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Chapter 5

The psychometric qualities of the Vineland Adaptive Behavior Scales in children and adolescents with mental retardation

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The study described in this chapter was the basis for the Dutch manual and norms of the Vineland

Adaptive Behavior Scales in children and adolescents with mental retardation:

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Abstract

The psychometric qualities of the Vineland Adaptive Behavior Scales-Survey Form (VABS) were studied in a total population of children and adolescents with mental retardation, and in the different levels (n=826, age 4-18 years). The original structure was replicated in the total population and in the mild and moderate levels of mental retardation. In the severe and profound levels of mental retardation the structure was less well recognized. The reliability of the instrument proved to be good in the total population and the subgroups. The construct validity was high in all groups. The implications of these findings are discussed with respect to the value of the VABS for the population with mental retardation.

5.1 Introduction

Adaptive behavior has become increasingly important in the definition and classification of mental retardation, as is illustrated by the overview in the two most recent versions of the handbook of the AAMR (1992, 2002), and the DSM-IV-TR (APA, 2000). Therefore, also the emphasis on measuring the level of adaptive behavior of persons (suspected) with mental retardation has increased.

The Vineland Adaptive Behavior Scales, VABS (Sparrow, Balla, & Cicchetti, 1984) are well-known and widely used internationally, as an instrument to measure the level of adaptive behavior in children and adolescents. Despite its wide use in the population of children and adolescents with mental retardation, to our knowledge, specific data on the psychometric qualities of the VABS in this population are not available. This paper aims to investigate whether the original structure, reliability and validity of the VABS, as reported in a population of typically developing children (Sparrow et al., 1984), can be replicated in a population of children and adolescents with mental retardation. Insight into these aspects will strengthen the scientific basis for the use of the instrument in this population.

The VABS is an interview for parents/caregivers measuring the level of adaptive behavior of a child, in four specific domains: Communication (Receptive, Expressive and Written), Socialization (Interpersonal Relationships, Play and Leisure Time and Coping Skills), Daily Living Skills (Personal, Domestic and Community) and Motor Skills (Gross and Fine, only applicable for children under 6). The distinction of the first three domains has recently increasingly been supported by fundamental research. Widaman and McGrew (1996) and Thompson et al. (1999) for example, found a domain distinction within the concept of adaptive behavior that highly corresponds to that of the VABS, based on a factor and cluster analysis. They found a Cognitive, Communication and Academic Skills-domain, a Social Competence Skills-domain and an Independent Living Skills-domain.

The original manual of the Survey Form (Sparrow et al., 1984), well describes and founds the development, use, norms and application of the VABS in typically developing children and adolescents. However, it does not corroborate the structure and applicability of the instrument for children and adolescents with mental retardation. Although a sample of persons with mental retardation was included in the form of supplementary norms, this group was not well defined or described. The group consisted of adults of 18 years and older, with no further indication with

respect to age range, level of functioning or representativity of the group. In the norms for mental retardation, the only distinction was ambulatory versus non-ambulatory (no criterion given), and residential versus non-residential. The levels of adaptive behavior corresponding to the supplementary norms are relatively undifferentiated.

For clinical practice and research with respect to children and adolescents with mental retardation, this most often results in applying the rules for administration (e.g. 'basal' and 'ceiling') and the norms for typically developing children and adolescents. As a first step it is indeed important to be able to compare children (suspected) with mental retardation to typically developing children, to find out in which areas the child shows deficits. Nevertheless, for further diagnostic purposes, e.g. to specify the extent and character of the observed deficits, comparing a child with other children with mental retardation in general, or even better, with children from specific levels of mental retardation, gives valuable information.

Additionally, levels and patterns of adaptive behavior are known to vary over specific diagnostic groups, for example in relation to syndromes, such as Fragile X syndrome (Dykens, Hodapp, Ort, & Leckman, 1993; Freund, Peebles, Aylward, & Reiss, 1995; Loveland & Tunali-Kotoski, 1998), Down syndrome (Rodrigue, Morgan, & Geffken, 1991; Loveland & Kelley, 1991; Dykens, Hodapp, & Evans, 1994; Loveland et al., 1998), or Prader-Willi syndrome (Dykens, Hodapp, Walsh, & Nash, 1992; Loveland et al., 1998), or co-morbid behavioral or psychiatric disorders, such as pervasive developmental disorders (Volkmar et al., 1987; Freeman et al., 1988; Volkmar, Carter, Sparrow, & Cicchetti, 1993; Vig & Jedrysek, 1995; Carpentieri & Morgan, 1996; Sparrow, 1997; Carter et al., 1998; Kraijer, 2000; Liss et al., 2001; de Bildt, Sytema, Kraijer, Sparrow, & Minderaa, submitted). When a child with mental retardation is suspected with a co-morbid behavior or physical problem, comparing the child to children with the same chronological age and level of mental retardation contributes to the interpretation of the profile of adaptive behavior. In the population with mental retardation, it often is the profile that provides starting points for both the diagnostic and the treatment process.

In sum, the VABS is well developed and founded in the typically developing population of children and adolescents, and it is appreciated in the population of children and adolescents with mental retardation as a measure of the increasingly emphasized concept of adaptive behavior. Investigation of its psychometric qualities

in this population will contribute to a well-founded use of the VABS in clinical practice and in research with children and adolescents with mental retardation.

5.2 Method

Participants

The VABS study took place as part of a behavior study in a population of children and adolescents with mental retardation (de Bildt et al., 2003b). The participants for this study were recruited from Friesland, a northern province of the Netherlands. All 1436 children and adolescents between 4 and 18 years, known to facilities for children and adolescents (suspected) with mental retardation (schools, day-care facilities and institutions) were approached. All levels of mental retardation were included. No participants were excluded based on etiology of mental retardation, presence of sensory or motor impairments, or co-morbid psychiatric disorder or behavior problems. With this procedure, 1059 (671 males, 388 females) participated, a response rate of 73.7%.

The participants were assigned to the four levels of mental retardation: profound, severe, moderate or mild. In 83.6% of the cases, this classification was based on information from intelligence tests or developmental tests obtained by the facility. In most cases these were standardized tests, e.g. Wechsler Intelligence Scale for Children-Revised, WISC-R (Wechsler, 1974; Vander Steene et al., 1986), Wechsler Preschool and Primary Scale for Intelligence-Revised, WPPSI-R (Wechsler, 1989; Vander Steene & Bos, 1997), Snijders-Oomen Niet-verbale Intelligentietest-Revisie, SON-R (Snijders, Tellegen, Winkel, & Laros, 1996), and the Dutch modification of the Bayley scales of Infant Development (Bayley, 1969; Van der Meulen & Smrkovsky, 1983). In the other 16.4 % of the cases, participants were assigned to one of these categories based on their developmental age equivalent on the Social Functioning Scale for the Mentally Retarded, SRZ, (Kraijer & Kema, 1994; Kraijer, 1997, 2000) combined with clinical review of functioning. The SRZ is a measure of adaptive behavior, which was administered as part of the study.

The sample for this VABS study consisted of 826 children and adolescents, of whom VABS Survey Form data were available. The male:female ratio of 516 (62.5%):310 (37.5%) corresponds to the ratio in clinical practice in the area of mental retardation. In table 5.1, the characteristics of the population are presented. Since the

profound and severe levels of mental retardation consist of small groups, these were combined into one group for the analyses.

Table 5.1 Characteristics of the sample

Level of MR	n	%	Age	
			mean	sd
Profound	82	9.9	10.63	4.04
Severe	89	10.8	11.26	4.10
Moderate	221	26.8	11.54	3.77
Mild	434	52.5	11.33	3.40
Total	826	100.0	11.31	3.65

Instruments

Vineland Adaptive Behavior Scales

In this study, the Survey Form of the VABS (Sparrow et al., 1984) was administered as part of a larger interview with parents, during a home visit. Psychologists, social workers or last-year students in these areas administered the interview, after training in administering and scoring. The interviews were recorded on audiocassette and were scored double randomly. Regularly organized meetings during data collection served to maintain consensus on administration and scoring of the interview. Since the Motor Skills domain is only applicable for children with ages of 6 and below, this domain was excluded for our analyses.

To investigate the convergent validity, the scores on the VABS were compared to the scores on the Social Functioning Scale for the Mentally Retarded, SRZ, (Kraijer et al., 1994; Kraijer, 1997, 2000). This instrument was developed to measure adaptive behavior in children and adults with mental retardation, and is well-known and widely used in the care of people with mental retardation in the Netherlands and Belgium. It is a modified version of the Cain-Levine Social Competency Scale (Cain, Levine, & Elzey, 1963) and is divided into four subscales: Self Help (SH), Communication (C), Persistence (P) and Social Skills (S). Norms were based on 4312 Dutch persons with mental retardation, aged 4 years and older.

To examine the discriminant validity, three concepts that theoretically differ from adaptive behavior were investigated. First, the scores on the VABS were compared with total IQ's on the standardized measures of intelligence, as mentioned before.

Second, scores on measures of general behavior problems, or in other words maladaptive behavior, were compared to the VABS scores. The Child Behavior Checklist, CBCL, (Achenbach, 1991; Crijnen, Achenbach, & Verhulst, 1997; Bölte, Dickhut, & Poustka, 1999; Noterdaeme, Minow, & Amorosa, 1999; Schmeck et al., 2001) and the Dutch version of the Developmental Behaviour Checklist, DBC, (Einfeld & Tonge, 1994; Einfeld & Tonge, 1995; Koot & Dekker, 2001; Dekker, Nunn, & Koot, 2002; Dekker, Nunn, Einfeld, Tonge, & Koot, 2002) were administered for this purpose. Finally, the concept of pervasive developmental disorders was investigated, by comparing scores on the VABS with scores on four instruments for pervasive developmental disorders. The first instrument was the Scale of Pervasive Developmental Disorder in Mentally Retarded persons, PDD-MRS (Kraijer, 1997, 1999), which is a Dutch screening instrument for the full spectrum of pervasive developmental disorders based on the DSM-III-R. The instrument was developed for use with children and adults with mental retardation and was administered with all participants. The second instrument was the Autism Behavior Checklist, ABC (Krug, Arick, & Almond, 1980). Additionally, for a subgroup of participants the scores on the VABS could be compared to the scores on the Autism Diagnostic Interview-Revised, ADI-R (Lord, Rutter, & Le Couteur, 1994), and on the Autism Diagnostic Observation Schedule, ADOS (Lord, Rutter, DiLavore & Risi, 1998; Lord et al., 2000).

Statistics

The structure of the VABS was investigated with a factor analysis (PCA, varimax rotation), and with Pearson's r correlations between the domains and the total score. In order to investigate if the VABS domains can be considered as scales that measure one underlying trait, a Mokken analysis (Molenaar, Schuur, Sijtsma, & Mokken, 2000) was applied. This is a non-parametric Item Response Theory (IRT) model that tests the scalability of a set of items, supposed to measure one latent trait. Typical of IRT is that the items of a scale also have a position on the latent trait, mostly interpreted as the difficulty. This means that items on which many children reach maximum scores (the 'easiest' items) form the one end of the scale, whereas the items that are not scored by many children (the 'most difficult' items) form the other end. The so-called value of homogeneity (H) is used as the scalability-coefficient that expresses the quality of the scale. In general, a scale with an H-value of .50 or above is considered to be a strong scale, with an H-value between .40 and

.50 a scale is considered to be moderately strong and a scale with an H-value between .30 and .40 to be weak (Molenaar & Sijtsma, 2000).

For the reliability study, the internal consistency of the domains and the total instrument was expressed in split-half reliability coefficients, corrected for half-test-length with the Spearman-Brown formula, to increase comparability with the original analyses. Besides that, Cronbach's coefficient alphas were calculated. For the validity study, Pearson's r correlations between the VABS scores (total and domains) and the scores on the other instruments were calculated.

The analyses were applied in the total population with mental retardation and, when relevant, in the subgroups Mild, Moderate and Severe/Profound.

5.3 Results

Structure

Sparrow et al. (1984) divided the items of the VABS Survey Form into three *domains*, based on the content of the items. We found high correlations between these domains and between each domain and the total score of the VABS, in all subgroups and in the total sample (Pearson's r .73 -.97). This finding implicates that the domains are not independent from each other.

The domains are divided into *subdomains*, and this structure was best replicated in the subgroups Mild and Moderate. In these groups the subdomains generally had high loadings, based on a factor analysis, on the domains that they were divided into by the authors of the VABS. In our sample, one exception was the subdomain Written, a Communication subdomain in the original VABS, which in this sample had high loadings on Daily Living Skills. In table 5.2, an example of the division found is presented, in the subgroup with a moderate level of mental retardation.

The items of the Survey Form are not only arranged by domain, but also by level of difficulty, i.e. in developmental order. Since this order is important for determining the starting point ('basal') and finish ('ceiling') of the interview, we examined the scaling of the items of the domains, with a Mokken analysis. This revealed three strong to very strong scales (Communication $H = .86$, Daily Living Skills $H = .79$, Socialization $H = .63$). Testing the scalability of all items into one scale, also revealed a strong scale ($H = .70$).

The implications of these results are that the VABS mainly measures one dimension, i.e. adaptive behavior. Nevertheless, the distinction of three domains by Sparrow et al. (1984) is also recognized in this sample.

Table 5.2 Structure: Factor loadings of the raw subdomain scores on three factors (PCA, varimax rotation) and the percentages of explained variance, in the group with a moderate level of mental retardation

	Subdomain	Factor 1, 'DLS'	Factor 2, 'Soc'	Factor 3, 'Com'
Com	<i>Receptive</i>	.23	.30	.87
	<i>Expressive</i>	.45	.35	.74
	<i>Written</i>	.75	.20	.35
DLS	<i>Personal</i>	.83	.24	.28
	<i>Domestic</i>	.81	.44	.13
	<i>Community</i>	.79	.45	.29
Soc	<i>Interpersonal Relationships</i>	.29	.77	.44
	<i>Play and Leisure Time</i>	.29	.85	.26
	<i>Coping skills</i>	.49	.79	.24
% Explained variance		34.8	29.4	21.3

Com = Communication, DLS = Daily Living Skills, Soc = Socialization

Reliability

The internal consistency of the VABS and the domains proved to be very high in the total sample, based on split-half reliability coefficients. For analysis in the subgroups, the distribution of the raw scores on the items was insufficient, since there were too many items that were scored 2 or 0 for all participants, score 0 especially in the severe/profound level of mental retardation. To investigate the internal consistency in the subgroups Mild/Moderate and Severe/Profound, the items with a distribution in raw scores between .25 and 1.75 were selected. Again, the internal consistency was high, as presented in table 5.3.

Concordant with this finding, Cronbach's alpha's were also high (Communication .98, Daily Living Skills .98, Socialization .97 and VABS total .99). Calculating these coefficients for the selected items only, did not change the results. The high internal consistency implies a high reliability of the total instrument, as well as the separate domains.

Table 5.3 Reliability: Split-half reliability coefficients before and after item selection

	Before selection				After selection				
	Total population		Severe/Profound		Mild/Moderate		Total pop		
	<i>n</i>	<i>items</i>	<i>rel.co.</i> ¹	<i>items</i>	<i>rel.co.</i> ¹	<i>items</i>	<i>rel.co.</i> ¹	<i>items</i>	<i>rel.co.</i> ¹
Com ¹	825	67	.75	34	.83	29	.88	40	.81
DLS ²	826	92	.81	44	.88	48	.85	57	.86
Soc ³	826	66	.82	30	.84	40	.85	42	.87
VABS	825	225	.93	108	.94	117	.91	139	.94

Com = Communication, DLS = Daily Living Skills, Soc = Socialization

¹ Corrected for half test length with Spearman-Brown formula

Validity

To investigate the convergent validity, Pearson's *r* correlations were computed between the domain and total VABS raw scores and the total and subscale scores of the SRZ, for the total sample and for the combined group Moderate and Severe, since the SRZ mainly focuses on these two levels of mental retardation. Pearson's *r* coefficients between the total scores were high (.93 in the total sample, .89 in the moderate/severe subgroup). In table 5.4, the correlations between the domain/subscale scores are presented. The correlations between the Communication domain/subscale (C) and between Daily Living Skills and Self Help (SH) were concordant with the expectation that these values would be specifically high. The same holds true for the correlation between Socialization and Social Skills (S), although the absolute value of the coefficient was a little lower. The subscale Persistence (P) of the SRZ does not have an equivalent in the VABS.

To investigate the discriminant validity, the correlation between the VABS scores (corrected for age) and Total IQ scores on intelligence tests were computed. To establish discriminant validity, these correlations should be low. Concordant with this theory, the correlation between the VABS and intelligence tests was low for the mild and moderate levels of mental retardation, as presented in table 5.5. For the severe/profound levels of mental retardation the correlation was relatively high.

Additionally, the VABS scores were compared to scores on measures of general problem behavior, that is maladaptive behavior, and on measures of behavior related to pervasive developmental disorders. Table 5.5 shows correlations for the total sample and for the combined Mild and Moderate subgroups, since the

CBCL and DBC appear to be most applicable in these groups. The correlations between the VABS and measures of pervasive developmental disorders as the PDD-MRS, the ABC, the ADI-R and the ADOS (total population only, see also table 5.5) were stronger than found for general problem behavior. The negative sign of these correlations implies that a lower level of adaptive behavior coincides with more problem behavior, especially related to pervasive developmental disorders.

Table 5.4 Convergent validity: The Pearson's *r* correlation between the VABS domains and the SRZ subscales

		Total population (n=818-823)			Moderate/severe (n=306-308)		
		VABS					
		Com	DLS	Soc	Com	DLS	Soc
SRZ	SH	.80	.91	.76	.66	.88	.64
	C	.89	.82	.79	.85	.70	.67
	P	.52	.61	.61	.26	.47	.49
	Soc	.70	.73	.77	.55	.59	.67

For all correlations $p < .001$

VABS: Com = Communication, DLS = Daily Living Skills, Soc = Socialization;

SRZ: SH = Self Help, C = Communication, P = Persistence, Soc = Social skills

Table 5.5 Discriminant validity: The Pearson's *r* correlation between the VABS and measures of intelligence, general and PDD problem behavior

Theoretical Construct	Instruments	Population	n	VABS	Com	DLS	Soc
Intelligence ¹	IQ-tests	Severe/profound	99	.65**	.66**	.61**	.56**
		Moderate	144	.18	.27*	.10	.10
		Mild	378	.36**	.33**	.38**	.21**
General problem behavior	CBCL	Total	826	-.18**	-.12**	-.16**	-.25**
		Mild/moderate	644	-.26**	-.18**	-.22**	-.33**
	DBC	Total	826	-.30**	-.23**	-.27**	-.36**
		Mild/moderate	644	-.36**	-.26**	-.31**	-.43**
PDD	PDD-MRS	Total	813	-.36**	-.34**	-.34**	-.37**
	ABC	Total	813	-.52**	-.48**	-.49**	-.54**
	ADI-R	Total	180	-.38**	-.37**	-.31**	-.44**
	ADOS	Total	180	-.49**	-.47**	-.46**	-.50**

¹ VABS raw scores corrected for age, * $p < .01$, ** $p < .001$

Com = Communication, DLS = Daily Living Skills, Soc = Socialization

5.4 Discussion

The present study aimed to investigate the psychometric qualities of the Vineland Adaptive Behavior Scales, VABS, in a population of children and adolescents with mental retardation. The VABS is well developed and well studied in the general population of children and adolescents, and it is widely used and appreciated for measuring adaptive behavior in children and adolescents with mental retardation. Therefore, the purpose of this study was to examine the original structure, the reliability and the validity of the interview in children and adolescents with mental retardation. Insight into the psychometric qualities will contribute to a more founded and evidence-based use of the VABS in this population. The strength of this study is that the results are based on a large and representative population of children and adolescents ($n=826$), including all levels of mental retardation and a wide age range (4-18 years).

With respect to the structure of the VABS in the Dutch population with mental retardation, two things can be said. First, one central concept seems to underly the VABS, rather than three mutually interdependent concepts. The high correlations between the domains, and the one, strong scale found with the Mokken analysis confirm this implication. Nevertheless, the way Sparrow and colleagues arranged the VABS into the domains Communication, Daily Living Skills and Socialization, is also largely recognized in this population. This is illustrated by the strong Mokken scales for each domain separately. Second, investigation of the arrangement of subdomains into domains reveals that this arrangement is well recognized in persons with mild and moderate levels of mental retardation, yet less well in the combined severe/profound level. In the mild and moderate levels of mental retardation, all subdomains have high loadings on the original domain, except for the subdomain Written, which is moved from the domain Communication in the general population, to Daily Living Skills in our sample. Probably, the fact that the original arrangement of the subdomains into domains is not replicated in the lowest levels of mental retardation, could mainly be explained by its basis in typically developing children and adolescents. The group with a severe/profound level of mental retardation differs most from that population, in the sense that the development in this group hardly increases with increasing age. Instead of three domains, we found that children and adolescents from this group seem to show behavior that can be divided into a more

technical factor 'daily living skills' and a factor that could be interpreted as 'contact behavior'.

Within each domain, the authors arranged the items in order of difficulty, i.e. in developmental order. This arrangement is confirmed empirically in the present study. With respect to the order of difficulty of the items in the separate domains, the scales found are strong to very strong, and show approximately the same order as the original domains. These findings imply that the development of adaptive behavior in children and adolescents with mental retardation closely resembles the development in the typically developing population. Therefore, these results support the use of the general rules for determining a starting point and finish of the interview in the population with mental retardation.

In conclusion, the results of the present study confirm the applicability of the structure of the VABS Survey in children and adolescents with mental retardation, especially in the higher levels.

Investigation of the reliability of the VABS Survey Form in our sample revealed that the internal consistency was high for the total VABS and for each domain separately. The split half reliability coefficients highly resemble the values that Sparrow and colleagues reported in the general population (.86-.90) and in their group of adults with mental retardation (.96-.99). These results provide support for the reliability of the total VABS, as well as the separate domains, in children and adolescents with all levels of mental retardation.

Unfortunately, our study did not provide data on two other aspects of reliability: interrater and test-retest reliability. Sparrow and colleagues also only provided these data for the typically developing population. In that group, the interrater reliability and the test-retest reliability were good to very good. Although a more thorough investigation of these aspects of reliability of the instrument in children and adolescents with mental retardation would be recommended, there are no reasons to assume that, in general, the results from the original sample could not also be applied to this population.

With respect to the validity of the VABS in our sample, two types of construct validity were investigated. Convergent validity is established when there is a clear observed correspondence between the VABS and other measures of adaptive behavior, since they aim to measure theoretically similar constructs. Discriminant validity is established when there is no observed relation between the VABS and

instruments that measure constructs that are theoretically expected to be different from adaptive behavior (e.g. intelligence, problem behavior). Both types of validity should be established to support construct validity.

The convergent validity was established by correlating the VABS scores to the scores on the SRZ, a Dutch instrument for adaptive behavior in the population with mental retardation. Not only the high correlation between the total scores, but also between the comparable domains/subscales support the assumption that the VABS indeed measures what it aims to measure, i.e. adaptive behavior.

For establishing discriminant validity, three constructs that are theoretically different from adaptive behavior were studied, e.g. intelligence, general problem behavior, and problem behavior in the area of pervasive developmental disorders. The observed relation between the VABS scores and Total IQ scores in the two highest levels of mental retardation, were equal to or lower than the correlations reported from the original study (.32, general population). The relatively high correlations in the severe/profound levels of mental retardation more closely resemble the findings the authors reported in the group of adults with mental retardation (.30-.54), although our findings are still higher. It is known from the literature that the lower the level of functioning, the higher the correlation of adaptive behavior with IQ is (Kahn, 1992; Liss et al., 2001). However, the results do clearly not imply that the VABS and intelligence tests are mutually exchangeable. For such an implication, the correlations should have been .80 or higher.

Correlations between the VABS and instruments for problem behavior were low and negative. A stronger negative correlation exists between the VABS and instruments for pervasive developmental disorders. In other words, a lower level of adaptive behavior coincides with more problem behavior, in fact *maladaptive*, especially related to pervasive developmental disorders. However, the correlations are low enough to state that the VABS and instruments designed to measure problem behavior are related to different concepts.

Overall, the combined findings of convergent and discriminant validity provide strong evidence for the construct validity of the VABS.

To summarize, the present study provides empirical evidence for the use of the VABS in children and adolescents with mental retardation. The structure in (sub)domains and in developmental order is largely replicated. Reliability and validity of the instrument are high to very high in this population. The largest differences in

psychometric qualities of the VABS compared to the general population are found in the lowest levels of mental retardation. The construct of adaptive behavior seems to have a different character and a different value in the lives of children and adolescents on these levels of mental retardation.

Comparing the results of this study with the results for adults with mental retardation from the study of Sparrow and colleagues (when applicable), revealed that the results closely resemble each other. Additionally, this resemblance is higher than the correspondence between the findings in our sample of children and adolescents with mental retardation and in the original population of children and adolescents without mental retardation. These outcomes seem to imply that, with respect to the psychometric data and the applicability of the VABS, there is a larger difference between children with and without mental retardation, than between children and adults with mental retardation.

To conclude, the strong evidence from this study for the applicability of the VABS in the population with mental retardation, increases the value of supplementary norms for this population. As we have already indicated, these are needed to be able to optimally apply the VABS for proper diagnostic and evaluation processes. For the Netherlands and Belgium, we developed such supplementary norms, based on the sample from this study, for the total population with mental retardation, and for the mild, the moderate and the combined severe and profound levels of mental retardation respectively (de Bildt & Kraijer, 2003; Kraijer, de Bildt, Sytma, & Minderaa, 2003). With respect to the fact that the VABS is currently undergoing thorough revision and new standardization, we expect that, besides norms for the general population, norms for specific levels of mental retardation will be included. These latter norms will add to extension of the already proven value of the VABS as the international instrument to measure one of the two most important aspects of mental retardation.

