Chapter 30

Development of Gifted Motivation: Longitudinal Research and Applications

Adele Eskeles Gottfried and Allen W. Gottfried

Abstract Gifted motivation was proposed by Gottfried & Gottfried (2004) as an area of giftedness in and of itself distinct from intellectual giftedness. Gifted motivation applies to those individuals who are superior in their strivings and determination pertaining to an endeavor. The foundation for theorizing about and providing empirical validation for this construct is based on the authors' longitudinal study of giftedness in the realm of academic intrinsic motivation. 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. The present chapter will present theory and contemporary findings regarding gifted motivation, and how this relate to concurrent and long-term outcomes from childhood through early adulthood. Implications for identification of gifted motivation, program selection, and program development and evaluation will be advanced.

Keywords Gifted motivation · Academic intrinsic motivation · Longitudinal study · Curiosity · Persistence · Task-endogeny · Program selection · Program development · Evaluation

A.E. Gottfried (✉)
California State University, Northridge, CA, USA
e-mail: adele.gottfried@csun.edu

Introduction

Gifted motivation is a recently proposed construct having significance for theory and research regarding gifted individuals, as well as educational applications and societal implications. It is defined as pertaining to individuals who are superior in their strivings and determination pertaining to an endeavor (Gottfried & Gottfried, 2004). Motivation in the extreme is considered to be a form of giftedness just as intelligence in the extreme is considered a form of giftedness (Feldhusen & Jarwan, 2000; Gottfried & Gottfried, 2004). In this chapter the rationale, development, empirical foundation, and applications of the recently proposed construct of gifted motivation are presented.

The construct of gifted motivation was conceptualized as a form of giftedness in and of itself, and empirical data validate the construct (Gottfried & Gottfried, 2004; Gottfried, Gottfried, Cook, & Morris, 2005). It was founded on theory and research in the domain of academic intrinsic motivation defined as the enjoyment of school learning characterized by an orientation toward mastery; curiosity; persistence; task-endogeny; and the learning of challenging, difficult, and novel tasks (Gottfried, 1985). Because academic intrinsic motivation concerns the pleasure inherent in learning it is particularly well suited to developing the construct of gifted motivation and its applications in academic and related domains across the life-span. The conceptualization and empirical evidence supporting gifted motivation are presented below.

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Conceptual Foundation of Gifted Motivation

A Study of the Development of Intellectual Giftedness and the Early Proposal of Gifted Motivation: The Fullerton Longitudinal Study

The initial conception of gifted motivation evolved from our longitudinal research on intellectual giftedness conducted within the Fullerton Longitudinal Study (FLS) (Gottfried, Gottfried, Barthurst & Guerin, 1994). The FLS is a contemporary long-term study of development from infancy through early adulthood. The sample initially consisted of 130 infants and their families representing a wide range of middle-socioeconomic status from skilled worker to professionals who were predominantly European-American (90%) with other ethnicities (Latino, Asian, East Indian, Hawaiian, Iranian, and interracial).

Beginning at age 1 year, the participants were assessed in the university research laboratory at 6-month intervals during infancy and the preschool years, and annually from age 5 years throughout school to age 17 years. At each assessment through adolescence, a comprehensive battery of standardized measures was administered. At age 24 years, the participants were surveyed with respect to demographics, but primarily regarding their educational progress. During infancy, preschool and middle elementary years, the homes of the participants were directly observed to appraise the social and emotional supports and cognitive enrichment being furnished by parents to the children as well as the physical characteristics of the family environment. As of this writing, there were 23 assessment waves throughout the course of the FLS that are displayed in Table 30.1. For further details about sample characteristics see Gottfried & Gottfried (1984) and Gottfried, Gottfried, Bathurst, Guerin, & Parramore (2003).

Academic intrinsic motivation was included in this investigation from early childhood through late adolescence. It was assessed with the Children's Academic Intrinsic Motivation Inventory (CAIMI) (Gottfried, 1986a, 2006), a published self-report inventory of established psychometric qualities, developed to measure academic intrinsic motivation as defined above in four subject areas (reading, math, social studies, and science) as well as for school in general. The CAIMI was originally developed for children ranging from middle elementary through middle/junior high school. A downward extension of the CAIMI, called the Y-CAIMI (Gottfried, 1990), was then developed to measure academic intrinsic motivation in young primary grade elementary school children in the school areas of reading, math, and school in general. An upward extension of the CAIMI for high school students was also developed in which the items were identical to the CAIMI with reading referred to as English and social studies as history (Gottfried, Fleming, & Gottfried, 2001). In the FLS, the Y-CAIMI was administered at the 7- and 8-year assessments; and the CAIMI was administered at the 9-, 10-, 13-, 16-, and 17-year assessments.

Table 30.1 The Fullerton longitudinal study assessments

Assessments	Ages
Laboratory	
Infancy	1, 1.5, 2
Preschool	2.5, 3, 3.5
Elementary school	5, 6, 7, 8, 9, 10, 11
Junior high school	12, 13
High school	14, 15, 16, 17
Surveys	24
Home visits	
Infancy	1.25
Preschool	3.25
Elementary school	8

In the FLS, 20 children were designated as intellectually gifted children at age 8 years on the basis of obtaining an IQ score of 130 or above on the WISC-R (Wechsler, 1974), a criterion consistent with the practice in the field (A. W. Gottfried et al., 1994). Early developmental aspects of intellectually gifted children across cognitive, educational, motivational, behavioral, and environmental domains were studied from infancy through age 8 (A. W. Gottfried et al., 1994).

Significant motivational differences were obtained when comparing the intellectually gifted children and their cohort peer comparison, i.e., children not designated as intellectually gifted, as early as infancy through early adolescence. From infancy through age 6 years, those who were subsequently designated as intellectually gifted at age 8 years evidenced significantly greater cognitive mastery motivation (A. W. Gottfried et al., 1994). Cognitive mastery motivation was assessed using the Bayley Infant Behavior Record (Bayley, 1969) consisting of the examiner's ratings of children's test-taking behaviors made during test administration. On this measure, intellectually gifted

children showed significantly higher goal directedness (degree of directed effort), object orientation (interest in test materials), attention span (degree of continued absorption in task), cooperativeness with the examiner (enters into tasks enthusiastically), positive emotional tone (happiness), and reactivity to test materials (A. W. Gottfried et al., 1994). These findings indicated that as early as infancy, the intellectually gifted children were more enthusiastically oriented toward cognitive tasks than those in the cohort peer comparison group. These behaviors are conceptually relevant to theories of intrinsic motivation inasmuch as they indicate pleasure in engaging in cognitive tasks. In fact, Matheny (1980) identified a cognitive mastery cluster of behaviors using the Bayley Infant Behavior Record items including goal directedness, attention span, object orientation, and stimulus reactivity. Hence, as early as infancy, those who were designated as intellectually gifted during childhood evidenced specific cognitive motivationally relevant behaviors (A. W. Gottfried et al., 1994).

As the children progressed in age, the intellectually gifted children evidenced significantly higher academic intrinsic motivation from early childhood through adolescence as measured by the Y-CAIMI and CAIMI (Gottfried & Gottfried, 1996; A. W. Gottfried et al., 1994) across school subject areas (reading, math, social studies and science) and for school in general. Hence, intellectually gifted children evidenced stronger enjoyment of the learning process per se compared to their cohort peer group throughout childhood, a finding consistent with their stronger mastery motivation for cognitive tasks during infancy.

Based on the evidence of stronger intrinsic motivation for the intellectually gifted, we proposed a conception of the development of intellectual giftedness, called the Potentiality-Enrichment Theory, in which motivation was viewed as playing an integral role in the development of giftedness, interfacing with cognitive ability and an intellectually stimulating environment (A. W. Gottfried et al., 1994). Further, it was in this same volume (A. W. Gottfried et al., 1994) that we first proposed the existence of the construct of gifted motivation. We further asserted that whereas there might be an overlap between the constructs of gifted intelligence and the motivation "we are not proposing a one-to-one correspondence between intelligence and motivation" (p. 172). It is to be noted that we immediately recognized that gifted motivation would be its own construct.

Conceptualizing the Gifted Motivation Construct

The construct of gifted motivation was developed and more fully proposed by Gottfried & Gottfried (2004). Whereas previous giftedness theories and research had included motivation, it was viewed as a factor supporting other forms of giftedness and talent rather than as a form of giftedness in its own right (Gottfried & Gottfried, 2004). For example, motivation had been seen as a prerequisite for, component of, and even an outcome of giftedness (e.g., Dai, Moon, & Feldhusen, 1998; Feldhusen, 1986; Gagné, 2000; Gottfried & Gottfried, 1996; A. W. Gottfried et al., 1994; Lens & Rand, 2000; Renzulli, 1986; Ziegler & Heller, 2000). These perspectives focused on superior intellect, talent, and creativity as giftedness, but none had recognized motivation as a domain of giftedness in and of itself, albeit, Gottfried and colleagues (A. W. Gottfried et al., 1994) suggested it.

Criteria for developing the construct of gifted motivation. The following criteria formed the basis of proposing gifted motivation (Gottfried & Gottfried, 2004): (a) comparisons between the intellectually gifted and their cohort peer comparison groups over time showing higher motivation for the former; (b) academic intrinsic motivation contributed to the prediction of achievement independently of IQ; (c) establishment of continuity of academic intrinsic motivation over time; and (d) the facilitative role of environment in developing intrinsic motivation. These criteria were chosen to demonstrate both the independence and the uniqueness of the gifted motivation construct and also to indicate that it is recognizable by teachers and parents, and stimulated by the environment.

Regarding the first criterion concerning group differences, the evidence reviewed above demonstrated that intellectually gifted children showed significantly stronger mastery and academic intrinsic motivation when compared to their cohort peer comparison group. This evidence is also consistent with other research findings that intellectually gifted children evidence greater curiosity and mastery motivation than their comparison groups (Davis & Connell, 1985; Henderson, Gold, & McCord, 1982; Hom, 1988; Li, 1988; Vallerand, Gagné, Senecal, & Pelletier, 1994).

Regarding the second criterion, in order to show that gifted motivation is not accounted for by intelligence,

it was important to document the unique statistical contributions of academic intrinsic motivation to achievement, above and beyond IQ (Gottfried, 1990; Gottfried & Gottfried, 2004). Predictions that motivation would add its own unique variance to achievement were supported. Results of hierarchical multiple regression analyses showed that when IQ and motivation were both used to predict achievement, entered in that order, each significantly predicted achievement independently of each other. Motivation added significant variance to these predictions above and beyond IQ, indicating that children's achievement was higher when their academic intrinsic motivation was higher even beyond their IQ scores. From childhood through adolescence, using numerous achievement indices including standardized achievement measures (Woodcock-Johnson Psycho-Educational Battery; Woodcock & Johnson, 1977, 1989), parents' and teachers' ratings of children's achievement (Child Behavior Checklist; Achenbach, 1991a, 1991b), high school grade point average (GPA), and across subject areas (reading, math, social studies, and science), academic intrinsic motivation proved to be a significant, positive, and unique predictor of achievement beyond the variance attributable to IQ (Gottfried & Gottfried, 2004). These results were important for establishing the construct of gifted motivation as independent of IQ. Further, the fact that these findings generalized across different types of achievement measures, different informants, and different subject areas, added to the generalizability of gifted motivation across academic domains. In addition to these findings with multiple regressions, in an earlier study using partial correlations, it had been found that academic intrinsic motivation was significantly related to achievement even when IQ was partialed, i.e., removed, from the correlations (Gottfried, 1985). Overall, across these findings academic intrinsic motivation has clearly been shown to be a construct independent of intelligence.

In addition to showing the significant statistical contributions of academic intrinsic motivation independent of intelligence, a similar set of results was obtained when academic intrinsic motivation predicted academic outcomes controlling for achievement. For example, in a study of young children's academic intrinsic motivation from ages 7 to 9 years, academic intrinsic motivation added uniquely, beyond standardized achievement measures, to the prediction of teachers' reading and math report card grades and ratings of performance (Gottfried, 1990). In a recent investigation at the high school level with regard to level of mathematics course taking, regression analyses of longitudinal data showed that when students were more highly intrinsically motivated in math at age 13 years they evidenced significantly higher high school math grade point average (GPA), significantly higher levels of math course-taking, and significantly more math honors classes and number math classes completed (Oliver et al., 2007). Math motivation significantly contributed to these outcomes independent of earlier achievement. Therefore, for students in high school, those who pursued math to a higher level, and who achieved more highly in math, were also more intrinsically motivated in math at an earlier age.

These findings are important by showing the independent statistical contributions of academic intrinsic motivation and achievement in predicting academic outcomes. These findings further augment the rationale for the construct of gifted motivation by showing that academic intrinsic motivation is an independent contributor to academic outcomes beyond both intelligence and achievement.

Research by others has supported the findings obtained in the FLS showing the distinctiveness between academic motivation and intelligence. For example, in a study of adolescents' intrinsic intellectual motivation, a construct similar to academic intrinsic motivation, motivation continued to be significantly related to academic achievement when IQ was controlled through partial correlations (Lloyd & Barenblatt, 1984). Lehrer & Hieronymus (1977) found that academic achievement motivation predicted achievement beyond IQ using multiple regressions. Using the High School and Beyond Longitudinal Study data, Cool & Keith (1991) found that academic motivation had a significant and meaningful indirect relationship, beyond ability, to achievement through its impact on the amount of challenging coursework taken. Since these findings are consistent with those in the FLS, they serve to further support the rationale for advancing the gifted motivation construct because they also show that academic motivation and intelligence are individual and separate constructs across different samples and measures.

The third criterion, which concerned the continuity of academic intrinsic motivation over time, was important for advancing the concept of gifted motivation for

the following reasons. If academic intrinsic motivation was found to be inconsistent and changeable over time, then a construct of gifted motivation could not be established because individuals who might be high or low at one time might be reversed at another. However, if academic intrinsic motivation was found to be consistent, predictable, and stable over time, then a construct of gifted motivation could be advanced since gifted motivation would be predictable over time.

Several studies have supported the continuity of academic intrinsic motivation longitudinally. Gottfried, Fleming, & Gottfried (2001) used structural equation modeling to examine the continuity of academic intrinsic motivation from ages 9 to 17 years. The results of these analyses indicated significant and substantial continuity of academic intrinsic motivation which increased in magnitude during adolescence. Further, each previous year directly predicted academic intrinsic motivation at the subsequent age, and indirect effects showed that earlier academic intrinsic motivation impacted subsequent motivation throughout the entire age range. In another study, academic intrinsic motivation between ages 7 and 8 years significantly related to academic intrinsic motivation at 9 years of age (Gottfried, 1990), providing evidence of continuity of the construct at these young ages inasmuch as those with higher academic intrinsic motivation at ages 7 and 8 years had higher academic intrinsic motivation at age 9 years. The magnitudes of relationships increased from ages 8 to 9 years, compared to 7 to 9 years, a finding consistent with that reported above regarding the increase in stability over the age range of 9–17 years.

At even earlier ages, in research using the Bayley Infant Behavior Record described above (Gottfried & Gottfried, 1994), mastery motivation in infancy (18 + 24 months) significantly predicted preschool mastery motivation (30 + 36 + 42 months) which in turn predicted school-age mastery motivation (60 + 72 months). School-age mastery motivation significantly predicted academic intrinsic motivation at age 9 years. Hence, cognitive mastery motivation in infancy proved to be an early correlate and developmental precursor of future academic intrinsic motivation.

Overall, these findings supported the development of a gifted motivation construct inasmuch as academic intrinsic motivation was found to evidence consistency from childhood to late adolescence, and stability increased with age. These findings are consistent with other psychological constructs including personality (Roberts & DelVecchio, 2000), temperament (Guerin & Gottfried, 1994; Guerin, Gottfried, Oliver, & Thomas, 2003), competence beliefs (Wigfield et al., 1997), and intelligence (Asendorpf, 1992; Gottfried, Gottfried, & Guerin, 2009, in press).

The last criterion that helped to launch the construct of gifted motivation concerned the role of environment in academic intrinsic motivation. Both teachers and parents have been found to play their own role in the recognition and/or facilitation of children's academic intrinsic motivation. Regarding teachers, they have been found to notice and be aware of students' academic intrinsic motivation from first to eighth grades. Their ratings of students' academic intrinsic motivation significantly correlated with students' own ratings of their academic intrinsic motivation (Gottfried, 1985, 1990), particularly in math for fifth through eighth grades (Gottfried, 1985). This is a significant finding because it documents the fact that academic intrinsic motivation is not simply a variable for researchers to examine, but it is a real phenomenon identifiable in students by teachers. Thus, students with particularly strong academic intrinsic motivation appear to engage in motivated behaviors that are noticeable in school.

We have also examined parental and home environmental influences on children's and adolescents' academic intrinsic motivation. Based on the theory that the use of extrinsic rewards has adverse consequences for children's intrinsic motivation, the types of parental motivational strategies used by parents and how these related to children's academic intrinsic motivation were examined in a study of 9- to 10-year-olds in the FLS (A. E. Gottfried et al., 1994). Two types of parent motivation strategies were assessed using an instrument called the Parental Motivational Practices Scale (PMPS, A. E. Gottfried et al., 1994). These included parents' use of task-endogenous (i.e., intrinsic) strategies (such as encouraging children's curiosity), and parents' use of task-extrinsic motivational strategies (such as money or toys). Using structural equation modeling, results supported the prediction that task-endogenous parental strategies facilitate the development of academic intrinsic motivation and achievement (A. E. Gottfried et al., 1994), whereas parents' use of extrinsic strategies was adverse for children's academic intrinsic motivation and achievement. To the extent that parents encouraged children's curiosity, inquisitiveness, independence, and task

engagement, their children's academic intrinsic motivation and achievement were significantly higher. Conversely, when parents used more extrinsic motivational strategies providing a greater amount of external consequences contingent on children's performance, such as giving money or toys when children did well, children evidenced significantly lower academic intrinsic motivation and achievement. Hence, both academic intrinsic motivation and achievement were related to the type of parental strategies used. Results occurred across CAIMI subject areas and for school in general.

In another study, Gottfried, Fleming, & Gottfried (1998) used structural equation modeling to investigate the hypothesis that children's exposure to cognitive home stimulation is facilitative of their academic intrinsic motivation. The longitudinal impact of cognitively stimulating home environment on children's academic intrinsic motivation was studied in children from ages 9 to 13 years controlling for family socioeconomic status. A latent home stimulation variable consisted of items from the HOME scales (Bradley, Caldwell, Rock, Hamrick, & Harris, 1988); the Family Environment Scale (Moos & Moos, 1994), and our own Home Environment Survey (A. W. Gottfried et al., 1994). Examples of items from the home observation included the following: child has ready access to a library card, family arranges for the child to go to the library once a month; and family provides lessons or organizational membership to support child's talent. Examples of items from parent survey include: availability of musical instruments, magazines, extracurricular lessons, parental expectation of child's achievement, discussions of political and social issues, and interest in cultural activities including art, music, literature, and museums. Results supported the hypothesis showing that stimulating home environment had a significant, positive direct path to subsequent academic intrinsic motivation at ages 9, 10, and 13 years. Moreover, this was obtained when socioeconomic status was controlled.

Results of these two studies strongly suggested that gifted motivation is related to specific home environments and that parents play an important role in the facilitation of their children's academic intrinsic motivation. In the first study, when parents used task-endogenous motivational strategies, children's academic intrinsic motivation was significantly higher than when they used task-extrinsic strategies. In the second study, parental provision of greater cognitive stimulation in the home environment facilitated children's academic intrinsic motivation. Hence, children whose family environments are higher in task-endogenous motivational strategies and intellectual stimulation are likely to develop greater curiosity, exploration, enjoyment of the learning process, and desire to master challenging learning opportunities. The quality and quantity of stimulation in the home environment are likely to play a significant role in children's development of intrinsic motivation and gifted motivation. This supposition has been further studied and will be examined below.

Based on the conceptual analysis put forth, we proposed that gifted motivation is a type of giftedness in and of itself, and not simply an augmentation of intellectual giftedness or giftedness in another domain (Gottfried & Gottfried, 2004).

Empirical Validation of the Gifted Motivation Construct

Our next task in the development of this construct was to provide empirical validation of the gifted motivation construct. We did so by identifying children evidencing consistent, extremely high academic intrinsic motivation, and comparing them to their cohort peer group with regard to their developmental/educational histories and future outcomes. Using extreme group methodology within the FLS, we emulated the research design used in our study of intellectual giftedness by applying it to academic intrinsic motivation (Gottfried et al., 2005).

In the research on intellectual giftedness, the traditional and ubiquitous standard cut-off score of 130 IQ or above was selected to designate the gifted at age 8 years. This age was selected as it has been found to provide reliable, predictive validity to IQ in subsequent years through adolescence and beyond (see Gottfried et al., 2005). This resulted in 19% (20 of 107) of the children in the longitudinal sample being designated as intellectually gifted at the age 8 year assessment, which was not unexpected because of the upward displacement of the distribution resulting from sampling middle-class families (Gottfried et al., 2005). Further, this percentage is in accord with thresholds used by other researchers in studying giftedness (see Gagné, 1998, for a review).

However, in the absence of a standardized cut-off score to designate gifted motivation, we applied the following rationale to create the gifted motivation and cohort peer comparison groups. Because academic intrinsic motivation increases in stability during adolescence, this period was chosen for designating the gifted motivation and cohort peer comparison groups. The school in general subscale of the CAIMI, henceforth called the general score, at ages 13, 16, and 17 years, were aggregated to provide an appraisal of adolescents' overall pleasure inherent in the learning process in order to apply to a wide range of academic criteria. Aggregation of CAIMI scores across ages was used in order to optimize reliability (Epstein, 1979; Rushton, Brainerd, & Pressley, 1983) and to obtain a sample of the most consistently highly motivated adolescents across time. The total *n* of the sample was 111. Under the assumption that gifted motivation occurs at a frequency similar to that of gifted intelligence, we applied the same percentage (19%) to designate the gifted motivation group as used in the study of intellectual giftedness. This resulted in 21 of the 111 participants displaying consistently, extremely high academic intrinsic motivation across ages 13–17. Statistical analyses examining the significance of mean differences and effect sizes were computed comparing the gifted motivation and the cohort peer groups across three time periods: (a) prior to the designation of motivationally gifted (ages 6–12 years); (b) concurrent to the designation of motivational giftedness (ages 13–17 years); and (c) subsequent to the designation of motivational giftedness (age 24 years). Results showed that across time, the motivationally gifted evidenced superior academic functioning across a wide array of criteria including academic intrinsic motivation (ages 9 and 10 years); reading and math achievement assessed with the Woodcock-Johnson Psycho-Educational Battery across ages 7–17 years; teachers' and parents' reports of academic performance in reading and math (ages 6–11 years for teachers, and ages 6 through 17 years for parents); high school GPA (freshman to senior); positive adaptive classroom behaviors (ages 6–11 years); Scholastic Aptitude Test scores (age 17 years); academic and general self-concept (ages 12–16 years); and intellectual performance (ages 6–17 years). It should be noted that regardless of this statistical difference, both groups scored above average in IQ.

Because the motivationally gifted evidenced higher intellectual performance, further analyses were conducted to determine the distinctiveness of gifted motivation and gifted intelligence. These additional analyses showed that the motivationally and intellectually gifted were distinct groups. Only eight of the adolescents were both motivationally and intellectually gifted, and there proved to be no statistically significant association between the motivationally and the intellectually gifted groups. It was concluded that whereas these two forms of giftedness are not mutually exclusive, their distinctiveness outweighs their overlap. A coefficient of alienation (i.e., non-correlation indicating the variance of one variable that is not accounted for by the other) between motivation and IQ was computed to be .87, indicating that the great majority of variance in academic intrinsic motivation is not accounted for by intelligence. A hierarchical multiple regression further supported the distinctiveness between academic intrinsic motivation and IQ in predicting cumulative high school GPA. In this analysis, motivation significantly contributed to the prediction of GPA beyond IQ. On the basis of these analyses, it was concluded that motivational giftedness is indeed distinct from gifted intelligence. Hence, these analyses further supported the view that gifted motivation needs to be recognized as a form of giftedness in and of itself (Gottfried et al., 2005).

Regarding educational attainment from the end of high school through early adulthood, the motivationally gifted had higher accomplishments. In the FLS, none of the motivationally gifted dropped out of high school, whereas five students in the cohort peer comparison group had done so. The motivationally gifted were significantly more likely to take the SAT than the comparison group and were more likely to enroll in 4-year colleges directly out of high school. By age 24, the motivationally gifted had completed significantly more years of education, had received more college degrees (BA and AA), and were more likely to be enrolled in graduate school. This pattern was clear and consistent with the enhanced academic functioning of the motivationally gifted in the earlier years.

These empirical results validated the construct of gifted motivation. Individuals gifted in the area of academic intrinsic motivation showed a pervasive pattern of enhanced academic functioning across childhood through early adulthood. Their superior academic proficiency began early, prior to adolescence and their designation as motivationally gifted, and continued throughout adolescence and beyond. Furthermore,

motivational giftedness proved to be distinct from intellectual giftedness. Based on these findings, the construct of gifted motivation was established as its own unique form of giftedness.

The Role of Home and Family Environment in Gifted Motivation

As discussed above, the level of cognitively stimulating environment and the nature of parental motivational practices significantly contribute to the development of academic intrinsic motivation (A. E. Gottfried et al., 1994, 1998). Since the initial proposal of gifted motivation, additional research has been conducted in the FLS examining parental motivational strategies and home environments comparing the motivationally gifted group with their cohort peer group.

Gottfried (2008) reported comparing the motivationally gifted to another group of FLS study participants who exhibited consistently low motivation. These individuals were termed the motivationally at-risk. This latter group was formed in a manner comparable to that of the motivationally gifted, but at the low end of the distribution. As reported above, because prior research indicated differential relationships between task-endogenous and task-extrinsic parental motivational strategies and children's academic intrinsic motivation, we sought to determine if parents of motivationally gifted and at-risk children differentially used intrinsic and extrinsic motivational strategies. Results revealed significantly different strategies used by parents of the motivationally gifted and at-risk groups as compared to their respective cohort peer group. For the motivationally gifted, when children were age 9 years of age parents used significantly fewer extrinsic strategies, whereas parents of the motivationally at-risk group used significantly more. At age 17 years, motivationally gifted adolescents perceived their parents as using significantly more intrinsic strategies, with parents' reports being consistent. On the contrary, at age 17 years, motivationally at-risk adolescents perceived their parents as using significantly fewer intrinsic strategies. Their fathers reported using significantly fewer intrinsic, and their mothers reported using significantly more extrinsic strategies with this latter group. Children who became motivationally at-risk received significantly more extrinsic and fewer intrinsic parental motivational strategies. On the other hand, the reverse was true for motivationally gifted children whose parents used significantly higher intrinsic and lower extrinsic motivational practices, a pattern likely to facilitate their children's academic intrinsic motivation. Hence, motivationally gifted and at-risk students were exposed to differential parenting messages having important consequences for their academic intrinsic motivational development. These results strongly suggest that children are more likely to become motivationally gifted if their parents use task-intrinsic strategies emphasizing encouragement of academic intrinsic motivation. Use of extrinsic parent motivation strategies is likely to have an adverse effect on children's development of gifted motivation.

Analyses on the cognitive stimulation available in the home environment as described above (Gottfried et al., 1998) were conducted comparing the homes of the motivationally gifted and their cohort peer group. The homes of the motivationally gifted were found to provide significantly more active stimulation, learning opportunities, and intellectual-cultural activities than the homes of the cohort peer comparison group. Motivationally gifted adolescents were also found to ask their parents for significantly more extracurricular activities at age 8 years than did their peer comparison group. These activities included lessons, sports, clubs, and hobbies. They also engaged in significantly more reading time at home than did their cohort peer comparison group. However, amount of time spent watching TV, or needing academic assistance, did not significantly distinguish these two groups.

Another recent study concerns parents' perceptions of children's academic engagement as related to motivational giftedness (Ho, Gottfried, Gottfried, Vaughan, & Martinez, 2007). At the 9- and 10-year assessments in the FLS, parents rated their perceptions of the child's academic interests, abilities, effort, and expectations of children's achievement. Across both ages 9 and 10 years, comparisons between the motivationally gifted and their cohort peer group revealed that the parents of the motivationally gifted viewed their children as significantly more academically engaged compared to the parents of the cohort peer group. As in the previous study described, it may be that parents provide their children messages that are facilitative of the development of gifted motivation.

Across these studies, many of the environmental variables were assessed prior to the designation of motivational giftedness. This time sequence suggests that early provision of home stimulation is significant for the subsequent development of gifted motivation.

Anecdotal Evidence for a Gifted Motivation Construct

When developing the conception of gifted motivation, examples of the circumstances and lives of several individuals provided insight into its nature and processes. In Gottfried & Gottfried (2004), we referred to several anecdotes including a homeless man who ultimately earned his college degree through a high level of commitment; a high school student with a passion for math who published a book of math problems he later donated to schools; a 102-year-old medical doctor who continued to work, had achieved four doctorates across his lifespan, and played violin on a 1694 Stradivarious to celebrate his 100th birthday; amateurs whose contributions to scientific discoveries exceeded those of professionals; the story of Jane Goodall who was advised not to go to Africa to study wildlife, advice that she did not heed but rather pursued her passion with determination; and a passion or doggedness to solve problems as a common theme among Nobel Laureates.

There are additional examples that we have encountered beyond these initial ones. In an article entitled "Women at the Top" (Kaminsky, 2003), featuring biographies of three women Presidents of elite universities, the common theme among them was "With fierce determination, intellect, and a love of learning in tow, three leading ladies hit the Ivy League" (p. 3). This article was about Presidents Judith Rodin (University of Pennsylvania); Ruth Simmons (Brown University) and Shirley Tilghman (Princeton University). These three remarkable women are certainly examples of the motivationally gifted, who became leaders, and broke through barriers to be in the forefront of higher education. In an article entitled "An unrelenting drive and a Harvard degree" (Steinberg, 2000), Brooke Ellison, who became a quadriplegic in seventh grade after being injured in a car accident, completed a bachelor's degree in psychology and biology at Harvard with an A- average. "This is just the way my life is...I've always felt that whatever circumstances I confront, it's just a question of continuing to live and not letting what I can't do define what I can." Clearly, gifted motivation is a component of her extraordinary achievement. In an article entitled, "Dedication paying off in degrees" (Silverstein, 2004), the story of a working-class immigrant Mexican family is described in which all of the parents' 11 children earned college degrees. The family held strong values for education, high expectations, parents' deep involvement in their children's lives, the help of siblings, and father's holding three jobs to support the children through college. We deem this to exemplify gifted motivation as well. A brief biography of the violinist, Joshua Bell, presented in the program book of a concert on February 15, 2002 at UCLA, stated that he "received his first violin at age four after his parents noticed him plucking rubber bands he had stretched around the handles of his dresser drawers. . .." Clearly, he provided his parents with messages through his motivated behavior, and they followed his lead. There are many more examples that continue to accrue. These are just a few that make the point.

Theoretical and Applied Significance of the Gifted Motivation Construct

Theoretical significance. Gifted motivation adds to theory by expanding the areas of giftedness from those focused on cognition and specific talents to including superiority of individuals' strivings and determination. Whereas motivation has previously been viewed as an ancillary factor described as being in the service of other forms of giftedness either as a prerequisite, component, catalyst, or outcome (e.g., Dai, Moon, & Feldhusen, 1998; Feldhusen, 1986; Gagné, 2000; Gottfried & Gottfried, 1996; A. W. Gottfried et al., 1994; Lens & Rand, 2000; Renzulli, 1986; Ziegler & Heller, 2000), gifted motivation as we propose it is a form of giftedness in its own right (see also Gottfried & Gottfried, 2004; Gottfried et al., 2005).

The conceptualization and research presented herein provides evidence for the validity of the gifted motivation construct. This construct serves heuristic purposes to advance further inquiry as well as providing implications for application, such as in the development and implementation of gifted programs. Gifted motivation, therefore, has implications for

developmental psychology, educational psychology, and for educational identification and programming.

Regarding developmental psychology, the precursors and sequelae of gifted motivation are a wide open area for future research. The presently available research contributes to the field by establishing the validity of gifted motivation, documenting early antecedents and subsequent outcomes of being designated motivationally gifted, and elucidating parenting and environmental processes associated with being motivationally gifted. Research generalizing across other populations is desirable.

It is important to note that the children and adolescents in the FLS were never made aware of their motivational status. The gifted motivation and cohort peer comparison groups were designated and analyzed after the laboratory assessments had been completed. Hence, there was no possibility that knowledge of one's motivational group status could have affected the results since that status was only known to the researchers subsequent to the assessments. Another methodological feature to be noted is that the children in the FLS attended different schools and classes, had different teachers, and as the study progressed resided in increasingly diverse geographic areas (Gottfried, Gottfried, Morris, & Cook, 2008; Gottfried, Marcoulides, Gottfried, Oliver, Guerin, 2007). Hence, there could not have been an influence of being in a common classroom or school, or having the same teacher, or curriculum. This is important in that it demonstrates that the gifted motivation construct generalizes across these factors.

The quality and stimulation of children's home environments have been found to be significant for the development of academic intrinsic motivation (Gottfried, 2008). On the basis of such research, recommendations have been made to enhance the positive role that parents can play in the development of their children's academic intrinsic motivation (Gottfried, 1983, 1986b, 2008). Examples of recommendations for parental input include careful observation of children's interests and level of engagement to determine appropriate activities; provision of a variety of experiences to expose children to new areas, to encourage curiosity and exploration, to challenge children appropriately; and to allow children choice in the selection of learning activities (Gottfried, 2008).

The research concerning parental encouragement of task intrinsic (i.e., endogenous) activities as opposed to task extrinsic consequences suggests that parents should refrain from providing rewards for learning, but instead encourage children's autonomy, curiosity, and orientation to accomplishing challenging tasks. The wide use of extrinsic consequences by parents and teachers may unfortunately backfire and actually reduce rather than augment children's academic intrinsic motivation.

Regarding educational psychology, the gifted motivation construct is important for identification of academic competence. At this point in time, because of the newness and uniqueness of the gifted motivation construct, it is likely that many motivationally gifted students are in regular education classes rather than in gifted programs. Therefore, a pertinent issue that needs to be raised concerns how schools will be able to accommodate to the needs of the motivationally gifted.

Another equally important issue concerns the educator's role in stimulating students' motivation so that all may potentially become motivationally gifted. The inclusion of motivational theories and findings in the education and professional training of all educators, including teachers, support staff (e.g., counselors), and administrators is critical. If academic intrinsic motivation was appropriately stimulated in schools, this might possibly prevent motivational declines from elementary through high school as pervasively documented (Gottfried et al., 2007).

Another area pertinent to educational psychology concerns the role of motivation in the underachievement of gifted students. For example, McCoach, & Siegle (2003) found that intellectually gifted achievers and underachievers differed significantly on their self-regulatory motivation (e.g., self-control, self-motivation, task commitment, and persistence) with the underachievers evidencing less motivation and engagement. Further, these motivational factors accurately classified these intellectually gifted achievers and underachievers a majority of the time. Therefore, intellectually gifted children are more likely to underachieve if they are not strongly motivated. The application of motivational development in and of itself may possibly prevent adverse achievement patterns in intellectually gifted children.

Applied significance. Gifted motivation allows for a more inclusive view of giftedness that is not restricted to intellectual giftedness or talent. It is a construct distinct from IQ that contributes uniquely to educational success. This widened perspective provides

many implications for identification and programming. It is recommended that gifted motivation be considered a criterion in and of itself for identification into gifted programs (Gottfried & Gottfried, 2004; Gottfried et al., 2005, 2006). The availability of the CAIMI provides an easily administered method for such identification. Using an instrument such as the CAIMI can provide a basis for this determination by observing patterns of motivation across subject areas and for school in general. We advocated this recommendation earlier (Gottfried & Gottfried, 1996, 2004; and A. W. Gottfried et al., 1994, 2005, 2006) which is also consistent with the recommendation of Clinkenbeard (1996).

Parents and teachers are on the front line of recognizing gifted potential and signs of reach (Gottfried, Gottfried, & Guerin, 2009, in press). Indeed, Subotnik & Olszewski-Kubilius (1997) pointed out that parents are the first to identify childhood talent and often the first teachers for those who evidence exceptional talent and eminence. Hence, this applies to the identification of gifted motivation as well. An example of this was presented in the anecdote regarding Joshua Bell which revealed that his parents were instrumental in identifying his music motivation and acting upon their observation to provide the environment to support his development.

Finally, the adoption of the gifted motivation construct would potentially allow for a wider availability of gifted programs which would be open to a diverse population of students identified by criteria broader than ability test scores. Children who might not qualify for gifted programs on these latter criteria might do so on the basis of their motivation. Through the recognition that gifted motivation is significant for excellence in academic competency, new programs may be incorporated both in the special settings and in the regular education classroom, for the development of children's academic intrinsic motivation, and hence positively impact their academic performance.

Directions for Future Research

Several directions for further research have been proposed (Gottfried & Gottfried, 2004; Gottfried et al., 2005) including the application of the gifted motivation construct to other types of academic motivation, and examination of the construct across populations varying in socioeconomic status, ethnicity, and gender. Since these recommendations were advanced, many more areas for research have presented themselves. It is well known that many underrepresented groups need to overcome obstacles and barriers in order to be successful. For example, regarding the development of talent in women, the recent contentious controversy about the reasons for women's underrepresentation in scientific fields illustrates the continuing attitudinal and opportunity barriers in this professional realm inasmuch as differences between the genders cannot be attributed to cognitive or biological factors (Dean, 2006; Spelke, 2005). Arnold, Noble, and Subotnik (1996), Tomlinson-Keasey (1998), Reis (2002), Reis and Sullivan, this volume and Williams, Alon, and Bornstein (2006) extensively discuss barriers faced by gifted and talented girls and women, and women in academia, which must be overcome for them to succeed. How do women in these fields overcome such impediments to their progress? Certainly, we suggest that gifted motivation is one such factor that propels women to succeed against the odds in these fields with preexisting barriers.

The proposal that gifted motivation may enhance individuals' achievement can be advanced regarding other underrepresented groups. For example, the construct of stereotype threat (Steele, 1997) concerns the academic underperformance of minority individuals (e.g., African-American), and women in math, as influenced by the self-perception of threat that one's performance would verify negative stereotypes that pertain to one's group. Such underperformance may set the stage for developing students' gifted motivation to enable them to overcome this obstacle of an inaccurate self-perception of low ability. Ambrose (2002) discussed barriers to giftedness and talent development in children of low socioeconomic status. He concluded that talent development is undermined by the adverse effects of socioeconomic deprivation on motivation and aspirations. Given this observation, it would take gifted motivation, and efforts to stimulate motivation, to empower talent and giftedness in children growing up in such conditions.

Aside from overcoming obstacles and barriers, an alternate area of research regards the positive development of leadership skills. The findings reported herein that motivationally gifted children requested significantly more extracurricular activities, including clubs, than their cohort peer comparison suggests that

these are early signs of the more active engagement of motivationally gifted children in leadership development experiences. (Gottfried & Gottfried, 2009, in press) Whereas retrospective accounts of leaders no doubt would identify superior motivation as a component of their eminence, we advocate for prospective and longitudinal research methodology to address this question.

Studying gifted motivation in specific subject areas is another area for additional research on gifted motivation. Previous studies indicate the specificity of relations between academic intrinsic motivation and achievement in corresponding domains, particularly reading and math. Specific relations between reading and math intrinsic motivation and achievement have been obtained and addressed in the literature (e.g. Gottfried, 1985, 1990). Reading and math intrinsic motivation tend to relate more strongly to academic outcomes (e.g., achievement, anxiety, and perception of competence) in corresponding areas (e.g., reading to reading and math to math) than across non-corresponding areas (Gottfried, 1985, 1988, 1990). Moreover, math has been said to be a unique area of challenge for students (Eccles, Adler, & Meece, 1984; Licht & Dweck, 1984; Stodolsky, 1988), perhaps requiring additional motivation. Research needs to be conducted to detect the aspects of specific domains in the development of gifted motivation as pertinent to that area.

Results of other research likewise suggest the importance of investigating gifted motivation in specific areas. For example, avid readers, compared to non-avid readers, were found to have higher reading academic intrinsic motivation (Shapiro & Whitney, 1997). In another study, with regard to math, high school students identified as academically gifted or creatively talented had more positive perceptions of their math self-efficacy, math ability, and valued math more than did their non-gifted peers (Hong & Aqui, 2004). Also, in a review of 35 years of research in the well-known Study of Mathematically Precocious Youth, Lubinski & Benbow (2006) reported that math–science graduate students had shown early commitment to math–science endeavors.

To take these suggestions further, developmental pathways of gifted motivation need to be established. In order to do so, additional longitudinal research is needed to identify precursors and outcomes of being motivationally gifted, and the direct and indirect relations between gifted motivation and developmental outcomes.

Conclusions

There is no doubt that society benefits from the accomplishments of individuals with gifted motivation. Across the realms of arts and sciences, leadership, business, politics, sports, education, professions, and many more, those who endeavor to strive at a superior level contribute to society's, as well as personal, well-being. The goal is to maximize gifted motivation across all individuals. We continue to assert that "Teaching the desire to learn may be as important as teaching academic skills" (Gottfried & Gottfried, 2004, p. 129). By advancing the rationale, evidence for, and encouragement and implications of the construct of gifted motivation, it is our hope that the conception of giftedness will be expanded and accessible to enable all individuals to develop their special gifts.

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