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Confirmatory Factor Analytic Investigation of Greenspan's Model of Personal Competence

AUTHOR:Kevin S. McGrew; Robert H. Bruininks and David R. Johnson
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AUTHOR ABSTRACT

In the recent revision of the AAMR classification manual, an adapted version of Greenspan's model of personal competence was used to describe personal capabilities. This adapted model differs significantly from the original Greenspan model. In the present study three alternative models of personal competence were evaluated with confirmatory factor analysis methods in separate samples of 180 students with mild and 143 students with moderate to severe disabilities. The results supported Greenspan's original model that includes the domains of physical and emotional competence and practical, social, and conceptual intelligence. The AAMR model that includes the construct of adaptive skills was not supported.

In the new American Association on Mental Retardation (AAMR) classification manual, Luckasson et al. (1992) stressed the description of personal capabilities within a theory of general competence "which refers to those attributes that enable an

individual to function in society" (p. 22). Emphasis was placed on Greenspan's model of personal competence (1979, 1981a, 1981b) that includes the capabilities of intellectual (conceptual, practical, and social intelligence), physical, and emotional competence. For the diagnosis of mental retardation, Luckasson et al. emphasized intellectual and adaptive skills limitations. The AAMR intellectual limitations dimension corresponds with Greenspan's conceptual intelligence. However, by combining social and practical intelligence into a broader adaptive skills dimension, the authors of the AAMR manual are at variance with Greenspan's model.

In Greenspan's model, intellectual competence includes the domains of conceptual, practical, and social intelligence. Conceptual intelligence is similar to traditional notions of intelligence and is the "ability to solve abstract intellectual problems and use and understand symbolic processes, including language" (Greenspan, 1981a, p.30). Social intelligence is "a person's ability to understand and to deal effectively with social and interpersonal objects and events" (Greenspan, 1979, p. 483) and includes both awareness (e.g., perspective-taking, person perception, social inference, social comprehension) and skills (e.g., referential communication and social problem-solving) (Greenspan & Granfield, 1992). Practical intelligence is similar to current notions of adaptive behavior as it "represents the ability to deal with the physical and mechanical aspects of life, including both self-maintenance and vocational activities" (Greenspan, 1979, p. 510) and involves the ability to solve problems "relevant to the everyday work and recreational concerns" (Greenspan, 1981a, p. 30).

Emotional competence represents a variety of character and temperament variables similar in description to the maladaptive dimensions included in many adaptive behavior scales. Physical competence is not dealt with extensively in Greenspan's model and includes a variety of motor, physical growth and development, and health variables. Greenspan (1981a) did not define social competence as a separate component, but, rather, as a combination of elements from both intellectual competence (i.e., social intelligence) and emotional competence.

A recent review of the exploratory and confirmatory factor analytic literature (Widaman & McGrew, in press) provides support for the existence of four broad domains of personal capabilities (namely, physical or motor competence, practical intelligence or independent living skills, conceptual intelligence or cognitive competence, and social intelligence or competence) that correspond with the major domains in the Greenspan model. However, a number of shortcomings in existing research studies also suggest the need for additional research. First, none of the studies that directly evaluated Greenspan's model (Greenspan, 1984; Ittenbach, Spiegel, McGrew, & Bruininks, 1992; Mathias & Nettelbeck, 1993; McGrew & Bruininks, 1990) included indicators of all model components. Second, most studies were either based on small samples of individuals with disabilities or large samples that included predominately individuals without disabilities. Third, in only one investigation (McGrew & Bruininks, 1990) did the researchers directly compare the relative fit of competing models of personal competence.

Different researchers or organizations (namely, AAMR) have reorganized the major components of Greenspan's model of personal competence in various ways, particularly with regard to whether to keep practical intelligence and social intelligence separate or to combine them into a single domain (adaptive skills; practical--interpersonal competence) (Mathias & Nettelbeck, 1993). Research is needed to investigate the validity of these competing conceptual models. The current investigation was designed to evaluate and compare the validity of three variations of Greenspan's model of personal competence in two samples of individuals that varied by severity of disability.

METHOD

SAMPLE

The sample was obtained from an initial pool of 663 randomly selected 6th-through 12th-grade students receiving special education services in one large metropolitan and one medium-size rural school system in a Midwestern state during the 1989-1990 school year. Parent permission was obtained for 364 students (54.9% participation rate) to participate as part of a prospective school-to-community transition follow-along/follow-up study (Institute on Community Integration, 1992).

The sample was divided into subsamples of 206 students with mild and 168 with moderate to severe disabilities. Due to inconsistent and variable special education program eligibility criteria and records across and within the different schools, the student's primary Individualized Education Plan (IEP) disability classification was judged to be an unreliable indicator of level of disability. Therefore, the sample was divided using a functional criterion of 2.5 standard deviations [SDs] below the mean (mild: [less than or equal]2.5 SD; moderate to severe: [greater or equal]2.5 SD) on the full-scale IQ used in the investigation (or total adaptive behavior scaled score if an IQ was not available). The descriptive characteristics of the two subsamples are summarized in Tables 1 and 2. A review of these tables indicates that the two samples were similar in gender and ethnic composition (i.e., approximately 65% male; approximately 65% Caucasian; nearly 100% non-Hispanic). On the average, the students with mild disabilities were 16.8 months younger than the students with moderate to severe disabilities.

Although the use of the total adaptive behavior scores for subject classification when IQs were not available was a concern, the different characteristics of the two resulting samples suggested that this procedure produced two samples that

differed significantly by degree of disability. The majority of the individuals in the mild sample consisted of students whose primary diagnosis was either "other," mental retardation, or none (see Table 2). In contrast, the sample of students with moderate to severe disabilities were primarily those classified as having mental retardation. The samples differed by 40 to 60 points in their average intelligence, achievement, and adaptive behavior standard scores (see Table 2).

INSTRUMENTATION

Indicators of physical competence, practical intelligence, and emotional competence were drawn from the Inventory for Client and Agency Planning (Bruininks, Hill, Weatherman, & Woodcock, 1986), a third-party informant scale standardized on 1,764 subjects selected to be representative of the population of the United States (1980 census). The Inventory's Social and Communication, Personal Living, Community Living, and Motor Skills adaptive behavior clusters were used as indicators of Greenspan's practical intelligence. The Internalized, Externalized, and Asocial maladaptive behavior clusters on the Inventory served as indicators of Greenspan's emotional competence. Research studies support the reliability and validity of the Inventory for Client and Agency Planning adaptive and maladaptive behavior scales (Bruininks et al., 1986). The protocol for this Inventory was completed by each student's primary special education teacher.

Three physical competence indicators were drawn from the Functional Limitations and Needed Assistance section of the Inventory for Client and Agency Planning. A physical complications variable consisted of the combined ratings on the vision and hearing and frequency of seizures items. A physical mobility variable consisted of combined ratings from the arm/hand and mobility items. Finally, need for a health care variable was based on the combination of the health and required care by nurse or physician items.

Conceptual intelligence indicators were drawn from the Standard Cognitive Battery and the Skills Achievement cluster from the individually administered Woodcock-Johnson Psycho-Educational Battery--Revised (Woodcock & Johnson, 1989). The Woodcock-Johnson was standardized on a nationally representative sample (based on the 1980 U.S. Census) of 6,359 subjects from age 2 years through adulthood (McGrew, Werder, & Woodcock, 1991). The standardization sample and psychometric characteristics are adequate (McGhee & Buckhalt, 1993; McGrew, 1994; McGrew et al., 1991; Ysseldyke, 1990). Ten Woodcock-Johnson tests were individually administered by doctoral students in special education or school psychology and educational diagnosticians trained in standardized administration of the tests.

The Woodcock-Johnson Standard Cognitive Battery consists of seven tests designed to measure seven of the abilities of the Horn-Cattell Gf-Gc theory of intelligence (McGrew, 1994; McGrew et al., 1991; Woodcock, 1990). The Skills Achievement cluster, a combined measure of basic skills in reading (Letter--Word Identification), mathematics (Applied Problems), and writing (Dictation), served as one indicator of conceptual intelligence. To reduce the complexity of the data analysis, we organized the seven cognitive tests into three composites based on their similar level of placement in Horn's Gf-Gc developmental and information-processing hierarchy (Horn, 1986): Analysis--Synthesis (Gf--Fluid Reasoning) plus Picture Vocabulary (Gc--Comprehension--Knowledge); Visual Closure (Gv--Visual Processing) plus Incomplete Words (Ga--Auditory Processing) plus Visual Matching (Gs--Processing Speed); Memory for Sentences (Gsm--Short-Term Memory) plus Memory for Names (Glr--Long-Term Associative Storage and Retrieval).

Eighty-five items with social competency content from the Checklist of Adaptive Living Skills (Morreau & Bruininks, 1989), an individually administered criterion-referenced measure of approximately 800 specific adaptive behaviors, were used or modified for use as indicators of social intelligence. Additional items were written based on a review of the social skills and social intelligence literature. The items were logically grouped into 11 subdomains (namely, cooperation, social interaction, conversation skills, feelings/self-control, assertion, responsibility, confidence/self-esteem, sensitivity/support for others, leadership, social problem-solving, and social insight) that were, in turn, logically organized into the three broad social clusters of Self-Control/Esteem, Social Sensitivity/Insight, and Social Communication/Interaction. The social skills instrument was completed by the same special education teacher who completed the Inventory for Client and Agency Planning for a subject.

The Woodcock-Johnson and Inventory for Client and Agency Planning scores were in the form of W scores, a special transformation of the Rasch ability scales (Bruininks et al., 1986; Woodcock, 1978). The W scale is an equal-interval scale centered on a value of 500, which is the approximate average performance of a beginning fifth-grade student. The three cognitive composite measures were created by averaging the W scores for the tests included in each composite. The Inventory for Client and Agency Planning maladaptive clusters are based on a scale with a zero mean and an SD of 10, which represents the variability typically observed in a variety of clinical samples (Bruininks et al., 1986). The three cluster scores from the experimental social intelligence/skills measure were the sum of the 4-point (0 to 3) items comprising each cluster scale.

DATA ANALYSIS

Data Screening. All variables in each sample were screened with the PRELIS (Version 2.0--Jöreskog & Sorböm, 1993b) computer program. The frequency distributions for the physical competence indicators displayed little variability and were

dropped. Almost all of the continuous variables in the each sample displayed significant departures from normality. Although data transformations (Tabachnick & Fidell, 1989) improved the characteristics of most of the variables overall, the assumption of multivariate normality in each sample was not met. This suggests caution in evaluating the absolute level of model fit and the inferential statistical results reported for each sample.

Only 104 of the 206 (mild sample) and 79 of the 178 (moderate to severe sample) subjects had complete data for all 14 variables. Because confirmatory factor analysis procedures often encounter serious estimation problems with pairwise correlation matrices, the PRELIS imputation procedure that substitutes a value for a missing value for a case with that from another case that has a similar response pattern over a set of matching variables (Jöreskog & Sorböm, 1993b) was used for the conceptual and social intelligence indicators. The imputation of missing data values prior to the calculation of the correlation matrix is a more effective procedure than the listwise and pairwise procedures (Little & Rubin, 1987; Raymond, 1987; Raymond & Roberts, 1987). In both samples, the imputation of approximately 10% of the data resulted in the recovery of three times that amount (approximately 33%) in real data that would have been discarded through the listwise method. Approximately 90% of the data used in the calculation of the final correlation matrices (mild sample n = 180; moderate to severe sample n = 143) was nonimputed data. Thus, the preservation of existing data was judged to outweigh the concern for "creating" data (Raymond, 1987). In addition, the mean Woodcock-Johnson Broad Cognitive Ability and Skills Achievement and Inventory for Client and Agency Planning Broad Independence and General Maladaptive Index scores for subjects with and without imputed data were compared within each sample. Across these eight t-test comparisons, none of the critical t values (which ranged from 0.04 to 1.13) were significant (smallest probability value was p = .204), which suggests that there was no systematic difference between the personal competency characteristics for subjects with or without imputed data.

Modeling Procedures. The latent variable analytic method of confirmatory factor analysis--LISREL (Jöreskog & Sorböm, 1993a) was used to evaluate and compare three models of personal competence. The three models are presented in Figure 1, where the ovals represent the latent factors; the rectangles, the measures or manifest variables; the arrows from the ovals to the rectangles, the factor loadings; the double-headed arrows, the latent factor correlations; and the single-headed arrows on the rectangles, the residuals (combination of error and unique variance) for the variables.

The four-factor Greenspan model (Greenspan-4) is the primary model represented in Figure 1. A three-factor Greenspan model (Greenspan-3) was specified to investigate the validity of combining Emotional Competence and Social Intelligence into a single Social-Emotional Competence factor (Greenspan, 1979, 1981a).

The third model (AAMR-3) was a three-factor model that operationalized the conceptual organization presented in the AAMR classification manual (Luckasson et al., 1992) and an exploratory factor analysis based model presented by Mathias and Nettelbeck (1993). In addition to the indicator--factor relations described earlier, logical content analysis resulted in five variables (namely, Inventory for Client and Agency Planning Community Living, Social-Community, and Asocial; Social: Sensitivity/Insight; Socia: Self-Control/Esteem) being specified as mixed measures of more than one factor.

Model specification was followed by the estimation of model parameters and fit statistics, with the iterative maximum like-lihood fitting function in the LISREL computer program (PC/DOS-based Version 8.02; Jöreskog & Sorböm, 1993a). Multiple fit statistics were used to evaluate the models (Loehlin, 1987; Tanaka, 1993). The chi-square statistic is essentially a "badness-of-fit" measure because larger values indicate poorer fit (Jöreskog & Sorböm, 1993a). The ratio of the chi-square to degrees of freedom can be used as a crude index (with smaller values indicating better fit) for comparing models (Loehlin, 1987).

Standardized root mean square residual (rmr) values below .10 are considered to reflect a good fit (Cole, 1987). Conversely, the Goodness-of-Fit index and Adjusted Goodness-of-Fit index, which are analogous to the multiple and adjusted multiple correlation in regression analyses (Tanaka, 1993), provide normed values between zero and one, with 1.0 being a perfect fit. Goodness-of-Fits above .90 and Adjusted Goodness-of-Fits above .80 are often considered to be indicative of good fit (Cole, 1987). The Parsimonious Goodness-of-Fit index, and the chi-square/df ratio, are from a family of parsimony fit indices that penalize models that have a large number of parameters in favor of simpler models (Tanaka, 1993).

The final step was the respecification and estimation of parameters for the best fitting model in each sample. The LISREL individual parameter tests, estimated parameter change values, and modification indices were inspected to identify changes that might result in a better fitting model. Because post hoc readjustment procedures can capitalize on chance associations in sample data, this step must be done judiciously. Individual parameters that were not significantly different from zero were dropped in the respecified models, and new model parameters were added only if they made logical or theoretical sense.

RESULTS

EVALUATION AND RESPECIFICATION OF MODELS

The goodness-of-fit statistics are presented in Table 3. A review of the fit statistics indicates that of the three initial models, the Greenspan-4 model produced the best fit to the data in both samples. The Goodness-of-Fit and Adjusted Goodness-of-Fit

indices were all noticeably larger and the rmr, chi-square, and chi-square/df ratio were relatively smaller (all of which indicate relatively better fit) for the Greenspan-4 model.

For the mild sample, the Parsimonious Goodness-of-Fit was nearly identical (range = .54 to .56) for the three initial models. For the moderate to severe sample, the Parsimonious Goodness-of-Fit index suggested that the AAMR-3 model was a relatively poorer fit (.45) when compared to the Greenspan-3 (.53) and Greenspan-4 (.54) models, which were not appreciably different. In both samples, the chi-square/df ratio favored the Greenspan-4 (2.1 and 2.4) over the AAMR-3 (3.6 and 5.6) and Greenspan-3 (4.6 and 3.9) models.

Because five of the six model fit indices (Goodness-of-Fit, Adjusted Goodness-of-Fit, rmr, chi-square, chi-square/df) favored the Greenspan-4 model--and for the remaining index (Parsimonious Goodness-of-Fit), the Greenspan-4 model was found to be similar in fit to the AAMR-3 and Greenspan-3 models--we concluded that the Greenspan-4 model was the best overall fitting model in both samples. Thus, a respecified version of the Greenspan-4 model (G-4r in Table 3) was estimated in each sample.

Although some of the fit indices were slightly different between the initial Greenspan-4 (G-4) and respecified Greenspan-4(G-4r) models in both samples (see Table 3), overall these differences were not appreciable. Although most of the estimated parameters in both models were very similar, the advantage of the were very similar, the advantage of the respecified models is that they removed nonsignificant parameters, suggested overlooked parameters, and eliminated an out-of-bounds parameter (i.e., factor loading over 1.0 for Inventory for Client and Agency Planning Asocial indicator on Emotional Competence latent factor in both samples). The results for the final respecified Greenspan-4 (G4-r) model in each sample are presented in Figure 2.

LATENT FACTOR CORRELATIONS

Three of the latent factor correlations in the final model in the mild sample (see Figure 2) were not significantly different from zero. The Social and Practical Intelligence factors, r = .57, and Social Intelligence and Emotional Competence factors, r = .54, were moderately correlated, and the Practical Intelligence and Emotional Competence factors were less related, r = .27. The finding of a moderate correlation, r = .57, between the Practical and Social Intelligence factors, a correlation that indicates related but separate constructs, provides additional support for the Greenspan-4 model over the AAMR-3 and Greenspan-3 models.

The latent factor correlations in the moderate to severe sample (see Figure 2) were all significantly different from zero, and much larger than those found in the mild sample. These latent factor correlations revealed low to moderate correlations, r = .24 to .34, between the Emotional Competence factor and the three other factors. The Conceptual Intelligence factor correlated, r = .69, similarly with the Practical and Social Intelligence factors. Although the relatively large Practical and Social Intelligence factor correlation, r = .78, suggests strongly related factors, the standard error of estimate of .04, together with the fact that latent factor correlations estimated by LISREL are estimates purged of measurement error, indicates that these constructs are not identical.

DISCUSSION

In separate samples of students with mild and moderate to severe disabilities, confirmatory factor analyses of 14 indicators of personal capabilities supported a version of Greenspan's model of personal competence that includes the dimensions of emotional competence and practical, conceptual, and social intelligence. The current study did not support the AAMR (Luckason, 1992) adaptive skills or Mathias and Nettelbeck's (1993) practical--interpersonal competence constructs--constructs that combine Greenspan's dimensions of social and practical intelligence--and did not support a single social--emotional competence factor (Greenspan, 1979, 1981a).

Because of the importance historically attached to the adaptive behavior (practical intelligence) and intelligence (conceptual intelligence) constructs in the classification of individuals with mental retardation, an examination of the latent factor correlations between these two constructs is important. For the sample of students with mild disabilities, the Practical and Conceptual Intelligence correlation was not significantly different from zero. This is contrary to prior research reviews (Harrison, 1987; Meyers, Nihira, & Zetlin, 1979) and latent variable modeling studies (Ittenbach et al., 1992; Keith, Fehrman, Harrison, & Pottebaum, 1987; McGrew & Bruininks, 1990), indicating that intelligence and adaptive behavior are separate but significantly related constructs (latent variable correlations from .27 to .58 have been reported). Although a portion of this nonsignificant correlation may be due to some restriction of range on the Woodcock-Johnson measures used to operationalize the Conceptual Intelligence factor (see Table 1), this is more likely a function of the broader array of cognitive abilities measured by the Woodcock-Johnson Cognitive Battery in comparison to other intelligence batteries (McGrew, 1994; Woodcock, 1990). The nonsignificant Conceptual and Practical Intelligence correlation suggests that a low to near zero relation may exist between the constructs of practical and conceptual intelligence when intelligence tests are used that more closely approximate the complete domain of intellectual behavior (Carroll, 1993; McGrew, 1994). However, the correlation of

.69 between these two constructs in the sample of students with moderate to severe disabilities does not completely support this hypothesis.

Almost all of the respective latent factor correlations were noticeably higher in the sample of students with severe to moderate disabilities. This may reflect true differences in the relations between the personal competence constructs as a function of degree of disability. Alternatively, the noticeable difference in the SDs of the scores between the two samples (see Table 1) suggests that the differences in the corresponding correlations between samples may be due to differences in sample variability.

STUDY LIMITATIONS AND RESEARCH SUGGESTIONS

The conclusions based on results of this study need to be tempered by a number of study limitations that suggest avenues for future research. First, the failure to meet the assumption of multivariate normality suggests caution in evaluating the absolute value of the models. Second, modeling studies are needed that include good indicators of Greenspan's domain of physical competence. Third, the study participation rate of 54.9% suggests caution in generalizing to the entire population of students with similar levels of disabilities. Modeling studies are needed that systematically explore the effect of different sample and instrument characteristics on the results. Also, samples with more clear diagnostic classifications and information on level of disability would address the problem encountered in splitting the current sample into two subsamples. Fourth, it is important to recognize that "the data do not confirm a model, they only fail to disconfirm it" (Cliff, 1983, p. 116). Other models not evaluated in this study need to be proposed and evaluated with these and other research methods. For example, some of the significant latent factor correlations suggest the possibility of higher-order factors or constructs (e.g., an "adaptive intelligence" factor that accounts for the large conceptual, social, and practical intelligence correlations in the moderate to severe sample). Such models are statistically equivalent to lower-order models that contain latent factor correlations, and, thus, the resulting fit statistics only suggest that such models are equally plausible. Finally, research that explores the relations between the Greenspan personal competencies and a variety of quality of life and community adjustment outcomes (McGrew & Bruininks, 1994; Schalock, 1990) might reveal important relations that could help direct intervention, research, and policy priorities.

IMPLICATIONS FOR PRACTICE

Results of this study did not support the combining of social and practical intelligence into the adaptive skills dimension in the AAMR classification manual (Luckasson et al., 1992). The independence of social and practical intelligence supports Greenspan and Granfield's (1992) argument that mental retardation should be defined as "a condition marked by deficits in three broad areas of intelligence: social, practical, and conceptual" (p. 450).

Although there have been efforts to operationalize the measurement of the social intelligence construct, none to date has produced a practically useful assessment tool similar in psychometric stature as the current collection of standardized measures of intelligence and adaptive behavior. There is a need to develop ecologically valid measures of social intelligence that may require the use of new technologies (e.g., hypermedia, videodisc, CD-ROM) that can create some degree of ambiguity or conflict in the assessment tasks (Greenspan & Granfield, 1992).

The interpretation of existing measures of practical and conceptual intelligence and emotional competence is enhanced by the current research. For example, of the four Inventory for Client and Agency Planning measures used to operationalize the Practical Intelligence construct, the Personal Living Skills cluster was the only indicator to load on only the Practical Intelligence factor across both samples (see Figure 2). Thus, this cluster may be the single best Inventory for Client and Agency Planning measure from which to make inferences about an individual's practical intelligence. In contrast, assessment personnel should recognize that an individual's score on the Inventory for Client and Agency Planning Social/Communication Living Skills cluster reflects, to varying degrees, information about a person's practical, conceptual, and social intelligence. The factor loading information presented for all measures in Figure 2, especially the information that identifies relatively pure (i.e., loading on only one factor) or factorially complex (i.e., loading on more than one factor) measures, can be used to increase the validity of inferences from the Inventory for Client and Agency Planning and Woodcock-Johnson scores.

Finally, support for the original Greenspan model indicates that comprehensive assessments need to include measures of intelligence, academic achievement, physical health and abilities, social skills or intelligence, and adaptive and maladaptive behavior (McGrew & Bruininks, 1990). The interpretation of the results from such comprehensive assessments may result in improvements in description, classification, and diagnosis in child psychopathology and special education research and practice (Greenspan, 1981a, 1981b). Better classification, placement, and service delivery decisions are likely if assessments, and assessment-related decisions and interpretations, are grounded in a empirically supported theoretical model of personal competence.

Added material

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Table 1 General Characteristics and Descriptive Statistics for the Modeling Indicators in the Two Samples

	Mild (n = 180)		Moderate
Characteristic/Indicator	Mean	SD	Mean
General sample characteristics			
CA (months)	195.8	24.8	212.6
Grade placement	10.1	2.6	10.2
WJ-R(FNa) Standard Broad Cognitive Ability standard score(FNb)	84.0	12.4	33.9
WJ-R Skills Achievement standard score(FNb)	78.0	11.7	38.4
ICAP(FNc) Broad Independence standard score(FNb)	106.8	26.1	42.8
ICAP General Maladaptive Index(FNd)	-4.4	7.5	-8.0
Practical intelligence(FNe)			
ICAP Motor	525.9	24.5	473.3
ICAP Community Living	535.0	26.5	484.2
ICAP Personal Living	536.3	23.9	494.8
ICAP Social and Communication	531.8	30.1	477.4
Conceptual intelligence(FNe)			
WJ-R Skills	525.9	24.5	438.5
WJ-R Gsm+Glr	503.9	12.4	468.7
WJ-RGv+Ga+Gs	505.8	6.1	472.5
WJ-R Gf+Gc	495.9	9.8	465.6
Social intelligence(FNf)			
Self-control/esteem	50.6	11.0	40.5
Sensitivity and insight	32.7	8.8	22.8
Communication and interaction	121.8	23.2	94.5
Emotional competence			
ICAP Asocial	-2.8	11.1	-5.4
ICAP Externalized	1.7	6.2	-1.5
ICAP Internalized	-0.9	6.2	-5.5

FOOTNOTES

a Woodcock-Johnson Psycho-Educational Battery--Revised.

b Standard score scale with a mean of 100 and SD of 15.

c Inventory for Client and Agency Planning.

d Maladaptive scores have a mean of zero and SD of 10 in a variety of clinical samples. Large negative scores indicate more significant problem behaviors.

e W scale where 500 is average performance of beginning fifth grade. Gsm + Glr = average of combined Memory for Sentences and Memory for Names tests, Gv + Ga + Gs = average of combined Visual Closure, Incomplete Words, and Visual Matching tests, Gf + Gc = average of combined Analysis-Synthesis and Picture Vecabulary tests.

f Sum of 4-point rating scale (0-3) items for each composite.

Table 2 Gender, Ethnic, and Diagnostic Characteristics of Two Samples

	Mild		Moderate-Severe	
Characteristic	n	%	n	%
Gender				
Male	122	64.7	95	67.4

Female	66	35.1	46	32.6
Ethnicity				
Asian, Oriental, or Pacific Island	0	0.0	7	4.9
African American	52	27.8	31	21.8
Native American	7	3.7	5	3.5
Caucasian	124	66.3	93	65.5
Other	4	2.1	6	4.2
Hispanic origin				
Not Hispanic	174	99.4	137	97.1
Hispanic	1	0.6	4	2.9
Primary diagnosis				
None	21	11.8	2	2.1
Autism	0	0.0	1	0.7
Neurological	9	5.1	8	5.7
Cerebral palsy	1	0.6	3	2.1
Epilepsy or seizures	1	0.6	1	0.7
Mental retardation	21	11.8	110	78.0
Physical health problem	4	2.2	0	0.0
Mental illness	6	3.4	1	0.7
Situational mental health problem	6	3.4	0	0.0
Other (primarily mild academic or learning disability)	109	61.2	14	9.9

Table 3 Goodness-of-Fit Statistics for Three Models in Two Samples

	Mild				Moderate-Severe			
Fit statistics(FNa)	AAMR-3	G-3	G-4	G-4r	AAMR-3	G-3	G-4	G-4r
Chi-square	280.8	325.3	137.9	130.9	392.9	273.6	158.8	187.7
df	70	70	65	69	70	70	65	68
Chi-square/df	3.6	4.6	2.1	1.9	5.6	3.9	2.4	2.8
GFI	.81	.81	.91	.91	.68	.79	.87	.85
AGFI	.72	.71	.85	.86	.52	.68	.79	.77
PGFI	.54	.54	.56	.60	.45	.53	.54	.55
rmr	.09	.09	.06	.06	.06	.08	.05	.08

NOTE

AAMR-3 = American Association on Mental Retardation three-factor model. G-3 = Greenspan three-factor model, G-4 = Greenspan four-factor model, and G-4r = respecified Greenspan four-factor model.

FOOTNOTE

(FNa) GFI = Goodness-of-Fit Index, AGFI = Adjusted Goodness-of-Fit Index, PGFI = Parsimonious Goodness-of-Fit Index, and rmr = standardized root-mean-square residual.

Figure 1. Path diagrams for initial Greenspan-4, Greenspan-3, and AAMR-3 models evaluated in this study. 1 = These two factors combined into an Adaptive Skills or Practical-Interpersonal Competence factor in the AAMR-3 model, 2 = These two factors combined into a Social-Emotional Competence factor in the Greenspan-3 model. See Table 1 for explanations of abbreviations.

Figure 2. Model parameters for respecified best fitting Greenspan-4 model in both samples. First and second values for each model parameter are for mild and moderate-severe samples, respectively. See Table 1 for explanations of abbreviations.

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