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ABSTRACT

The purpose of this paper is to compare the utility of the information yielded by the classical and latent trait psychometric models when they are used to examine the psychometric qualities of an instrument designed to assess school-related stress. The instrument, known as the School Situation Survey (SSS), is described, and efforts to determine its content and construct validity and alpha reliability are discussed. The SSS is a 34-item attitude instrument that assesses four sources and three manifestations of school-related stress for students in grades 3 through 12. Sources of stress include teacher and peer interactions, academic stressors and academic self-concept, while manifestations include emotional, behavioral, and physiological signs. Application of the Rasch latent trait model and classical psychometrics to instrument analysis indicate that while the use of classical techniques assists in the instrument development process, classical manipulations have shortcomings. However, content validation of this sort of instrument should be informed by the principles of latent trait theory. Eight data tables are included. (TJH)

The Measurement of Perceived School-Related Stress Using Classical and Rasch Latent Trait Models

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When researcners employ classical techniques to develop affective measures judgmental evidence of content validity, along with correlational and factor analytic empirical evidence of construct validity, is typically offered. In addition, alpha reliability and related item/scale correlations are used to reflect adequacy of item sampling and the accuracy of the measurement of the variable (Gable, 1986).

While latent trait techniques have been used extensively in developing cognitive acnievement tests (see, for example, Wright & Stone, 1979), their use in developing affective instruments is more recent. The benefits of using the Rasch latent trait techniques (Rasch, 1960) to obtain more comprehensive empirical support for both content and construct validity make the procedure an essential part of the instrument development process. When for example, classical techniques result in incomplete score interpretations, the comprehensive understanding of tne "definition of the variable" provided by tne Rasch model may result in finer construct interpretations that lead to more complete descriptions of high and low scoring respondents.

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[1] Paper presented at the annual meeting of the American Educational Research Association, San Francisco, March, 1989.

Purpose

The purpose of this paper is to compare the utility of the information yielded by the classical and latent trait psychometric models when they were employed to examine the psychometric qualities of the School Situation Survey -- SSS (Helms and Gable, 1989). The first section of the paper will describe the development of the SSS using classical procedures to examine content and construct validity and alpha reliability. The second section will describe the additional information obtained from using a Rasch model for rating scale data. Emphasis will be placed upon the adequacy of variable definition and an analysis of item and person goodness-of-fit statistics.

Description of the School Situation Survey

The SSS is a 34-item attitude instrument that assesses four sources and three manifestations of school-related stress for grade 3-12 students. Table 1 lists the SSS variables and describes the concept hypothesized for each variable. Higher scoring people were hypothesized to exhibit higher levels of perceived stress for the attributes listed for each variable.

Classical Techniques: Development and Analysis of the SSS

This section will present a description of the development and analysis of the SSS validity and reliability data.

Scaling and Item Selection

Likert's summated rating technique was used as a scaling model with responses scored on a 5-point scale ranging from Never (1) to Always (5). Thus, the criterion for item selection was the "criterion of internal consistency" where emphasis is placed upon item-scale correlations.

Content Validity

The SSS items were based upon the literature on school-related student stress, interviews of students, teachers, school psychologists, parents and child development specialists and pilot ratings of students. Five a priori hypothesized source of stress variables and three manifestation of stress variables were targeted for the pilot form.

Pilot Form: Construct Validity and Reliability

A pilot version containing 56 items was administered to 907 grade 5, 7, and 9 students from three school systems (i.e., urban, suburban and rural). The data from this sample were submitted to principal component analyses followed by oblique rotations to examine construct validity in relation to the rationally derived categories identified in the content validation. The 35 sources of stress items were analyzed separately from the 21 manifestations of stress items.

Four principal component analyses were conducted on each set of items: one for the overall sample, and one for each of the three grade levels (fifth, seventh, and ninth). For each derived factor, a subset of items common to all three grade levels was clearly identifiable. Because the factor structures were similar across grade levels, the total group analyses were used in developing the SSS.

The analysis of the 35 sources of stress items resulted in eight components or "factors" accounting for 50.9 percent of the total variance. Eight items that had factor loadings less than .40 or that did not contribute to a meaningful factor structure were deleted. Three factors containing a total of seven items were also deleted because they did not relate to the initial rationally derived categories.

The remaining five factors contained 20 items replicating the original categories posited in the content validation: Teacher Interactions, Academic Stress, Peer Interactions, Academic Self-Concept, and Perceived Control. Given the factor intercorrelations, which ranged from .00 to .26, factors were not collapsed to form factor composites.

The analysis of the 21 manifestations of stress items resulted in four factors that explained 51.9 percent of the total variance. Five items were deleted because they did not have factor loadings of at least .40 or did not contribute to a meaningful factor structure. Three of the four factors replicated the original three Manifestations of Stress categories: Emotional, Behavioral, and Physiological. Factor intercorrelations ranged from .10 to .42 and

were considered insufficient to form factor composites given the conceptual meaning of the item stems.

Item analysis and alpha reliabilities were generated for items common to factors across grade levels and a revised 46 item instrument was produced. The five common source factors and three common manifestation factors were consistent with the judgmentally targeted item categories.

The revised 46-item form of the SSS was administered to a new sample of 1,111 fifth, seventh, and ninth-grade students from four school districts (urban, suburban and rural). The data obtained were submitted to principal component analyses followed by oblique rotations to examine the validity of the rationally derived categories. Again, the 38 sources of stress items were analyzed separately from the 18 manifestations of stress items, with items indicative of low stress reverse scored and individual analyses generated for the total sample and for each of the three grades.

The analyses of the sources of stress items were examined for factors that best replicated the original constructs across the three grade levels as well as across the total sample. Only subjects who responded to all 38 items were included in the analyses (N=902). Of the 10 components (55% of the total variance) derived from the total sample, the first four replicated the original categories and are presented in Table 2. These four factors were defined by a total of 19 items representing the operational definitions of the Teacher Interactions, Academic Stress, Peer Interactions, and Academic Self-Concept scales for the Sources of Stress dimension of the final form of the SSS. The Perceived Control items did not contribute to the definition of a

meaningful factor and were deleted. Factor intercorrelations ranged from .01 to .27, indicating that the factors were sufficiently independent.

The data from the manifestations of stress items were analyzed by the same procedures. Only subjects responding to all 18 items were included in the analyses (N=1,005). Four factors (51% of the total variance) were derived from the total sample. The first three factors replicated the original constructs and are presented in Table 2. These constructs (Emotional, Behavioral, and Physiological) were a replication of the pilot data and were defined by 15 items. Factor intercorrelations ranged from .08 to .31.

Alpha internal consistency reliabilities gathered for the four source scales ranged from .70 - .79; the three manifestation scale reliabilities ranged from .69 - .79. Since Nunnally's (1978, Ch-6) domain sampling model suggests that coefficient alpha reflects item sampling adequacy, it was concluded that the items reflected an adequate sample from the universe of content targeted during the content validity examination.

Further examination of construct validity was undertaken using the causal modeling technique of path analysis (Pedhazur, 1982). The manifestation of stress models used the scores on the manifestation of stress scales as the outcome variables. The antecedent variables were the four sources of stress, sex of student, grade and grade-level structure (e.g., being in grade 5 in a K-5 elementary school versus a grade 5-8 middle school), cognitive ability, and perceived family stress.

A series of separate regression analyses, one for each outcome variable, was generated to determine the path coefficients. The F values of the beta weights were tested at the .05 level so that the relationship could be examined between the antecedent and the respective outcome variable as indicated by the path. The paths that were not significant were deleted, and the resulting revised models were tested against their corresponding full or saturated models by the F test for incremental validity (Pedhazur, 1982). The analyses and resulting trimmed models for each of the three manifestations variables (Emotional, Behavioral, and Physiological) are described in Helms, Gable and Owen (1986).

To summarize, the trimmed model for the Emotional scale contained the set of variables: Academic Stress, Peer Interactions, Teacher Interactions, Sex and Cognitive Ability ($R=.63$, adjusted $R^2=.39$); for the Behavioral scale the trimmed model variable set included: Teacher Interactions, Sex, Academic Self-Concept and Academic Stress ($R=.57$, adjusted $R^2=.33$); for the Physiological scale the variable set included Academic Stress, Peer Interactions, Sex, Teacher Interactions and Cognitive Ability ($R=.42$, adjusted $R^2=.17$).

In addition to the results of these informative path models, simple correlations were generated with the State Trait Anxiety Inventory for Children (Spielberger, et al., 1973). Theoretically consistent relationships contributed to the further interpretation of the SSS variables. For example, the A-Trait scale assessing general anxiety proneness correlated, as hypothesized, .71 with the Emotional manifestations scale and .52 with the Academic Stress source scale.

Summary

In this section we traced how items were specified, written, and reviewed for defining the targeted variables; support for content validity was also presented. Also described was the use and utility of Likert's summated rating technique based upon the "criterion of internal consistency" for developing attitude measures. The results of correlational and principal components techniques were presented to support the existence of meaningful dimensions of items (i.e., potential constructs) that corresponded to the content domains targeted by the developers. Further, in light of Nunnally's domain sampling model, the obtained alpha internal consistency reliability indices were employed as support for the adequacy of item sampling.

Rasch Latent Trait Techniques: Advantages and Results for the SSS Data

Examining SSS Variables

Any assessment instrument should provide variables that are well defined as constructs in addition to being accurately measured. Since a latent trait concept was not envisioned during the original development phase of the SSS, the developers could have employed additional judgmental procedures to examine the psychological continuum defined by the items underlying each variable. One procedure would have been Thurstone's equal-appearing interval technique that employs the item selection "criterion of ambiguity" (Thurstone, 1931). This technique assesses the variability in content judges' opinions with respect to where the items are located (i.e., item scale value) on the underlying psychological continuum and it might have previewed the variable identification problem uncovered by the latent trait technique for one of the SSS scales.

Data Source and Analytic Procedures

The data analyzed represent 1958 students from the grade 6-8 SSS data file. Analyses were performed under the assumption that the data fit a Rasch rating scale model (Andrich, 1978; Wright & Masters, 1982). The computer program employed was Scale (Masters, Wright & Ludlow, 1981).

In this section two examples will be presented that illustrate practical instrument development aspects of latent trait analysis:

- o the lack of proper variable (i.e., construct) definition, and
- o the use of item and person fit statistics to reveal item content ambiguity.

Inadequate Definition of a Variable

Analysis of the data indicated that most of the SSS scales fit a Rasch rating scale model. Student responses were found to be distributed across the Likert response continuum. Further, the item difficulties were spread across much of the continuum for the variable map. It was thus possible to describe high and low scoring people on a respective variable in a manner consistent with the originally hypothesized variable.

However, the Rasch latent trait technique did uncover a problem with one of the SSS source of stress scales: Academic Stress. Table 3 presents the variable map for students completing the three items:

21 I worry about not doing well in school.

28 I am afraid of getting poor grades.

34 I worry about taking tests.

Displayed are the positions of the 1829 students and the three items on the Academic Stress variable. Of particular importance are the positions of the three items on the continuum that facilitates the definition of the variable. The three item difficulty estimates (i.e., being able to respond "always" to the items) were clustered near the center of the continuum with logits of .06, -.02 and -.05.

While the frequency data presented in Table 4 indicate that the responses were distributed across most of the score range, the item difficulties suggest that a lack of optimal variable definition is present. This lack of differentiation among items results in little information about the Academic Stress construct. That is, we do not clearly know what it means to differentiate between high and low scoring students. While the classical techniques employing alpha reliability and factor analytic procedures provided support for Nunnally's domain sampling model and initial supportive information for the ongoing examination of construct validity interpretations, the latent trait model identified the restricted nature of the measurement of the targeted variable for this scale. It is clear that a few new items that assess different locations on the underlying continuum need to be developed.

In contrast, the item difficulties presented for the six items (N=1958) on the Behavioral manifestations of stress scale in Table 5 indicate a higher degree of differentiation of the variable for these items:

29 I try to get attention by acting silly in class.

27 I talk back to my teachers.

4 I get into fights.

25 I yell at my classmates.

20 I pick on other students.

9 I talk in class when I should be quiet.

Since there is a more adequate definition of this variable, a more complete score interpretation is possible for both low and high scoring students. At the upper end of the continuum items hardest

to agree with (i.e., 29, 27, 4 and 25) appear to define a more "aggressive" aspect of behavior depicted by "acting silly", "talking back", "fighting" and "yelling." On the lower end of the continuum item 9, which is clearly easier to agree with, appears to define a less aggressive behavioral act depicted by "talking in class." Thus for the Behavioral scale the continuum appears more reasonable and consistent with the original conception of the variable.

Item and Person Fit

Item Fit. Given that the definition of the variables has been examined using latent trait techniques, the issue of how well items and people fit the measurement model must be addressed in order to gain insight into the variables being measured. Table 6 presents the item fit statistic information for the N=1958 students responding to the six Behavioral scale items. The information is presented in three different formats: serial order (i.e., order in which items appear on the instrument), calibration order (i.e., items ordered by then ranked item difficulties), and fit order (i.e., ordered from highest negative to highest positive fit statistic).

Generally, the most important information appears in the lower right section of the fit order portion of the table. For the Behavioral scale we note that items 27 and 29 are the most difficult for students to indicate a response of "always." With t values exceeding 2.00 these two items are identified as not fitting the measurement model because low scoring students were not expected to respond "always", but, in fact, numerous students did

give such a response. These were students who, in general, exhibited relatively few of the behaviors targeted by the remaining four items on the scale, but unexpectedly said they "always" exhibited the behaviors identified in items 27 and 29.

At this point it is not clear whether it is the content of the items or the characteristics of the students that has resulted in these unexpected response patterns. In order to clarify this situation we first note that the response frequencies in Table 7 indicate that relatively few students said they "never" talk in class (item 9), while relatively few said they "always" "try to get attention by acting silly in class" (item 29) or "always" "talk back to teachers" (item 27). An additional consideration of item 29 also suggests that competing behaviors may be included. A student may tend to feel they "always" want "attention" but tend not to "act silly."

Person Fit. Turning now to an examination of the response patterns for those students with large fit statistics (i.e., t>2.00, indicating that the student's response pattern does not fit the pattern expected under the model), we find that numerous students scored higher than expected (i.e., responding "always") on items 27 and 29. To illustrate this finding we selected a few of the students who exhibited unexpected response patterns.

The six right-most columns in Table 8 contain for each person the actual responses to the six items, the responses expected under the model, and the standardized residuals (Wright & Masters, 1982). For example, person number 39 (far left column) has responded "4" to item 29 while, given that person's total score,

the model expects a response of "1", a response more consistent with the person's responses to the remaining five items. Person 171 exceeded their expected response for both items 27 and 29. Person 196 exhibits an interesting but extreme pattern -- either "never" or "always." While we note that with only six items one large unexpected response can inflate the fit statistic, the responses to items 27 and 29 are fairly consistent (i.e., low scoring students who respond "always").

Summary - Recommendations

In summary, this section has illustrated how the Rasch latent trait procedure can assist in obtaining a better understanding of the constructs hypothesized by the affective instrument developer. More valid interpretations of scores should result.

While the use of classical techniques such as factor analysis, correlations and alpha reliability certainly assisted in the instrument development process, the shortcomings of these procedures have been illustrated in this paper. It is obvious that well thought out decisions need to be made during the content validation process that are grounded in the literature and judgments of experts. When the targeted variables are conceptually identified and then operationally defined through the item writing process, instrument developers need to place greater emphasis on spanning the underlying psychological continuum for a targeted variable. It is clear that systematic expert judgments should be gathered using appropriate rating procedures to examine the

estimated item placements along the underlying psychological continuum prior to gathering actual respondent data. A latent trait model can then be employed to test the developer's original conception of the variable for consistency with respondent score patterns.

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Table 1

School Situation Survey Scales

SSS Scales
Sources of Stress
• Teacher Interactions assesses students' perceptions of their teachers' attitudes toward them.
• Academic Stress assesses situations that relate to academic performance or achievement.
• Peer Interactions assesses students' social interactions or their perceptions of their classmates' feelings toward them.
• Academic Self-Concept assesses students' feelings of self-worth, self-esteem, or self-concept relevant to perceived academic ability.
Manifestations of Stress
• Emotional assesses feelings such as fear, shyness, and loneliness.
• Behavioral assesses actions, reactions, or behavior toward others, such as striking out or being hurtful or disrespectful.
• Physiological assesses physical reactions or functions such as nausea, tremors, or rapid heart beat.

Table 2

Factor Structure of the SSS

Factor	I	II	III	IV
Sources of Stress				
Factor I: Teacher Interactions				
31. Some of my teachers yell at me for no reason.	.77	.02	.00	.02
*24. I feel that my teachers treat me fairly.	.67	.01	.06	.01
13. Some of my teachers call on me when they know I am not prepared just to embarrass me.	.61	.06	.04	.01
20. I feel that some of my teachers don't really care about what I think or how I feel.	.61	.10	.10	.02
9. I feel that some of my teachers expect too much of me.	.58	.07	.01	.08
2. I feel that some of my teachers don't like me very well.	.46	.08	.05	.09
Factor II: Academic Stress				
5. I worry about not doing well in school.	.04	.81	.03	.03
16. I am afraid of getting poor grades.	.07	.79	.04	.04
27. I worry about taking tests	.12	.62	.09	.11
Factor III: Peer Interactions				
*23. I enjoy talking to my classmates.	.02	.07	.74	.14
*30. I have many friends.	.10	.09	.71	.02
*12. I get along well with my classmates.	.15	.01	.68	.07
*1. I enjoy doing things with my classmates.	.03	.23	.61	.17
8. Other students make fun of me.	.07	.15	.56	.12
19. I am among the last to be chosen for teams.	.04	.20	.49	.26
Factor IV: Academic Self-Concept				
*29. I do good work in school.	.01	.04	.09	.76
*7. I do well in school and get good grades.	.09	.00	.02	.74
*18. I feel that I learn things easily.	.09	.06	.13	.55
*34. School work is easy for me.	.10	.19	.08	.55

Table 2 (continued)

Factor Structure of the SSS

Factor	I	II	III	IV
Manifestations of Stress				
Factor I: Emotional				
15. I feel frustrated	.79	.01	.01	
11. I feel mixed up.	.77	.05	.01	
4. I feel upset.	.68	.01	.09	
33. I feel angry at school.	.58	.38	.03	
26. I feel nervous.	.55	.18	.26	
22. I feel like crying.	.47	.20	.36	
Factor II: Behavioral				
3. I get into fights.	.06	.71	.14	
25. I talk back to my teachers.	.03	.66	.10	
14. I pick on other students.	.14	.65	.08	
21. I yell at my classmates.	.09	.63	.08	
19. I talk in class when I should be quiet.	.12	.40	.09	
32. I try to get attention by acting silly in class.	.16	.37	.20	
Factor III: Physiological				
28. I get stomachaches.	.16	.05	.72	
17. I feel sick to my stomach.	.26	.04	63	
6. I get headaches.	.12	.01	.55	

Note: This information is based upon complete sets of data for 902 students on the Sources of Stress items and 1,005 students on the Manifestations of Stress items across grades 5, 7, and 9.

Item numbers with asterisks indicate reverse-scored items (i.e., higher scores reflect higher stress levels)

Only items with factor loadings greater than .40 are listed. Although item 29 had a factor loading less than .40, it contributed sufficiently to the scale reliability to warrant inclusion in the scale.

NOTE. Item numbers reflect new numbers employed in the SSS technical manual.

Table 3

Variable Map for the SSS Academic Stress Scale

R. GABLE: GRADES 6-8· ASTRESS SCALE

1829 PERSONS 3 ITEMS MAX. OF 5 CATEGORIES 12 STEPS 13-JUL-88 PAGE 11

MAP SHOWING POSITIONS OF PEOPLE AND ITEMS ON THE VARIABLE

SCORE (FREQ)	PERSON POSITION	ERROR	PEOPLE(N=1829)	ITEMS(L= 3)	ITEM VALUE (SE) FIT
11(128)	2.16	0.97	XXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXX	
10(192)	1.48	0.72	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
9(186)	1.04	0.62	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
8(232)	0.69	0.58	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
7(206)	0.36	0.56	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
6(262)	0.05	0.56	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	I28 I21 I34	0.06(0.0)-2 -0.05(0.0)-2 3
5(194)	-0.28	0.58	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
4(184)	-0.62	0.60	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
3(126)	-1.02	0.65	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
2(78)	-1.51	0.75	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
1(34)	-2.26	1.02	XXXXXXXXXXXXXXXXX		

WHEN THE SCORE GROUP POSITIONS ARE CLOSER THAN ONE TENTH OF A LOGIT, SCORE GROUPS ARE COMBINED: X=NO MORE THAN 2 PERSON/S

Table 4

Item Response Frequencies for the SSS Academic Stress Scale

R. GABLE: GRADES 6-8: ASTRESS SCALE

1029 PERSONS 3 ITEMS MAX. OF 5 CATEGORIES 12 STEPS 13-JUL-88 PAGE 5

CATEGORY COUNTS EDITED FOR SCALE

ITEM NAME	SEQ NUM	MAX SCORE	ITEMS REVERSED	SCALE CATEGORY CODES 0	1	2	3	4	ITEM SCORE
I21	1	4		148	369	552	418	342	4095
I28	2	4		190	370	570	363	336	3943
I34	3	4		128	304	681	380	336	4150
TOTAL		12	RESPONSES	466	1043	1803	1161	1014	
			RESPONSES AT OR ABOVE	5487	5021	3978	2175	1014	

Table 5

Variable Map for the SSS Behavioral Scale

R. GABLE: GRADES 6-8: BEHAVE SCALE

1958 PERSONS 6 ITEMS MAX. OF 5 CATEGORIES 24 STEPS 13-JUL-88 PAGE 11

MAP SHOWING POSITIONS OF PEOPLE AND ITEMS ON THE VARIABLE

SCORE (FREQ)	PERSON POSITION	ERROR	PEOPLE (N=1958)	ITEMS (L= 6)	ITEM VALUE (SE) FIT
23(0)	2.92	0.95			
22(0)	2.28	0.68			
21(0)	1.90	0.56			
20(4)	1.62	0.50	XX		
19(2)	1.38	0.47	X		
18(10)	1.17	0.44	XXXXX		
17(8)	0.98	0.43	XXXX		
16(18)	0.80	0.42	XXXXXXXXX		
15(22)	0.63	0.42	XXXXXXXXXX		
14(30)	0.46	0.42	XXXXXXXXXXXXXX	I29	0.47(0.0) 8
13(52)	0.28	0.42	XXXXXXXXXXXXXXXXXXXXXXXX	I27	0.45(0.0) 5
12(66)	0.11	0.42	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	I4 I25	0.15(0.0) 2-2
11(84)	-0.07	0.43	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	I20	-0.13(0.0)-6
10(94)	-0.26	0.43	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
9(104)	-0.45	0.44	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
8(146)	-0.65	0.46	XXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
7(192)	-0.86	0.47	XXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
6(208)	-1.10	0.50	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	I9	-1.12(0.0)-8
5(186)	-1.36	0.53	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
4(214)	-1.67	0.57	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
3(198)	-2.03	0.64	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		

Table 6

Item Fit Statistics for the SSS Behavioral Scale

R. GABLE: GRADES 6-8: BEHAVE SCALE

1958 PERSONS 6 ITEMS MAX. OF 5 CATEGORIES 24 STEPS 13-JUL-88 PAGE 9

ITEM STATISTICS

SERIAL ORDER

SEQ NUM	NAME	CALIBRATION VALUE	CALIBRATION ERROR	FIT
1	I4	0.17	0.03	1.56
2	I9	-1.12	0.03	-7.80•
3	I20	-0.13	0.03	-5.69•
4	I25	0.15	0.03	-1.58
5	I27	0.45	0.03	5.19•
6	I29	0.47	0.03	8.06•

CALIBRATION ORDER

SEQ NUM	NAME	CALIBRATION VALUE	CALIBRATION ERROR	FIT
6	I29	0.47	0.03	8.06•
5	I27	0.45	0.03	5.19•
1	I4	0.17	0.03	1.56
4	I25	0.15	0.03	-1.58
3	I20	-0.13	0.03	-5.69•
2	I9	-1.12	0.03	-7.80•

FIT ORDER

SEQ NUM	NAME	CALIBRATION VALUE	CALIBRATION ERROR	MS	SE	FIT
2	I9	-1.12	0.03	0.78	0.03	-7.80•
3	I20	-0.13	0.03	0.83	0.03	-5.69•
4	I25	0.15	0.03	0.95	0.03	-1.58
1	I4	0.17	0.03	1.05	0.03	1.55
5	I27	0.45	0.03	1.19	0.03	5.19•
6	I29	0.47	0.03	1.31	0.03	8.06•

ITEM SUMMARY STATISTICS

	VALUE	ERROR	FIT	MS	SE	FIT
MEAN	0.00	0.03	-0.04	MEAN 1.02	0.03	-0.04
SD	0.59	0.00	6.16	SD 0.21	0.00	6.16

ITEM SD (ADJUSTED FOR ERROR) = 0.589 ERROR RMS = 0.033 ITEM SEPARATION = 17.59 RELIABILITY OF ITEM SEPARATION = 1.00

Table 7

Item Response Frequencies for the SSS Behavioral Scale

R. GABLE: GRADES 6-8: BEHAVE SCALE

1956 PERSONS 6 ITEMS MAX. OF 5 CATEGORIES 24 STEPS 13-JUL-88 PAGE 4

ORIGINAL CATEGORY USAGE

ITEM NAME	SEQ NUM	ORIGINAL CATEGORY CODES AS READ 1	2	3	4	5
I4	1	81	733	322	76	46
I9	2	92	606	749	337	1.4
I20	3	564	823	411	89	71
I25	4	744	761	341	76	36
I27	5	1088	478	249	81	62
I29	6	1069	501	275	59	54
	RESPONSES	4338	3902	2347	718	443

Table 8

Selected Respondents from the Person Measurement Roster

R. GABLE: GRADES 6-8: BEHAVE SCALE

1958 PERSONS 6 ITEMS MAX. OF 5 CATEGORIES 24 STEPS 13-JUL-88 PAGE 8

PERSON MEASUREMENT ROSTER

SEQ NUM	PERSON NAME		ESTIMATION SCORE	MEASURE	ERROR	FIT MS	SE	FIT	RESPONSES, EXPECTED RESPONSES & MISFITTING PEOPLE. ITEMS LIST	STANDARDIZED RESIDUALS FOR SERIAL ORDER. MISFIT |T|=2.00
39	193 919	6	8	-0 65	0.46	3.51	0.55	3.03.	1 1 0 2 0 4 1 3 1 1 1 1 0-1-1 0-1 3	
196	051 323	6	16	0.80	0.42	5.40	0.52	4.51	4 0 4 4 0 4 2 4 3 2 2 2 1-5 1 1-2 2	
201	051 328	6	5	-1.36	0.53	2.95	0.58	2.44	0 0 1 1 0 3 1 2 1 1 1 1 -1-1 0 0 0 3	
171	051 298	6	14	0.46	0.42	3.52	0.55	3.02	1 4 1 0 4 4 2 3 2 2 2 2 -1 0-1-2 2 2	
86	123 398	6	6	-1.10	0.50	2.65	0.56	2.24	1 0 1 1 0 3 1 2 1 1 1 1 0-2 0 0-1 3	