Technical Qualities of the SIGS

3

This chapter describes the standardization, reliability, and validity of the SIGS.

Standardization of the SIGS

Data collection for the SIGS began in the spring of 2002 and continued through the spring of 2003. Data were collected on two samples of students. The first sample consisted of students in general education classrooms and is referred to as the General norm sample. The second sample consisted of students identified as gifted by their school districts and is referred to as the Gifted norm sample. The goal in constructing the General and Gifted norm samples was to collect representative samples of students ages 5 through 18 in terms of geographic location, gender, race, and ethnicity. The General norm sample included children with special education classifications. In addition, we wanted the norm samples to contain as many of the same students as possible so the two rating scales (SRS and HRS) would be comparable. The overlap was 75% for the General norm sample and 72% for the Gifted norm sample.

Sampling Procedures

The procedures for collecting the two samples were as follows. First, a letter requesting assistance in norming the SIGS was sent to individuals who had purchased a test in the last 2 years from Prufrock Press. Individuals who were interested in participating in the norming process provided us with the demographic characteristics of the potential sample. The demographic characteristics of the potential sample were placed into a database. Using the database, a representative sample was selected and these individuals were sent instructions for completing the SIGS. Each respondent was asked to have teachers and parents rate matching set of students using the SIGS. Site coordinators were told to ask any one teacher to rate only one or two students. Site coordinators who collected SIGS for the General norm sample were asked to rate students who were not nominated or identified for gifted programs. In addition, it was requested that these students be chosen so that the demographics of the sample would match the demographic characteristics of the location. Site coordinators who collected SIGS for the Gifted norm sample were asked to rate students who were formally identified by the school district as gifted.

These procedures resulted in the collection of an initial sample. After this sample was collected, the demographic characteristics of the participants were examined and the ages and geographic regions for which more data were neded were identified. Then specific site coordinators who had collected test data for the authors in the past were contacted and asked to participate in the norming. The goal was to obtain a sample that matched selected characteristics of the U.S. population (U.S. Bureau of the Census, 2001).

Demographic Characteristics

The demographic characteristics of the General and the Gifted norm samples are found in Tables 3.1 through 3.10. Tables 3.1 through 3.8 illustrate that both the General and Gifted samples are representative of the U.S. population of school-age children in relation to geographic region, ethnicity, and race. The General norm sample for the SRS is slightly overrepresented in terms of females. The U.S. school-age population is 49% male and 51% female. The General norm sample for the SRS is 41% male and 59% female. As discussed in the next section, there were no gender differences on any of the scales, therefore, this slight overrepresentation does not affect the SIGS norms.

Table 3.1
Demographic Characteristics for the Gifted Norm Sample by Region and Age Level

		Northeast		South		Midwest		West		Total	
Form	**Age**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**
SRS	5–9	73	20%	145	39%	83	22%	72	19%	373	100%
	10–13	120	24%	178	35%	114	23%	90	18%	502	100%
	14–18	30	17%	76	42%	41	23%	33	18%	180	100%
Total		223	21%	399	38%	238	23%	195	18%	1055	100%
HRS	5–9	48	19%	95	37%	64	25%	49	19%	256	100%
	10–13	102	25%	132	32%	83	20%	93	23%	410	100%
	14–18	27	19%	56	39%	36	25%	26	18%	145	100%
Total		177	22%	283	35%	183	23%	168	21%	811	100%

Note. SRS = School Rating Scales; HRS = Home Rating Scales.

Table 3.2
Demographic Characteristics for the Gifted Norm Sample by Ethnicity and Age Level

		Hispanic		Non-Hispanic		Total	
Form	**Age**	***N***	**%**	***N***	**%**	***N***	**%**
SRS	5–9	42	11%	331	89%	373	100%
	10–13	72	14%	430	86%	502	100%
	14–18	22	12%	158	88%	180	100%
Total		136	13%	919	87%	1055	100%
HRS	5–9	35	14%	221	86%	256	100%
	10–13	73	18%	337	82%	410	100%
	14–18	19	13%	126	87%	145	100%
Total		127	16%	684	84%	811	100%

Note. SRS = School Rating Scales; HRS = Home Rating Scales.

Table 3.3
Demographic Characteristics for the Gifted Norm Sample by Race and Age Level

		White		African American		Other		Total	
Form	**Age**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**
SRS	5–9	315	84%	35	9%	23	6%	373	100%
	10–13	434	86%	47	9%	21	4%	502	100%
	14–18	161	89%	13	7%	6	3%	180	100%
Total		910	86%	95	9%	50	5%	1055	100%
HRS	5–9	214	84%	25	10%	17	7%	256	100%
	10–13	360	88%	33	8%	17	4%	410	100%
	14–18	130	90%	13	9%	2	1%	145	100%
Total		704	87%	71	9%	36	4%	811	100%

Note. SRS = School Rating Scales; HRS = Home Rating Scales.

Table 3.4
Demographic Characteristics for the Gifted Norm Sample by Gender and Age Level

		Male		Female		Total	
Form	**Age**	***N***	**%**	***N***	**%**	***N***	**%**
SRS	5–9	182	49%	191	51%	373	100%
	10–13	231	46%	271	54%	502	100%
	14–18	84	47%	96	53%	180	100%
Total		497	47%	558	53%	1055	100%
HRS	5–9	123	48%	133	52%	256	100%
	10–13	189	46%	221	54%	410	100%
	14–18	71	49%	74	51%	145	100%
Total		383	47%	428	53%	811	100%

Note. SRS = School Rating Scales; HRS = Home Rating Scales.

Table 3.5
Demographic Characteristics for the General Norm Sample by Region and Age Level

		Northeast		South		Midwest		West		Total	
Form	**Age**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**
SRS	5–9	30	10%	144	47%	54	18%	80	26%	308	100%
	10–13	88	31%	64	23%	96	34%	36	13%	284	100%
	14–18	46	14%	110	33%	46	14%	127	39%	329	100%
Total		164	18%	318	35%	196	21%	243	26%	921	100%
HRS	5–9	18	6%	136	48%	60	21%	68	24%	282	100%
	10–13	88	29%	64	21%	102	34%	50	16%	304	100%
	14–18	30	16%	38	20%	36	19%	84	45%	188	100%
Total		136	18%	238	31%	198	26%	202	26%	774	100%

Note. SRS = School Rating Scales; HRS = Home Rating Scales.

Table 3.6
Demographic Characteristics for the General Norm Sample by Ethnicity and Age Level

		Hispanic		Non-Hispanic		Total	
Form	**Age**	***N***	**%**	***N***	**%**	***N***	**%**
SRS	5–9	50	16%	258	84%	308	100%
	10–13	52	18%	232	82%	284	100%
	14–18	22	7%	307	93%	329	100%
Total		124	13%	797	87%	921	100%
HRS	5–9	42	15%	240	85%	282	100%
	10–13	44	14%	260	86%	304	100%
	14–18	18	10%	170	90%	188	100%
Total		104	13%	670	87%	774	100%

Note. SRS = School Rating Scales; HRS = Home Rating Scales.

Table 3.7
Demographic Characteristics for the General Norm Sample by Race and Age Level

		White		African American		Other		Total	
Form	**Age**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**
SRS	5–9	276	90%	32	10%	0	0%	308	100%
	10–13	248	87%	30	11%	6	2%	284	100%
	14–18	285	87%	30	9%	14	4%	329	100%
Total		809	88%	92	10%	20	2%	921	100%
HRS	5–9	256	91%	24	9%	2	1%	282	100%
	10–13	270	89%	28	9%	6	2%	304	100%
	14–18	168	89%	18	10%	2	1%	188	100%
Total		694	90%	70	9%	10	1%	774	100%

Note. SRS = School Rating Scales; HRS = Home Rating Scales.

Table 3.8
Demographic Characteristics for the General Norm Sample by Gender and Age Level

		Male		Female		Total	
Form	**Age**	***N***	**%**	***N***	**%**	***N***	**%**
SRS	5–9	120	39%	188	61%	308	100%
	10–13	112	39%	172	61%	284	100%
	14–18	148	45%	181	55%	329	100%
Total		380	41%	541	59%	921	100%
HRS	5–9	118	42%	164	58%	282	100%
	10–13	130	43%	174	57%	304	100%
	14–18	102	54%	86	46%	188	100%
Total		350	45%	424	55%	774	100%

Note. SRS = School Rating Scales; HRS = Home Rating Scales.

Table 3.9
Demographic Characteristics for the Gifted Norm Sample by Gifted Category and Age Level

		General Intellectual Ability		Language Arts		Mathematics		Science		Social Studies		Creativity		Leadership	
Form	**Age**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**
SRS	5–9	315	84%	105	28%	90	24%	59	16%	60	16%	68	18%	45	12%
	10–13	424	84%	144	29%	136	27%	82	16%	81	16%	112	22%	71	14%
	14–18	137	76%	95	53%	84	47%	64	36%	68	38%	60	33%	33	18%
Total		876	83%	344	33%	310	29%	205	19%	209	20%	240	23%	149	14%
HRS	5–9	192	75%	77	30%	71	28%	46	18%	39	15%	62	24%	36	14%
	10–13	342	83%	117	29%	134	33%	78	19%	65	16%	112	27%	73	18%
	14–18	122	84%	86	59%	75	52%	59	41%	56	39%	45	31%	36	25%
Total		656	81%	280	35%	280	35%	183	23%	160	20%	219	27%	145	18%

Note. Percentages based on the total sample size. Most students were identified as gifted in more than one area.
SRS = School Rating Scales; HRS = Home Rating Scales.

Table 3.10
Demographic Characteristics for the General Norm Sample by Disability Classification and Age Level

		Attention-Deficit/Hyperactivity Disorder		Learning Disability		Other		Total	
Form	**Age**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**
SRS	5–9	4	1%	0	0%	10	3%	14	100%
	10–13	14	5%	6	2%	8	3%	28	100%
	14–18	6	2%	4	1%	8	2%	18	100%
Total		24	3%	10	1%	26	3%	60	100%
HRS	5–9	8	3%	0	0%	8	3%	16	100%
	10–13	12	3%	4	1%	6	1%	22	5%
	14–18	8	6%	8	6%	4	3%	20	14%
Total		28	3%	12	1%	18	2%	58	7%

Note. Percentages based on the total sample size. Some students were classified under more than one disability category.
SRS = School Rating Scales; HRS = Home Rating Scales.

Table 3.9 illustrates the number and percent of students in the Gifted norm sample by category of giftedness. As this table shows, most of the children in the sample were identified as gifted in general intellectual ability. Table 3.10 illustrates the number and percent of students included in the General norm sample by category of disability. Only the categories of attention-deficit/hyperactivity disorder, learning disability, and other disability are included because all other disability categories contained a very small number of students.

Norms Development

The first step in developing the norms for the SIGS was to inspect raw score means for the seven scales at each 1-year age interval within each gender for both the Gifted and General norming samples. There were no gender differences. We noted, however, that there was a tendency for adolescents to be rated higher on all the scales, except in the case of the General norm sample of the SRS in mathematics. Therefore, we subdivided the samples for both norm groups for both rating scales into two groups. Group 1 consisted of children ages 5 through 13. Group 2 consisted of adolescents ages 14 through 18. These two groups were used to run the norms with the exception of the mathematics scale for the SRS, where norms were developed on the basis of the full age range, 5 through 18 years.

Standard Scores for the Scales

The standard scores for the scales have a mean of 100 and a standard deviation of 15. This distribution was selected because many tests use a similar distribution, and, therefore, the results of the SIGS can easily be compared to standard scores on other tests.

The raw scores of the General norm sample were converted to standard scores based on a normal distribution conversion because the distribution of raw scores of the General norm sample for each scale was close to normal. The method used to develop the standard scores was a continuous norming procedure that uses polynomial regression to fit the progression of means, standard deviations, skewness, and kurtosis for the two age groups. Given the fitted values of skewness and kurtosis from the regression, the shape of the distribution of the scores was determined and percentiles were derived. These percentiles were then converted into standard scores for the two age groups. The resulting data were smoothed somewhat to allow for a consistent progression across the two age levels. The standard scores for the General norm sample are found in Appendix A.

The raw scores of the Gifted norm sample were converted to standard scores using a linear transformation, a process that maintains the original shape of the raw score distribution. A linear conversion was chosen because the raw score distributions of the Gifted norm sample for all scales were skewed in the positive direction. In other words, there were many more scores in the upper raw score ranges than in the lower raw score ranges. These scores cannot be interpreted in terms of the normal distribution because there are more cases in the upper ranges than predicted by the normal curve. Norms for the Gifted norm sample are found in Appendix C.

Percentile Ranks

A percentile rank indicates the percentage of participants in the norm sample scoring below a particular score. For example, 90% of the normative sample scored below a student who has a percentile rank of 90. Percentile ranks for the General norm sample were based on a normal distribution. Percentile ranks for the General norm sample can be determined after standard scores are found, using Appendix B. Percentile ranks for the Gifted norm sample were calculated for each scale separately using an algorithm suggested by Kirk (1999), which is based on the frequency with which a score occurs in the distribution. Percentile ranks for the Gifted norm sample are found in Appendix C. The examiner locates the raw score for the scale in question, then finds the corresponding standard score and percentile rank in the proper column. Standard scores and percentile ranks for the SRS are in Tables C.1 and C.2 and for the HRS in Tables C.3 and C.4.

Reliability

According to the *Standards for Educational and Psychological Testing* (American Educational Research Association, American Psycological Association, & National Council on Measurement in Education, 1999) reliability is the consistency of measurement "when the testing procedure is repeated on a population of individuals or groups" (p. 25). Reliability can also be thought of as the difference between an individual's observed score and true score on a test. This difference is measurement error and is caused by random or unpredictable fluctuations that can occur in test results. Tests and rating scales should provide evidence of reliability in terms of the content (internal consistency), the stability (test–retest) and

the rating (interrater) of the instrument. The next three sections provide evidence that the SIGS possesses high reliability in these areas.

Internal Consistency

Internal consistency is a measure of the consistency of responses to all items on a test or a rating scale. High internal consistency means that all the items are measuring the same construct. Table 3.11 reports the coefficient alphas for both norm samples for the SRS and the HRS. As this table illustrates, the internal consistency of the SIGS is high. All coefficients .85 or above and the average coefficients (averaged using Fisher's (1963/1974) *z*-transformation method) are all above .90.

Test–Retest Reliability

Test–retest reliability in a rating scale shows the extent to which a rater interprets the items similarly on separate occasions. For the SIGS, teachers and parents of gifted students were asked to rate students twice with a 2-week interval between the ratings. All scales were rated twice except for the mathematics scale on the SRS. The demographic characteristics of the samples used in the test–retest studies are found in Table 3.12.

Two studies were completed for the SRS and one study was completed for the HRS. Study 1 of the SRS was conducted with 61 elementary and middle school students. Study 2 was conducted with 46 high school students. For the HRS, a study was conducted with 37 children and adolescents, ages 5 through 18. The resulting means, standard deviations, and correlation coefficients are found in Table 3.13. As this table illustrates, the test–retest reliability for the SRS and HRS are more than adequate. The correlation coefficients range from .58 to .93. These results indicate that teachers and parents interpret the items consistently across time.

Interrater Reliability

The last type of reliability has to do with the amount of agreement teachers and parents have about a student's strengths in the seven areas measured by the SIGS. The amount of agreement between teachers' and parents' ratings of the same student's behaviors is often reported as moderate. This may be a result of personal standards of the raters or differences in the environmental demands of settings. Achenbach and Edelbrock (1981) reported that agreement between individuals who observe students in different settings, in this case parents at home and teachers at school, tend to produce correlation coefficients ranging from .20 to .50.

For the SIGS, two studies were conducted to determine interrater reliability. In the first study, 676 students who were identified as gifted by their school district were rated by their teachers and parents. The students ranged in age from 5 to 18; 321 were males and 355 were females; 94 were Hispanic and 582 were non–Hispanic. The results of the correlations are found in Table 3.14 and range from .43 to .53. According to Cohen (1988), correlations less than or equal to .1 are trivial, correlations greater than .1 but less than or equal to .3 are small, correlations greater than .3 but less than or equal to .5 are moderate, and correlations greater than .5 are large. For the SIGS, the interrater reliability coefficients were all in the moderate to large range.

In the second study, 639 students who were not identified as gifted by their school district were rated by their teachers and parents. The students ranged in age from 5 to 18; 272 were males and 367 were females; 113 were Hispanic and 526 were non–Hispanic. The results, found in Table 3.14, show that the correlations range from .49 to .60. As with the General norm sample, the interrater reliability coefficients were all in the moderate to large range. These findings suggest that teachers and parents interpret the items on the SIGS in a similar fashion.

Validity

The *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 1999) state that validity is the "degree to which evidence and theory support the interpretation of test scores" (p. 9). At the heart of validity is how closely the results of a test or rating scale match what the examiner is trying to measure. Test developers must provide evidence that supports the intended uses of the test or rating scale. For the SIGS, which is a measure of students' strengths, evidence of convergent and discriminate validity should be provided. Convergent validity examines the relationship between the SIGS and other tests that purport to measure the same constructs. Discriminate validity examines the relationship between the SIGS and other tests that measure different constructs.

We provide four types of validity evidence in this section. First, we provide nine studies that illustrate the convergent and discriminant validity of the SIGS. Second, we discuss a study that examines the degree to which the items function differently for selected groups based on ethnicity, race, and gender. The third study examines the degree to which the SIGS discriminates between students identified as gifted and students not identified as

Table 3.11
Coefficient Alphas for School and Home Rating Scales for Seven Age Intervals

SIGS Scale	Age							Average
	5–6	7–8	9–10	11–12	13–14	15–16	17–18	
School Gifted Norm Sample								
General Intellectual Ability	.92	.96	.95	.94	.95	.93	.95	.94
Language Arts	.85	.94	.94	.93	.95	.94	.94	.93
Mathematics	.94	.97	.97	.96	.95	.95	.97	.96
Science	.94	.96	.96	.95	.94	.95	.95	.95
Social Studies	.93	.95	.96	.93	.94	.92	.92	.94
Creativity	.93	.93	.93	.93	.93	.94	.88	.93
Leadership	.95	.95	.96	.95	.95	.94	.92	.95
Home Gifted Norm Sample								
General Intellectual Ability	.90	.90	.89	.89	.89	.90	.90	.90
Language Arts	.90	.89	.91	.92	.91	.91	.88	.90
Mathematics	.95	.96	.96	.96	.96	.97	.97	.96
Science	.89	.95	.94	.94	.93	.93	.94	.93
Social Studies	.90	.91	.93	.93	.94	.93	.91	.92
Creativity	.92	.87	.88	.90	.91	.88	.90	.90
Leadership	.95	.94	.93	.93	.94	.93	.87	.93
School General Norm Sample								
General Intellectual Ability	.97	.96	.97	.97	.97	.98	.98	.97
Language Arts	.96	.97	.97	.96	.97	.97	.97	.97
Mathematics	.97	.97	.98	.98	.98	.98	.98	.98
Science	.88	.95	.94	.94	.93	.94	.94	.93
Social Studies	.94	.96	.95	.95	.96	.94	.96	.95
Creativity	.95	.95	.96	.95	.96	.95	.98	.96
Leadership	.97	.97	.97	.95	.97	.95	.98	.97
Home General Norm Sample								
General Intellectual Ability	.95	.95	.94	.95	.94	.96	.98	.96
Language Arts	.95	.96	.95	.95	.96	.96	.98	.96
Mathematics	.96	.97	.95	.95	.97	.98	.98	.97
Science	.95	.97	.94	.95	.96	.97	.98	.96
Social Studies	.94	.96	.95	.95	.96	.94	.96	.95
Creativity	.93	.93	.93	.90	.93	.93	.98	.94
Leadership	.95	.96	.96	.94	.96	.90	.96	.95

Table 3.12
Sample Characteristics for Test–Retest Studies

	Study 1 Teacher/Child (*N*=61)		Study 2 Teacher/Adolescent (*N*=46)		Study 3 Parent/All (*N*=37)	
Characteristic	***N***	**%**	***N***	**%**	***N***	**%**
Age						
5	—		—		3	8%
6	1	2%	—		1	3%
7	8	13%	—		1	3%
8	11	18%	—		1	3%
9	6	10%	—		3	8%
10	11	18%	—		2	5%
11	9	15%	—		4	11%
12	15	25%	—		8	22%
13	—		24	52%	1	3%
14	—		9	20%	2	5%
15	—		6	13%	—	
16	—		—		—	
17	—		7	15%	2	5%
18	—		—		9	24%
Gender						
Male	33	54%	19	41%	20	54%
Female	28	46%	27	59%	17	46%
Ethnicity						
Hispanic	3	5%	3	7%	3	8%
Non-Hispanic	58	95%	43	93%	34	92%
Race						
White	52	85%	38	83%	30	81%
African American	6	10%	5	11%	4	11%
Other	3	5%	3	7%	3	8%

Note. — = Data were not collected for these ages.
Some percentages do not add to 100% due to rounding conventions.

gifted. Finally, we examine the correlations among the seven scales of the SIGS.

Convergent and Discriminant Validity

This section presents the results of convergent and discriminant validity concurrently. Because the SIGS measures strengths in seven areas, some relationships support convergent validity for some of the scales and discriminate validity for other scales. Studies in the next two sections, School Rating Scales and Home Rating Scales, were completed with the Gifted norm sample.

School Rating Scales. In this section we discuss the results of five validity studies. The demographic characteristics of these studies can be found in Table 3.15. In all studies reported in this and the next section, we corrected the correlation coefficients for restricted range.

The first three studies examined the relationship of the SRS with measures of intelligence or aptitude. Study 1 is a comparison of the scales of the SIGS with the *Wechsler Intelligence Scale for Children*, *Third Edition*, Full Scale IQ (WISC–III; Wechsler, 1991). Participants of this study were 53 students ages 6 through 16. Study 2 correlated the SIGS with the *Test of Cognitive Skills*, *Second Edition*, Total Battery (TCS–2; CTB/McGraw-Hill,

Table 3.13
Means, Standard Deviations, and Correlation Coefficients for Test–Retest Studies

Scale	Study 1[a]					Study 2[a]					Study 3[a]				
		First Rating		Second Rating			First Rating		Second Rating			First Rating		Second Rating	
	r	*M*	*SD*	*M*	*SD*	*r*	*M*	*SD*	*M*	*SD*	*r*	*M*	*SD*	*M*	*SD*
General Intellectual Ability	.77	97	18	93	16	.91	101	11	101	12	.83	101	12	99	12
Language Arts	.76	99	16	96	14	.88	103	11	103	11	.85	100	14	100	15
Mathematics	—	—	—	—	—	—	—	—	—	—	.74	97	13	99	12
Science	.61	103	18	96	14	.68	102	13	101	13	.93	100	14	103	14
Social Studies	.58	102	15	97	14	.93	104	12	103	14	.93	99	14	100	15
Creativity	.70	102	17	97	15	.91	103	13	103	13	.90	97	15	98	16
Leadership	.67	100	15	96	14	.92	99	14	98	16	.66	96	15	93	16

Note. — = Data were not collected for the mathematics scale.

[a] Demographic characteristics of study samples can be found in Table 3.12.

Table 3.14
Correlations Between Teacher Ratings and Parent Ratings

Scale	Gifted Norm Sample	General Norm Sample
General Intellectual Ability	.43	.59
Language Arts	.47	.49
Mathematics	.53	.50
Science	.45	.58
Social Studies	.49	.60
Creativity	.46	.49
Leadership	.50	.55

1992). Participants in this study were 27 students ages 7 through 9. Study 3 correlated the SIGS General Intellectual Ability scale with the *Cognitive Abilities Test*, Verbal Battery (CogAT; Lohman & Hagen, 2001). Participants were 23 students ages 6 through 11. The correlation coefficients for these three studies can be found in Table 3.16.

We expected that the correlations between the General Intellectual Ability scale and the three measures of intelligence and aptitude would be large. Using Cohen's (1988) guidelines, two of the correlations are large, although the correlation with the CogAT Verbal Battery is moderate. This may be because the CogAT Verbal Battery measures verbal reasoning to a larger degree than the SIGS General Intellectual Ability scale. We also expected that the correlations between the academic and leadership scales and the measures of intelligence would be moderate to large, which is the case. Finally, we expected that the correlations between the Creativity scale and the measures of intelligence would be the lowest. This is true for the WISC–III Full Scale IQ, but not for the TCS–2 Total Score. As Table 3.16 illustrates, the correlations between the TCS–2 Total Score and all the SIGS scales are large.

The fourth study examined the relationship between the *Otis-Lennon School Ability Test*, *Seventh Edition*, School Ability Index (OLSAT; Otis & Lennon, 1995) and the SIGS scales. Participants were 40 students ages 7 through 14. Using Cohen's (1988) guidelines, these correlations were all moderate to large (see Table 3.17). We expected that the correlation between the OLSAT and the SIGS Creativity scale would be one of the lowest. As the table illustrates, this is the case.

The final study examined the relationship between the *Torrance Tests of Creative Thinking–Figural* (TTCT; Torrance, 1990). We expected that the correlation between the SIGS Creativity scale and the TTCT would be large. This relationship is as expected (see Table 3.18). The TTCT also correlates to a large magnitude with the SIGS General Intellectual Ability and the Social Studies scales. Items on these two scales may be measuring creative ability to some degree. Moderate correlations are found between the TTCT and the Language Arts and Leadership scales. The lowest correlations are between the TTCT and the Mathematics and Science scales; in fact, these correlations are not statistically significant.

Home Rating Scales. In this section we discuss the results of four studies. The demographic characteristics of these studies can be found in Table 3.19.

The first two studies examined the relationship of the HRS with measures of intelligence. Study 1 is a comparison of the scales of the SIGS with the *Wechsler Intelligence Scale for Children*, *Third Edition*, Full Scale IQ (WISC–III; Wechsler, 1991). Participants of this study were the same 53 students who participated in the SRS study. Study 2 correlated the SIGS General Intellectual Ability scale with the *Cognitive Abilities Test*, Verbal Battery (CogAT; Lohman & Hagen, 2001). Participants were 21 students ages 6 through 11. The correlation coefficients for these two studies can be found in Table 3.20. We expected that the correlations between the General Intellectual Ability scale and the two measures of intelligence would be large, and using Cohen's (1988) guidelines, this is the case. Other correlations were moderate with the exception of the Mathematics scale and the WISC–III, which was large.

Study 3 examined the relationship between the *Otis-Lennon School Ability Test*, *Seventh Edition*, School Ability Index (OLSAT; Otis & Lennon, 1995) and the SIGS scales. Participants were 38 students ages 7 through 14. Many of the participants were the same as those in the SRS study. Using Cohen's (1988) guidelines, all correlations were moderate to large (see Table 3.21). As expected in this study, the smallest correlation is with the SIGS Creativity scale.

The final study examined the relationship between the *Torrance Tests of Creative Thinking–Figural* (TTCT; Torrance, 1990). We expected that the correlation between the Creativity scale and the TTCT would be large. This relationship is as expected (see Table 3.22). The TTCT correlates moderately with all other SIGS scales, except for the Science and General Intellectual Ability scales, which have low correlations.

These studies lend support to both the convergent and discriminate validity of the SIGS. In the majority of cases, relationships were as hypothesized.

Table 3.15
Demographic Characteristics for Validity Studies with the School Rating Scale Gifted Norm Sample[a]

	WISC–III Study (*N* = 53)		TCS–2 Study (*N* = 27)		CogAT Study (*N* = 23)		OLSAT Study (*N* = 40)		TTCT Study (*N* = 30)	
Characteristic	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**
Age										
5	—		—		—		—		—	
6	2	4%	—		1	4%	—		—	
7	—		7	26%	4	17%	1	3%	2	7%
8	5	9%	18	67%	2	9%	2	5%	1	3%
9	8	15%	2	7%	9	39%	8	20%	3	10%
10	8	15%	—		5	22%	10	25%	2	7%
11	6	11%	—		2	9%	4	10%	16	53%
12	6	11%	—		—		5	13%	2	7%
13	7	13%	—		—		3	8%	2	7%
14	5	9%	—		—		7	18%	2	7%
15	1	2%	—		—		—		—	
16	5	9%	—		—		—		—	
Gender										
Male	20	38%	9	33%	10	43%	19	48%	13	43%
Female	33	62%	18	67%	13	57%	21	53%	17	57%
Ethnicity										
Hispanic	3	6%	0	0%	6	26%	2	5%	8	27%
Non-Hispanic	50	94%	27	100%	17	74%	38	95%	22	73%
Race										
White	43	81%	26	96%	13	57%	35	88%	28	93%
African American	2	4%	1	4%	5	22%	4	10%	2	6%
Other	8	15%	0	0%	5	22%	1	3%	0	0%

Note. — = Data were not collected for these ages.

Some percentages do not add to 100% due to rounding conventions.

WISC–III = *Wechsler Intelligence Scale for Children, Third Edition*, Full Scale IQ (Wechsler, 1991); TCS–2 = *Test of Cognitive Skills, Second Edition*, Total Battery (CTB/McGraw-Hill, 1992); CogAT = *Cognitive Abilities Test*, Form 6, Verbal Battery (Lohman & Hagen, 2001); OLSAT = *Otis-Lennon School Ability Test* (Otis & Lennon, 1995); TTCT = *Torrance Tests of Creative Thinking–Figural* (Torrance, 1990).

[a]Cases were scored using the General norm sample.

Table 3.16
Relationship Between School Rating Scale and Measures of Intelligence

SIGS Scale	Intelligence Test		
	WISC–III	TCS–2	CogAT
General Intellectual Ability	.67	.73	.48
Language Arts	.62	.72	—
Mathematics	.47	.88	—
Science	.56	.89	—
Social Studies	.53	.83	—
Creativity	.38	.86	—
Leadership	.53	.84	—

Note. — = Data were not collected for these scales.
WISC–III = *Wechsler Intelligence Scale for Children, Third Edition*, Full Scale IQ (Wechsler, 1991).
TCS–2 = *Test of Cognitive Skills, Second Edition*, Total Battery (CTB/McGraw-Hill, 1992).
CogAT = *Cognitive Abilities Test*, Form 6, Verbal Battery (Lohman & Hagen, 2001).

Table 3.17
Relationship Between School Rating Scale and *Otis-Lennon School Ability Test*

SIGS Scale	OLSAT
General Intellectual Ability	.60
Language Arts	.56
Mathematics	.38
Science	.56
Social Studies	.60
Creativity	.47
Leadership	.51

Note. OLSAT = *Otis-Lennon School Ability Test*, School Ability Index (Otis & Lennon, 1995).

Table 3.18
Relationship Between School Rating Scale and *Torrance Tests of Creative Thinking–Figural*

SIGS Scale	TTCT
General Intellectual Ability	.50
Language Arts	.46
Mathematics	.14[a]
Science	.07[a]
Social Studies	.51
Creativity	.62
Leadership	.39

Note. TTCT = *Torrance Tests of Creative Thinking–Figural*, Total Score (Torrance, 1990).
[a]Not significant at $p < .05$.

Differential Item Functioning

A rating scale should provide evidence that the items are not interpreted for selected groups differently. In this study, we examined the differential item functioning (DIF) of three groups: African American versus non–African American, Hispanic versus non–Hispanic, and males versus females. We used the logistic regression procedure for ordinal scales developed by Swaminathan and Rogers (1990) to conduct this study. We compared the adequacy of two different logistic regression models to account for the characteristics being measured. The full model predicted the item score using the total score on a given scale, the group, and the interaction between the two. The restricted model predicted the item score using only the total score on a given scale. If the full model is not significantly better at predicting item performance than the restricted model, then the item is measuring differences in the amount of the observed characteristics and does not appear to be influenced by group membership.

Miller and Spray (1993) recommended setting a significance level of .001 because of the large number of comparisons made, in this case 750. We also calculated an effect size to evaluate the magnitude of DIF for significant items. Zumbo (1999) suggested using Nagelkerke's R^2 to calculate the effect size. The norming version of the SIGS consisted of 18 items for each scale, except the Leadership scale, which consisted of 17 items.

Table 3.19
Demographic Characteristics for Validity Studies with the Home Rating Scale Gifted Norm Sample[a]

	WISC–III Study (*N* = 53)		CogAT Study (*N* = 21)		OLSAT Study (*N* = 38)		TTCT Study (*N* = 29)	
Characteristic	***N***	**%**	***N***	**%**	***N***	**%**	***N***	**%**
Age								
5	—		—		—		—	
6	2	4%	1	5%	—		—	
7	—		3	14%	1	3%	2	7%
8	5	9%	2	10%	3	8%	1	3%
9	8	15%	8	38%	7	18%	3	10%
10	8	15%	5	24%	11	29%	2	7%
11	6	11%	2	10%	4	11%	16	55%
12	6	11%	—		1	3%	1	3%
13	7	13%	—		3	8%	2	7%
14	5	9%	—		8	21%	2	7%
15	1	2%	—		—		—	
16	5	9%	—		—		—	
Gender								
Male	20	38%	8	38%	20	53%	12	41%
Female	33	62%	13	62%	18	47%	17	59%
Ethnicity								
Hispanic	3	6%	6	29%	3	8%	8	28%
Non-Hispanic	50	94%	15	71%	35	92%	21	72%
Race								
White	43	81%	12	57%	35	92%	26	90%
African American	2	4%	4	19%	3	8%	3	10%
Other	8	15%	5	24%	0	0%	0	0%

Note. — = Data were not collected for these ages.

Some percentages do not add to 100% due to rounding conventions.

WISC–III = *Wechsler Intelligence Scale for Children, Third Edition*, Full Scale IQ (Wechsler, 1991); CogAT = *Cognitive Abilities Test*, Form 6, Verbal Battery (Lohman & Hagen, 2001); OLSAT = *Otis-Lennon School Ability Test*, School Ability Index (Otis & Lennon, 1995); TTCT = *Torrance Tests of Creative Thinking–Figural*, Total Score (Torrance, 1990).

[a]Cases were scored using the General norm sample.

Table 3.20
Relationship Between Home Rating Scale and Measures of Intelligence

SIGS Scale	Intelligence Test	
	WISC–III	CogAT
General Intellectual Ability	.51	.51
Language Arts	.48	—
Mathematics	.57	—
Science	.43	—
Social Studies	.49	—
Creativity	.44	—
Leadership	.39	—

Note. — = Data were not collected for these scales.
WISC–III = *Wechsler Intelligence Scale for Children, Third Edition*, Full Scale IQ (Wechsler, 1991).
CogAT = *Cognitive Abilities Test*, Form 6, Verbal Battery (Lohman & Hagen, 2001).

Table 3.21
Relationship Between Home Rating Scale and *Otis-Lennon School Ability Test*

SIGS Scale	OLSAT
General Intellectual Ability	.59
Language Arts	.59
Mathematics	.66
Science	.48
Social Studies	.50
Creativity	.33
Leadership	.36

Note. OLSAT = *Otis-Lennon School Ability Test*, School Ability Index (Otis & Lennon, 1995).

Table 3.22
Relationship Between Home Rating Scale and *Torrance Tests of Creative Thinking–Figural*

SIGS Scale	TTCT
General Intellectual Ability	.20
Language Arts	.31
Mathematics	.49
Science	.10
Social Studies	.45
Creativity	.69
Leadership	.39

Note. TTCT = *Torrance Tests of Creative Thinking–Figural*, Total Score (Torrance, 1990).

We found 8 significant items for African American participants versus non–African American participants, 6 for Hispanic versus non–Hispanic participants, and 21 for males versus females. We eliminated all the significant items from the final version except three that had negligible effect sizes. Therefore, the SIGS is considered to be an unbiased measure of students' strengths.

Group Differentiation

Because the purpose of the SIGS is to assist schools with identifying students as gifted, it should discriminate between students who are identified as gifted and students who are not identified as gifted. In this study, we compared the scores on each of the seven scales of the General norm sample with the Gifted norm sample. The first step in this study was to score the scales for students in the Gifted norm sample using the General norms. We next calculated *t*-test ratios for each scale for both the SRS and the HRS. Because of the large number of comparisons, we set alpha at .003. The results are displayed in Table 3.23 and illustrate that the Gifted norm sample scored significantly higher statistically than the General norm sample. In all cases, the difference between scores on the scales is larger than one standard deviation.

Table 3.23
Means, Standard Deviations, and *T*-score Results of SIGS Scales: Comparison of the Two Norm Samples

Scale	Mean		Standard Deviations		*T*-score
	General Norm Sample	Gifted Norm Sample[a]	General Norm Sample	Gifted Norm Sample[a]	
School Rating Scale					
General Intellectual Ability	100	15	122	14	32.91
Language Arts	100	14	122	13	33.82
Mathematics	100	15	122	13	25.81
Science	100	15	120	14	25.81
Social Studies	100	15	117	14	23.22
Creativity	100	14	118	14	26.07
Leadership	100	15	116	17	20.30
Home Rating Scale					
General Intellectual Ability	100	14	121	13	28.11
Language Arts	100	15	121	14	28.41
Mathematics	100	15	117	15	22.23
Science	101	15	120	16	22.01
Social Studies	100	14	117	16	19.02
Creativity	100	15	117	16	20.26
Leadership	101	15	119	17	19.84

Note. [a]Standard Scores Based on General Norms.

$p < .0001$

Correlations Among the Scales

In the last study, we correlated the SIGS scales for both the SRS and HRS. Because the scales are all measures of students' strengths, we expected that the correlations would be in the moderate to large range. As Table 3.24 illustrates, this is the case in nearly all instances.

Summary

In summary, the SIGS is a highly reliable and valid measure of students' strengths in seven areas. Its raw scores can be converted to standard scores using two normative samples. Evidence of reliability and validity are supported in several studies. Examiners can use the scales with confidence, knowing that the results yield important information about students' strengths.

Table 3.24
Correlations Among Scales for School and Home Rating Scales

	LA	M	S	SS	C	L
School Gifted Norm Sample						
General Intellectual Ability (GIA)	.75	.70	.74	.65	.75	.56
Language Arts (LA)	—	.53	.68	.63	.71	.48
Mathematics (M)	—	—	.69	.51	.52	.39
Science (S)	—	—	—	.69	.67	.49
Social Studies (SS)	—	—	—	—	.70	.65
Creativity (C)	—	—	—	—	—	.63
Leadership (L)	—	—	—	—	—	—
Home Gifted Norm Sample						
General Intellectual Ability (GIA)	.74	.62	.72	.63	.66	.58
Language Arts (LA)	—	.49	.64	.68	.66	.52
Mathematics (M)	—	—	.62	.44	.48	.46
Science (S)	—	—	—	.70	.64	.54
Social Studies (SS)	—	—	—	—	.67	.64
Creativity (C)	—	—	—	—	—	.65
Leadership (L)	—	—	—	—	—	—
School General Norm Sample						
General Intellectual Ability (GIA)	.69	.60	.71	.65	.73	.64
Language Arts (LA)	—	.57	.66	.63	.64	.56
Mathematics (M)	—	—	.56	.49	.51	.47
Science (S)	—	—	—	.81	.65	.61
Social Studies (SS)	—	—	—	—	.71	.66
Creativity (C)	—	—	—	—	—	.71
Leadership (L)	—	—	—	—	—	—
Home General Norm Sample						
General Intellectual Ability (GIA)	.62	.56	.51	.54	.55	.29
Language Arts (LA)	—	.47	.50	.57	.58	.33
Mathematics (M)	—	—	.62	.55	.46	.36
Science (S)	—	—	—	.68	.53	.31
Social Studies (SS)	—	—	—	—	.63	.40
Creativity (C)	—	—	—	—	—	.32
Leadership (L)	—	—	—	—	—	—