curriculum:** The regular curriculum of any or all subjects is tailored to the specific gaps, deficiencies, and strengths of an individual student. The learner "tests out" or bypasses previously learned skills and content, focusing only on mastery of deficient areas, thus moving rapidly through the curriculum offered in the educational setting. Replacement activities are provided to fill in the learner's classroom time.
- **Competition Programs:** Co-curricular, academically-oriented programs allow students to work at their limits against others with similar talents for local, state, national, or international standing. It is to be noted that among the eight studies on competitions, most of them through the Olympiads, none have data that can be calculated in terms of effect size. Nonetheless, the research in this area must be recognized as supportive of academic and psychological gains for learners with gifts or talents.
- **Computer Online Courses:** Students enroll in online advanced, often individualized, courses during the school day in lieu of courses taken at the school site.
- **Concurrent/Dual Enrollment:** Gifted learners are allowed to attend classes in more than one building level during the same school year. For example, a junior high student attends high school for part of the school day and junior high classes for the remainder of the day. In some states, the term *Postsecondary Enrollment Options* is used when this dual enrollment occurs for high schoolers who are given both high school and community college or university credit for their work on a community college, college, or university campus. Another variation of this option is *Distance Education Courses,* which allow gifted learners to work with outside materials provided by a college or other organization in lieu of the regular grade-level curriculum of the school. Many schools award credit for this type of coursework.
- **Credit by Examination:** Students take a test to ensure mastery of the content area in order to place them at a higher content level. This is often offered as a course placement option at the university level (e.g., the College Level Examination Program [CLEP]). As with distance learning studies, there were two studies on the academic and psychological impact of credit by examination, but the data provided could not be calculated into an effect size metric for the most recent study. Nonetheless, the two studies merit attention.

1. Editors' note: Rogers's forms are highly similar to the 20 forms reported by Southern and Jones (this volume). However, there are some important distinctions, including elaborations about various forms. Therefore, the two lists are included in the respective chapters of the volume.

- **Distance Education Courses:** Students take televised or Skype courses from their home school along with students from other sites enrolled in the same course. Correspondence courses are also considered a form of distance education. None of the studies found since 2004 have had quantifiable data that could be converted to effect size metrics.
- **Early Entrance to Kindergarten or First Grade:** Gifted learners demonstrating a readiness to perform school work are allowed to enter kindergarten or first grade one to two years earlier than the usual beginning age.
- **Early Entrance to University:** A student enters college as a full-time student without completing a high school diploma. Students matriculate to university a minimum of one year earlier and participate in full-time academic work there.
- **Grade-Skipping:** Gifted learners bypass one to two grade levels, either in tandem or in separate years in the K-12 system.
- **Grade Telescoping:** Students progress more rapidly through the curriculum of several grade levels, either individually or in groups. A middle school student or group of students, for example, would complete the three years of middle school curriculum in two years' time.
- **Homeschooling:** Students study at advanced levels outside of the regular school, often using an external, commercial curriculum.
- **Honors Classes at University:** Advanced classes are offered to gifted students upon entering university programs as a full-time student.
- **Independent Study:** Gifted learners are provided with a structure for studying in depth a topic of interest on their own during the school day, in lieu of the regular school curriculum.
- **Individualized Acceleration:** Students work at their own pace through continuous progress content and skill outcomes.
- **International Baccalaureate Program:** Students participate in full college-level curriculum in high school, receiving advanced standing at selected universities if they score highly on the international diploma examination.
- **Mentorship/Coaching:** Students are placed with a content expert to extend learning in the expert's content area (one-year placement). This option connects high school students who have exhausted all high school curriculum in their talent areas with a community or university "expert" who oversees the student's studies and learning over the course of a year, usually outside of school time.
- **Multi-Grade/Combination Classrooms**: Learners of all ability levels are placed in a classroom that covers two years' curriculum, such as a combined first/second grade classroom.
- **Non-Graded/Multi-Age Classrooms:** Learners of all ability levels are placed in a classroom undifferentiated by grade levels. Students work through the curricular materials at a pace appropriate to individual ability and motivational levels.
- R**adical Acceleration:** Students complete the four years of high school and four years of university in four years' time; another permutation would be an individualized progression through K-16, not necessarily only occurring during the secondary years of school.
- **Saturday Classes on University Campus:** Students attend weekly all-day class in advanced subject area across an entire year.
- **Single-Subject Acceleration:** Gifted learners are allowed to bypass the usual progression of skills and content mastery in one subject where great advancement or proficiency has been observed. Often the learner continues to progress at the regular pace through the remaining subject areas.
- S**ummer University Classes:** Students attend a one- to six-week summer enrichment program working on advanced subject matter, often receiving credit in their home schools for their work.
- T**alent Search Programs:** Students demonstrating talents in one or more areas participate in above-level testing, for example, by taking the SAT or ACT in middle school through a university-based talent search program. Those students who achieve high scores are invited to attend advanced courses and programs that

typically occur outside of regular school time and often on a college campus or online.

Table 2 summarizes the type of effect, number of quantitative studies, number of outcomes, and average effect size found for many of these forms of acceleration for the years between 2008 and 2013. In some cases, this has resulted in effect sizes considerably different from those initially reported, particularly in Rogers' earliest synthesis (1992).

Mean academic effect sizes are **strong** for gifted participants in *accelerated/honors high school classes, AP classes, computerized online classes, grade-skipping, honors classes at university, International Baccalaureate diploma programs, radical acceleration;* and *Saturday enrichment classes* (n=1 study). In these most recent years, the number of studies for subject-based accelerative strategies has ranged from three to six per acceleration option (with the exception of AP). **Strong** effect sizes for social adjustment outcomes are shown for one option: *mentorships*. Psychological effects were found to be **strong** for *accelerated/honors high school classes* and *homeschooling* (n=1 study).

Moderate academic effects were found for a*ccelerated residential high schools* (usually on college campuses), *dual/concurrent enrollment, early entrance to kindergarten, homeschooling* (n=1 study), *individualized acceleration, single subject acceleration, summer classes on university campuses,* and participation in *talent search programs*. **Moderate** social effects were found for *grade-skipping, honors classes at university,* and *summer classes on university campuses.* One option reported a **moderate** negative social effect: *Accelerated residential high schools.* **Moderate** psychological effects were found for *AP classes, computer online classes, honors classes at university, single subject acceleration,* and *summer university courses.* **Moderate** psychological effects also were found for three grade-based acceleration options researched during this period: *early admission to university, grade-skipping,* and *radical acceleration.*

Slight, but positive academic effects were found for *curriculum compacting, individualized acceleration,* and *mentorships,* while **slight,** but positive social effects were found for *accelerated/honors classes, early entrance to kindergarten, early entrance to university,* and *radical acceleration.* Slight, but positive, psychological effects were found for *AP classes, curriculum compacting,* and *mentorships.* A slight negative effect was found for *early entrance to kindergarten.* (See Table 2.)[2]

One last analysis makes the attempt to find the patterns of effects among the variety of subject-based and grade-based acceleration options. As Table 3 summarizes, there was no difference between the general academic effects of subject-based acceleration options and grade-based options. Both categories of acceleration produce **moderate** academic effects for learners with gifts and talents; however, grade-based acceleration produces stronger (**moderate**) socialization and psychological effects, while those effects are smaller for subject-based acceleration. When the studies that collected data on students at different school levels (elementary, middle school, high school) were synthesized, it was discovered that there were some differences in various summary effects. For elementary school gifted learners, grade-skipping was the only metric that measured academic effects of grade-based options (gauged as "**strong**"), but for subject-based acceleration and socialization and psychological effects at the elementary level, the effects were **moderate**. All academic, socialization, and psychological effects were **moderate** at the *middle school* level for both subject-based and grade-based acceleration. And at the *high school* level, there were **strong** academic effects for both subject-based and grade-based options, and a **strong** psychological effect for grade-based options, but the remaining socialization and psychological effects are **slight** across both subject-based and grade-based options. In sum, grade-based acceleration has a slight academic advantage in effect at all three school levels and somewhat more positive socialization and psychological effects at all three school levels. (See Table 3.)

Conclusions, Discussion, and Future Directions

The research on academic acceleration since 2008, as reported here, provides educational decision-makers with a large, research-supported menu of accelerative options that may result in substantial academic achievement for gifted learners. When one looks at the academic effects of the various subject-based and grade-based options, there are several subject-based acceleration options with at least moderate mean effect sizes, and three grade-based acceleration options with moderate-to-strong effect sizes.

Considering the social effects that have been studied for some of these options, there also are several subject-based and grade-based options that produce moderate improvements in this domain. Whereas for psychological adjustments (e.g., self-efficacy, personal well-being, stability, etc.) there are

2 Three forms of acceleration are not reported in Table 2: grade telescoping, multi-grade classrooms, *and* nongraded classrooms *because there were no new studies since 1991 on these forms. The previous academic effect sizes of +.40, +.21, and +.39, respectively, are the most recent evidence of academic effects for these three options.*

Table 2: Mean Effect Sizes for Acceleration Options

Acceleration Option	Type of Effect	Number of Studies	Number of Outcomes	Mean Effect Size
Accelerated/honors high school classes	A	3	6	+0.69
	S	1	2	+0.11
	P	5	9	+0.60
Accelerated residential high school on university campus	A	2	5	+0.29
	S	2	3	-0.27
	P	5	11	+0.07
Advanced Placement courses	A	16	40	+0.60
	S	1	2	+0.01
	P	5	10	+0.19
Compacted curriculum	A	1	18	+0.20
	P	1	1	+0.17
Computer on-line courses	A	5	21	+0.72
	P	3	7	+0.24
Concurrent/dual enrollment	A	11	32	+0.41
	P	2	3	-0.04
Early entrance to Kindergarten or first grade	A	5	8	+0.30
	S	4	6	+0.20
	P	5	11	-0.20
Early entrance to university	A	10	23	+0.23
	S	4	6	+0.18
	P	6	16	+0.35
Grade-skipping	A	5	8	+0.67
	S	4	4	+0.34
	P	3	3	+0.42
Homeschooling	A	1	1	+0.42
	P	1	2	+0.82
Honors classes at university	A	2	7	+0.56
	S	1	1	+0.38
	P	2	9	+0.37
Individualized curriculum	A	2	6	+0.25
International Baccalaureate program	A	6	18	+0.70
	S	2	4	-0.08
	P	2	4	+0.03
Mentorship/coaching	A	4	9	+0.22
	S	1	2	+0.71
	P	2	2	+0.16
Radical acceleration	A	4	5	+0.61
	S	4	10	+0.18
	P	4	12	+0.42
Saturday classes on university campus	A	1	1	+1.56

Table 2: Mean Effect Sizes for Acceleration Options (continued)

Acceleration Option	Type of Effect	Number of Studies	Number of Outcomes	Mean Effect Size
Single-subject acceleration	A	13	27	+0.42
	S	6	8	+0.07
	P	13	51	+0.35
Summer university courses	A	11	19	+0.43
	S	5	7	+0.31
	P	10	32	+0.40
Talent search programs	A	6	21	+0.34

*Note: **A – academic effects**, including achievement, time on academic task, subsequent choice of advanced courses, grade point average, academic competency measures, perceptions of challenge, school satisfaction, concept attainment, clarity of instruction, honors/awards/scholarships received, intellectual efficiency, school aptitude, grasp of main idea, information processing speed, perceptions of school climate, success on exams, number of university credits awarded, school/subject aptitude, academic progress, education level attained, educational/career aspirations, college graduation age, sense of preparation for advanced coursework, college ranking, PhD received, adult income, patents received, caliber of career.*

***S = social adjustment effects**, including social cognition level, social maturity, engagement/leadership in organizations, co-curricular participation, friendship, peer acceptance, socialization, social presence, family harmony, social confidence, introversion or extraversion, social skill level, level of social problems, perceptions of social interference in learning, perceptions of parent/social support, level of social interaction, social self-concept, level of competitiveness, perceptions of popularity.*

***P = psychological adjustment effects**, including perceptions of appeal and meaning of academic effort, task commitment, trait anxiety, positive/negative emotions, perceptions of well-being, self-efficacy, self-regulation levels, worry, attitude toward subject, satisfaction with teachers, life satisfaction, global satisfaction, cheer, seriousness, mood levels, independence/autonomy, self-acceptance, flexibility, mental health, self-concept, self-confidence, stability, self-worth, mental attention, conduct, sense of integration, responsibility, persistence, distress, perceptions of relevance, perceptions of difficulty, locus of control, academic interest, motivation to learn, perceptions of readiness, priorities, intellectual satisfaction, happiness, intrinsic motivation, sensitivities, levels of psychological distress (i.e., depression, phobia, paranoia).*

several subject-based and all grade-based options reporting moderate-to-strong effect sizes. What is promising about this most recent meta-analysis is the remarkable focus on social and psychological outcomes that was not as evident and consistent in previous syntheses. The reported results bode well for helping to overcome the "myths" of social maladjustment and psychological problems, which may have deterred educational leaders from considering more of their brightest students for some form of acceleration, whether grade-based or subject-based.

In terms of the quality of research reported in more recent years, there seems to have been a decline in qualitative studies on the nature and outcomes of acceleration options; for Rogers (2010) report, approximately one- third of the studies were qualitative. With the years between 2008 and 2013, approximately one-tenth of the studies were qualitative in this area of educational practice. Some concerns must be raised, however, about the quantitative designs employed. Very large data bases have served as the student populations under study, for *dual enrollment* and *AP studies* in particular. For *residential high schools, honors classes at both high school and university, International Baccalaureate diploma programs, single subject acceleration, summer university courses, talent search, radical acceleration*, and *early admission to college,* survey data have been administered, usually across several cohorts, comparing participants with either "traditional" students or "gifted, non-accelerated" students. Usually structural equation modeling, Logit modeling, or regression studies are used for data analysis with what may be considered little regard for what is actually occurring for the gifted learners who participate. The individual student and best practice for that student is often unconsidered, despite the many calls over the years to "match" our acceleration decision to the cognitive, social, and emotional needs of individual learners with gifts or talents (e.g., Benbow & Lubinski, 1995; Kent, 1992; Rogers, 2002).

The forms of academic acceleration for gifted learners have shifted in research focus during this most recent period as well. *Advanced Placement,* now a more widespread program offered to underserved populations as well as more mainstream high ability learners, *dual/concurrent enrollment with college credit, International Baccalaureate diploma programs, early admission to university, single subject acceleration,* and *summer university courses* have focused on high school students, primarily, with some consideration given to middle schoolers, especially with *single-subject acceleration* and *summer university courses.* Currently, studies of elementary students, the mainstay of the previous century's research, are relatively few, with only *early entrance to schoo*l and *computerized on-line courses* producing more than one to two studies. If the "answers" to our accelerative decisions were clear, this set of circumstances might be appropriate, but the research on such options as *curriculum compacting, nongraded classrooms, grade telescoping,*

Table 3: Summary Effect Sizes by Category of Acceleration and School Level

	Subject-Based Acceleration	Grade-Based Acceleration
Effect Size Variables, All Levels Combined, Elementary, Middle, and High School		
Summary Academic Effets	+0.51	+0.50
Summary Socialization Effects	+0.16	+0.23
Summary Psychological Effects	+0.24	+0.34
Effect Size Variables, Elementary Level		
Academic Effects: Elementary	+0.42	+0.67
Socialization Effects: Elementary	+0.33	+0.34
Psychological Effects: Elementary	+0.31	+0.42
Effect Size Variables, Middle School Level		
Academic Effects: Middle School	+0.39	+0.45
Socialization Effects: Milddle School	+0.29	+0.26
Psychological Effects: Middle School	+0.36	+0.39
Effect Size Variables, High School Level		
Academic Effects: High School	+0.56	+0.50
Socializaton Effects: High School	+0.16	+0.23
Psychological Effects: High School	+0.21	+0.34

Note: Actual numbers of elementary vs. middle school vs. high school students were not parsed out and recalculated across various acceleration options. A secondary analysis to do such calculations is recommended. The composite effect size for those forms of acceleration that included elementary students, for example, were separated out, averaged, and reported in this table.

mentorships, individualized acceleration, homeschooling, and *Saturday classes* at the elementary school level is scant with major sets of effects, particularly social and emotional outcomes, basically unaddressed. At the high school level, more needs to be studied concerning *accelerated/honors classes* and *residential high schools* about actual academic as well as social and psychological effects.

The numbers of gifted students studied regarding the impact of acceleration practices is quite extensive, however. In a previous meta-analysis, a criticism of the work conducted on academic acceleration was that the sample sizes in the studies were small. With recent access to NELS data as well as university admissions records as sources for data, the sizes of studies have increased substantially. Across the subject-based acceleration option effects reported here, 50,660 students were studied (not including their comparison groups), while for grade-based acceleration option effects 2,811 students were studied.

Even though the research in the gifted field on acceleration practices is substantial, an important caveat needs to be repeated. It is imperative that decisions about both subject-based and grade-based acceleration be formulated on more than the research alone. Although the limitations of the studies found on the various forms of acceleration have been reported here, it is possible that the studies themselves do not match the specific settings and contexts of every state, district, or school. Therefore, it is important that those responsible for decisions collect adequate supplementary information about an individual learner's cognitive functioning levels, learning strengths, learning preferences, and interests and involvement inside and outside of school. With this additional information, the "best" decision for meeting the learner's educational needs through some form of acceleration provided at the right time and in the right place will most likely be made.

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** A complete reference list of all studies included in the current meta-analysis can be found on the* Nation Empowered *website (www.nationempowered.org/authors/rogers).*