# Technical Report

# Boehm·3
# Preschool
## Boehm Test of Basic Concepts • Third Edition

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## OVERVIEW

The *Boehm Test of Basic Concepts, Third Edition–Preschool* (Boehm–3 *Preschool*) is an individually administered assessment for children ages 3.0 to 5.11 designed to evaluate young children's understanding of the basic relational concepts important for language and cognitive development, as well as for later success in school.

The basic relational concepts as defined by Boehm–3 *Preschool* include size, direction, position in space, time, quantity, classification, and general.

Boehm–3 *Preschool* is a revision of Boehm–*Preschool*, published in 1986. Enhancements in the revision include new norms, color picture manual, age extension and differentiated age testing, concurrent development of Spanish edition, tools to assist with IDEA compliance, and more. The revision will provide valuable information to speech-language pathologists, preschool educators, school psychologists, and educational diagnosticians.

## TEST DESIGN CRITERIA

Since the publication of Boehm–*Preschool* in 1986, there have been many changes in preschool and early school assessment. This test was developed within the context of the changing environment and was devised in a format that can be translated into learning objectives and can be used for intervention planning and working with parents. Outlined below are the enhancements that have been included in Boehm–3 *Preschool*:

- Updated normative information and extension of norms through age 5 years 11 months
- Percentiles and performance ranges are provided by 6-month age bands for ages 3.0 to 5.11
- Four measures provided – Raw Scores, Percent Correct, Performance Range, and Percentile
- Inclusion of items that overlap with the easier items on Boehm–3, the group administered test of basic concepts for students K–grade 2

- The addition of a fourth response choice for each item to minimize guessing
- Full-color picture manual and modification of illustrations to appeal to children taking the test
- Increasing the diversity of people pictured in the illustrations by including diverse racial groups, individuals in non-stereotypical roles, and who are differently-abled individuals
- Introduction of an observation form that therapists and teachers can use for ongoing observation of the generalized use of basic concepts across learning areas, and for intervention planning.
- Development of a Parent Report Form to communicate information to parents and suggestions for working with their children in the home environment
- Concurrent development of a Spanish edition with the English edition

Boehm–3 *Preschool* now measures basic concept acquisition in two ranges with item difficulty linked to age

| Age: | 3.0–3.11 |
| | 52 items tested |
| | (26 concepts tested) |

| Age: | 4.0–5.11 |
| | 52 items tested |
| | (26 concepts tested) |

1st item set includes 12 concepts tested twice

2nd item set includes 14 concepts tested twice

2nd item set includes 14 concepts tested twice

3rd item set includes 12 concepts tested twice

# ADMINISTRATION AND SCORING

Boehm–3 *Preschool* can be quickly and easily administered in 20–30 minutes, including preparation time.

Boehm–3 *Preschool* results can be reported as a raw score, percent correct, performance range, and a percentile. The raw score can be determined by summing the number of correct responses. Using the raw scores, the percent correct, performance range, and percentile can be obtained.



# STANDARDIZATION SAMPLE

National norms were developed by administering the test to children beginning in September 1999. The Boehm–3 *Preschool* English standardization sample consisted of *660* children ages 3.0 to 5.11, evenly divided among gender (50.3% female, 49.7% male) and six age groups. The sample was designed to replicate the U.S. population, stratified by age, gender, race/ethnicity, parent education level and geographic region based on the 1998 U.S. Bureau of the Census demographics report. Parent education level was used as a measure of socioeconomic level. Children who were diagnosed with a disorder and/or were receiving special services comprised 11% of the standardization sample.

The selection process for test items included evaluation of p-values (percent of children passing), item difficulties, item correlation, and bias of the standardization data.
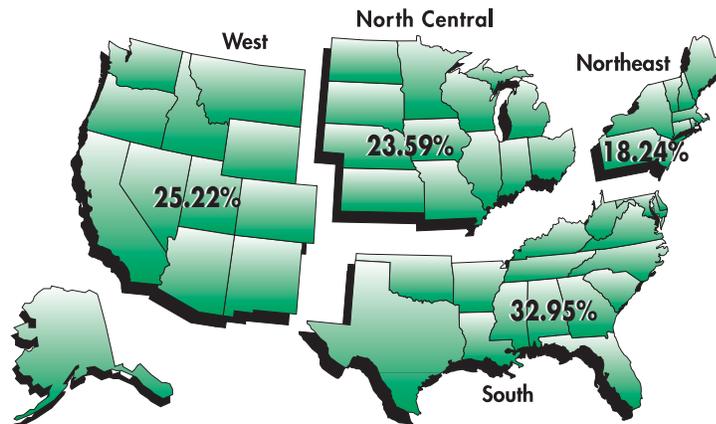
## Boehm–3 *Preschool* Standardization Samples by Age

| Age | n |
|---|---|
| 3-0 to 3-5 | 110 |
| 3-6 to 3-11 | 110 |
| 4-0 to 4-5 | 110 |
| 4-6 to 4-11 | 110 |
| 5-0 to 5-5 | 110 |
| 5-6 yo 5-11 | 110 |
| **Total** | **660** |

## Boehm–3 *Preschool* Standardization Samples by Race/Ethnicity

| Race/Ethnicity | n | % | U.S. Population % |
|---|---|---|---|
| African American | 106 | 16.1 | 15.76 |
| Hispanic | 114 | 17.3 | 18.23 |
| Other | 32 | 4.8 | 5.52 |
| White | 408 | 61.8 | 60.49 |
| **Total** | **660** | **100.0** | **100.0** |

## Boehm–3 *Preschool* Standardization Samples by Parent Education Level

| Parent Years of Education | n | % | U.S. Population % |
|---|---|---|---|
| 0–11 | 94 | 14.2 | 18.01 |
| 12 | 189 | 28.6 | 30.77 |
| 1–3 Years College | 205 | 31.1 | 28.26 |
| 4 Years College | 172 | 26.1 | 22.96 |
| **Total** | **660** | **100.0** | **100.0** |

U.S. Bureau of the Census (1998). *Current population survey, October 1998: School Enrollment Supplemental File* [Machine-readable data file]. Washington, DC: U.S. Bureau of the Census (Producer/Distributor).

# RELIABILITY AND VALIDITY

The reliability of the Boehm–3 *Preschool* was determined by checking internal consistency, standard error of measurement, and test-retest reliability.

A test with a high level of internal consistency indicates that the internal structure of the test is such that results are repeatable. The coefficient alphas for Boehm–3 *Preschool* ranged from .85 to .92. The Standard Error of Measurement (SEM) provides an alternative measure of reliability. The smaller the SEM, the greater level of confidence attributed to the accuracy of test scores. The SEM for Boehm–3 *Preschool* ranged from 1.98 to 2.88, indicating overall low variability.

## Internal Consistency Reliability Coefficients (Coefficient Alpha) and Standard Error of Measurement by Age Band

| | 3-0 to 3-5 | 3-6 to 6-11 | 3-6 to 6-11 | 3-6 to 6-11 | 3-6 to 6-11 | 3-6 to 6-11 |
|---|---|---|---|---|---|---|
| *n* | 110 | 110 | 110 | 110 | 110 | 110 |
| *r* | .92 | .91 | .90 | .90 | .89 | .85 |
| *SEM* | 2.88 | 2.42 | 2.71 | 2.50 | 2.08 | 1.98 |

Test–retest reliability coefficients ranged from .90 to .94.

## Retest Reliability Coefficients, Means, and Standard Deviations

| First Testing | 4-0 to 4-11 | 3-6 to 6-11 | Overall |
|---|---|---|---|
| *n* | 50 | 48 | 98 |
| Mean | 40.44 | 45.91 | 43.12 |
| *SD* | 9.13 | 6.10 | 8.23 |

| Second Testing | 4-0 to 4-11 | 3-6 to 6-11 | Overall |
|---|---|---|---|
| *n* | 50 | 48 | 98 |
| Mean | 40.22 | 46.37 | 43.23 |
| *SD* | 9.58 | 5.77 | 8.49 |
| | *r* = .90 | *r* = .94 | *r* = .92 |

A test can be said to have evidence of validity if it measures what it states that it measures. The Boehm–3 *Preschool* contains evidence of validity based on test content, relations to other variables, and test criterion relationships.

Research outlined in the Boehm–3 *Preschool* Examiner's Manual supports the claim that a child's ability to make relational judgments using the Boehm-3 *Preschool* concept terms, plus their synonyms and antonyms, is basic to understanding early childhood activities in and out of the preschool setting. The content of the test is based on an extensive review of multiple sources.

Validity evidence based on relationships of other variables was compiled in two separate studies. The first study looked at the relationship between Boehm–3 *Preschool* and its predecessor, Boehm-*Preschool*. The second study looked at the relationship between Boehm–3 *Preschool* and the *Bracken Basic Concept Scale–Revised* (BBCS-R, 1998), also a test of basic concepts.

## Means, Standard Deviations, and Correlations Between Boehm–3 *Preschool* and Boehm-*Preschool* Raw Scores (*n* = 59)

| Assessments | *n* | Mean | SD | *r* |
|---|---|---|---|---|
| Boehm–3 *Preschool* | 59 | 37.70 | 7.32 | .84 |
| Boehm–*Preschool* | 59 | 43.03 | 5.63 | |

The correlation between Boehm–3 *Preschool* and Boehm-*Preschool* is .84, providing evidence of their concurrent validity.

## Means, Standard Deviations, and Correlations Between Boehm–3 *Preschool* and *Bracken Basic Concepts Scale–Revised* Total Test Raw Scores (*n* = 62)

### (*n*=33) 3-0 to 3-11

| Assessments | *n* | Mean | SD | *r* |
|---|---|---|---|---|
| Boehm–3 *Preschool* | 33 | 42.33 | 9.03 | .80 |
| *Bracken Basic Concepts Scale–Revised* | 33 | 119.03 | 59.92 | |

### (*n*=29) 5-0 to 5-11

| Assessments | *n* | Mean | SD | *r* |
|---|---|---|---|---|
| Boehm–3 *Preschool* | 29 | 45.93 | 5.26 | .73 |
| *Bracken Basic Concepts Scale–Revised* | 29 | 220.24 | 47.83 | |

The correlation between Boehm–3 *Preschool* and *Bracken Basic Concept Scale–Revised* is .80 for 3-year-olds and .73 for 5-year olds. It may be inferred that both tests measure many of the same aspects of the constructs of basic concepts.

## Means and Standard Deviations of Boehm–3 *Preschool* Raw Scores for a Matched Set of Children Without Receptive Language Disorder and Children With a Receptive Language Disorder (*n* = 290)

| Children Without Receptive Languge Disorder | | | | Children With Receptive Languge Disorder | | |
|---|---|---|---|---|---|---|
| | 3-0 to 3-11 | 4-0 to 5-11 | | | 3-0 to 3-11 | 4-0 to 5-11 |
| *n* | 43 | 102 | | *n* | 43 | 102 |
| Mean | 40.23 | 42.09 | | Mean | 25.35 | 31.23 |
| SD | 10.18 | 8.19 | | SD | 12.12 | 9.50 |

A study was conducted to determine the degree to which Boehm–3 *Preschool* can differentiate between two groups of children. The study was conducted on the two groups tested in Boehm–3 *Preschool* (3.0 to 3.11 and 4.0 to 5.11): half of the children included were diagnosed with a receptive language disorder, and the remaining children were not.

While these results clearly show a significant difference between the performance of the two groups of children who comprised the study, it is important to use caution in the interpretation. The purpose of Boehm–3 *Preschool* is not to identify the disordered population from the non-disordered population, but rather, to be used as a part of battery of tests to determine what, if any, special services may be needed for a child.

# SPANISH EDITION

The Spanish edition of Boehm–3 *Preschool* has been enhanced through:
- Concurrent development of English/Spanish Norms
- Spanish dialectal word variations for test directions in Picture Manual
- Dual English/Spanish Record Form
- Spanish Parent Report Form and Test Summary and Ongoing Observation and Intervention Planning Form included as reproducibles in the Examiner's Manual

National norms for the Spanish version of Boehm–3 *Preschool* were developed by administering the test to Spanish-speaking children between the ages of 3.0 and 5.11 beginning in October 1999. Examiners included bilingual speech-language pathologists, school psychologists, teachers, and other professionals who were experienced in test administration. All examiners testing children had to complete a Spanish proficiency check or have been an examiner for the company on one or more Spanish test products.

The Boehm–3 *Preschool* Spanish standardization sample and related studies of more than 400 children ages 3.0 to 5.11, evenly divided among gender (50.3% male, 49.7% female). The sample was also evenly divided among the six age bands reflecting 50 children per age band. Children who were diagnosed with a disorder and/or were receiving special services comprised 11% of the standardization sample.

Although considerable recruitment of examiners from all over the United States occurred, few responses were received from the Northeast and North Central regions. As a result, a large percentage of the sample consists of children from those regions of the United States that typically have large populations of Spanish-speaking children.
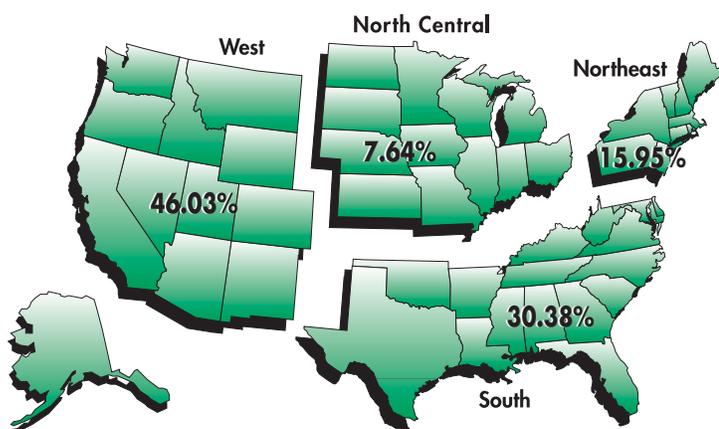


## Boehm–3 *Preschool* Standardization Samples by Parent Education Level

| Parent Years of Education | n | % | U.S. Hispanic Population % |
|---|---|---|---|
| 0–11 | 155 | 51.7 | 48.42 |
| 12 | 103 | 34.3 | 28.29 |
| 1–3 Years College | 25 | 8.3 | 16.74 |
| 4 Years College | 17 | 5.7 | 6.55 |
| **Total** | 300 | 100.0 | 100.0 |

Parent education level was used to gauge the socioeconomic level of the child. A large percentage of children participating in the study had parents with 12 or fewer years of education.

## Means and Standard Deviations of Boehm–3 *Preschool* Spanish Edition Raw Scores for a Matched Set of Children Without Receptive Language Disorder and Children With a Receptive Language Disorder (*n* = 120)

| Children Without Receptive Langue Disorder | 3-0 to 3-11 | 4-0 to 5-11 |
|---|---|---|
| n | 20 | 40 |
| Mean | 29.40 | 36.33 |
| SD | 6.84 | 10.21 |

| Children With Receptive Langue Disorder | 3-0 to 3-11 | 4-0 to 5-11 |
|---|---|---|
| n | 20 | 40 |
| Mean | 21.35 | 31.30 |
| SD | 10.30 | 6.47 |

Boehm–3 *Preschool* Spanish demonstrates evidence of validity based on test-criterion relationships through the differentiation of two groups of children ages 3.0 to 3.11 and 4.0 to 5.11. For each of the age groups, half of the children included in the study were diagnosed with a receptive language disorder. The results clearly show a significant difference between the two groups of children; however, it is important to use caution in the interpretation. The purpose of Boehm–3 *Preschool* Spanish edition is not to identify the disordered population from the non-disordered population, but rather to be used as part of a battery of tests to determine what, if any, special services may be needed for a given child.
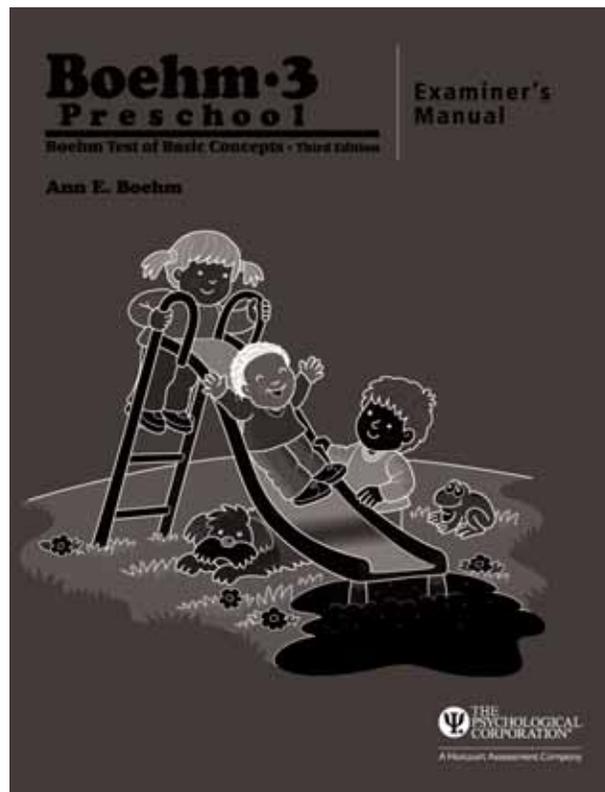
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## Preschool
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## SUMMARY

Boehm–3 *Preschool* provides professionals involved in preschool assessment and education with a reliable and efficient tool to evaluate basic relational concept acquisition in preschool children. The Boehm assessments continue to be renowned for demonstrating reliable and accurate results.

The test has undergone stringent quality control measures in the standardization process including precautions to ensure that items are fair to all students. Careful review by professionals assures that ethnic and gender bias has been addressed.



**PEARSON**