Dimensions of Anxiety Among High IQ Children

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Abstract

Responses of 584 high IQ children to the 37 item Revised Children's Manifest Anxiety Scale were submitted to a factor analysis. The five factors that emerged (Physiological, Worry/Oversensitivity, Concentration, Lie 1, and Lie 2) were shown to be highly similar to the factors found with the normative sample. Coefficients of congruence revealed significant correspondence between all factors for the high IQ and normative group. Means and standard deviations for males and females at each age group are also reported, revealing lower levels of anxiety for the high IQ group on all variables. Reliability estimates for each age group on the three subscales of anxiety and for the total Anxiety Scale support the clinical and research use of this new scale in work with high IQ children.

Identifying intellectually superior students and providing them with an appropriate education has been an important goal for educators but is presently in another cyclical period of emphasis. However, relatively little research exists concerning the various personality dimensions and affective characteristics of intellectually gifted children or whether these dimensions differ from those of children in other IQ ranges. Furthermore, the instruments commonly used to assess these dimensions have not been investigated adequately regarding validity for high IQ children nor for potential bias in their use with high IQ groups.

Popular mythology has held that gifted people, especially those labeled "genius," are particularly emotionally unstable. Although this common stereotype has persisted, the available research tends to refute the view that high IQ children have more personality disorders or emotional disturbance than normal IQ children. Much of the earlier research involved the use of projective testing and teacher ratings to measure emotional disturbance and anxiety levels. In a study using Rorschach responses of groups of high IQ children, Gair (1944) found gifted children to be better adjusted emotionally and to possess more mature personality features when compared to children of average intellectual ability. Later studies using Rorschach responses report similar findings (Gallagher & Crowder, 1957; Jacobs, 1971). The longitudinal research of Terman and his colleagues (Oden, 1968; Terman & Oden, 1951; Terman, 1954), in studying the characteristics of high IQ children, also found greater emotional stability of the gifted group when compared to a random sample of the population. Yet investigators have largely ignored the test instruments involved in such investigations, not assessing their appropriateness (e.g., construct validity) for use with very high IQ groups.

The extent to which research findings can be generalized across race, sex, age, and group membership is dependent upon the cross-group validity of the measure being used. The issue of potential test bias due to some moderator variable such as group membership (e.g., intellectually gifted) may alter the interpretation that one makes from the test results. Therefore, it is imperative that the cross-group validity of these measures be investigated for any systematic or constant error of measurement as opposed to random error that is inherent in all tests that are not perfectly reliable. It is now well documented in measurement circles that for any test to yield valid comparisons across groups of subjects, the underlying or latent structure of the instrument must be common across all groups concerned. Otherwise, interpretations will be misleading at best and are potentially quite contrary to the real state of affairs. Researchers have, as of late, taken to conducting such validation when researching race and sex differences, but have not done so when looking at high IQ children. The need to establish consistency of factor structures across groups when comparing this population to others is no less needed than when dealing with more socially volatile research issues.

The purpose of the present study was to delineate the underlying factors and patterns of responses for high IQ children on the Revised Children's Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 1985, 1978) based upon principal factor analysis, and to determine the comparability of the test across groups of gifted and nongifted children. The Children's Manifest Anxiety Scale (CMAS; Casteneda, McCandless, & Palermo, 1956), since its inception, has been used in more than 100 published studies in the psychological literature. The Reynolds and Richmond (1978) revision of the CMAS involved the deleting, adding, and reordering of items, the development of new norms and the renaming of the CMAS to "What I Think and Feel." In addition to being an updated test, the RCMAS has also been extensively investigated for its content validity and construct validity (Reynolds & Paget, 1981; Reynolds & Richmond, 1979). Factor analysis of RCMAS by Reynolds and Richmond (1979) and Reynolds and Paget (1981) yielded three subscales or factors of anxiety that were named "physiological," "worry/oversensitivity," and "concentration." These factors are in accord with a growing body of literature that suggests anxiety is multidimensional in nature (Cattell & Scheier, 1961; Fenz & Epstein, 1965;

Finch, Kendall, & Montgomery, 1974; Logan & Loo, 1979; Loo, 1979; Naylor, 1978; Spielberger, 1972).

Before applying factor analysis results from a heterogeneous sample to a more homogeneous sample, such as an intellectually superior group, factor dimensions need to be compared and shown to be similar or invariant to any potential moderator variable such as group membership. This study is, therefore, intended to provide data relevant to RCMAS score interpretation for gifted children. Special normative data for high IQ children are also provided. The paper is also instructive in that it gives a practical example of just how such a factor analytic comparison might be undertaken. Reynolds (1982b) provides more detail on the methodology of these comparisons.

Method

Subjects

The sample consisted of 5,507 children between the ages of 6 and 19 years who were tested with the RCMAS by school and clinical psychologists, classroom teachers, and public school administrators. The children represented 13 states and more than 80 school districts from all major geographic regions of the United States. Data on the socioeconomic status (SES) of individual children were not made available to investigators, but it is believed that an excellent cross section of children from various SES groups was obtained. All geographic regions of the United States were sampled and districts with specific, known demographic characteristics were sought out and included in the sampling. Schools from large urban cities, small rural towns, and inner city districts were all used in the study. The intellectually superior group consisted of 584 children (extracted from the total sample of 5,507 children) who were attending classes for the gifted. Complete criteria for placement in these programs varied but all programs required a Binet or Wechsler IQ above 130 in addition to other criteria. The intellectually gifted sample ranged in age from 7 to 18 years and included 259 male and 325 female children.

Procedure

All children were tested in groups in classrooms of public schools using standard instructions printed on the scale. In the kindergarten and primary grades, the administrator read all questions to the students while they marked yes or no in response to each question. Previous research with the scale (Reynolds, Bradley, & Steel, 1980) indicates that this age group understands and responds reliably to the scale under these conditions. The children marked their own race, sex, and age on the test form. Age was marked as the year of age on the day of testing; that is, age 8 years, for example, represents ages 8 years 0 months 0 days through 8 years 11 months 30 days. Demographic data were checked by teachers only for the earlier grades.

Data Analysis

Means and standard deviations were computed separately for males and females at each age on all anxiety variables. Ages 7-8 and 17-18 were collapsed into single age groups in order to obtain adequate sample sizes.

Responses of the 584 high IQ children to the 37 item RCMAS were submitted to a factor analysis using the method of principal factors with R^2 in the diagonal of the item correlational matrix as the initial communality estimates. Iteration was performed until no further significant increases in communality estimates were obtained. The factors obtained were then rotated orthogonally via the varimax procedure. Factor analysis was performed separately for the high IQ and regular classroom groups to determine the degree of similarity of the factors between groups. Coefficients of congruence (Harman, 1976; Mulaik, 1971) were calculated between corresponding factors for the two groups. Previous research (Reynolds, 1982b; Reynolds & Harding, 1983) has shown the coefficient of congruence to be an adequate means of comparison in large sample studies with no additional indices required. Coefficient alpha estimates of internal consistency were also calculated for each age group by sex since equivalent reliability coefficients need to be demonstrated to establish the construct validity of a test (Reynolds, 1982a, 1982b).

Results and Discussion

Means and standard deviations are reported for the high IQ group by age and for each factor extracted in Table 1. The high IQ children scored significantly lower ($p < .05$) on all of the anxiety scales (cf. Reynolds & Bradley, 1983, for a discussion of this comparison). The factor structure for the RCMAS for the large sample of normal children is well known (Reynolds & Paget, 1981) and has been previously discussed in the introduction. A comparable solution was obtained for the high IQ group and for the national normative sample and is presented in Table 2.

Results presented in Table 2 reveal interesting similarities and differences across the high IQ and normative groups. Several items that loaded highest on the Physiological factor for the normative sample (9, 21, 33), loaded highest on the Concentration factor in the high IQ sample. On the Worry/Oversensitivity factor, item 26 loaded higher on the Physiological factor for the high IQ group, while the opposite was true for item 30. A change in the Concentration factor occurred only with item 31, which had a higher loading in the Physiological factor for the normative group. These changes are for the most part inconsequential and no consistent pattern of alteration occurred. The Lie 1 and Lie 2 factors remained the same for both samples.

The coefficients of congruence between corresponding factors for the high IQ and normative group are presented in Table 3 and confirmed the similarity of the various factors

Table 1
Mean Levels of Performance on the RCMAS by age and sex for 584 Children with IQ ≥ 130

Age Group (N)	Physiological Anxiety				Worry/Oversensitivity				Concentration Anxiety				Total Anxiety Score			
	Male		Female		Male		Female		Male		Female		Male		Female	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
7-8	4.98	2.21	5.55	1.98	4.1	3.50	5.01	2.50	3.24	2.45	3.12	2.25	12.25 (17)	5.73	13.67 (14)	4.83
9	5.14	2.56	3.95	2.09	4.39	3.25	3.42	2.78	3.00	2.48	1.95	1.73	12.54 (28)	7.09	9.33 (40)	5.25
10	2.95	2.15	3.55	2.32	3.12	2.53	4.25	2.98	1.81	1.69	2.14	1.99	7.89 (43)	5.56	9.94 (64)	6.42
11	2.59	2.10	3.23	2.22	3.02	2.21	4.51	3.05	2.24	2.06	2.06	1.74	7.86 (42)	5.22	9.80 (65)	5.93
12	2.79	2.01	3.06	2.50	3.34	2.65	3.90	3.31	2.04	2.10	2.01	2.03	8.17 (47)	5.82	8.98 (53)	6.76
13	2.41	1.76	2.32	1.77	3.61	2.50	3.53	2.60	1.98	1.68	1.94	2.10	8.00 (41)	4.80	7.79 (34)	5.13
14	1.75	1.75	2.40	1.59	2.38	2.39	3.67	2.72	1.88	2.03	1.73	1.53	6.00 (8)	5.40	7.80 (14)	4.78
15	2.00	2.27	4.11	1.74	3.62	2.13	5.17	2.90	1.50	1.51	2.44	1.98	7.12 (8)	5.03	11.72 (18)	4.94
16	2.82	2.36	2.25	1.75	4.91	3.33	5.50	1.93	2.82	2.14	1.88	1.55	10.54 (11)	6.40	9.63 (8)	3.78
17-18	2.30	1.40	2.78	1.67	2.70	1.52	3.85	2.94	1.88	1.89	2.42	1.99	6.88 (15)	2.55	9.00 (14)	6.11

across the two groups. By convention, a value of .90 or higher has been used to indicate factorial similarity or invariance. As seen in Table 3, coefficients of congruence for each of the three anxiety factors as well as the two lie scales equals or exceeds .90, demonstrating a substantial level of agreement between the factors as determined in two groups. The first unrotated principal factor, or the general anxiety (A_g) factor yielded a coefficient of congruence value of .89, providing support for the presence of a large general anxiety factor in the measurement of manifest anxiety across both gifted and nongifted groups.

Internal consistency estimates were contrasted across sex at each age grouping (Reynolds, 1982b). Alpha was calculated for the total Anxiety Scale score as well as for the three subscales of anxiety. No significant differences occurred for the total Anxiety Scale until the 17-18 year old age group where male performance was significantly ($p \leq .05$) less reliable than that of females. Except for the 17-18 age group, the reliabilities found for the total Anxiety Scale score appear to be appropriate for evaluation and research purposes. Reliability estimates on the three subscales of anxiety also appear to be adequate for research and clinical purposes, with two exceptions. Significant differences ($p \leq .05$) were found at the 7-8 age groups for the Worry/Oversensitivity Scale and at age 9 for the Concentration Scale. The values reported for this high IQ sample are highly consistent with those of the regular classroom children of the national standardization sample of the RCMAS.

The present study has provided substantial evidence that the RCMAS is an appropriate tool for use with high IQ children in evaluating levels of anxiety as far as the construct validity of the scale is concerned (a most important attribute for a personality scale). The results of the study also add to the growing body of literature that indicates that high IQ children, as a group, demonstrate lower levels of anxiety than lower IQ peers as has previously been reported (Reynolds & Bradley, 1983). These findings should help to dispel the stereotype of very high IQ children being emotionally unstable and anxiety prone, particularly now that the factorial similarity of the scale has been established for these children with the national normative sample.

The paper also provides an example of cross-group validation of factor structures that may be useful to future researchers. It is well known among psychometricians that if one wishes to compare two (or more) groups on some set of variables (e.g., test scores), the latent structure of the variables must be common to the two groups. High IQ and other gifted children are frequently compared to the normal population of children on a host of personality and intellectual traits. Seldom do researchers compare the internal structures of the measurement devices across these groups of individuals, yet such comparisons are necessary if the results are to be understood adequately. If the latent structure of the scale is not common to the two groups, then systematic error, or bias, will be introduced into the interpretation of the results in some unknown manner. This is true of clinical and educational decision making and is not

Table 2

Five Factor Solution for the IQ ≥ 130 Sample (N = 584) and the National Normative Sample (N = 5507)[1] for the Revised Children's Manifest Anxiety Scale[2]

Item No.	Item	Anxiety Factors						Lie Factors			
		Physiological		Worry/ Oversensitivity		Concentration		Lie I		Lie II	
1	I have trouble making up my mind.	19	(26)*	23*	(25)	22	(14)	13	(14)	01	(10)
5	Often I have trouble getting my breath.	39*	(37)*	08	(12)	26	(08)	01	(09)	03	(02)
9	I get mad easily.	04	(25)*	18	(12)	33*	(14)	18	(13)	01	(08)
13	It is hard for me to get to sleep at night.	34*	(46)*	06	(06)	30	(10)	02	(04)	05	(08)
17	Often I feel sick in my stomach.	32*	(47)*	24	(22)	22	(11)	04	(10)	08	(11)
19	My hands feel sweaty.	23*	(30)*	14	(05)	13	(08)	02	(11)	04	(06)
21	I am tired a lot.	10	(37)*	26	(17)	38*	(13)	03	(01)	07	(03)
25	I have bad dreams.	53*	(47)*	08	(22)	11	(00)	01	(09)	05	(12)
29	I wake up scared some of the time.	53*	(37)*	21	(26)	01	(04)	05	(05)	03	(04)
33	I wiggle in my seat a lot.	10	(34)*	16	(14)	33*	(09)	08	(05)	07	(02)
2	I get nervous when things do not go the right way for me.	12	(15)	44*	(38)*	01	(07)	09	(01)	05	(00)
6	I worry a lot of the time.	07	(25)	55*	(40)*	23	(14)	01	(04)	07	(03)
7	I am afraid of a lot of things.	20	(28)	38*	(31)*	14	(12)	06	(03)	02	(05)
10	I worry about what my parents will say to me.	20	(18)	40*	(42)*	21	(11)	10	(02)	08	(03)
14	I worry about what other people think about me.	00	(01)	44*	(46)*	22	(23)	01	(02)	12	(04)
18	My feelings get hurt easily.	16	(26)	37*	(45)*	30	(14)	09	(10)	04	(02)
22	I worry about what is going to happen.	08	(14)	59*	(61)*	14	(12)	11	(05)	00	(01)
26	My feelings get hurt easily when I am fussed at.	26*	(23)	24	(46)*	25	(06)	02	(06)	07	(10)
30	I worry when I go to bed at night.	24	(38)*	41*	(34)	18	(09)	01	(08)	07	(01)
34	I am nervous.	16	(35)	53*	(36)*	20	(13)	03	(09)	01	(02)
37	I often worry about something bad happening to me.	32	(29)	42*	(50)*	27	(16)	01	(04)	10	(08)
3	Others seem to do things easier than I do.	14	(09)	18	(12)	50*	(40)*	03	(03)	07	(06)
11	I feel that others do not like the way I do things.	12	(09)	21	(27)	54*	(45)*	03	(11)	05	(02)
15	I feel alone even when there are people with me.	04	(26)	29	(19)	41*	(27)*	03	(02)	04	(06)
23	Other children are happier than I.	21	(24)	07	(14)	47*	(49)*	06	(01)	09	(01)
27	I feel someone will tell me I do things the wrong way.	16	(15)	23	(34)	45*	(34)*	04	(04)	07	(07)
31	It is hard for me to keep my mind on my school work.	06	(28)*	19	(16)	33*	(23)	07	(07)	06	(03)
35	A lot of people are against me.	03	(27)	02	(18)	60*	(39)*	03	(03)	07	(04)
4	I like everyone I know.	18	(11)	10	(04)	06	(05)	41*	(50)*	09	(18)
8	I am always kind.	04	(00)	00	(03)	06	(02)	77*	(75)*	08	(06)
12	I always have good manners.	05	(05)	08	(00)	15	(04)	58*	(69)*	26	(06)
16	I am always good.	14	(05)	00	(00)	03	(01)	57*	(75)*	27	(03)
20	I am always nice to everyone.	08	(00)	04	(04)	04	(03)	77*	(78)*	14	(05)
24	I tell the truth every single time.	08	(07)	04	(01)	07	(01)	34	(59)*	54*	(14)
28	I never get angry.	08	(11)	02	(02)	08	(02)	28	(20)	29*	(47)*
32	I never say things I shouldn't.	02	(07)	02	(03)	06	(04)	19	(10)	44*	(51)*
36	I never lie.	02	(04)	00	(03)	02	(02)	16	(09)	57*	(57)*
	Eigenvalue	1.61	(2.44)	2.75	(2.70)	2.78	(1.30)	2.39	(3.00)	1.27	(.96)

[1]Numbers in parenthesis are for the normative sample [2]Decimals omitted *Indicates highest loading

Table 3
Coefficients of Congruence Between Corresponding Factors of the RCMAS for High IQ and Regular Classroom Children

Factor	Coefficient of Congruence*
Physiological	.91
Worry/Oversensitivity	.91
Concentration	.90
Lie I	.96
Lie II	.97
General Anxiety	.89

*Coefficients of .90 or higher indicate a high degree of similarity frequently referred to as factorial invariance.

just an esoteric concern of the researcher. If interpretations of test scores for high IQ and other gifted children are to be made accurately, then the factor structure of the tests used must be known specifically for those groups of children. Otherwise, test bias will always be a potential problem in test score interpretation. For the RCMAS, the current study moves significantly toward eliminating the possibility that anxiety has separate structures or dimensions for high IQ children and allows much confidence in the clinical and research uses of the RCMAS with this population.

The potential for bias in both objective and projective measures of personality should continue to be investigated across a number of variables such as IQ and not be restricted to race or sex. The research to date indicates that the RCMAS is a useful instrument in evaluating anxiety in both high IQ and normal children. The additional normative data presented in Table 1 may also add to the utility of the scale with this group. By using these special norms in conjunction with the total sample, national norms of the RCMAS, one may evaluate the relative anxiety level of high IQ children with regard to other high IQ children as well as more typical children.

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Table 4
Alpha Reliability Estimates for the RCMAS Physiological Worry/Oversensitivity, Concentration and Total Anxiety Scales

	Physiological		Worry/Oversensitivity		Concentration		Total Anxiety	
Age Group	Male	Female	Male	Female	Male	Female	Male	Female
7-8	.61	.62	.84	.39*	.76	.72	.81	.74
9	.59	.50	.85	.78	.86	.65*	.83	.76
10	.62	.59	.72	.81	.61	.75	.74	.87
11	.53	.65	.67	.75	.74	.66	.82	.79
12	.55	.69	.78	.85	.80	.80	.83	.86
13	.45	.34	.74	.77	.60	.85	.77	.80
14	.52	.17	.82	.76	.78	.55	.81	.82
15	.63	.31	.62	.73	.83	.72	.81	.66
16	.70	.75	.77	.61	.80	.63	.87	.69
17-18	.34	.57	.34	.86	.29	.68	.25*	.84

*Significant differences ($p \leq .05$).

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