Educational Characteristics of Adolescents With Gifted Academic Intrinsic Motivation: A Longitudinal Investigation From School Entry Through Early Adulthood

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ABSTRACT

The construct of gifted motivation was examined in a contemporary, long-term, longitudinal investigation. Adolescents with extremely high academic intrinsic motivation (i.e., gifted motivation) were compared to their cohort peer comparison on a variety of educationally relevant measures from elementary school through the early adulthood years. Assessment of academic intrinsic motivation was based on the Children's Academic Intrinsic Motivation Inventory. Cross-time, pervasive differences resulted favoring the gifted motivation compared to the cohort comparison group on motivation, achievement, classroom functioning, intellectual performance, self-concept, and postsecondary educational progress. Meaningful effect sizes were obtained and corroborated by teachers' observations. Gifted motivation proved to be distinct from gifted intelligence. This research serves to expand the definition of giftedness to include the construct of gifted motivation in its own right. These findings have implications for identifying students with gifted motivation for entry into programs for the gifted.

Gottfried and Gottfried (2004) proposed and conceptualized a construct of gifted motivation. According to their conceptualization, gifted motivation applies to those individuals who are superior in their strivings and determination pertaining to an endeavor. Hence, motivation in the extreme is considered gifted just as is intellectual performance in the extreme.

In order to further develop this construct, Gottfried and Gottfried (2004) recommended examining the developmental histories of individuals with extremely high motivation. Following up on this suggestion, in the

PUTTING THE RESEARCH TO USE

The present findings have important implications. First, they provide further validation of gifted motivation as a distinct construct from gifted intellect. Second, the findings lay the groundwork for identifying students with gifted motivation. Third, this construct provides the opportunity for schools to develop programs that are more inclusive of and responsive to students who evidence gifted motivation. Fourth, this construct may be useful in developing and assessing motivationally oriented programs.

This research shows that the Children's Academic Intrinsic Motivation Inventory (CAIMI) is useful for identifying motivationally gifted students. Highly elevated CAIMI scores were used to distinguish between the motivationally gifted group and their cohort comparison; and, on the basis of an empirically derived cutoff score, pervasive and educationally meaningful cross-time group differences were obtained. Hence, the CAIMI is a valid instrument for identifying motivationally gifted students. Furthermore, the CAIMI is easily administered. Hence, there is a method to implement the identification process. Further, the CAIMI may be used to assess the motivational quality of educational programs.

present study the developmental/educational histories of such individuals are compared with those of individuals who do not evidence this extreme. Should the extremely high motivation group have a differential educational/developmental history in the expected direction (i.e., with higher performance and competence), this would provide further empirical evidence supporting the construct of gifted motivation. Hence, the purpose of the present paper is to examine the educational and developmental histories during childhood, adolescence, and young adulthood of individuals with consistently high motivation and compare them to their cohort peer comparison who do not have a comparable level of motivation. This research was conducted in the context of an ongoing, long-term, longitudinal study of development.

The motivational construct examined in this research is academic intrinsic motivation inasmuch as this form of motivation provides the foundation for theorizing about the existence of a gifted motivation construct (Gottfried & Gottfried, 2004). Academic intrinsic motivation is defined as enjoyment of school learning characterized by an orientation toward mastery, curiosity, persistence, task-endogeny, and the learning of challenging, difficult, and novel tasks (A. E. Gottfried, 1985, 1986). It has been shown to have substantial criterion-related (concurrent and predictive) and construct validity with regard to children's development and achievement from childhood through adolescence and to be superior in intellectually gifted children (Gottfried & Gottfried, 1996, 2004). In brief, children with higher academic intrinsic motivation tend to have significantly higher achievement, less anxiety, less extrinsic motivation, and higher intellectual performance; in addition, academic intrinsic motivation becomes more stable over the adolescent years (A. E. Gottfried, 1985; A. E. Gottfried, 1990; Gottfried, Fleming, & Gottfried, 2001; Gottfried & Gottfried 2004).

In order to demonstrate that gifted academic intrinsic motivation is a construct that differs from intelligence in relation to academic performance, it is important to show that it relates to achievement and other performance criteria above and beyond IQ. Data supporting this has already been published (Gottfried & Gottfried, 2004) and provided the conceptual and empirical foundation for us to move ahead and examine groups of children differing in their motivation. Moreover, the distinction between the constructs of academic intrinsic motivation and IQ, as well as their independent contributions to the prediction of achievement, has not only been established within the Fullerton Longitudinal Study (FLS), but also with independent samples. Within the FLS, data supporting the independence of academic intrinsic motivation and IQ in predicting achievement was obtained from early childhood through adolescence (A. E. Gottfried, 1990; Gottfried & Gottfried). Hierarchical multiple regressions in which IQ was entered prior and motivation entered subsequent to IQ were conducted to determine the unique contributions of motivation beyond the variance attributable to IQ. Results supported the conclusion that academic intrinsic motivation and IQ provide unique and independent variance to the prediction of achievement across childhood through adolescence, using varied types of achievement indices, including standardized achievement tests and teacher and parent reports of achievement (A. E. Gottfried, 1990; Gottfried & Gottfried). Further, in a cross-sectional study examining the independent contributions of academic intrinsic motivation and IQ to achievement with a different subject population, including students from a different geographic area, academic intrinsic motivation was shown to independently predict achievement controlling for IQ using partial correlations (A. E. Gottfried, 1985).

The distinctiveness between academic motivation and achievement has been obtained not only with academic intrinsic motivation, nor only within the FLS. Other researchers have likewise established the separate contributions of academic motivation and IQ to achievement. For example, in a study of adolescents' intrinsic intellectual motivation (IIM), a construct similar to academic intrinsic motivation, and its relationship to IQ and achievement, results showed that, when IQ was controlled using partial correlations, IIM continued to bear a significant unique relationship to achievement (Lloyd & Barenblatt, 1984). The authors concluded, "The results show that IIM contributes significantly to academic achievement in addition to and independent of IQ" (p. 646). This conclusion is consistent with the results of regressions in the FLS. Lehrer and Hieronymus (1977) found that academic achievement motivation predicted achievement above and beyond IQ using multiple regressions. In a study using the High School and Beyond Longitudinal Study data, Cool and Keith (1991) found that academic motivation had a significant and meaningful indirect relationship to achievement through its impact on the quantity of challenging coursework taken, above and beyond ability. The independence of intrinsic motivation and IQ has been so well established that it is taken as a given, as exemplified by Jensen's (1998) statement that "individual differences in intrinsic motivation for cognitive learning appear to be as great as individual differences in *g*" (p. 124) Indeed, to the knowledge of the present authors, the only study (Gagné & St. Père, 2002) that did not find that a measure of intrinsic motivation predicted achievement above and beyond ability (although student- and parent-reported persistence did show such independent prediction) had methodological shortcomings inasmuch as the sample comprised a restricted group of high-ability eighth-grade girls attending a select private school. This may have compromised the power of the analyses by restricting variance, which was acknowledged in the article by the authors themselves.

Based on the well-established and impressive foundation of theory and empirical evidence indicating the distinctiveness of the constructs of academic intrinsic motivation and intelligence, as well as the theoretical and empirical foundation delineated to define the construct of gifted motivation (Gottfried & Gottfried, 2004), we were confident in pursuing the next goal in our research program: determining whether a group of extremely highly motivated students could be identified and, if they could, whether their educational and developmental histories would differ from each other. It should be added that distinctness of constructs does not mean that they are unrelated to one another. If this were the case, then since IQ and achievement are related to one another, as are IQ and socioeconomic status (Gottfried, Gottfried, Bathurst, Guerin, & Parramore, 2003), then there would be no need to distinguish these constructs. However, regardless of their relationships, no one would argue that IQ, achievement, and socioeconomic status are not separate constructs.

Taking academic intrinsic motivation in the extreme and examining its relationship to theoretically relevant variables such as academic performance/educational achievement would allow for the gifted motivation construct to be further elaborated. It was hypothesized that, from early childhood through adolescence, participants with exceptionally high academic intrinsic motivation, herein called "gifted motivation," would evidence superior academic achievement across a variety of indices, better self-concepts, and greater educational progress in their postsecondary years. We also expected gifted motivation and gifted IQ to be separable constructs based on analyses indicating that academic intrinsic motivation contributes to achievement above and beyond IQ, as detailed above. Should this construct distinguish those with gifted motivation from those without, the development of theoretical models about the development of giftedness and talent could be facilitated.

Use of extremes in developmental research has precedence in other domains. For example, Guerin, Gottfried, Oliver, and Thomas (2003) examined the extremes of temperament from infancy on and found important developmental regularities associated with very high and low scores on various temperament dimensions. Kagan, Snidman, and Arcus (1998) likewise advocated the use of extreme groups who differ qualitatively from the population in order to study temperament longitudinally. Similarly, Wachs (1991a) has advocated the use of extreme-group analyses to study organism-environment interactions, as well as intermediate, nonextreme, quantitative groups. Wachs (1991b) also stated that power may be increased when extreme-group designs are used either through an increase in variance or a more accurate classification of subjects or environments.

To study the construct of gifted motivation, we adopted an extreme-group approach. We deemed it necessary to identify those individuals with the highest motivation, consistent with the definition of gifted motivation presented above, to analyze their developmental and educational histories compared to their nonextreme cohort. We identified a group of the most highly motivated individuals and compared them with their cohort peer comparison, as we have done in our previously published research in the FLS investigating intellectual giftedness (Gottfried, Gottfried, Bathurst, & Guerin, 1994) and temperament (Guerin et al., 2003).

Whereas motivation has been incorporated into theories of giftedness as a precursor, concomitant, or outcome (e.g., Dai, Moon, & Feldhusen, 1998; Feldhusen, 1986; Gagné, 2000; Gottfried & Gottfried, 1996; Gottfried et al., 1994; Lens & Rand, 2000; Renzulli, 1986; Ziegler & Heller, 2000), examining motivation as its own form of giftedness represents a new direction (Gottfried & Gottfried, 2004). The use of extreme-group methodology to identify the longitudinal educational and developmental patterns of children with high motivation from childhood through young adulthood represents a unique opportunity to provide additional validation of the gifted motivation construct. For this construct to be further validated, the gifted motivation group should show a developmental pattern of enhanced academically related performance across a variety of ages and criteria. This was examined in the present study.

Method

Participants

The FLS furnished the database for the present study. The FLS is a contemporary investigation that was initiated in 1979 with 130 infants and their families. Children were 1 year old at the initiation of the project and were assessed at 6-month intervals during infancy and the preschool years and annually throughout school to age 17. At each assessment through adolescence, a comprehensive battery of standardized measures was administered to examine development across a broad variety of domains. At age 24, 104 participants were surveyed as to their current educational progress. The retention rate of this sample was substantial, with no less than 80% of the original sample returning at any assessment. There was no evidence of attrition bias throughout the course of the study (Guerin & Gottfried, 1994; Guerin et al., 2003).

The socioeconomic status of the sample represented a wide, middle-class range, from semiskilled workers through professionals, as determined by the Hollingshead Four-Factor Index of Social Status (Hollingshead, 1975; see also A. W. Gottfried, 1985; Gottfried et al., 2003). The mean Hollingshead Social Status Index was 45.6 (SD = 11.9) at the initiation of the FLS and 48.6 (SD = 11.4) at the 17-year assessment. Participants were predominantly European American (90%), with inclusion of other ethnic groups (Hispanic, East Indian, Hawaiian, Iranian). The percentages of males and females were 52% and 48%, respectively. For further details concerning sample characteristics and study design, see Gottfried et al. (1994) and Guerin et al. (2003).

Measures

Throughout the course of investigation, numerous well-established, standardized, academically related measures of known and substantial reliability and validity were administered. Specific coefficients can be found in the citations referred to herein. These included the following:

Academic Intrinsic Motivation. Academic intrinsic motivation as defined above was measured with the Children's Academic Intrinsic Motivation Inventory (CAIMI), a reliable and valid scale that provides measurement of four subject area scales (reading, math, social studies, and science), as well as a scale for school in general (A. E. Gottfried, 1986). In the high school years, the subject designation of reading was changed to English, and social studies changed to history (see Gottfried, Fleming, & Gottfried, 2001, for further explanation). The CAIMI was administered at ages 9, 10, 13, 16, and 17. Because the school-in-general scale assesses overall pleasure inherent in learning in the academic setting, it was chosen to be used in the present research to develop the contrasting groups and also to analyze previous motivation.

Achievement. The measurement of achievement was conducted utilizing a multisource methodology. Reading and math grade percentile scores were used from the Woodcock-Johnson Psycho-Educational Battery (Woodcock & Johnson, 1977, 1989) at ages 7–10, and with the revised Woodcock-Johnson used from ages 11–17. The advantage of the grade percentile is that it furnishes a score correcting for grade level at a given age.

Teacher and parent reports of reading and math performance were also obtained on the Child Behavior Checklist via a standardized 5-point and 4-point Likert scale, respectively (Achenbach & Rescorla, 2001). For teachers, ratings were obtained only during the elementary years (ages 6–11) because there is a single or primary teacher per grade. For parents, ratings were obtained throughout the school years, from ages 6–17.

Scholastic Aptitude Test (SAT) Verbal and Quantitative scores were collected from the participants' school records. High school grade-point averages (GPA) for freshman year through senior year, as well as the cumulative GPA, were acquired from the participants' school records, as well. Whether participants had completed or dropped out of high school was assessed.

Finally, at age 24, the participants were surveyed as to their college attendance, highest level of education thus far attained, the degree obtained, and attendance in graduate school.

Classroom Functioning. Standardized ratings of the participants' classroom functioning was appraised with the Teacher's Report Form of the Child Behavior Checklist (Achenbach & Rescorla, 2001) at ages 6, 7, 8, 9, 10, and 11. This category comprises four items: how hard is the child working; how appropriately is the child behaving; how much is the child learning; and how happy is the child. The ratings involved a 7-point Likert scale comparing each pupil to others of the same age, with 1 designating *much less*, 7 designating *much more*, and 4 being the average.

Intellectual Performance. Intellectual performance was measured with the Wechsler Intelligence Scale for Children (WISC-R; Wechsler, 1974) at ages 6, 7, 8, and 12; the Wechsler Intelligence Scale for Children–Third Edition (WISC-III; Wechsler, 1991) at age 15; and the Wechsler Adult Intelligence Scale–Revised (WAIS-R; Wechsler, 1981) at age 17.

Self-Concept. Self-concept was measured with the Self-Description Questionnaire II (Marsh, 1990). The General School and General Self measures were used at ages 12, 14, and 16.

Analytic Strategy for Group Designation

We applied a conceptualization previously published dealing with intellectually gifted children. In our earlier research on the intellectually gifted (Gottfried et al., 1994), we selected the traditional and ubiquitous standard cutoff score of 130 IQ or above and designated them as the gifted group. This resulted in 19% (20 of 107) of the children in our longitudinal study sample being designated as intellectually gifted at the age 8 assessment. This age was used to designate gifted IQ because of its reliable, predictive validity to subsequent school years through adolescence and beyond (e.g., Brody, 1992; Deary, Whalley, Lemmon, Crawford, & Starr, 2000; McCall, 1977). For example, in the FLS, the correlation between IQ at ages 8 and 17 is .77 (Barter, 1997). These intellectually gifted children were then compared to their cohort peer comparison. The 19% was not unexpected because of the upward displacement of the distribution curve resulting from sampling a wide range of middle-class families. Furthermore, this percentage is in accord with the thresholds adopted by other well-known researchers in the field of giftedness (see Gagné, 1998, for a review). To date, there is no percentage of giftedness across study samples that has been universally established.

In the absence of a standardized cutoff score to designate gifted motivation that does exist in the case of gifted intelligence (e.g., IQ equal to or greater than 130), we applied the following rationale to create the study groups to be compared. Due to recent research demonstrating that the stability of academic intrinsic motivation increases in adolescence and maintains strong cross-time consistency, with stability path coefficients as high as .86 (Gottfried et al., 2001), we selected this developmental period as our frame of reference for selecting the designated study groups. The school-in-general scale raw scores (henceforth referred to as "the general score") of the CAIMI at ages 13, 16, and 17 were aggregated to provide an appraisal of the adolescents' overall pleasure inherent in learning in the academic setting. Aggregation was done to optimize reliability (Epstein, 1979; Rushton, Brainerd, & Pressley, 1983) by creating a composite of the most consistently highly motivated adolescents and, at the same time, to maximize the available sample size. At ages 13, 16, and 17, there were 108, 112, and 111 participants assessed, respectively. The aggregation resulted in 111 participants (only one subject was eliminated because of having only one score). Participants missing only one score who would have been excluded due to missing data at a particular age were included because their data were averaged across their extant data. The ordinary least squares estimation procedure (OLS) recommended by Cohen, Cohen, West, and Aiken (2003, p. 445), was utilized to estimate missingness (albeit missing data were minimal) to ensure that missing values had no bearing on group membership. OLS utilizes a regression line based on nonmissing CAIMI general scores to estimate the missing values. Sensitivity analysis revealed that the original groups remained constant. Thus, the original groups were preserved for subsequent analysis.

To be concordant with the occurrence of gifted intelligence in our study, we likewise identified the top 19% of the aggregated motivation scores. This resulted in 21 of the 111 participants displaying consistently extremely high motivation through the adolescent years of 13–17. In the absence of a standard cutoff score for gifted motivation, we operated under the assumption and heuristic that gifted motivation occurs at a frequency similar to gifted intelligence. However, no assumption was made that all of the same children would be in both groups. Hence, we did not expect gifted motivation and gifted intelligence to be identical.

Results

Data-Analytic Strategy

There were two dimensions guiding the analyses: time frame and type of measure. Regarding time frame, there were three time periods: (a) antecedent, which encompassed middle childhood from age 6 to 12; (b) concurrent, which encompassed adolescence from age 13 to 17; and (c) subsequent years, which encompassed the 24-year period. Regarding type of measure, these included motivation, educational performance/achievement, classroom functioning, intellectual performance, and self-concept.

Statistical assumptions were tested and data transformations were conducted as needed to adjust for normality. Otherwise, the remaining assumptions were met. No discrepancies in the analyses were found between the original and transformed data, thus the original data will be presented and used because it allows for the original metrics to be used for interpretation. Predominantly *t* tests and repeated measures ANOVAs were conducted on pertinent variables. Across ANOVAs, only between-group results will be reported because they are the only relevant differences with which this study is concerned. The between-subjects factor was always motivational group status (i.e., gifted motivation vs. cohort comparison); therefore, it was a fixed factor. We also examined the within-subjects effects (time), and these did not change any conclusions of the between-subjects effects. There were no reliable significant interactions obtained between motivational group status and time. In the few instances for which data were missing, list-wise deletion was used because it maximized the *n* for each analysis (i.e., in list-wise deletion, a case is removed only for the analysis in which it is missing data for any of the variables involved).

As for gender, a few points are noteworthy: (a) research in academic intrinsic motivation has consistently revealed no significant differences in gender (e.g., Gottfried et al., 2001); (b) the proportion of males and females was not significantly different within each of the study groups; and (c) the number of boys and girls within the highly motivated group is too small to generate any reliable conclusions.

We employed both *p* values and effect sizes in our analyses. The importance of effect size estimates is that they provide valuable information beyond the significance level regarding the magnitude and practical importance of the results. In this regard, two effect sizes are presented in Tables 1 and 2: eta-squared and *r* (binomial effect size displays, or r_{BESD}). Eta-squared represents the magnitude of the overall effect, a more traditional approach. However, Rosenthal, Rosnow, and Rubin (2000) have suggested that labeling effect sizes as small, medium, or large can result in misleading interpretations of the results. Therefore, the effect sizes for the analyses were transformed into r_{BESD} and then into the binomial effect size display (BESD) for ease of interpretation. The BESD addresses the following question: What is the effect of group membership (gifted motivation vs. cohort comparison) on the success rate of a given outcome? The r_{BESD} represents the difference between the success rates for the two groups (i.e., gifted motivation vs. cohort comparison), and the BESD is a 2 x 2 contingency table with the columns representing motivational group status (gifted vs. cohort) and the rows representing success and nonsuccess rates, respectively. Success rate is defined as the percentage of individuals expected to be above the mean. With unequal sample size, the r_{BESD} provides a conservative estimate (Rosenthal et al., 2000).

We have presented the r_{BESD} and the success rates for the gifted motivation and cohort comparison groups. Nonsuccess rates are the reciprocal of the success rate (i.e., 1-success rate) and, hence, were not presented. By allowing the researcher to obtain success and nonsuccess rates for each group on outcomes, it is possible to interpret the magnitude and practical importance of the effect size based on knowledge of the subject at hand. For example, in Table 2, for cumulative GPA, the r_{BESD} of .46 is the effect size of the difference between the two groups, and the percentages presented beneath the r_{BESD} of .73 and .27 are the success rates for the motivationally gifted adolescents and the cohort comparison, respectively, indicating that 73% of those adolescents with gifted motivation achieve success with regard to GPA, compared to only 27% of the cohort group. Had both groups received a 50% success rate, there would have been no effect size, which equates to a r_{BESD} of .00, indicating no group differences. Hence, group membership of gifted motivation results in a substantially higher likelihood of being successful in terms of GPA. All other r_{BESD} and BESD effect sizes are to be interpreted likewise.

Motivation

A repeated measures ANOVA was conducted on the antecedent motivational variables from the CAIMI general scores at ages 9 and 10. Results revealed that motivationally gifted adolescents had significantly greater academic intrinsic motivation during the elementary school years. Results are reported in Table 1. The r_{BESD} effect size indicates a 58% difference between the two groups, with 79% of the adolescents with gifted motivation having higher motivation during the middle childhood years compared to 21% for the cohort comparison group. Therefore, adolescents with gifted motivation are significantly more likely to have increased academic intrinsic motivation prior to high school.

Academic Achievement

Analyses between the highly motivated adolescents and their cohorts focused on the antecedent and concurrent measures of the Woodcock-Johnson reading and math scores, teacher and parent ratings of reading and math performance on the Child Behavior Checklist, GPA (freshman through senior years) and cumulative GPA, SAT score, whether or not students had dropped out of high school, and educational progress at age 24 (type of college attended, number of postsecondary years of school completed, degree obtained [associate's degree or equivalent, bachelor's degree]; and attendance in graduate school).

Woodcock-Johnson. Repeated measures ANOVA addressed the antecedent Woodcock-Johnson achieve-

Table 1

Antecedent and Concurrent ANOVA Results With Means and Standard Deviations for Motivationally Gifted Adolescents and Cohort Comparison

	Means (Standard Deviations)					
Measure (Ages)	Gifted Motivation	Cohort Comparison	*F*	*df*	η^2	r_{BESD} (Display)
Motivation						
Children's Academic Intrinsic Motivation Inventory (9 and 10 years)	76.32 (5.18)	67.91 (8.43)	25.23***	1, 100	.20	.58 (.79 / .21)
Academic Achievement						
Woodcock Johnson						
Reading–Antecedent (7, 8, 9, and 10 years)	79.15 (21.66)	62.17 (25.68)	9.15**	1, 98	.09	.37 (.68 / .32)
Reading–Antecedent (11 and 12 years)	93.47 (13.46)	78.80 (23.27)	7.47**	1, 101	.07	.33 (.66 / .34)
Reading–Concurrent (13, 14, 15, 16, and 17 years)	92.17 (13.01)	77.66 (22.60)	8.50**	1, 98	.08	.35 (.67 / .33)
Math–Antecedent (7, 8, 9, and 10 years)	80.65 (20.46)	66.28 (25.92)	9.03**	1, 98	.08	.37 (.68 / .32)
Math–Antecedent (11 and 12 years)	93.92 (10.45)	85.48 (17.23)	5.27*	1,101	.05	.28 (.64 / .36)
Math–Concurrent (13, 14, 15, 16, and 17 years)	90.34 (14.11)	68.89 (25.74)	14.73***	1, 98	.13	.44 (.72 / .28)
GPA (Freshman to Senior)	3.63 (.73)	2.99 (.74)	14.99***	1, 96	.14	.44 (.72 / .28)
Classroom Functioning						
Child Behavior Checklist Teacher's Report Form–Antecedent						
Hard Working (6, 7, 8, 9, 10, and 11 years)	5.29 (.88)	4.52 (1.26)	6.37*	1, 103	.00	.31 (.66 / .34)
Learning (6, 7, 8, 9, 10, and 11years)	5.72 (.73)	4.86 (1.12)	10.26**	1, 103	.01	.38 (.69 / .31)
Intellectual Performance						
Weschler Intelligence Scale for Children (6, 7, 8, and 12 years)–Antecedent	124.99 (12.20)	113.28 (12.26)	18.16***	1, 96	.16	.49 (.74 / .26)
Self-Concept						
Self-Description Questionnaire–Concurrent						
General School (14 and 16 years)	5.60 (.44)	4.96 (.73)	36.85***	1, 103	.26	.61 (.80 / .20)
General Self (14 and 16 years)	5.58 (.52)	4.45 (.88)	18.10***	1, 103	.15	.47 (.73 / .27)

Note. *$p < .05$. **$p < .01$. ***$p < .001$; r_{BESD} *represents the effect size correlation. Display represents the Binomial Effect Size Display (Rosenthal et al., 2000).*

Table 2

Antecedent, Concurrent, and Subsequent t Test Results With Means and Standard Deviations for Motivationally Gifted Adolescents and Cohort Comparison

Measure (Age)	Means (Standard Deviations) Gifted Motivation	Cohort Comparison	t	df	η^2	r_{BESD} (Display)
Academic Achievement						
Child Behavior Checklist Teacher Report						
Reading Aggregate–Antecedent	4.15	3.42	3.57**	103	.11	.42
(6, 7, 8, 9, 10, and 11years)	(.85)	(.56)				(.71 / .29)
Math Aggregate–Antecedent	3.84	3.44	2.67**	103	.07	.32
(6, 7, 8, 9, 10, and 11 years)	(.56)	(.61)				(.66 / .34)
Child Behavior Checklist Parent Report						
Reading Aggregate–Antecedent	2.78	2.41	2.95**	104	.08	.35
(6, 7, 8, 9, 10, 11, and 12 years)	(.28)	(.53)				(.68 / .32)
Reading Aggregate–Concurrent	2.66	2.39	1.87+	109	.03	.22
(13, 14, 15, 16, and 17 years)	(.45)	(.63)				(.61 / .39)
Math Aggregate–Antecedent	2.66	2.41	2.38*	104	.05	.29
(6, 7, 8, 9, 10, 11, and 12 years)	(.31)	(.43)				(.65 / .35)
Math Aggregate–Concurrent	2.65	2.22	2.92**	109	.07	.34
(13, 14, 15, 16, and 17 years)	(.43)	(.64)				(.67 / .33)
GPA	3.63	2.97	4.06***	101	.14	.46
(Cumulative) Concurrent	(.68)	(.65)				(.73 / .27)
Scholastic Aptitude Test–Concurrent						
Verbal	639.33	558.33	2.63*	49	.12	.38
(17 years)	(97.21)	(101.55)				(.69 / .31)
Mathematics	648.67	579.17	2.33*	49	.03	.34
(17 years)	(92.19)	(99.21)				(.67 / .33)
Total Years of Education Completed	14.70	13.89	1.84+	100	.03	.23
(24 years)–Subsequent	(1.75)	(1.81)				(.61 / .39)
Intellectual Performance						
Wechsler Intelligence	118.38	105.47	4.25***	105	.15	.46
Scale for Children–III–Concurrent	(11.12)	(12.79)				(.73 / .27)
(15 years)						
Wechsler Adult	119.14	108.30	3.79***	106	.12	.42
Intelligence Scale–Concurrent	(12.81)	(11.50)				(.71 / .29)
(17 years)						
Self-Concept						
Self-Description Questionnaire						
General School–Antecedent	5.54	4.89	3.06***	98	.09	.37
(12 years)	(.44)	(.88)				(.69 / .31)
General Self–Antecedent	5.62	5.12	2.36*	98	.05	.30
(12 years)	(.46)	(.74)				(.65 / .35)

Note. *$p < .05$. **$p < .01$. ***$p < .001$. $^{+}p = .06$ *(Had a 1-tailed significance test been chosen, which would have been justified given our directional hypothesis, this probability would have been statistically significant, at p <.05. However, we chose the more conservative alternative.)* r_{BESD} *represents the effect size correlation. Display represents the Binomial Effect Size Display (Rosenthal et al., 2000).*

ment reading and math variables. Earlier Woodcock-Johnson scores were grouped in two age periods because at age 11 the newly revised version was employed. Thus, for the antecedent measures, for both reading and math, repeated measures analyses were conducted on ages 7, 8, 9, and 10 and on ages 11 and 12. Results are organized by reading at both time periods and then by math at both time periods. The concurrent period of age 13–17 was also analyzed for reading and math using repeated measures ANOVA and presented separately.

Results evidence significant mean differences in reading and math achievement throughout the antecedent and concurrent years (see Table 1). Highly motivated adolescents evidenced higher reading and math achievement throughout their elementary, middle school, and high school years. Success rates ranged from 64% to 72% for the gifted motivation group, compared to 28% to 36% for the cohort comparison across reading and math, indicating a substantially higher chance of the motivationally gifted having higher achievement compared to the cohort comparison.

Teacher and Parent Ratings of School Performance. An aggregated score was created for reading and for math separately for teacher and parent ratings to maximize sample size and prevent the subject loss that would result if a teacher or a parent did not return the form at an individual assessment wave. As noted above, teacher ratings were available only for the antecedent period. *T* tests were conducted on reading and math aggregates, with motivational group status being the between-groups variable.

Results presented in Table 2 for teachers' ratings reveal that the gifted motivation group had significantly higher performance in both subject areas. Parents' ratings were analyzed with *t* tests for antecedent and concurrent time periods. As presented in Table 2, results for the antecedent period were the same as for the teachers, showing significantly higher performance for the gifted motivation group. For the concurrent period, math was also significantly higher in the gifted motivation group. And, with respect to reading, the means were in the same direction, with the gifted motivation group being higher and approaching statistical significance. Success rates ranged from 61% to 71% for the gifted motivation group, compared to 29% to 39% for the cohort comparison across reading and math, indicating a substantially higher chance of the motivationally gifted having higher academic performance compared to the cohort comparison.

SAT. To assess group differences between motivationally gifted adolescents and their cohort comparison on whether or not they took the SAT, a 2 (Gifted Motivation Status) x 2 (Took SAT vs. Did Not Take SAT) chi-square analysis was conducted. This analysis was significant, $\chi^2(1, N = 111) = 6.77$, $p < .01$, indicating that motivationally gifted adolescents were significantly more likely to take the SAT than the cohort comparison group. In fact, 15 of the 21 motivationally gifted students (71.4%) took the SATs, compared to 36 of the 90 in the cohort comparison group (40%). Odds ratio for the chi-square results indicates that motivationally gifted adolescents were 3.75 times more likely to take the SAT, when compared to their cohort. SAT scores are generally needed to attend 4-year college institutions. Therefore, these results imply that motivationally gifted students have an enhanced desire to matriculate at a 4-year college institution than the comparison cohort.

A comparison of the Verbal and Quantitative SAT scores for the participants in the two groups who did take the test was conducted using *t* tests. Results indicated that the motivationally gifted students had significantly higher SAT Verbal and Quantitative scores (see Table 2). Success rates of 69% and 67% for the gifted motivation group compared to 31% and 33% for the cohort group indicate a substantially greater chance for the motivationally gifted to score higher on the SAT, compared to the cohort comparison. Not only were the motivationally gifted adolescents more likely to take the SAT, but they were also more likely to perform at a higher level on the SAT, compared to the cohort comparison.

GPA. Analyses were divided into a repeated measures ANOVA across freshman, sophomore, junior, and senior GPA and a *t* test comparing group differences on cumulative GPA. The repeated measures analysis revealed significant group differences between the GPAs of the motivationally gifted adolescents and those of the cohort comparison (see Table 1). The *t* test results for cumulative GPA was also significant (see Table 2). Success rates were 72% and 73% for the gifted motivation group and 28% and 27% for the cohort comparison. These results clearly demonstrate that the motivationally gifted adolescents were significantly more likely to obtain higher grades in high school than their cohort comparison group.

Dropout Rates. A cross-tabulation was conducted to examine the percentage of high school dropouts within the two comparison groups. In a 2 (Gifted Motivation Status) x 2 (Dropout Status) contingency table, $\chi^2(1, N = 105) = 1.24$, $p > .05$, results revealed that none of the highly motivated students dropped out of high school, while 5 students (or 6%) of the cohort comparison group dropped out. Whereas these results were not significant, these percentages reveal that motivationally gifted students do not drop out of high school.

Classroom Functioning

A MANOVA was conducted using the four items, and each was aggregated across ages 6–11, with motivational group status being the between-groups variable. A composite was used for each of the four items in order to prevent loss of an individual across the years because a teacher did not return the form. This procedure maximized sample size and power.

A significant multivariate main effect for motivation group status was obtained, Pillais trace and Wilks' Lambda, $F(4, 100) = 2.92$, $p < .05$. Univariate ANOVAs were then conducted on the 4 items, revealing significant differences on how hard the child worked and how much the child learned (see Table 1). The Behaving Appropriately and Happiness variables were in the same direction, but did not reach statistical significance. For the gifted motivation group, the effect size success rates were 66% and 69% for Hard Working and Learning, respectively, and for the cohort comparison group were 34% and 31%, respectively. These results indicate that, in the school years prior to adolescence, the children in the gifted motivation group were reliably observed by their teachers to display more effort and learning.

Intellectual Performance

Group differences in IQ scores were analyzed with a repeated measures ANOVA for ages 6, 7, 8, and 12 using the WISC-R Full Scale IQ score. *T* tests were calculated to determine differences between the groups for the WISC-III at age 15 and the WAIS-R at age 17.

Results for the repeated measures ANOVA and *t* tests showed significant group differences (see Tables 1 and 2), indicating that motivationally gifted students have significantly higher IQ compared to the cohort comparison. Success rates ranged from 71% to 74% for the gifted motivation group, compared to 26% to 29% of the cohort group, indicating a substantially greater chance of higher intellectual scores before and during the high school years for the gifted motivation group compared to the cohort comparison. Whereas, the motivationally gifted group has on average a higher intelligence test score, those individuals with gifted motivation are not necessarily the same individuals as those with gifted intelligence test scores.

In order to assess the correspondence between gifted motivation and gifted intelligence, 2 (Gifted Motivation Status) x 2 (Gifted Intelligence Status) contingency tables were analyzed. Two analyses were conducted. One was conducted using gifted intellectual status at age 8 to designate participants having gifted intelligence (IQ of 130 or above) compared to their cohort comparison. This age was used because it was the anchor point at which the children were designated as intellectually gifted in the FLS (Gottfried et al., 1994). The other analysis was conducted with an aggregate of three IQ scores using the age 12, 15, and 17 assessments and adopted the same IQ cutoff score of 130 to designate intellectual giftedness.

Results of these analyses revealed that the preponderance of individuals who are motivationally gifted are not intellectually gifted. For age 8 and for the composite, significant χ^2s were obtained: χ^2 (1, $N = 104$) = 8.91, $p <$ .01, and χ^2 (1, $N = 99$) = 4.07, $p < .05$, respectively. Of the motivationally gifted adolescents only 8 (44%) were intellectually gifted at age 8, and only 4 (21%) were intellectually gifted on the IQ composite. These findings show that, whereas gifted motivation and gifted intelligence are not mutually exclusive, their degree of nonoverlap far exceeds their degree of overlap.

Additionally, correlations were computed between the aggregated academic intrinsic motivation scores and IQ scores at age 8 and the IQ aggregate. These coefficients were virtually identical, both being .49, $p <.001$. Hence, these correlations further show the degree to which these constructs are distinct. Although the shared variance is 24%, the coefficient of alienation (i.e., noncorrelation, which is the variance of one variable that is not accounted for by the other, or the square root of $1 - r^2$; see Cohen et al., 2003, p. 39) is .87, indicating that the overwhelming majority of variance in academic intrinsic motivation is not accounted for by intelligence, further supporting the view that gifted motivation and gifted intelligence are distinct constructs.

In another analysis separating motivation from intelligence, a hierarchical multiple regression was conducted to examine the contribution of academic intrinsic motivation above and beyond the effects of intelligence on high school cumulative GPA. Cumulative GPA was selected because it provides an overall index of the students' high school academic performance. In this regression, the two composites comprising the three ages were utilized: intelligence (at ages 12, 15, and 17) and motivation (at ages 13, 16, and 17). Intelligence was entered first, and motivation was entered subsequently to determine if it significantly contributed to the prediction of GPA.

Results revealed that motivation independently and significantly contributed to the model above and beyond

IQ, ΔR^2 (1,92) = .06, $p < .01$, R^2 (2,94) = .48. Motivation also has a significant semipartial correlation of .25, $p < .01$, which is a measure of the pure and unique association between motivation and GPA without IQ.[1]

General School Self-Concept

General school self-concept was analyzed at the antecedent age of 12 and also concurrently at ages 14 and 16. The *t* test performed on the antecedent age revealed significant group differences, as did the concurrent repeated measures ANOVA. Motivationally gifted students viewed themselves as more competent in the academic arena at ages 12, 14, and 16 compared to their cohorts (see Tables 1 and 2). The success rates for the gifted motivation group were .69 and .80, compared to success rates of .31 and .20 for the cohort group, indicating that the motivationally gifted have higher rates of favorable school self-concept compared to the cohort group.

General Self-Concept

A *t* test was conducted to assess group differences on the antecedent self-concept measure at age 12, and repeated measures ANOVA was conducted on the self-concept measure at ages 14 and 16. Results revealed significant differences between the self-concepts of the motivationally gifted and their cohorts across the antecedent and concurrent ages (see Tables 1 and 2). The success rates were 65% and 73% for the gifted motivation group and 35% and 27% for the cohort group. Motivationally gifted adolescents had significantly better perceptions of themselves and higher chances of favorable general self-concepts at all three age levels when compared to the cohort group.

Postsecondary Education

Analyses were carried out on the age 24 data to provide an overall picture of the educational trajectories of the motivationally gifted adolescents and the cohort comparison group during early adulthood. The variables included type of college attended directly out of high school, postsecondary educational progress, and pursuit of graduate education. Type of college attended directly out of high school was examined in a 2 (Gifted Motivation Status) x 2 (4-Year College vs. Community 2-Year College) χ^2 analysis.

Results revealed that motivationally gifted adolescents were significantly more likely to pursue 4-year colleges directly out of high school than the cohort comparison group, χ^2 (1, N = 101) = 3.90, $p < .05$. Odds ratio for the analysis reached a magnitude of 3.0, which indicated that motivationally gifted adolescents were three times more likely to enter a 4-year college directly out of high school than the cohort group.

Other analyses were conducted that provided evidence in the same direction, indicating that the motivationally gifted had more advanced academic progress, although the analyses did not reach statistical significance. A *t* test was performed to examine the mean difference between the motivationally gifted and their cohort comparison on years of education attained. Although by age 24 the motivationally gifted had completed almost 3 years of college, whereas the cohort had completed less than 2 years of college, this difference did not reach, though it approached, the traditional level of significance (see Table 2).

In terms of degrees completed, in the course of their education, 70% of the motivationally gifted had received an associate's degree or equivalent by age 24, compared to 54% of the cohort group; and, with respect to bachelor's degrees, 50% of the motivationally gifted had received a BA by age 24, compared to 32% of the comparison cohort. With respect to graduate school attendance, 25% of the motivationally gifted were attending a graduate program, whereas only 10% of the cohort comparison group were attending graduate school. Although these three preceding findings did not reach statistical significance, χ^2 (1, N = 102) = 1.51, χ^2 (1, N = 102) = 2.36, χ^2 (1, N = 100) = 3.18, respectively, all p's > .05, the pattern for the groups is clear in showing that those with gifted motivation have advanced further in their education by age 24.

Discussion

These findings clearly support the construct of gifted motivation by revealing pervasive, significant, and meaningful group differences between the gifted motivation group and their cohort peer comparison across a broad array of educationally related variables from school entry through early adulthood.

Moreover, the hypotheses set forth at the beginning of the study, namely that those with gifted motivation would evidence superiority on educationally relevant variables and that there was a distinction between gifted motivation and gifted intelligence, were supported. Students who evidenced gifted academic intrinsic motivation were educationally superior across a variety of indices. These included antecedent academic intrinsic motivation, academic performance on standardized tests, ratings of academic performance, high school GPA, high school completion, SAT scores, classroom functioning, intellectual performance, self-concept, and pattern of postsecondary education advancement. These findings traversed multiple methods, that is, differences emerged on self-report measures (i.e., CAIMI, SDQ, and survey data), measures directly administered to the participants (Wechsler Tests of Intelligence and Woodcock-Johnson), parent and teacher ratings of academic performance, teachers' ratings of classroom functioning, GPA, and SAT scores. The latter four measures were obtained directly from the participants' school and represent ecologically collected variables. Thus, these findings persist across time, method, informant, and type of measure in supporting a gifted motivation construct. Gifted motivation shows construct, concurrent, and predictive validity. There is also support for incremental validity in that academic intrinsic motivation was significant above and beyond IQ in predicting cumulative high school GPA.

The present findings provide support for this construct because students who differ in academic intrinsic motivation showed significant differences in areas that are distinguishable from motivation, albeit theoretically related. The distinctiveness or uniqueness of this construct is that the motivationally and intellectually gifted are not necessarily the same individuals. Of the motivationally gifted, the majority of students were not intellectually gifted. Hence, the present results provide further evidence for considering gifted motivation as a construct in its own right. Further distinction between academic intrinsic motivation and intelligence was obtained through the coefficient of alienation (i.e., noncorrelation), which indicated that the large majority of variance of these two constructs is simply not overlapping. Additionally, motivation independently contributed to the variance in high school GPA, a finding in accord with regressions reported by Gottfried and Gottfried (2004) and with research by Lehrer and Hieronymus (1977), Lloyd and Barenblatt (1984), and Cool and Keith (1991).

The separation of gifted motivation and gifted intelligence appears to have applicability to the issue of gifted underachievers. For example, McCoach and Siegle (2003) reported that intellectually gifted achievers and underachievers were found to differ significantly on their self-regulation motivation (e.g., self-control, self-motivation, task commitment, persistence), and this motivation correctly classified these groups a majority of the time. Hence, higher motivation relates to higher achievement in intellectually gifted children, further supporting the distinction between motivation and intellectual performance.

The current analyses support the use of extreme groups with an underpinning rationale. Radke-Yarrow (1998) commented that "renewed attention to subgroups of children at the extremes in the samples for whom we assess central tendencies can bring a new level of insight into the nature of individual functioning" (p. 82). This helps to elucidate developmental data inasmuch as significant differences were obtained in a systematic fashion.

The effect sizes indicated the amount of impact that group membership (i.e., gifted motivation vs. cohort comparison) had on the various outcomes. The success rates for the gifted motivation group ranged from 61% to 80%, with the preponderance being in the 70% range, indicating that, from school entry through postsecondary education, motivationally gifted adolescents are substantially more likely to be successful in their academic performance and competence. Therefore, being gifted in academic intrinsic motivation has important practical meaning for school success. Considering the relatively short period of time needed to complete the CAIMI (approximately 20–30 minutes; see A. E. Gottfried, 1986), a great deal of valuable and efficient information is obtained concerning students' current and future success.

There are important implications of the gifted motivation construct. The first pertains to identification of students in gifted programs. Because gifted motivation is a distinct construct that contributes uniquely to educational success and is not identical with gifted intellect, then motivation should be considered as a criterion in and of itself to augment the selection of students into programs for the gifted and talented (see, e.g., Clinkenbeard, 1996; Gottfried & Gottfried, 1996, 2004; Gottfried et al., 1994). In the current study, the top 19% had a cutoff raw score of 75 on the aggregated CAIMI general scale. As noted, there currently is no unanimously accepted cutoff score to designate gifted motivation. However, the cutoff score used here can serve as a starting point, though school districts may want to determine their own local reference norms and conduct their own field studies.

Second, gifted motivation not only has implications for doing well from elementary school through the high school years, but also for educational progress beyond high school. Those with gifted motivation were not only significantly more likely to take the SAT, but were significantly more likely to enroll in a 4-year college when compared to their cohort comparison. Further, by age 24, the motivationally gifted showed a pervasive pattern of more advanced educational progress. Where results were not statistically significant at age 24, it should be kept in mind that these study participants have not brought their education to fruition, thus their ultimate educational trajectories are not yet known. In addition to academic achievement being significantly related to gifted motivational status, so was general and academic self-concept, again favoring the gifted.

Third, since there are early differences in academic intrinsic motivation that emerge as being associated with later gifted academic intrinsic motivation, classroom instruction in both regular and gifted education ought to examine the motivational aspects of their programs. Hence, superior academic intrinsic motivation would potentially emerge, which in turn would serve to support educational achievement. Since academic intrinsic motivation stabilizes over the adolescent years (Gottfried et al., 2001), it is essential that motivational programs in the schools begin as early as possible so that all children have an opportunity to optimize their motivation at an early age. Inasmuch as teachers' ratings of students' academic intrinsic motivation are significantly positively correlated with students' own reports of motivation (A. E. Gottfried, 1985), then it is apparent that teachers notice students' academic intrinsic motivation.

This interpretation bolsters observations with the effect size analyses. Indeed, Cohen (1988) argued that effect sizes of the magnitude obtained in the present study reach a level of distinction in the natural setting such that it becomes a noticeable phenomenon. In fact, in the present study, across hundreds of teachers' ratings throughout the elementary school years, those who were designated as motivationally gifted were noticed to be harder working and learning more. Being harder working can be construed as reflecting motivation for learning in the school context. It is noteworthy that these ratings occurred independent of and prior to our designation of gifted motivation during adolescence. These were observations that teachers made on their own accord. It is likely that teachers respond positively to students' own motivation; hence, the early identification of gifted motivation, as well as the development of programs to provide such experiences as an optimal degree of challenge in the curriculum, would help stimulate students' enjoyment of the learning process, their mastery strivings, and their academic and general self-concepts.

In conclusion, we advance two overall points regarding gifted motivation. First, inasmuch as individuals with higher levels of academic intrinsic motivation excel on a variety of measures indexing more advanced educational attainment, this would provide an advantage for occupational opportunities in the adulthood years. Thus, gifted motivation has implications for the life course and may well provide a foundation for future academic and career success. Second, validating the construct of gifted motivation broadens and elaborates conceptions of giftedness and thus has implications for student identification and program development.

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End Note

1. The use of analysis of covariance (ANCOVA), controlling for IQ, was raised in the review process. This statistical technique, which was initially designed for experimental analyses by Fisher (1932), is highly questionable and controversial when study groups are not randomly assigned. The assumptions under which ANCOVA may be appropriately used are rarely met in nonreactive research. It has been amply stated that nonrandom groups cannot be equated by controlling for a covariate, and attempts to do so by ANCOVA result in erroneous and problematic conclusions that are fraught with difficulty in interpretation. In fact, it has been recommended not to use this statistical method for nonexperimental research designs (Kerlinger & Lee, 2000). For some other major classic and contemporary references, see Elashoff (1969), Huitema, (1980), Miller and Chapman (2001), Pedhazur (1982), and Tabachnick and Fidell (2001).