

National Longitudinal Surveys

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PIAT Mathematics

Created variables

- MATHyyyy.** PIAT MATH: TOTAL RAW SCORE
MATHPyyyy. PIAT MATH: TOTAL PERCENTILE SCORE
MATHZyyyy. PIAT MATH: TOTAL STANDARD SCORE
MAT_ERRORyyyy. PIAT MATH: TOTAL # OF ERRORS BETWEEN BASAL AND CEILING (available 2000 - current survey round)
MAT_BASALyyyy. PIAT MATH: FINAL BASAL (available 2000 - current survey round)

The Peabody Individual Achievement Test (PIAT) is a wide-range measure of academic achievement for children aged five and over. It is among the most widely used brief assessment of academic achievement having demonstrably high test-retest reliability and concurrent validity. The NLSY79 Child Supplement includes three subtests from the full PIAT battery: the Mathematics, Reading Recognition, and Reading Comprehension assessments. Many of the comments related here to the PIAT math subtest are equally appropriate for the other PIAT (as well as PPVT) assessments.

Description of the PIAT Math

The PIAT Mathematics assessment protocol used in the field is described in the documentation for the *Child Supplement* (available on the [Questionnaires \(https://www.nlsinfo.org/content/cohorts/nlsy79-children/other-documentation/questionnaires\)](#) page). This subscale measures a child's attainment in mathematics as taught in mainstream education. It consists of 84 multiple-choice items of increasing difficulty. It begins with such early skills as recognizing numerals and progresses to measuring advanced concepts in geometry and trigonometry. The child looks at each problem on an easel page and then chooses an answer by pointing to or naming one of four answer options.

Administration of the PIAT Math

Administration of this assessment is relatively straightforward. Children entering the assessment at an age-appropriate item (although this is not essential to the scoring) and establish a "basal" by attaining five consecutive correct responses. If no basal is achieved then a basal of "1" is assigned (see [PPVT \(https://www.nlsinfo.org/content/cohorts/nlsy79-children/topical-guide/assessments/peabody-picture-vocabulary-test-revised\)](#)). A "ceiling" is reached when five of seven items are answered incorrectly. The non-normalized raw score is equivalent to the ceiling item minus the number of incorrect responses between the basal and the ceiling scores.

Age Eligibility for the PIAT Math

The PIAT Mathematics assessment is administered to all children below young adult age whose "PPVT age" was five years and above.

Norms for the PIAT Math

For a precise statement of the norm derivations, the user should consult the *PIAT Manual* (Dunn and Markwardt, 1970, pp. 81-91, 95). In interpreting the normed scores, the researcher should note that the *PIAT assessments used in the NLSY79 Child were normed about 30 years ago*. Social changes affecting the mathematics and reading knowledge of small children in recent years undoubtedly have altered the mean and dispersion of the reading distribution over this time period. In this regard, a revised version of the PIAT ("PIAT-R") was released in 1986, but this release occurred too late to incorporate as a 1986 child assessment. To date, we have opted to maintain internal continuity within the NLSY79 by continuing to use the 1968 version of the PIAT.

Normalized percentile and standard scores are derived on an age-specific basis from the child's raw score. The norming sample has a mean of 100 and a standard deviation of 15. The user is reminded that a *child's age determination for this assessment is based on a PPVT age*. The norming procedures essentially are a two-step process with the percentile scores being derived from the raw scores and the standard scores from the percentile scores. The reference numbers for the raw and normed PIAT Math scores for the current survey round are listed in Table 1 in the "[Child Assessments--Introduction \(https://www.nlsinfo.org/content/cohorts/nlsy79-children/topical-guide/assessments/introduction\)](https://www.nlsinfo.org/content/cohorts/nlsy79-children/topical-guide/assessments/introduction)" section.

The overall (weighted) standard score means for NLSY79 children completing the PIAT Mathematics have been higher compared to what one might expect from a full national cross-section. See Tables series 7 in the *Selected Tables* reports, available on the [Research/Technical Reports \(https://www.nlsinfo.org/content/cohorts/nlsy79-children/other-documentation/researchtechnical-reports\)](https://www.nlsinfo.org/content/cohorts/nlsy79-children/other-documentation/researchtechnical-reports) page, for PIAT Math standard scores by child age and race/ethnicity. It is likely that this pattern at least partly reflects changes that have occurred in American society in the last 30 years. For example, it is very possible that factors such as child educational television viewing patterns or involvement in pre-school programs have improved younger children's readiness for mathematics and reading, if not their advanced capability.

Changes in PIAT Norming Scheme. Beginning with 1990, changes were introduced into the PIAT norming scheme to improve the utility of these measures and to simplify their use. First, children between the ages of 60 and 62 months (for whom no normed percentile scores had been available previously) are now normed using percentile scores designed for children enrolled in the first third of the kindergarten year, the closest approximation available to ages 60 to 62 months.

Starting in 1994, children with raw scores translating to percentiles that were below the established minimum were assigned percentile scores of "1"; children with raw scores translating to percentile scores above the maximum are assigned percentile scores of 99. In prior years, the "out-of-range" children had been assigned arbitrarily scores of 0, which led to some inadvertent misuse of the data. (Prior to the 1994 period, children who were more than 217 months of age were assigned normed scores of -4, since they were beyond the maximum ages for which national normed scores are available.)

Completion Rates for the PIAT Math

The majority of the invalidly skipped items in the PIATs between 1986 and 1992 (years when the survey was administered by paper and pencil) fall into two categories. First, there are some children who inadvertently were skipped over even though they were of an appropriate age. Second, a number of children could not be scored because the scoring decision rules were not followed properly so either a basal or ceiling could not be obtained. Starting in 1994, this procedure, which resulted in children being asked a greater number of questions than was required by protocol, is no longer utilized. The introduction of computer-assisted personal interview (CAPI) technology in the 1994 child data collection took the decision making regarding basal and ceiling procedures out of the hands of the interviewer. Thus, a PIAT assessment can no longer be terminated inadvertently because an interviewer errs in deciding whether a basal or ceiling has been reached.

Users of the PIAT assessments are encouraged to examine the individual response patterns as well as the reasons for invalid scores, particularly for the 1986-1992 period. Having the individual responses will permit the user to note that a number of assessments originally considered "unscorable" were scorable once the actual patterns of response on the various assessments were considered individually. This edit was possible because the interviewer recorded the actual response and a score of correct or incorrect for each answer. Thus, if the correct-wrong item was left blank inadvertently (something which was possible only with paper-and-pencil administration), but the actual response was available, it was frequently possible, in scoring the 1986 through 1992 assessments, to make a post hoc determination of "correctness." In addition, depending on the user's research intention, it may be possible to "score" additional cases if one is willing to sacrifice some precision in the scoring. For example, some additional cases could be scored, if one is willing to accept as adequate a score that does not deviate by more than one or two points from the "true" score. This issue has become less relevant since the introduction of CAPI interviewing procedures in 1994.

Table 6 in the "[Child Assessments--Introduction \(https://www.nlsinfo.org/content/cohorts/nlsy79-children/topical-guide/assessments/introduction\)](https://www.nlsinfo.org/content/cohorts/nlsy79-children/topical-guide/assessments/introduction)" section contains the completion rate for the PIAT Math in the current survey round.

Validity and Reliability for the PIAT Math

In general, the PIAT Math is a highly reliable and valid assessment. As described in the *NLSY Child Handbook: 1986-1990* and *The NLSY Children, 1992: Description and Evaluation*, both available on the [Research/Technical Reports page \(https://www.nlsinfo.org/content/cohorts/nlsy79-children/other-documentation/researchtechnical-reports\)](https://www.nlsinfo.org/content/cohorts/nlsy79-children/other-documentation/researchtechnical-reports), it is correlated closely with a variety of other cognitive measures. It is both predicted by and predicts scores on a variety of the other assessments. A particularly strong analytical advantage derived from all of the PIAT assessments is the fact that they have now been asked repeatedly of children aged five and over. As of the current survey year, more than 5,700 children have four or more valid PIAT Math scores. Some children in the sample aged 13 or 14 years completed these assessments five times and, indeed, most of the children in the Young Adult sample have several PIAT administrations in their NLSY79 history (see Tables 7-8 in the "[Child Assessments--Introduction \(https://www.nlsinfo.org/content/cohorts/nlsy79-children/topical-guide/assessments/introduction\)](https://www.nlsinfo.org/content/cohorts/nlsy79-children/topical-guide/assessments/introduction)" section). This pattern of repeat assessment permits the careful examination of their developmental profiles in relation to school and early-career development. A more detailed discussion of repeat assessment can be found under "Repeat Assessments" in the "[Child Assessments--Introduction \(https://www.nlsinfo.org/content/cohorts/nlsy79-children/topical-guide/assessments/introduction\)](https://www.nlsinfo.org/content/cohorts/nlsy79-children/topical-guide/assessments/introduction)" section.

PIAT Math Scores in the Database

Three types of scores are provided in each survey year for each assessed child: a raw score, a standard score, and a percentile score. Documentation for the PIAT Math scores for the current survey round is included in Table 1 in the "[Child Assessments--](https://www.nlsinfo.org/content/cohorts/nlsy79-children/topical-guide/assessments/introduction)

Introduction (https://www.nlsinfo.org/content/cohorts/nlsy79-children/topical-guide/assessments/introduction) " section.	
<i>Areas of Interest</i>	ASSESSMENT [scores]
	ASSESSMENT ITEMS
	CHILD SUPPLEMENT