

Psychological Adjustment in Mathematically Gifted Students

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Abstract

The Brief Symptom Inventory (BSI) was administered to 274 mathematically gifted students who were identified by a national talent search and attended a summer program in precalculus. Results indicated that these students were significantly better adjusted than the adolescent normative group for the instrument. Gender, grade level, and verbal abilities were not related to adjustment scores. The scores obtained by the most gifted students were not significantly different from scores obtained by the rest of the sample.

Psychological Adjustment in Mathematically Gifted Students

The popular press often promotes the stereotype of the gifted as predisposed to serious maladjustment to the point of being social isolates and misfits. Decades ago, Terman and Oden (1925) countered this perception by demonstrating that the gifted were actually better adjusted than their less able peers. Most recent research has confirmed that the gifted are not at greater risk for serious maladjustment (Brody & Benbow, 1986; Cornell & Grossberg, 1987; Haier & Denham, 1976; Kennedy, 1962; Lajoie & Shore, 1981; Leluman & Erdwins, 1981; Olszewski-Kubilius, Kulicke, & Krasney, 1988; Pollins, 1983; Pyryt & Mendaglio, 1994; Reynolds & Bradley, 1983; Rost, 1994; Solano, 1983). However, dissenting research results have indicated that gifted students are less popular and have poorer self-concepts than less able students (Feldman & Goldsmith, 1986; Klein & Cantor, 1976; Milgram & Milgram, 1976; Powell & Haden, 1984; Trotter, 1971). Some authors have contended that perfectionistic tendencies in the gifted predispose them to maladjustment (reviewed in Parker & Adkins, 1995). A particular concern has emerged from modest anecdotal and empirical evidence suggesting that the gifted may be at greater risk for suicide (Delisle, 1986; Garfinkel & Golombek, 1977; Hayes & Sloat, 1990; Lajoie & Shore, 1981; Weisse, 1990).

A number of studies have looked for patterns of adjustment *within* subgroups of the gifted. Looking at gender differences, Loeb and Jay (1987) and Tomlinson-Keasey

and Smith-Winberry (1983) found gifted females to have better self-concepts than nongifted females, but this pattern did not emerge in studies of gifted males. However, Kelly and Colangelo (1984) found the opposite result with gifted males having better self-concepts while gifted females did not have better self-concepts than nongifted females. Finally, Ross and Parker (1980) found no gender difference in the self-concepts of the gifted.

In comparing gifted students to highly gifted students, several studies (Austin & Draper, 1981; Dauber & Benbow, 1990; Feldman & Goldsmith, 1986; Freeman, 1979) found the highly gifted less well adjusted, while two other studies (Brody & Benbow, 1986; Gallucci, 1988) found no difference in adjustment among individuals with different levels of giftedness. Studies have typically found the mathematically gifted to be better adjusted than the verbally gifted (Brody & Benbow, 1986; Dauber & Benbow, 1990; D'Heurle, Mellinger, & Haggard, 1959; Ferguson & Maccoby, 1966; Solano, 1983).

A number of methodological problems have made the meaningful comparison of results in the previously cited studies problematic. These problems include drastically different definitions of giftedness, poor articulation of the demographic variables, small sample sizes, and noncomparable measures of adjustment. The preponderance of these studies actually use self-reports of self-esteem as an indirect measure of adjustment, assuming that self-esteem is a reflection of adjustment. The purpose of the present study is to investigate the psychological adjustment of a gifted sample of substantial size, using a more direct measure with adequate adolescent norms.

Method

Subjects

In the summer of 1995, 602 students qualified for and enrolled in a self-paced precalculus course through the Center for Talented Youth of The Johns Hopkins University.

Putting Research to Use

Many parents of gifted students worry that the intellectual excellence of their children will predispose them to adjustment problems. This research suggests that these fears are not well founded. The gifted children in this study were superior in emotional adjustment when compared to their more typical peers. Giftedness, in this case mathematical talent, does not appear to predispose children to maladjustment.

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In order to qualify, students take the Scholastic Aptitude Test (SAT), typically at age 12, and based on their performance on the test are estimated to function at higher than the 99.5 percentile in mathematical reasoning ability for their age group. The students in this sample had a seventh grade mean SAT-I math score of 594.07 ($SD=76.38$) and an SAT-I mean verbal score of 443.47 ($SD=74.53$).

All program participants were recruited for voluntary participation in a research study which required filling out several psychological instruments mailed to the student pool. Of the total potential subjects, 280 (46.5%) returned the research packet. Of those 280, 6 did not have useable protocols and were dropped from this study leaving a sample of 274. This sample contained moderately more males than females, had fairly equal numbers of Asians and Whites, and was primarily made up of seventh through ninth graders. While specific data on the socioeconomic status of participants was not gathered, CTY participants tend to come from relatively affluent families with highly educated parents. A small number took the instruments anonymously and did not provide all demographic information. The mean age of the sample was 13.77 ($SD=.97$). A more detailed description of the sample is provided in Table 1.

Table 1
Demographic Characteristics of the Sample

<i>Gender</i>	Male	159	(58.0%)
	Female	115	(42.0%)
<i>Ethnic Group</i>	Asian	133	(48.5%)
	White	125	(45.6%)
	Hispanic	6	(2.2%)
	Black	4	(1.5%)
	Other	3	(1.1%)
	No response	3	(1.1%)
<i>Last Grade Completed</i>	7th	119	(43.4%)
	8th	83	(30.3%)
	9th	54	(19.7%)
	10th	8	(2.9%)
	11th	1	(.4%)
	No response	9	(3.3%)

$N=274$

Instrument

The Brief Symptom Inventory (BSI; Derogatis, 1993) a self-report Likert-style symptom inventory, is a shortened version of the Symptom Checklist-90 (SCL-90-R), developed from the Hopkins Symptom Checklist. This instrument measures nine symptom constructs: Somatization (SOM), Obsessive-compulsive (O.C), Interpersonal sensitivity (I-S), Depression (DEP), Anxiety (ANX), Hostility (HOS), Phobic anxiety (PHOB), Paranoid ideation (PAR), and Psychoticism (PSY) as well as three measures of general adjustment, the most widely used of which is the Global Severity Index (GSI). Elevated scores indicate greater maladjustment. Separate norms are available for normal adults, normal adolescents, clinical adults, and clinical adolescents. These normal adolescent norms, produced by sampling 2408 noninstitutionalized adolescents between the ages of 13 to 19, formed the comparison group for the present study. Internal reliability of the subscales as measured by Cronbach's alpha is reported in the Manual (Derogatis, 1993) from a low of .71 (Psychoticism) to a high of .85 (Depression), and the test-retest reliability of the GSI is reported at .90. The present sample produced coefficient alpha of .95 for the total scale. Correlations of comparable scales between the BSI and SCL-90-R range from .92 to .99 (Cochran & Hale, 1985). The BSI has been judged to be among the best instruments of its type (Edwards, Yarvis, Mueller, Zingale, & Wagman, 1978; Waskow & Parloff, 1975) and has been widely used in psychiatric research and clinical screening for maladjustment.

Results

Scores for the nine symptom constructs and the overall adjustment measure were compared to the mean scores of the normal adolescent normative group. The results, presented in Table 2, indicate that the mathematically gifted students' mean scores and standard deviations were lower for all measures of maladjustment. Using Bonferroni adjusted *t*-tests of $p < .005$ for an experiment wise $p < .05$, all of the mean score differences were found to be statistically significant except for O-C (Obsessive-compulsive). Cohen's *d* (Cohen, 1977) was computed as a measure of effect size and all nine statistically significant scores were in the small effect size range ($d = .20 - .49$), with some scores in the high end of this range.

A two-factor multivariate analysis of variance (MANOVA) was performed to determine if there were gender and grade level differences in adjustment within the mathematically gifted group. Scores on the nine symptom constructs and the general maladjustment measure (GSI) were the dependent variables. Gender and grade level (Grade 7, Grade 8, and > Grade 8) were the independent variables. The MANOVA results indicated a nonsignificant interaction of gender and grade level

Table 2
Means and Standard Deviations of BSI Scores for Mathematically Gifted Students and Adolescent Normative Group with *t*-tests of Independent Means and Cohen's *d* as a Measure of Effect Size

Scale	Mathematically Gifted		Adolescent Norms		<i>t</i>	<i>p</i>	<i>d</i>
	Mean	SD	Mean	SD			
SOM	.33	.46	.63	.64	-9.77	.000	.48
O-C	.84	.67	.94	.75	-2.11	.035	.14
I-S	.80	.79	.99	.84	-3.57	.000	.23
DEP	.56	.67	.82	.79	-5.97	.000	.33
ANX	.55	.59	.78	.68	-5.37	.000	.34
HOS	.74	.69	1.02	.86	-6.19	.000	.33
PHOB	.28	.41	.54	.64	-9.29	.000	.41
PAR	.78	.72	1.13	.82	-6.77	.000	.43
PSY	.46	.56	.73	.73	-7.31	.000	.38
GSI	.58	.48	.83	.59	-7.96	.000	.43

N Mathematically Gifted = 274;
N Normative Group = 2408

(Wilks' lambda=.93; $F_{20,500}=.88$; $p=.61$) as well as non-significant main effects for gender (Wilks' lambda=.94; $F_{10,250}=1.72$; $p=.08$) and grade level (Wilks' lambda=.91; $F_{20,500}=1.15$; $p=.30$).

To determine if verbal ability was related to adjustment among mathematically gifted students, BSI scores were correlated with SAT-Verbal scores obtained in the seventh grade. None of the BSI scores demonstrated a statistically significant correlation. To assess if the most highly gifted students had a different level of adjustment from other gifted students, the sample was dichotomized into those who scored 700 or greater on the seventh grade SAT-Math ($N=23$) and those who scored between 500 and 690 ($N=240$). No statistically significant differences were found.

When the BSI is used as a screening instrument, clinical levels of maladjustment are indicated by a *T* score > 63 on the GSI or two or more symptom construct *T* scores > 63. Using the GSI standard, 8 students scored at this level; using the symptom construct standard, an additional 23 students were identified for a total of 31. Using a random sample from the general adolescent population, one would expect 27 students to be indicated by the GSI standard and another 56 by the symptom construct standard for a total of 83 students. Thus, this mathematically gifted sample had only 37 percent of the clinical cases of those expected in the normal adolescent population.

Discussion

The major finding of this study is that the mathematically gifted students attending the CTY summer programs show less maladjustment than the normative adolescent group. Further, within the mathematically gifted group, grade level and gender are unrelated to adjustment. One serious limitation to the generalizability of the present study is the heterogeneous socio-economic status of the normative group and the relatively homogeneous and affluent socio-economic status of the mathematically gifted sample. Because of the relationship between socioeconomic status and academic achievement, in future research the gifted sample should be paired with a sample of similar socioeconomic status but more typical abilities. In this way, the relative contribution of giftedness and socioeconomic status to psychological adjustment may be assessed.

While the number of possible clinical cases screened in the gifted sample was relatively small, such students are of considerable interest. For example, are such students predisposed to underachievement due to emotional interference with their academic pursuits? Are such students characterized by differential demographic characteristics, educational programming, or family patterns which predispose them to greater maladjustment? It is also unclear to what extent their elevated scores are indicative of adolescent adjustment reaction or transitory adolescent angst versus more serious structural maladjustment. This determination can be most effectively made through longitudinal study of such students.

The concern for possible increased risk of suicide among the gifted is likewise not supported by the results of this study. While suicidal ideation or behavior was not measured, frequency of depressed affect was measured. Depression, while not a sufficient condition for suicide, is a necessary precondition for suicidal preoccupation. The mathematically gifted students in this study were less prone to depression than more typical adolescents and hence would be expected to have a lower rate of suicidal ideation and behavior.

The absence of gender differences was surprising, particularly for the depression symptom construct. The research literature on depression clearly indicates greater rates of depression in females than in males. In a review of this literature, Weissman and Klerman (1981) concluded that gender differences in depression are primarily related to the adoption of the traditional female social role. While it was not directly tested in these subjects, it would not be surprising to find that these mathematically gifted females who excel in a subject traditionally seen as male are less committed to the traditional female role, and hence, no more predisposed to depression than males.

There are theoretical explanations for the superior adjustment manifested by these mathematically gifted students. According to Adler (1956), neurotic adjustment is the product of a striving for superiority which arises in response to self-perceived inadequacy. The more the individual perceives himself as competent and is able to deal effectively

with his physical and social environment, the less likely the individual is to develop neurotic needs. The gifted are academically competent and typically effective in having their needs met by their environment, lessening their likelihood for maladjustment. According to Seligman's theory of learned helplessness (Peterson, Maier, & Seligman, 1993), adjustment and self-esteem are not feelings, but the result of mastering challenges and experiencing success. Children who are successful in important areas of their lives (such as school) are likely to experience greater self-esteem and emotional adjustment. For those with low self-esteem, the focus should not be on improving the feelings of self-esteem, but on producing more successful performance which will result in remediation of the lowered self-esteem. This perspective would expect the gifted to be better adjusted because of their superior performance. Thus, it might be hypothesized that underachieving gifted with poor adjustment are poorly adjusted because of the underachievement, rather than the poor adjustment producing poor achievement.

Many parents of mathematically gifted children express concerns that their children by virtue of being different are highly vulnerable to maladjustment. The results of the present study indicate that such fears are largely misplaced.

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