

**The Vineland Adaptive Behavior Scale in a Sample of
Norwegian Second-Grade Children: A Preliminary Study**

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Measuring adaptive behavior is an important part of the assessment of developmental disorders. Because of cultural variations the norms on standardized instruments may differ across countries. Adaptive behavior is the application of skills to cope effectively with everyday situations. Examples include speaking in words to communicate needs, using the telephone to speak with individuals at distant locations, caring for one's own toileting and grooming needs, and playing age-appropriate games with peers. In current diagnostic systems such as the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2000) and International Classification of Diseases (World Health Organization, 1992), delays in adaptive behaviors must be present in order to diagnose mental retardation. Measuring adaptive behavior is also important in the assessment of other developmental disorders such as autism (Carter et al., 1998), hearing impairment (Dunlap & Sands, 1990), specific communication or motor disabilities (Balboni, Pedrabissi, Molteni, & Villa, 2001), and low birthweight infants (Rosenbaum, Saigal, Szatmari, & Hoult, 1995).

Investigators have developed many standardized instruments to assess adaptive behavior, including behavior observation measures such as the AAMR Adaptive Behavior Scales (Nihira, Leland, & Lambert, 1993) and caregiver interviews or checklists such as the Scales of Independent Behavior – Revised (Bruininks, Woodcock, Weatherman, & Hill, 1996). One of the best known and most influential measures of adaptive behavior is the Vineland Adaptive Behavior Scales (VABS; Sparrow, Balla, & Cicchetti, 1984). There are three forms of the Vineland: the Survey Edition, which is a 20–60 minute caregiver interview; the Expanded Form, which is a 60–90 minute caregiver interview; and the Classroom Edition, which is a 20 minute rating scale for teachers. The Vineland was normed on a large, stratified sample in the United States. Some debate has arisen about the adequacy of methods used to derive standardized scores from the normative data (Cicchetti & Sparrow, 1986; Silverstein, 1986). Nevertheless, subsequent studies in the United States indicate that the test has strong psychometric properties. It correlates well with infant intelligence tests (Raggio, Massingale, & Bass, 1994), childhood intelligence tests (Atkinson, Bevc, Dickens, & Blackwood, 1992; Johnson, Cook, & Killman, 1992), achievement tests (Goldstein, Smith, Waldrep, & Inderbitzen, 1987), and other adaptive behavior inventories (Ronka & Barnett, 1987). It also discriminates reliably between groups of children with different disorders (e.g., Balboni et al., 2001).

In a study of 151 children in France, Fombonne and Archard (1993) found that average scores on the Vineland in their sample were comparable to the test norms developed in the United States. However, no other published studies have yielded information on the utility of the Vineland in different countries. As a result, additional research is needed on this issue. Accordingly, the current study was conducted to examine the applicability of Vineland norms to a sample of second grade children in Norway.

Materials and Methods

Participants were parents of 42 second-grade children (23 girls, 19 boys) who were enrolled in five public elementary schools for typically developing children in Vestfold County, Norway. To recruit families, the investigators sent letters about the study to school principals, who forwarded the letters to parents. Thirty-seven mothers, four fathers, and one mother-father pair participated.

Children had a mean age of 93 months ($SD = 3.6$, range = 81–99 months). In written questionnaires, parents indicated that 35 (83 %) had no history of behavior problems, medical concerns, or developmental delays. Of the remaining seven children, one reportedly had been treated for school adjustment problems; two had received speech therapy for articulation; one had received speech therapy for stuttering; one had ear tubes inserted as a toddler; and one was born prematurely, had hypospady, and was receiving special education instruction for reading. Three children (6 %) lived in a single-parent home. Seventeen parents (40 %) had a bachelor's degree or higher; 12 others (29 %) were high school graduates; and 13 (31 %) had not finished high school. The proportions in the general population of Norway are 22 %, 56 %, and 22 % (Statistics Norway, 2004), respectively; thus, parents in the present study appeared to be above average in education level. In other respects, households appeared representative of the Norwegian population: Eight children (19 %) lived with a single parent, similar to the overall rate of 24.7 % in Norway (Statistics Norway, 2004). Parents reported a median income of 400 000 Norwegian kroner, with a range from 200 000 to 700 000 kroner, comparable to the mean household income in the country of 414 000 kroner (Statistics Norway, 2004).

Assessment and Data Collection

Data collection took place in children's schools. The third author, who had a master's degree in education and a license to administer psychological tests, interviewed parents on the survey form

of the Vineland Adaptive Behavior Scales (Sparrow et al., 1984). The survey form of the Vineland is a 20–60 minute, semi-structured interview that yields standard scores ($M = 100$, $SD = 15$) in three domains: Communication, Daily Living Skills, and Socialization. The instrument also yields a composite standard score based on the results across the three domains. In addition, it yields a raw score for maladaptive behavior. Rather than reading specific, standardized questions, interviewers formulate their own general questions (e.g., «How does the child communicate?») and then probe with follow-up questions based on informants' responses (e.g., «Can you give some examples of typical sentences that the child uses?»). As caregivers respond, interviewers scan the test form and assign scores to items covered in the caregivers' answers (e.g., uses «and» and «or» in a sentence). The test manual includes guidelines for interviewing non-English speaking caregivers. According to these guidelines, interviewers should be fluent in both English and the caregivers' language, and they should conduct the interview in the caregivers' language while recording answers on the standard (English) test form. These guidelines were followed in the present study.

To check reliability, the examiner and a second assessor conducted five interviews independently within three months of each other ($M = 1.6$ month). Each examiner was blind to the results obtained by the other examiner. Pearson correlations for test-retest reliability were $r = 0.72$ for the Communication scale, $r = 0.80$ for Daily living Skills, $r = 0.69$ for socialization, and $r = 0.95$ for maladaptive behavior. The mean standard scores obtained by the examiners differed by two to five points in each scale. Thus, inter-rater reliability appeared acceptable.

For every child, standardized scores were derived from the American norms presented in the test manual. We conducted three analyses to ascertain whether Norwegian children's scores differed from the mean of 100 in the American normative sample. First, we performed one-sample t-tests, Bonferroni corrected for a familywise error of 0.05, to ascertain whether Norwegian children's scores differed from the mean of 100 in the American normative sample. Second, although kurtosis and skewedness statistics were consistent with a normal distribution of scores, we re-ran these analyses for the sample excluding the seven children who had some history of behavioral or developmental concerns. Third, based on previous discussions (Silverstein, 1986) and research (Fombonne & Archard, 1993) on comparing sample means to population norms for the Vineland, we calculated 95 % confidence intervals for population scores and determined whether sample means fell outside the confidence intervals (confidence intervals for Maladaptive Behavior was not calculated because norms do not exist for the Maladaptive Behavior scale). The formula for computing each confidence

interval was $100 \pm 2.88 (15/n)$, where n is the sample size, 100 and 15 are the mean and standard deviation in the null hypothesis that sample scores did not differ from normative population scores, and 2.88 is the critical z -value for statistical significance at $p < 0.05$, corrected for the 12 confidence intervals that were derived (i.e., $0.05/12$). In addition, Spearman rank-order correlations, Bonferroni corrected for familywise error of 0.05, were performed to test for associations between Vineland scores and socioeconomic status (SES), as measured by education and income.

Results

Table 1 presents the mean standard score and standard deviation in Communication, Daily Living Skills, Socialization, and Adaptive Behavior Composite. It also displays these statistics for raw scores in Maladaptive Behavior. As shown, the mean standard scores were below 100 in all cases. For one-tailed t -tests, this difference reached statistical significance for all scores, except the Communication domain for boys. Excluding the seven children with a history of behavioral or developmental concerns did not change the pattern of results in the analysis of the total sample. For the confidence interval analysis, the difference was statistically significant for Socialization and Adaptive Behavior Composite scores in boys, and it was significant for Socialization, Daily Living skills, and Adaptive Behavior Composite scores in girls and in the whole sample. Thus, as a group, the Norwegian children in this study tended to obtain lower standard scores than the American children in the normative sample. Norms do not exist for the Maladaptive Behavior scale, but scores in this sample were generally in a nonclinical range. None of the scores correlated significantly with parent education or income.

Table 1. Means and standard deviations on the Vineland Adaptive Behavior Scales

	Communication		Socialization		Daily Living Skills		Adaptive Behavior Composite		Maladaptive Behavior	
Males	95.4	12.4	85.2** †	6.9	93.2*	9.6	88.0**†	9.3	4.0	2.5
Females	93.3*	9.7	85.0** †	8.6	91.2*†	9.8	86.2**	8.6	3.3	2.6
All	94.3*	10.9	85.1**†	7.8	92.1**†	9.6	87.0** †	8.9	3.6	2.5

Table 1. Means and standard deviations on the Vineland Adaptive Behavior Scales

Note. One-sample t-tests with the null hypothesis that cell means equal 100 (* $p < 0.05$, ** $p < 0.01$, Dunn Bonnferroni corrected for familywise error = 0.05); 95 % confidence interval corrected for familywise error = 0.05 († = sample score outside the confidence interval for the normative population)

Table 2. Spearman correlations between SES variables (income and education) and scores on the Vineland Adaptive Behavior Scales

	Communication	Socialization	Daily Living Skills	Adaptive Behavior Composite	Maladaptive Behavior
Education	0.02	-0.17	0.05	-0.03	-0.04
Income	0.31	-0.08	0.23	0.22	0.11

Note. All scores nonsignificant ($p > 0.05$, corrected for familwise error = 0.05)

Discussion

Norwegian second-graders in the present study obtained mean scores on the Vineland Adaptive Behavior Scales – Survey Edition that were lower than means for the normative sample in the United States. This difference was found in all analyses of the Socialization and Composite scores, and it was also found in some analyses of Communication and Daily Living Skills scores. Thus, caution may be needed in applying standard scores from this instrument to Norwegian children.

The third author administered the Vineland to caregivers of children in the study, but, given the high reliability between this author and an independent examiner, it is unlikely that examiner bias accounts for the low scores that were obtained. Another possible source of bias is that the test norms were developed nearly 20 years ago and may have become outdated. At this writing, the Vineland is being revised and normed on a new sample, but it is currently unclear how the new norms will differ from the previous ones. Hence, it cannot be determined whether the age of the test norms was a factor in the present study. An additional aspect of the study that could have introduced bias was the recruitment procedure. Only a minority of parents who received our letter about the study decided to participate. Although they were reportedly average or above average in education and income, they may have been an atypical group in other respects (e.g., having a high level of concern about their children's development). Also, their children were all in a narrow age range (second grade). Replication with a large sample and wide age range of children will be necessary to confirm the results.

Although the study has limitations, the present study provides preliminary support for the notion that norms on the Vineland may differ across countries. If so, there may be cultural reasons for these differences. For example, in the United States, intensive instruction in reading and writing begins in first grade; however, in Norway, such instruction starts a grade later. This discrepancy in educational practice may be a reason for the low scores in the Norwegian sample on the Communication scale, which includes a subscale for reading and writing. Cultural practices in the United States may foster more social extraversion than do practices in Norway, and this factor may have reduced scores on the Socialization scale for our Norwegian sample. Given the importance of adaptive behavior instruments such as the Vineland in clinical and educational settings, analysis of cross-country differences on such instruments and cultural factors that may produce these differences will be an important area for further investigation.

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