NAB™

Neuropsychological Assessment Battery™

Psychometric and Technical Manual

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4

Development of the Norms

SELECTION OF NORMATIVE SCORES

The NAB consists of 36 individual tests, most of which provide at least several quantitative and qualitative indicators of performance. Before the norming process was begun, all potential NAB scores were categorized into one of three types of scores: primary, secondary, or descriptive. Table 4.1 summarizes these score types. Several types of information were used to categorize scores, including their (a) psychometric properties, (b) presumed interpretive importance, and (c) content and construct validity.

Criteria for Selecting NAB Scores

Chapter 5 presents information on the reliability of the NAB scores, including interrater reliability (where appropriate), internal consistency (where appropriate), generalizability, and test–retest reliability. In general, only scores with high reliability across most or all methods were selected as primary variables; those with weaker reliability were relegated to secondary or descriptive status. In addition to reliability estimates, the distributional properties of each potential score were analyzed. The parametric statistical procedures used to convert raw scores to T scores are based on the assumption of approximate normality of the score distribution. Some NAB scores of potential interpretive interest have a restricted range of raw scores, and this limits the use of parametric methods. Therefore, NAB primary scores were selected to have both a relatively large range of possible raw scores and approximately normal score distributions. Most NAB secondary scores have skewed score distributions and/or limited score ranges. NAB descriptive scores also have highly skewed score distributions and/or limited score ranges but to an even greater degree. It is very rare for a healthy participant, regardless of age and education level, to have less-than-perfect performance on most NAB tasks that yield descriptive scores.

Table 4.1
Types of NAB Test Scores

Test score type	Description	Normative metric
Primary	Primary scores are the most important scores for interpreting performance on a particular NAB test. In most cases, there is only one primary score per test, but several NAB tests yield multiple primary scores. Primary scores are interpreted by transforming the raw score to a z score and then referencing the z score to one of several different normative samples. Selected primary scores contribute to Module Index and Total NAB Index scores.	T scores ($M = 50$, $SD = 10$)
Secondary	Secondary scores are less important for interpretation than primary scores but are nonetheless viewed as significant sources of information. The lower reliability coefficients and nonparametric distributions of the secondary scores do not support their conversion to T scores. Secondary scores do *not* contribute to Module Index and Total NAB Index scores.	Percentiles by age groups
Descriptive	Descriptive scores have poor reliability and/or highly skewed distributions in normal healthy individuals but are included in the NAB as qualitative indicators of performance. Descriptive scores do *not* contribute to Module Index and Total NAB Index scores.	Cumulative percentages for overall sample

Many NAB tests yield scores that are analogous to neuropsychological measures that have a rich clinical and research tradition, and users are familiar with interpreting such scores. Each test was reviewed from this perspective, and scores were categorized on this basis. Primary scores are thought to be the most important indicators of performance on a NAB test. Secondary and descriptive scores are viewed as useful sources of qualitative interpretive information. Finally, NAB scores were also categorized according to their (a) content validity, (b) interrelationships with scores in the same NAB module, (c) interrelationships with scores in other NAB modules, and (d) relationships with external variables (i.e., concurrent neuropsychological measures).

Normative Metrics for NAB Scores

All NAB primary test raw scores are first transformed to z-score equivalents based on their percentile ranks and then are converted to either demographically corrected T scores or T scores based on the age-based, U.S. Census-matched sample. Because of their psychometric characteristics, NAB secondary and descriptive scores do not lend themselves to normative conversions within each age/education level/sex group. For each of the two normative samples, NAB secondary score percentiles are provided separately for nine age groups, and the cumulative percentages of NAB descriptive scores are provided for the overall sample (not separately by age group). Tables 4.2 through 4.7 present the normative metrics for scores in each of the six NAB modules.

Process of Obtaining Normative Scores

The process of obtaining normative scores for an individual performance on the NAB is described in detail in chapter 4 of the *NAB Administration, Scoring, and Interpretation Manual* (Stern & White, 2003). Normative data for the NAB are provided in two separate manuals. One manual, the *NAB Demographically Corrected Norms Manual* (White & Stern, 2003a) provides the demographically corrected norms for the primary standardization sample ($N = 1,448$), and the other manual, *NAB U.S. Census-Matched Norms Manual* (White & Stern, 2003b), provides norms for the age-based, U.S. Census-matched standardization sample ($N = 950$). The demographically corrected norms are recommended for most situations. The process for obtaining normative scores follows:

1. The clinician selects the normative group that is most appropriate for the interpretations that will be made of the individual's performance.

2. Raw primary scores for each test are converted to z scores.

3. Primary z scores are converted to T scores.

4. Primary T scores are converted to percentiles.

5. Secondary raw scores are converted to percentiles.

6. Descriptive raw scores are converted to cumulative percentages.

7. Selected primary T scores are used to obtain the module domain/index scores.

8. Module domain/index scores are used to obtain the total index scores.

EQUATING OF FORMS 1 AND 2

One principle that guided the development of the NAB was the need for two alternate forms that would minimize potential practice effects when the NAB was administered on two separate occasions to the same individual. Chapter 2 discussed the extensive procedures that were employed to construct the NAB tests and the individual items to ensure that the two alternate forms closely matched each other with respect to content sampling. Even though every attempt was made to construct two identical NAB forms, minor differences in difficulty were nevertheless observed in the performance of the NAB standardization sample, as is typical in test development projects. *Test equating* refers to a family of statistical concepts and procedures that have been developed to adjust for differences in difficulty level on alternate test forms and that therefore allow the forms to be used interchangeably. Note that test equating adjusts for differences in *difficulty* between the two forms of a test, not for differences in *content* (Kolen & Brennen, 1995). An equivalent-forms reliability study was conducted as part of the NAB development process, and these results are discussed extensively in chapter 5 (Reliability and Score Differences).

A random-groups design was chosen for the NAB equating process. The assumptions underlying the random-groups equating design are more easily achievable relative to other equating designs; thus, there are fewer sources of possible systematic error with this design. Age, sex, and educational attainment are known sources of variance in neuropsychological test scores, and chi-square analyses were conducted to determine the similarity of the samples of participants who completed Form 1 ($n = 711$) and Form 2 ($n = 737$). The results indicated that the samples were not significantly different with respect to age, $\chi^2(8, N = 1,448) = 6.48$, $p = .594$; education, $\chi^2(3, N = 1,448) = 1.49$, $p = .6986$; and sex, $\chi^2(1, N = 1,448) = 2.16$, $p = .142$.

Many statistical methods may be used to equate test forms, including mean equating, linear equating, and equipercentile equating. The equipercentile equating method

Table 4.2
Normative Score Metrics for Screening Module Tests

Test	Acronym	Normative metric
Primary score		
Screening Digits Forward	S-DGF	*T* score
Screening Digits Backward	S-DGB	*T* score
Screening Numbers & Letters Part A Speed	S-N&L$_A$–spd	*T* score
Screening Numbers & Letters Part A Errors	S-N&L$_A$–err	*T* score
Screening Numbers & Letters Part A Efficiency	S-N&L$_A$–eff	*T* score
Screening Numbers & Letters Part B Efficiency	S-N&L$_B$–eff	*T* score
Screening Auditory Comprehension	S-AUD	*T* score
Screening Naming	S-NAM	*T* score
Screening Shape Learning Immediate Recognition	S-SHL–irg	*T* score
Screening Shape Learning Delayed Recognition	S-SHL–drg	*T* score
Screening Story Learning Immediate Recall	S-STL–irc	*T* score
Screening Story Learning Delayed Recall	S-STL–drc	*T* score
Screening Visual Discrimination	S-VIS	*T* score
Screening Design Construction	S-DES	*T* score
Screening Mazes	S-MAZ	*T* score
Screening Word Generation	S-WGN	*T* score
Secondary score		
Screening Orientation	S-ORN	Percentile
Screening Digits Forward Longest Span	S-DGF–spn	Percentile
Screening Digits Backward Longest Span	S-DGB–spn	Percentile
Screening Shape Learning Percent Retention	S-SHL–%rt	Percentile
Screening Story Learning Percent Retention	S-STL–%rt	Percentile
Screening Word Generation Perseverations	S-WGN–psv	Percentile
Descriptive score		
Screening Orientation to Self	S-ORN–slf	Cumulative percentage
Screening Orientation to Time	S-ORN–tim	Cumulative percentage
Screening Orientation to Place	S-ORN–plc	Cumulative percentage
Screening Orientation to Situation	S-ORN–sit	Cumulative percentage
Screening Auditory Comprehension Colors	S-AUD–col	Cumulative percentage
Screening Auditory Comprehension Shapes	S-AUD–shp	Cumulative percentage
Screening Auditory Comprehension Colors/Shapes/Numbers	S-AUD–csn	Cumulative percentage
Screening Naming Percent Correct After Semantic Cuing	S-NAM–sem%	Cumulative percentage
Screening Naming Percent Correct After Phonemic Cuing	S-NAM–pho%	Cumulative percentage

was selected for the NAB because it is thought to have greater generalizability and applicability than mean and linear equating when test scores may deviate from a perfectly normal distribution (Kolen & Brennen, 1995), which is the case with many NAB scores. Note that only NAB primary scores are equated. Secondary and descriptive scores are not equated by form; therefore, normative data for these scores are provided separately by form.

Percentile Ranks of Raw Scores by Form

The first step in the equipercentile equating process involved dividing the standardization sample into two groups on the basis of which NAB form was administered. Next, the cumulative frequency distribution of each primary raw score was derived, and the corresponding percentile

Table 4.3

Table 4.3
Normative Score Metrics for Attention Module Tests

Test	Acronym	Normative metric
Primary score		
Digits Forward	DGF	*T* score
Digits Backward	DGB	*T* score
Dots	DOT	*T* score
Numbers & Letters Part A Speed	N&L$_A$–spd	*T* score
Numbers & Letters Part A Errors	N&L$_A$–err	*T* score
Numbers & Letters Part A Efficiency	N&L$_A$–eff	*T* score
Numbers & Letters Part B Efficiency	N&L$_B$–eff	*T* score
Numbers & Letters Part C Efficiency	N&L$_C$–eff	*T* score
Numbers & Letters Part D Efficiency	N&L$_D$–eff	*T* score
Numbers & Letters Part D Disruption	N&L$_D$–dis	*T* score
Driving Scenes	DRV	*T* score
Secondary score		
Orientation	ORN	Percentile
Digits Forward Longest Span	DGF–spn	Percentile
Digits Backward Longest Span	DGB–spn	Percentile
Descriptive score		
Orientation to Self	ORN–slf	Cumulative percentage
Orientation to Time	ORN–tim	Cumulative percentage
Orientation to Place	ORN–plc	Cumulative percentage
Orientation to Situation	ORN–sit	Cumulative percentage

rank of each possible raw score was then computed from this distribution. This computation was performed separately for each primary variable by form. The cumulative percentile rank distributions of raw scores were then plotted for each form to allow for visual inspection of the two curves. Figure 4.1 presents the curves for the Mazes (MAZ) raw scores by form. As can be seen, the Mazes raw scores closely match each other throughout the range of scores for both forms, although some minor differences in difficulty are observable.

Raw Score to *z*-Score Conversions by Form

The second step involved assigning a *z* score to each raw score based on the derived percentile rank; *z* scores are scaled to have a mean of 0 and a standard deviation of 1. Again, this was done separately by form. The *z* scores were derived from a theoretically normal distribution. Thus, the raw score to *z*-score conversion process preserves the shape of the distribution of raw scores. The cumulative percentile

rank distributions of *z* scores were plotted for each form to allow for visual inspection of the two curves. Figure 4.2 presents the curves for the Mazes (MAZ) *z* scores by form. As can be seen, the two curves are identical, indicating that the scores on the two forms have the same difficulty at all areas of the score distribution.

Accuracy of the Equating Process

The accuracy of the equipercentile equating process can be determined by both graphical and statistical methods. Graphs similar to that in Figure 4.2 were constructed for every NAB primary score, and each graph confirmed the accuracy of the equating process. Tables 4.8 through 4.13 present (a) the percentage of variance in raw scores attributable to form in the equivalent-forms study (see chapter 5), (b) the four central moments (i.e., *M*, *SD*, skewness, kurtosis) and percentage of variance of *raw scores* attributable to form in the full standardization sample, and (c) the four central moments and percentage of variance in *z scores* attributable to form in the full standardization sample.

Table 4.4
Normative Score Metrics for Language Module Tests

Test	Acronym	Normative metric
Primary score		
Oral Production	OPD	*T* score
Auditory Comprehension	AUD	*T* score
Naming	NAM	*T* score
Writing	WRT	*T* score
Bill Payment	BIL	*T* score
Secondary score		
Reading Comprehension	RCN	Percentile
Writing Legibility	WRT–leg	Percentile
Writing Spelling	WRT–spl	Percentile
Writing Syntax	WRT–syn	Percentile
Writing Conveyance	WRT–cnv	Percentile
Descriptive score		
Auditory Comprehension Colors	AUD–col	Cumulative percentage
Auditory Comprehension Shapes	AUD–shp	Cumulative percentage
Auditory Comprehension Colors/Shapes/Numbers	AUD–csn	Cumulative percentage
Auditory Comprehension Pointing	AUD–pnt	Cumulative percentage
Auditory Comprehension Yes/No	AUD–y/n	Cumulative percentage
Auditory Comprehension Paper Folding	AUD–fld	Cumulative percentage
Naming Percent Correct After Semantic Cuing	NAM–sem%	Cumulative percentage
Naming Percent Correct After Phonemic Cuing	NAM–pho%	Cumulative percentage
Reading Comprehension Words	RCN–wrd	Cumulative percentage
Reading Comprehension Sentences	RCN–sen	Cumulative percentage

The central moments of the *z* scores are a useful indication of the accuracy of the equating process. Ideally, after equating, the *z*-score moments should be identical across forms. However, equipercentile equating typically does not yield identical central moments, in part because the test scores are discrete. Score moments that are equivalent to at least one decimal place indicate successful equating (Kolen & Brennen, 1995). For both the full standardization sample and the equivalent forms sample, the two NAB forms were quite similar prior to the equating process, with the exception of scores based on tests containing verbal information and stimuli (e.g., Oral Production, List Learning, Story Learning, Judgment, Word Generation), which is to be expected. The means, standard deviations, skewness, and kurtosis of the primary *z* scores indicate that the scores were successfully equated for difficulty across the two forms. In addition, the percentage of variance in *z* scores attributable to form is 0.0 for most scores, and no score has more than 1.7% of its variance explained by form after the equating process.

INFLUENCE OF DEMOGRAPHIC VARIABLES

Analyses were conducted on the NAB standardization sample data to evaluate the potential effects of age, education, and sex on NAB raw scores. Regression techniques were used to investigate these relationships. Age, education, and sex were entered into separate regression equations as predictors, and the NAB primary *z* score was the dependent variable. The percentage variance in *z* scores (as reflected by the R^2 value) accounted for by each demographic variable was recorded. Next, the three demographic variables were entered into a stepwise regression equation to determine the effect on *z* scores of the demographic variables taken as a group. Tables 4.14 through 4.19 present the results of these analyses.

Table 4.5
Normative Score Metrics for Memory Module Tests

Test	Acronym	Normative metric
Primary score		
List Learning List A Immediate Recall	LLA–irc	T score
List Learning List B Immediate Recall	LLB–irc	T score
List Learning List A Short Delayed Recall	LLA–sd:drc	T score
List Learning List A Long Delayed Recall	LLA–ld:drc	T score
Shape Learning Immediate Recognition	SHL–irg	T score
Shape Learning Delayed Recognition	SHL–drg	T score
Story Learning Phrase Unit Immediate Recall	STL–irc:phu	T score
Story Learning Phrase Unit Delayed Recall	STL–drc:phu	T score
Daily Living Memory Immediate Recall	DLM–irc	T score
Daily Living Memory Delayed Recall	DLM–drc	T score
Secondary score		
List Learning List A Trial 1 Immediate Recall	LLA1–irc	Percentile
List Learning List A Trial 2 Immediate Recall	LLA2–irc	Percentile
List Learning List A Trial 3 Immediate Recall	LLA3–irc	Percentile
List Learning List A Percent Retention	LLA–%rt	Percentile
List Learning List A Long Delayed Forced-Choice Recognition	LLA–dfc	Percentile
List Learning List A Long Delayed Forced-Choice Recognition False Alarms	LLA–fa	Percentile
List Learning List A Discriminability Index	LLA–dis	Percentile
List Learning List A Recall vs. Recognition	LLA–rvr	Percentile
Shape Learning Trial 1 Immediate Recognition	SHL1–irg	Percentile
Shape Learning Trial 2 Immediate Recognition	SHL2–irg	Percentile
Shape Learning Trial 3 Immediate Recognition	SHL3–irg	Percentile
Shape Learning Percent Retention	SHL–%rt	Percentile
Shape Learning Delayed Forced-Choice Recognition	SHL–dfc	Percentile
Shape Learning Delayed Forced-Choice Recognition False Alarms	SHL–fa	Percentile
Shape Learning Discriminability Index	SHL–dis	Percentile
Story Learning Trial 1 Phrase Unit	STL1–irc:phu	Percentile
Story Learning Trial 2 Phrase Unit	STL2–irc:phu	Percentile
Story Learning Thematic Unit Immediate Recall	STL–irc:thu	Percentile
Story Learning Trial 1 Thematic Unit	STL1–irc:thu	Percentile
Story Learning Trial 2 Thematic Unit	STL2–irc:thu	Percentile
Story Learning Thematic Unit Delayed Recall	STL–drc:thu	Percentile
Story Learning Phrase Unit Percent Retention	STL–%rt	Percentile
Daily Living Memory Retention	DLM–rt	Percentile
Daily Living Memory Delayed Recognition	DLM–drg	Percentile
Daily Living Memory Recall vs. Recognition	DLM–rvr	Percentile
Medication Instructions Immediate Recall	MED–irc	Percentile
Medication Instructions Delayed Recall	MED–drc	Percentile
Medication Instructions Delayed Recognition	MED–drg	Percentile
Name/Address/Phone Immediate Recall	NAP–irc	Percentile
Name/Address/Phone Delayed Recall	NAP–drc	Percentile
Name/Address/Phone Delayed Recognition	NAP–drg	Percentile
Descriptive score		
List Learning Semantic Clusters	LL–sem	Cumulative percentage
List Learning Perseverations	LL–psv	Cumulative percentage
List Learning Intrusions	LL–int	Cumulative percentage

Table 4.6
Normative Score Metrics for Spatial Module Tests

Test	Acronym	Normative metric
Primary score		
Visual Discrimination	VIS	*T* score
Design Construction	DES	*T* score
Figure Drawing Copy	FGD–cpy	*T* score
Figure Drawing Copy Organization	FGD–cpy:org	*T* score
Figure Drawing Immediate Recall	FGD–irc	*T* score
Map Reading	MAP	*T* score
Secondary score		
Figure Drawing Copy Fragmentation	FGD–cpy:frg	Percentile
Figure Drawing Copy Planning	FGD–cpy:pln	Percentile
Figure Drawing Immediate Recall Organization	FGD–irc:org	Percentile
Figure Drawing Immediate Recall Fragmentation	FGD–irc:frg	Percentile
Figure Drawing Immediate Recall Planning	FGD–irc:pln	Percentile
Figure Drawing Immediate Recall Percent Retention	FGD–%rt	Percentile

Table 4.7
Normative Score Metrics for Executive Functions Module Tests

Test	Acronym	Normative metric
Primary score		
Mazes	MAZ	*T* score
Judgment	JDG	*T* score
Categories	CAT	*T* score
Word Generation	WGN	*T* score
Secondary score		
Word Generation Perseverations	WGN–psv	Percentile

The first three columns list the percentage of variance accounted for by the *individual* demographic variables. The fourth column indicates the percentage of variance accounted for by the *group* of demographic variables. The final column lists the combination of demographic variables of the final stepwise model and their relative predictive power.

DEMOGRAPHICALLY CORRECTED NORMATIVE DATA

Derivation of Test *T* Scores
Continuous Norming Procedure

The method of continuous norming was used to derive the NAB demographically corrected norms. Continuous norming has been recommended to correct for irregularities in (a) the distributions of scores within groupings of the

norming variable and (b) trends in the means and standard deviations across groupings when group sample sizes are 200 or smaller (Angoff & Robertson, 1987). Ideally, individually administered tests such as the NAB would have very large samples for each age, education, and sex group. Practical realities, however, result in smaller samples in these groups than is considered ideal in a purely statistical sense. Therefore, these samples provide only estimates of the underlying population parameters. The method of continuous norming was developed by Gorsuch (1983b) to mitigate the effects of relatively small sample sizes across age groups. Continuous norms provide a more accurate estimation of population parameters such as means and standard deviations because they are based on an equation that results from using the data for *all* demographic groups, rather than only the one group, for a particular table (Zachary & Gorsuch, 1985). Thus, information about the effects of age,
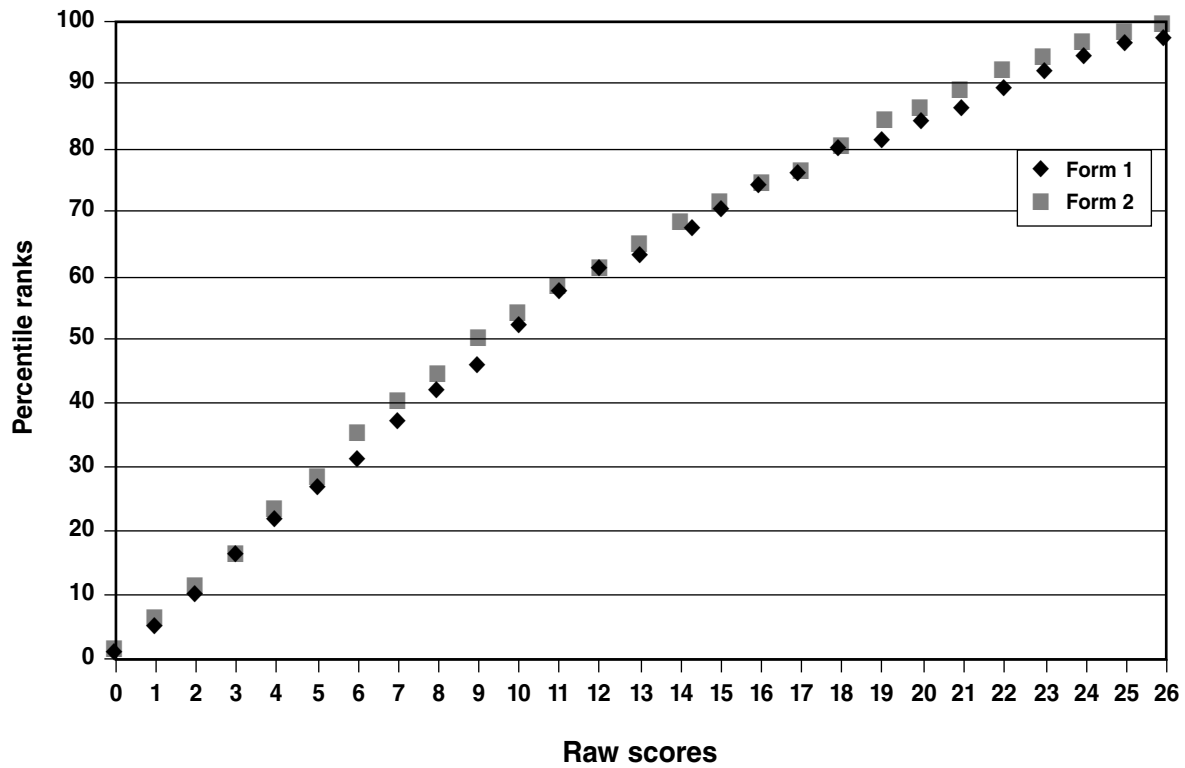
Figure 4.1. Mazes (MAZ) raw score cumulative percentile ranks by form for the NAB standardization sample (*N* = 1,448).
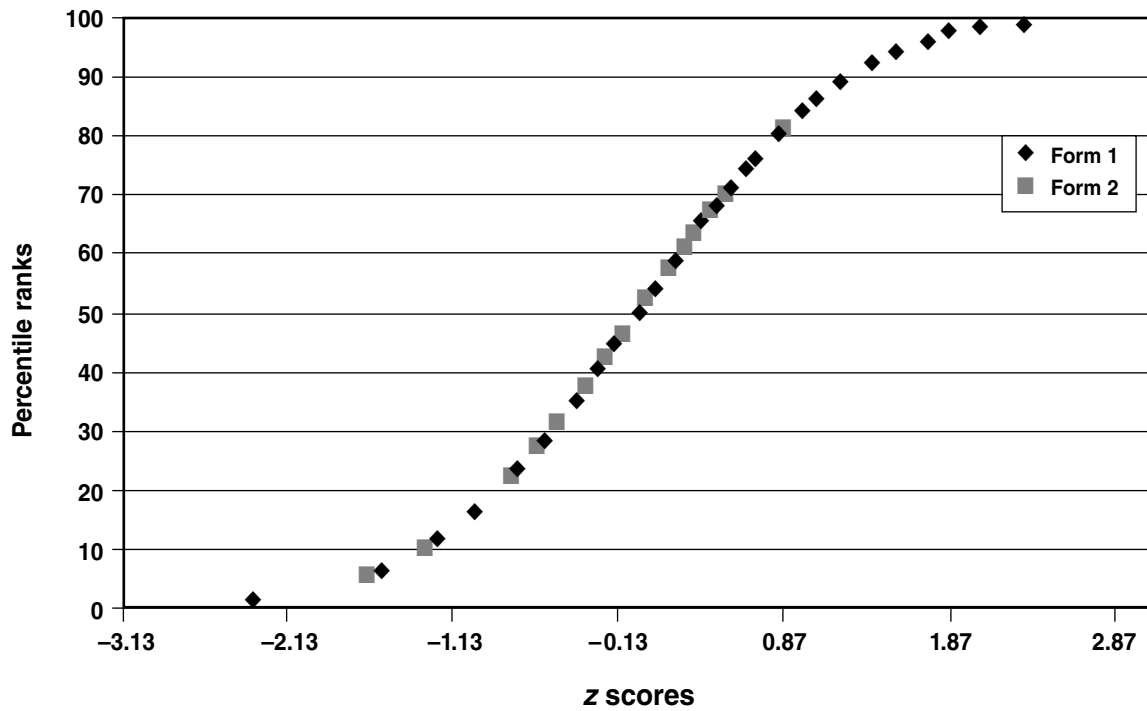
Figure 4.2. Mazes (MAZ) *z* score cumulative percentile ranks by form for the NAB standardization sample (*N* = 1,448).

Test	Acronym	Form	Equivalent-forms study[a] % variance by form	Demographically corrected standardization sample[b]									
				Raw score (before equating)					z score (after equating)				
				M	SD	Skewness	Kurtosis	% variance by form	M	SD	Skewness	Kurtosis	% variance by form
Screening Digits Forward	S-DGF	1	0.5	8.59	2.41	0.00	−0.48	0.2	0.18	0.98	−0.03	−0.27	0.0
		2		8.36	2.34	0.31	−0.40		0.19	0.96	−0.06	−0.13	
Screening Digits Backward	S-DGB	1	0.1	4.71	2.53	0.79	0.78	0.0	0.18	0.93	−0.12	−0.21	0.0
		2		4.64	2.24	0.61	0.63		0.19	0.85	−0.27	0.14	
Screening Numbers & Letters Part A Speed	S-N&L$_A$-spd	1	0.7	39.25	10.11	1.65	6.91	0.3	0.04	1.01	−0.05	−0.07	0.0
		2		40.42	10.26	1.72	8.49		0.04	1.01	−0.05	−0.06	
Screening Numbers & Letters Part A Errors	S-N&L$_A$-err	1	0.2	0.99	1.69	3.59	23.12	0.6	−0.38	0.51	−2.31	5.20	1.7
		2		1.27	2.01	3.81	25.70		−0.24	0.59	−1.89	3.22	
Screening Numbers & Letters Part A Efficiency	S-N&L$_A$-eff	1	0.5	105.28	25.08	0.36	0.00	0.6	0.03	1.00	0.05	−0.11	0.0
		2		101.30	23.89	0.38	−0.04		0.02	0.99	0.02	−0.09	
Screening Numbers & Letters Part B Efficiency	S-N&L$_B$-eff	1	0.1	37.87	16.50	2.08	5.95	0.3	0.04	0.99	0.02	−0.02	0.0
		2		39.80	19.22	2.35	8.09		0.03	0.99	0.00	−0.06	
Screening Auditory Comprehension	S-AUD	1	0.0	55.59	1.06	−4.73	31.94	0.0	−0.83	0.28	−3.97	17.61	0.4
		2		55.57	1.14	−5.16	39.88		−0.86	0.29	−3.98	17.71	
Screening Naming	S-NAM	1	5.4	9.22	1.12	−1.69	2.82	1.7	−0.33	0.49	−2.32	4.95	1.0
		2		9.47	0.81	−1.84	4.00		−0.42	0.40	−3.12	9.47	

(continued)

Table 4.8 (continued)
Percentage of Variance in Screening Module Primary Raw Scores and z Scores Accounted for by NAB Form

| Test | Acronym | Form | Equivalent-forms study[a] % variance by form | Demographically corrected standardization sample[b] | | | | | | | | | |
| | | | | Raw score (before equating) | | | | | z score (after equating) | | | | |
				M	SD	Skewness	Kurtosis	% variance by form	M	SD	Skewness	Kurtosis	% variance by form
Screening Shape Learning Immediate Recognition	S-SHL–irg	1	0.0	2.33	1.27	0.19	−0.56	0.5	0.33	0.88	−0.28	−0.64	0.0
		2		2.15	1.26	0.24	−0.47		0.36	0.92	−0.11	−0.79	
Screening Shape Learning Delayed Recognition	S-SHL–drg	1	0.0	2.17	1.33	0.26	−0.67	0.3	0.33	0.89	−0.13	−0.76	0.1
		2		2.02	1.19	0.39	−0.35		0.39	0.92	−0.13	−0.42	
Screening Story Learning Immediate Recall	S-STL–irc	1	0.8	16.63	4.26	−0.44	0.10	0.8	0.09	0.97	−0.25	−0.40	0.0
		2		17.44	5.11	−0.80	−0.07		0.06	0.94	−0.44	−0.58	
Screening Story Learning Delayed Recall	S-STL–drc	1	0.9	14.72	4.74	−0.39	−0.10	0.0	0.08	1.00	−0.07	−0.35	0.0
		2		14.77	5.54	−0.33	−0.68		0.08	1.00	−0.06	−0.43	
Screening Visual Discrimination	S-VIS	1	1.6	4.50	1.11	−0.53	−0.05	2.6	0.20	0.77	−1.08	0.41	1.2
		2		4.85	1.05	−0.76	0.33		0.04	0.65	−1.60	2.26	
Screening Design Construction	S-DES	1	0.2	6.93	4.17	0.42	−0.75	0.1	0.11	0.94	0.00	−0.46	0.0
		2		6.60	4.26	0.44	−0.84		0.12	0.93	0.16	−0.29	
Screening Mazes	S-MAZ	1	0.1	5.38	2.42	−0.14	−0.91	0.1	0.09	0.84	−0.53	−0.43	0.0
		2		5.21	2.52	−0.06	−1.05		0.09	0.83	−0.48	−0.52	
Screening Word Generation	S-WGN	1	2.9	5.68	2.59	0.14	−0.41	1.5	0.17	0.99	0.01	−0.22	0.0
		2		6.34	2.81	0.03	−0.56		0.16	0.99	0.06	−0.27	

[a]$N = 100$. [b]$N = 1,448$.

Table 4.9

Percentage of Variance in Attention Module Primary Raw Scores and z Scores Accounted for by NAB Form

| Test | Acronym | Form | Equivalent-forms study[a] % variance by form | Demographically corrected standardization sample[b] | | | | | | | | | |
| | | | | Raw score (before equating) | | | | | z score (after equating) | | | | |
				M	SD	Skewness	Kurtosis	% variance by form	M	SD	Skewness	Kurtosis	% variance by form
Digits Forward	DGF		0.5					0.2					0.0
		1		8.59	2.41	0.00	−0.48		0.18	0.98	−0.03	−0.27	
		2		8.36	2.34	0.31	−0.40		0.19	0.96	−0.06	−0.13	
Digits Backward	DGB		0.1					0.0					0.0
		1		4.71	2.53	0.79	0.78		0.18	0.93	−0.12	−0.21	
		2		4.64	2.24	0.61	0.63		0.19	0.85	−0.27	0.14	
Dots	DOT		0.0					0.5					0.0
		1		5.69	2.67	0.32	−0.71		0.17	0.95	−0.03	−0.17	
		2		5.31	2.77	0.44	−0.64		0.17	0.93	−0.03	−0.07	
Numbers & Letters Part A Speed	N&L$_A$–spd		0.2					0.3					0.0
		1		264.53	64.80	1.70	5.81		−0.01	1.00	−0.06	−0.07	
		2		271.40	64.59	1.46	5.56		−0.01	0.99	−0.06	−0.07	
Numbers & Letters Part A Errors	N&L$_A$–err		0.2					0.1					0.0
		1		6.94	8.03	2.60	9.19		0.03	0.96	−0.45	−0.52	
		2		7.38	7.89	2.46	9.82		0.05	0.98	−0.34	−0.52	
Numbers & Letters Part A Efficiency	N&L$_A$–eff		0.1					0.4					0.0
		1		91.92	20.07	0.18	0.02		0.02	1.00	0.04	−0.08	
		2		89.33	19.75	0.37	0.15		0.02	0.99	0.03	−0.06	
Numbers & Letters Part B Efficiency	N&L$_B$–eff		0.4					1.0					0.0
		1		74.06	28.44	−0.14	0.13		0.02	0.99	0.09	−0.17	
		2		68.29	28.64	−0.05	−0.27		0.01	0.99	0.09	−0.16	
Numbers & Letters Part C Efficiency	N&L$_C$–eff		1.1					0.0					0.0
		1		60.05	23.47	−0.33	0.55		0.02	0.98	0.16	−0.30	
		2		61.08	23.33	−0.40	0.64		0.03	0.98	0.16	−0.27	

Table 4.9 (continued)
Percentage of Variance in Attention Module Primary Raw Scores and z Scores Accounted for by NAB Form

Test	Acronym	Form	Equivalent-forms study[a] % variance by form	Demographically corrected standardization sample[b]									
				Raw score (before equating)					z score (after equating)				
				M	SD	Skewness	Kurtosis	% variance by form	M	SD	Skewness	Kurtosis	% variance by form
Numbers & Letters Part D Efficiency	N&L$_D$–eff		1.3					0.0					0.0
		1		45.00	12.97	1.65	8.40		0.04	0.99	0.04	–0.12	
		2		45.18	14.81	2.44	14.62		0.04	0.98	0.01	–0.11	
Numbers & Letters Part D Disruption	N&L$_D$–dis		4.1					0.0					0.0
		1		49.44	11.78	1.69	6.60		0.04	1.00	–0.03	–0.02	
		2		49.08	12.83	1.70	6.92		0.04	0.99	–0.02	–0.11	
Driving Scenes	DRV		0.2					2.2					0.0
		1		46.83	8.69	–0.36	0.12		0.05	1.00	0.02	–0.09	
		2		44.15	9.32	–0.09	–0.23		0.02	0.97	–0.10	–0.05	

[a]N = 100. [b]N = 1,448.

Table 4.10
Percentage of Variance in Language Module Primary Raw Scores and z Scores Accounted for by NAB Form

| | | | Equivalent-forms study[a] | Demographically corrected standardization sample[b] | | | | | | | | | |
| | | | | Raw score (before equating) | | | | | z score (after equating) | | | | |
Test	Acronym	Form	% variance by form	M	SD	Skewness	Kurtosis	% variance by form	M	SD	Skewness	Kurtosis	% variance by form
Oral Production	OPD	1	2.1	21.33	7.01	0.07	−0.33	7.2	0.05	0.98	−0.04	−0.14	0.0
		2		25.34	7.48	0.09	−0.44		0.05	1.00	0.03	−0.13	
Auditory Comprehension	AUD	1	0.0	87.03	2.55	−2.02	5.51	0.0	−0.20	0.63	−1.71	2.16	0.0
		2		87.03	2.55	−2.43	10.50		−0.19	0.62	−1.75	2.38	
Naming	NAM	1	0.4	29.39	2.41	−2.46	8.31	0.0	−0.12	0.69	−1.46	1.30	0.0
		2		29.34	2.08	−2.74	11.36		−0.13	0.67	−1.57	1.89	
Writing	WRT	1	1.1	9.91	0.96	−0.93	1.56	2.3	0.17	0.65	−2.00	4.00	0.4
		2		9.60	1.05	−0.61	0.29		0.18	0.82	−0.94	−0.04	
Bill Payment	BIL	1	1.7	17.71	1.86	−3.29	17.12	0.3	−0.13	0.65	−1.70	2.11	0.5
		2		17.49	2.06	−3.13	14.33		−0.03	0.72	−1.46	1.25	

[a]$N = 100$. [b]$N = 1,448$.

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Table 4.11
Percentage of Variance in Memory Module Primary Raw Scores and z Scores Accounted for by NAB Form

Test	Acronym	Form	Equivalent-forms study[a] % variance by form	Raw score (before equating)					z score (after equating)				
				M	SD	Skewness	Kurtosis	% variance by form	M	SD	Skewness	Kurtosis	% variance by form
List Learning List A Immediate Recall	LLA–irc	1	1.0	22.84	5.56	−0.25	−0.55	0.0	0.08	1.00	0.01	−0.18	0.0
		2		23.00	5.60	−0.23	−0.51		0.04	1.03	−0.11	−0.12	
List Learning List B Immediate Recall	LLB–irc	1	0.2	4.52	1.99	0.40	0.34	0.1	0.23	0.97	−0.18	0.00	0.0
		2		4.37	1.82	0.27	0.33		0.25	0.97	−0.10	−0.24	
List Learning List A Short Delayed Recall	LLA–sd:drc	1	4.9	7.62	2.76	−0.37	−0.45	0.4	0.12	0.93	−0.31	−0.58	1.3
		2		7.98	2.70	−0.55	−0.10		−0.08	0.74	−0.69	0.11	
List Learning List A Long Delayed Recall	LLA–ld:drc	1	5.0	7.35	2.94	−0.52	−0.12	0.2	0.12	0.94	−0.25	−0.69	1.2
		2		7.66	3.14	−0.66	−0.14		−0.07	0.76	−0.53	−0.52	
Shape Learning Immediate Recognition	SHL–irg	1	0.0	15.89	4.32	0.05	−0.39	0.0	0.09	0.97	−0.11	−0.24	0.0
		2		15.91	4.34	0.02	−0.42		0.10	1.00	−0.05	−0.09	
Shape Learning Delayed Recognition	SHL–drg	1	0.0	5.71	1.88	−0.20	−0.53	0.1	0.20	0.94	−0.32	−0.50	0.0
		2		5.61	1.87	−0.14	−0.52		0.20	0.92	−0.37	−0.40	
Story Learning Phrase Unit Immediate Recall	STL–irc:phu	1	23.8	60.21	11.41	−0.85	0.84	20.1	0.03	1.00	0.04	−0.08	0.0
		2		48.12	12.65	−0.19	−0.35		0.03	0.99	0.00	−0.17	
Story Learning Phrase Unit Delayed Recall	STL–drc:phu	1	27.6	30.77	8.12	−1.97	4.74	14.7	0.11	1.04	0.14	−0.63	0.1
		2		23.98	8.24	−0.66	0.45		0.05	1.00	0.01	−0.14	

(continued)

Table 4.11 (continued)
Percentage of Variance in Memory Module Primary Raw Scores and z Scores Accounted for by NAB Form

Test	Acronym	Form	Equivalent-forms study[a] % variance by form	Demographically corrected standardization sample[b] Raw score (before equating) M	SD	Skewness	Kurtosis	% variance by form	z score (after equating) M	SD	Skewness	Kurtosis	% variance by form
Daily Living Memory Immediate Recall	DLM–irc		0.2					0.6					0.0
		1		41.16	6.62	–1.09	1.12		0.07	1.01	–0.07	–0.29	
		2		42.13	5.75	–1.04	1.30		0.08	0.99	–0.11	–0.45	
Daily Living Memory Delayed Recall	DLM–drc		0.0					0.0					0.0
		1		13.98	3.02	–1.16	0.78		–0.02	0.81	–0.91	0.07	
		2		13.97	3.04	–1.17	1.06		–0.04	0.80	–0.94	0.19	

[a]$N = 100$. [b]$N = 1,448$.

Table 4.12
Percentage of Variance in Spatial Module Primary Raw Scores and z Scores Accounted for by NAB Form

Test	Acronym	Form	Equivalent-forms study[a] % variance by form	Demographically corrected standardization sample[b]									
				Raw score (before equating)					z score (after equating)				
				M	SD	Skewness	Kurtosis	% variance by form	M	SD	Skewness	Kurtosis	% variance by form
Visual Discrimination	VIS	1	0.3	15.25	2.50	−1.33	2.50	0.0	0.08	0.89	−0.71	−0.28	0.0
		2		15.29	2.46	−1.17	1.32		0.06	0.86	−0.78	−0.17	
Design Construction	DES	1	0.3	15.35	7.19	0.92	0.79	0.1	0.08	0.96	−0.03	0.07	0.0
		2		15.01	7.49	0.91	0.72		0.06	0.97	−0.02	−0.06	
Figure Drawing Copy	FGD–cpy	1	0.9	26.46	3.37	−0.73	2.27	0.0	0.13	1.00	−0.05	−0.21	0.0
		2		26.56	3.18	−0.29	0.45		0.15	0.99	−0.01	−0.16	
Figure Drawing Copy Organization	FGD–cpy:org	1	0.7	7.51	1.75	−0.69	0.01	0.1	0.20	0.91	−0.65	−0.48	0.0
		2		7.59	1.55	−0.59	0.15		0.23	0.91	−0.66	−0.39	
Figure Drawing Immediate Recall	FGD–irc	1	0.0	20.33	5.55	−0.21	−0.30	0.0	0.07	0.99	0.02	−0.15	0.0
		2		20.26	5.35	−0.32	−0.15		0.08	1.01	−0.02	−0.17	
Map Reading	MAP	1	0.0	7.73	2.26	−0.50	0.26	0.0	0.20	1.00	−0.16	−0.33	0.0
		2		7.71	2.32	−0.69	0.74		0.22	1.06	0.00	−0.12	

[a]$N = 100$. [b]$N = 1,448$.

Table 4.13

Percentage of Variance in Executive Functions Module Primary Raw Scores and z Scores Accounted for by NAB Form

Test	Acronym	Form	Equivalent-forms study[a] % variance by form	Demographically corrected standardization sample[b]									
				Raw score (before equating)					z score (after equating)				
				M	SD	Skewness	Kurtosis	% variance by form	M	SD	Skewness	Kurtosis	% variance by form
Mazes	MAZ	1	0.0	11.28	7.33	0.42	−0.94	0.1	0.05	0.94	−0.08	−0.39	0.0
		2		10.86	7.18	0.43	−0.96		0.07	0.96	0.04	−0.21	
Judgment	JDG	1	4.3	14.70	2.39	−0.42	0.05	0.2	0.20	1.03	0.00	−0.18	0.0
		2		14.91	2.02	−0.35	0.84		0.23	1.02	−0.06	0.03	
Categories	CAT	1	0.9	16.23	10.22	0.46	−0.52	1.0	0.06	0.95	0.21	−0.26	0.0
		2		18.40	11.26	0.53	−0.24		0.05	0.95	0.18	−0.31	
Word Generation	WGN	1	9.1	10.07	4.89	0.28	−0.33	5.0	0.09	0.98	0.04	−0.24	0.0
		2		12.37	5.17	0.15	0.12		0.07	0.99	−0.06	−0.19	

[a]$N = 100$. [b]$N = 1,448$.

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Table 4.14
Percentage of Variance in Screening Module *z* Scores Accounted for by Demographic Variables

Test	Acronym	Single predictors (% variance)			Combined predictors	
		Age	Education	Sex	% variance	Model[a]
Primary score						
Screening Digits Forward	S-DGF	3.5	5.3	0.1	8.9	E, A
Screening Digits Backward	S-DGB	2.2	8.5	0.0	10.7	E, A
Screening Numbers & Letters Part A Speed	S-N&L$_A$–spd	33.4	1.7	1.3	36.1	A, E, S
Screening Numbers & Letters Part A Errors	S-N&L$_A$–err	3.6	2.0	0.8	6.4	A, E, S
Screening Numbers & Letters Part A Efficiency	S-N&L$_A$–eff	36.3	2.5	1.8	40.3	A, E, S
Screening Numbers & Letters Part B Efficiency	S-N&L$_B$–eff	20.1	0.3	0.1	20.4	A, E
Screening Auditory Comprehension	S-AUD	1.8	3.1	0.1	4.8	E, A
Screening Naming	S-NAM	4.5	1.3	0.2	6.0	A, E, S
Screening Shape Learning Immediate Recognition	S-SHL–irg	7.1	1.8	0.0	8.9	A, E
Screening Shape Learning Delayed Recognition	S-SHL–drg	7.4	1.5	0.0	8.9	A, E
Screening Story Learning Immediate Recall	S-STL–irc	4.1	5.7	2.7	12.4	E, A, S
Screening Story Learning Delayed Recall	S-STL–drc	7.0	5.4	4.1	16.3	A, E, S
Screening Visual Discrimination	S-VIS	2.7	1.6	0.2	4.4	A, E
Screening Design Construction	S-DES	10.5	3.0	2.6	16.4	A, E, S
Screening Mazes	S-MAZ	34.0	2.2	1.7	38.2	A, E, S
Screening Word Generation	S-WGN	3.1	11.1	0.3	14.4	E, A, S
Secondary score						
Screening Orientation	S-ORN	1.3	1.0	0.1	2.3	A, E
Screening Digits Forward Longest Span	S-DGF–spn	2.7	4.5	0.2	7.2	E, A
Screening Digits Backward Longest Span	S-DGB–spn	2.1	7.5	0.0	9.6	E, A
Screening Shape Learning Percent Retention	S-SHL–%rt	1.0	0.2	0.1	1.0	A
Screening Story Learning Percent Retention	S-STL–%rt	2.6	0.4	1.2	4.1	A, S, E
Screening Word Generation Perseverations	S-WGN–psv	1.1	0.1	0.2	1.1	A
Descriptive score						
Screening Orientation to Self	S-ORN–slf	0.1	0.1	0.1	—	—
Screening Orientation to Time	S-ORN–tim	0.5	0.1	0.1	0.5	A
Screening Orientation to Place	S-ORN–plc	0.4	1.0	0.1	1.4	E, A
Screening Orientation to Situation	S-ORN–sit	3.5	0.2	0.0	3.5	A
Screening Auditory Comprehension Colors	S-AUD–col	0.5	0.0	0.0	0.5	A
Screening Auditory Comprehension Shapes	S-AUD–shp	0.3	1.7	0.0	2.0	E, A
Screening Auditory Comprehension Colors/Shapes/Numbers	S-AUD–csn	1.4	1.7	0.0	3.0	E, A
Screening Naming Percent Correct After Semantic Cuing	S-NAM–sem%	0.0	0.0	0.0	—	—
Screening Naming Percent Correct After Phonemic Cuing	S-NAM–pho%	0.0	0.1	0.7	—	—

Note. $N = 1,448$; A = Age; E = Education; S = Sex; a dash indicates that the predictors did not account for any of the variance.

[a]Model = combination of variables in the final stepwise model and their relative predictive power.

Table 4.15
Percentage of Variance in Attention Module *z* Scores Accounted for by Demographic Variables

Test	Acronym	Single predictors (% variance)			Combined predictors	
		Age	Education	Sex	% variance	Model[a]
Primary score						
Digits Forward	DGF	3.5	5.3	0.1	8.9	E, A
Digits Backward	DGB	2.2	8.5	0.0	10.7	E, A
Dots	DOT	22.8	3.6	0.3	26.8	A, E, S
Numbers & Letters Part A Speed	N&L$_A$–spd	33.9	1.5	1.2	36.4	A, E, S
Numbers & Letters Part A Errors	N&L$_A$–err	6.7	3.3	0.1	10.0	A, E
Numbers & Letters Part A Efficiency	N&L$_A$–eff	36.9	2.0	1.2	39.9	A, E, S
Numbers & Letters Part B Efficiency	N&L$_B$–eff	28.9	3.3	0.0	32.2	A, E
Numbers & Letters Part C Efficiency	N&L$_C$–eff	8.9	2.2	0.5	11.5	A, E, S
Numbers & Letters Part D Efficiency	N&L$_D$–eff	24.6	0.9	0.0	24.6	A
Numbers & Letters Part D Disruption	N&L$_D$–dis	0.4	0.3	2.4	3.0	S, A, E
Driving Scenes	DRV	27.0	3.4	0.0	30.4	A, E
Secondary score						
Orientation	ORN	1.3	1.0	0.1	2.3	A, E
Digits Forward Longest Span	DGF–spn	2.7	4.5	0.2	7.2	E, A
Digits Backward Longest Span	DGB–spn	2.1	7.5	0.0	9.6	E, A
Descriptive score						
Orientation to Self	ORN–slf	0.1	0.1	0.1	—	—
Orientation to Time	ORN–tim	0.5	0.1	0.1	0.5	A
Orientation to Place	ORN–plc	0.4	1.0	0.1	1.4	E, A
Orientation to Situation	ORN–sit	3.5	0.2	0.0	3.5	A

Note. N = 1,448; A = Age; E = Education; S = Sex; a dash indicates that the predictors did not account for any of the variance.

[a]Model = combination of variables in the final stepwise model and their relative predictive power.

education, and sex on NAB *z* scores derived from the entire sample of 1,448 participants is used to determine the normative performance for each age, education, and sex group (i.e., normative table).

The NAB normative tables were developed with the continuous norming method to maximize the accuracy of the derived normative scores. The calculation of normative scores by this method involves the following sequence of steps:

1. Determination of the lines or curves of best fit for the progression of means and standard deviations across groupings of the norming variables, based on polynomial regression.

2. Estimation of the means and standard deviations of scores for each normative variable group.

3. Calculation of *T* scores based on the estimates obtained in Steps 1 and 2.

4. Evaluation of the accuracy of the computed norms.

This series of steps was followed for each NAB primary score. Angoff and Robertson (1987), Gorsuch (1983b), Roid (1983), and Zachary and Gorsuch (1985) present detailed discussions of the method of continuous norming.

Step 1. The method of continuous norming uses group descriptive statistics, rather than the data of the individual participants composing the groups, as the unit of analysis in the models of the lines or curves of best fit. NAB subtest raw scores were plotted across age to assist in determining the age groupings for the normative tables. The observed statistical relationships between age and *z* scores, as well as sample size considerations, were also used to categorize the NAB sample into the most statistically and theoretically meaningful age groups. This procedure resulted in the decision to group the standardization sample into nine discrete age bands: 18-29, 30-39, 40-49, 50-59, 60-64, 65-69, 70-74, 75-79, and 80-97 years. Note that a majority of the individuals in the oldest age group were less than 90 years of age.

Table 4.16
Percentage of Variance in Language Module *z* Scores Accounted for by Demographic Variables

Test	Acronym	Single predictors (% variance) Age	Education	Sex	Combined predictors % variance	Model[a]
Primary score						
Oral Production	OPD	0.4	4.5	0.0	4.8	E, A
Auditory Comprehension	AUD	6.0	5.1	0.0	11.2	A, E
Naming	NAM	3.4	1.1	0.2	4.5	A, E
Writing	WRT	1.9	2.4	4.8	9.0	S, E, A
Bill Payment	BIL	2.1	7.0	0.4	9.5	E, A, S
Secondary score						
Reading Comprehension	RCN	0.1	0.0	0.1	—	—
Writing Legibility	WRT–leg	0.0	0.3	0.0	0.3	E
Writing Spelling	WRT–spl	0.1	0.1	0.1	—	—
Writing Syntax	WRT–syn	0.0	0.1	0.0	—	—
Writing Conveyance	WRT–cnv	0.1	0.6	0.7	1.3	S, E
Descriptive score						
Auditory Comprehension Colors	AUD–col	0.5	0.0	0.0	0.5	A
Auditory Comprehension Shapes	AUD–shp	0.3	1.7	0.0	2.0	E, A
Auditory Comprehension Colors/Shapes/Numbers	AUD–csn	1.4	1.7	0.0	3.0	E, A
Auditory Comprehension Pointing	AUD–pnt	0.1	0.2	—	—	—
Auditory Comprehension Yes/No	AUD–y/n	0.4	1.2	0.0	1.6	E, A
Auditory Comprehension Paper Folding	AUD–fld	3.1	1.1	0.0	4.2	A, E
Naming Percent Correct After Semantic Cuing	NAM–sem%	2.7	0.1	0.2	2.7	A
Naming Percent Correct After Phonemic Cuing	NAM–pho%	0.1	0.0	0.0	—	—
Reading Comprehension Words	RCN–wrd	0.2	0.0	0.1	—	—
Reading Comprehension Sentences	RCN–sen	0.1	0.0	0.1	—	—

Note. *N* = 1,448; A = Age; E = Education; S = Sex; a dash indicates that the predictors did not account for any of the variance.

[a]Model = combination of variables in the final stepwise model and their relative predictive power.

A similar procedure was followed for educational attainment, which is defined as the number of years of formal schooling completed by the participant. A graduate equivalency degree (G.E.D.) was coded as 11 years, a high school diploma was coded as 12 years, and a bachelor's degree was coded as 16 years. Education was divided into four levels: less than or equal to 11 years, 12 years, 13-15 years, and more than or equal to 16 years. The relatively infrequent sampling of participants with very low and very high education levels did not permit further subdivision of these ranges.

Step 2. Means and standard deviations were then calculated for each normative table group with hierarchical polynomial regression techniques. Age, age-squared, education, education-squared, sex, and the interactions of these variables were entered as predictors in a regression model where the subgroup mean and subgroup standard deviation were the dependent variables. The incremental improvement in R^2 was used as the criterion for determining the best fitting model.

Step 3. Normalized scores corresponding to *z* scores were calculated for every normative table, based on the respective mean and standard deviation values from Step 2. Minor irregularities at the upper and lower bounds of the raw score distributions were smoothed by hand. *T* scores were derived to have a mean of 50, a standard deviation of 10, a minimum tabled value of 19 (i.e., ≤19) and maximum tabled value of 81 (i.e., ≥81). These demographically corrected *T* score tables are presented in the *NAB Demographically Corrected Norms Manual* (White & Stern, 2003a).

Step 4. The accuracy of the demographically corrected *T* scores was assessed by inspection of visual plots and statistical techniques. Raw and smoothed mean *z* scores were plotted against each other across age, education, and sex

Test	Acronym	Single predictors (% variance)			Combined predictors	
		Age	Education	Sex	% variance	Model[a]
Primary score						
List Learning List A Immediate Recall	LLA–irc	18.3	10.4	3.3	31.7	A, E, S
List Learning List B Immediate Recall	LLB–irc	14.8	6.4	1.8	22.7	A, E, S
List Learning List A Short Delayed Recall	LLA–sd:drc	15.2	8.2	2.8	26.0	A, E, S
List Learning List A Long Delayed Recall	LLA–ld:drc	16.1	8.8	3.1	27.7	A, E, S
Shape Learning Immediate Recognition	SHL–irg	24.3	4.4	0.6	29.2	A, E, S
Shape Learning Delayed Recognition	SHL–drg	21.8	4.3	0.5	26.5	A, E, S
Story Learning Phrase Unit Immediate Recall	STL–irc:phu	8.6	6.9	4.5	19.7	A, E, S
Story Learning Phrase Unit Delayed Recall	STL–drc:phu	12.1	6.4	4.2	22.4	A, E, S
Daily Living Memory Immediate Recall	DLM–irc	15.5	8.0	2.3	25.6	A, E, S
Daily Living Memory Delayed Recall	DLM–drc	16.2	4.8	1.4	22.2	A, E, S
Secondary score						
List Learning List A Trial 1 Immediate Recall	LLA1–irc	11.3	7.8	2.1	21.1	A, E, S
List Learning List A Trial 2 Immediate Recall	LLA2–irc	16.0	8.9	3.0	27.6	A, E, S
List Learning List A Trial 3 Immediate Recall	LLA3–irc	15.4	7.9	3.2	26.2	A, E, S
List Learning List A Percent Retention	LLA–%rt	1.3	0.7	0.1	2.0	A, E
List Learning List A Long Delayed Forced-Choice Recognition	LLA–dfc	3.3	3.3	0.3	6.6	E, A
List Learning List A Long Delayed Forced-Choice Recognition False Alarms	LLA–fa	14.0	5.4	2.0	21.2	A, E, S
List Learning List A Discriminability Index	LLA–dis	16.3	7.4	2.0	25.5	A, E, S
List Learning List A Recall vs. Recognition	LLA–rvr	14.4	6.7	3.1	24.0	A, E, S
Shape Learning Trial 1 Immediate Recognition	SHL1–irg	13.8	1.7	0.3	15.8	A, E, S
Shape Learning Trial 2 Immediate Recognition	SHL2–irg	15.7	3.4	0.5	19.5	A, E, S
Shape Learning Trial 3 Immediate Recognition	SHL3–irg	19.2	3.9	0.5	23.4	A, E, S
Shape Learning Percent Retention	SHL–%rt	0.3	0.1	0.0	—	—
Shape Learning Delayed Forced-Choice Recognition	SHL–dfc	1.0	0.0	1.2	—	—
Shape Learning Delayed Forced-Choice Recognition False Alarms	SHL–fa	16.6	2.7	0.1	19.4	A, E
Shape Learning Discriminability Index	SHL–dis	11.5	1.4	0.9	13.7	A, E, S
Story Learning Trial 1 Phrase Unit	STL1–irc:phu	5.4	5.3	4.2	14.7	A, E, S
Story Learning Trial 2 Phrase Unit	STL2–irc:phu	10.4	6.5	3.5	20.2	A, E, S
Story Learning Thematic Unit Immediate Recall	STL–irc:thu	6.9	4.4	3.1	14.3	A, E, S
Story Learning Trial 1 Thematic Unit	STL1–irc:thu	4.9	3.3	2.6	10.7	A, E, S
Story Learning Trial 2 Thematic Unit	STL2–irc:thu	2.5	2.7	0.9	6.0	E, A, S
Story Learning Thematic Unit Delayed Recall	STL–drc:thu	6.9	4.2	2.1	13.0	A, E, S
Story Learning Phrase Unit Percent Retention	STL–%rt	2.9	0.8	0.8	4.4	A, E, S
Daily Living Memory Retention	DLM–rt	13.3	2.1	0.6	15.9	A, E, S
Daily Living Memory Delayed Recognition	DLM–drg	11.5	2.6	0.6	14.7	A, E, S
Daily Living Memory Recall vs. Recognition	DLM–rvr	4.3	2.0	0.8	7.0	A, E, S
Medication Instructions Immediate Recall	MED–irc	9.1	5.3	2.0	16.1	A, E, S
Medication Instructions Delayed Recall	MED–drc	9.0	2.7	0.6	12.3	A, E, S
Medication Instructions Delayed Recognition	MED–drg	4.1	1.2	0.3	5.6	A, E, S
Name/Address/Phone Immediate Recall	NAP–irc	13.5	6.4	1.1	20.9	A, E, S
Name/Address/Phone Delayed Recall	NAP–drc	11.7	3.7	1.0	16.2	A, E, S
Name/Address/Phone Delayed Recognition	NAP–drg	6.0	1.5	0.2	7.5	A, E
Descriptive score						
List Learning Semantic Clusters	LL–sem	8.3	11.1	2.0	21.2	E, A, S
List Learning Perseverations	LL–psv	1.7	0.1	0.2	1.7	A
List Learning Intrusions	LL–int	0.9	1.0	0.3	2.3	E, A, S

Note. *N* = 1,448; A = Age; E = Education; S = Sex; a dash indicates that the predictors did not account for any of the variance.

[a]Model = combination of variables in the final stepwise model and their relative predictive power.

Table 4.18
Percentage of Variance in Spatial Module *z* Scores Accounted for by Demographic Variables

Test	Acronym	Single predictors (% variance)			Combined predictors	
		Age	Education	Sex	% variance	Model[a]
Primary score						
Visual Discrimination	VIS	6.6	4.3	0.0	10.9	A, E
Design Construction	DES	14.2	6.2	3.2	24.0	A, E, S
Figure Drawing Copy	FGD–cpy	6.3	4.8	0.1	11.1	A, E
Figure Drawing Copy Organization	FGD–cpy:org	0.1	0.3	0.1	0.3	E
Figure Drawing Immediate Recall	FGD–irc	16.3	2.9	0.2	19.4	A, E, S
Map Reading	MAP	5.5	10.3	1.3	17.3	E, A, S
Secondary score						
Figure Drawing Copy Fragmentation	FGD–cpy:frg	1.4	0.2	0.0	1.4	A
Figure Drawing Copy Planning	FGD–cpy:pln	0.5	0.1	0.1	0.5	A
Figure Drawing Immediate Recall Organization	FGD–irc:org	2.6	1.5	0.1	4.1	A, E
Figure Drawing Immediate Recall Fragmentation	FGD–irc:frg	0.0	0.4	0.0	0.4	E
Figure Drawing Immediate Recall Planning	FGD–irc:pln	4.6	1.1	0.1	5.7	A, E
Figure Drawing Percent Retention	FGD–%rt	10.1	0.7	0.3	—	—

Note. N = 1,448; A = Age; E = Education; S = Sex; a dash indicates that the predictors did not account for any of the variance.

[a]Model = combination of variables in the final stepwise model and their relative predictive power.

Table 4.19
Percentage of Variance in Executive Functions Module *z* Scores Accounted for by Demographic Variables

Test	Acronym	Single predictors (% variance)			Combined predictors	
		Age	Education	Sex	% variance	Model[a]
Primary score						
Mazes	MAZ	44.7	1.3	1.2	47.6	A, S, E
Judgment	JDG	6.4	7.7	0.0	14.1	E, A
Categories	CAT	26.0	14.9	0.7	41.4	A, E, S
Word Generation	WGN	6.6	9.2	0.7	16.5	E, A, S
Secondary score						
Word Generation Perseverations	WGN–psv	1.1	0.0	0.4	1.5	A, S

Note. N = 1,448; A = Age; E = Education; S = Sex.

[a]Model = combination of variables in the final stepwise model and their relative predictive power.

groups. This procedure was repeated for raw and smoothed standard deviation *z* scores. Figures 4.3 through 4.10 present the plots for the Mazes, as examples. As can be seen, the derived regression lines correct for fluctuations caused by sampling error (see Figures 4.3 through 4.6) and result in smooth and orderly progressions of means and standard deviations across age, education, and sex groups (see Figures 4.7 through 4.10).

Several statistical criteria must be met for the demographic correction process to be considered accurate. First, the *T* scores in the standardization sample should have an approximately normal distribution. Second, the *T* scores should have an approximate mean of 50.0 and a standard deviation of 10.0. Finally, the demographic variables of age, education, and sex should account for very little, if any, residual variance in the derived *T* scores.
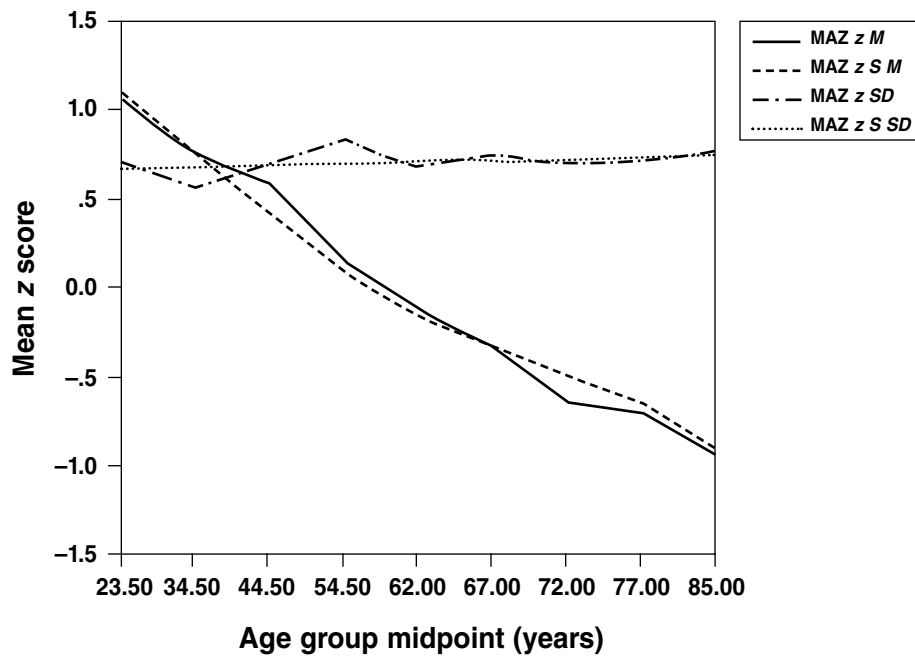
Figure 4.3. Raw mean (*M*), smoothed mean (*S M*), raw standard deviation (*SD*), and smoothed standard deviation (*S SD*) Mazes (MAZ) *z* scores for female examinees, plotted across age group.
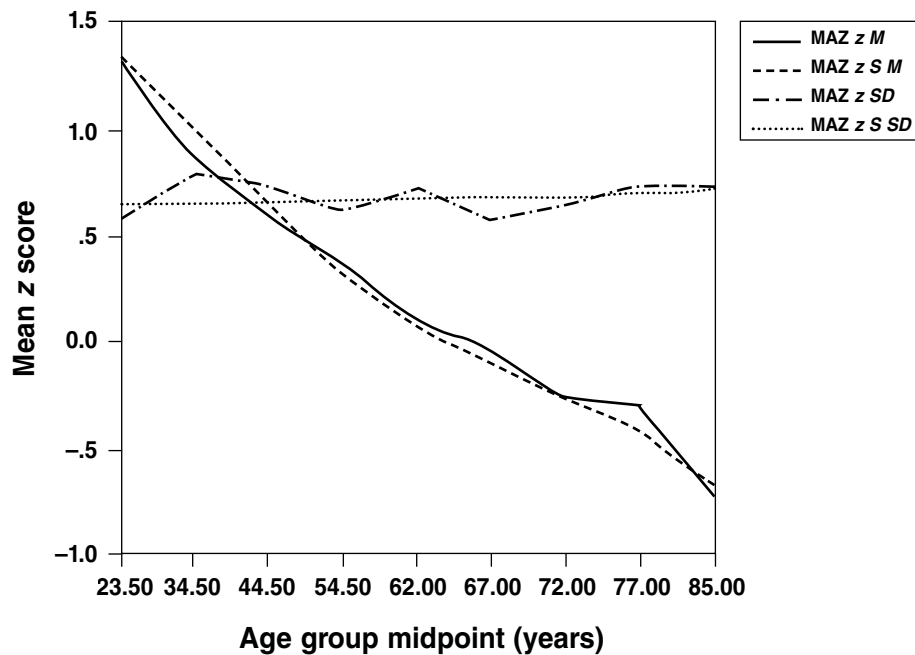
Figure 4.4. Raw mean (*M*), smoothed mean (*S M*), raw standard deviation (*SD*), and smoothed standard deviation (*S SD*) Mazes (MAZ) *z* scores for male examinees, plotted across age group.

Tables 4.20 through 4.25 present the percentages of the demographically corrected standardization sample participants who obtained scores in each of seven *T*-score ranges, the percentages in each range that would be expected given a perfectly normal distribution, and the derived mean *T* scores and standard deviations. The derived *T* scores closely approximate a normal distribution, and their means and standard deviations are all very close to 50.0 and 10.0, respectively.

A related issue is whether the derived *T* scores have the same characteristics as a normal distribution when categorized
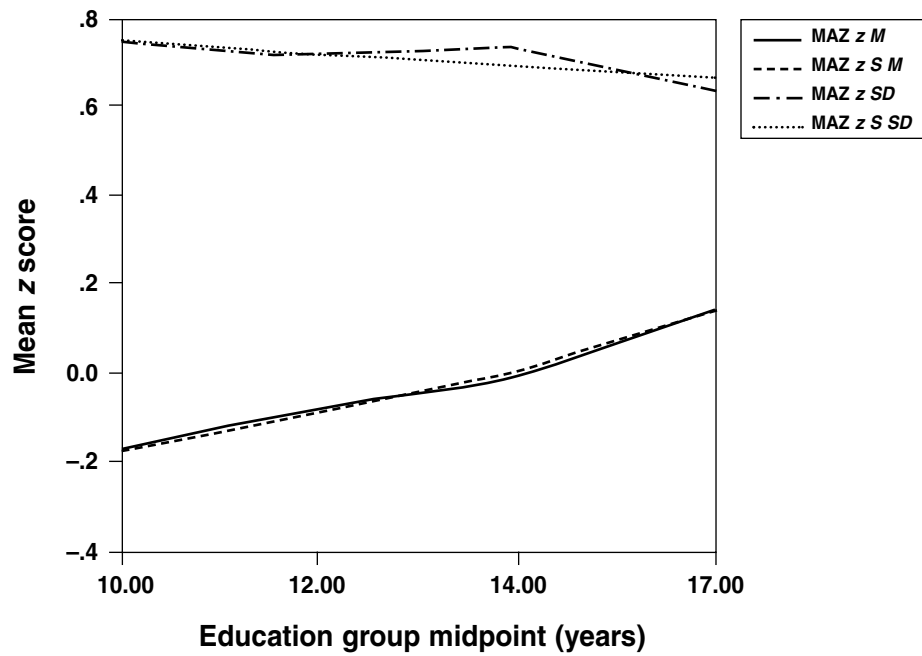
Figure 4.5. Raw mean (*M*), smoothed mean (*S M*), raw standard deviation (*SD*), and smoothed standard deviation (*S SD*) Mazes (MAZ) *z* scores for female examinees, plotted across education group.
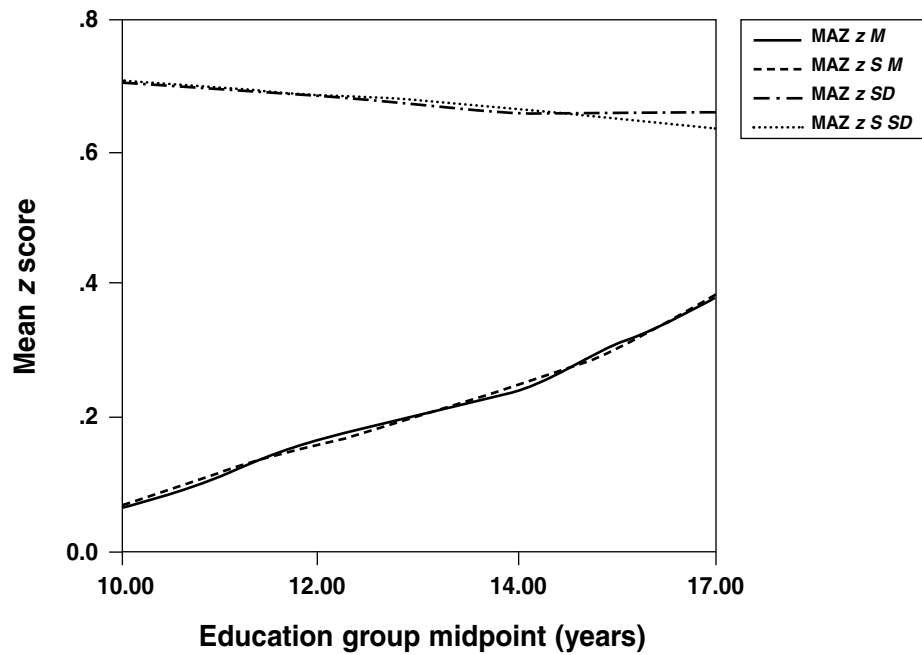
Figure 4.6. Raw mean (*M*), smoothed mean (*S M*), raw standard deviation (*SD*), and smoothed standard deviation (*S SD*) Mazes (MAZ) *z* scores for male examinees, plotted across education group.
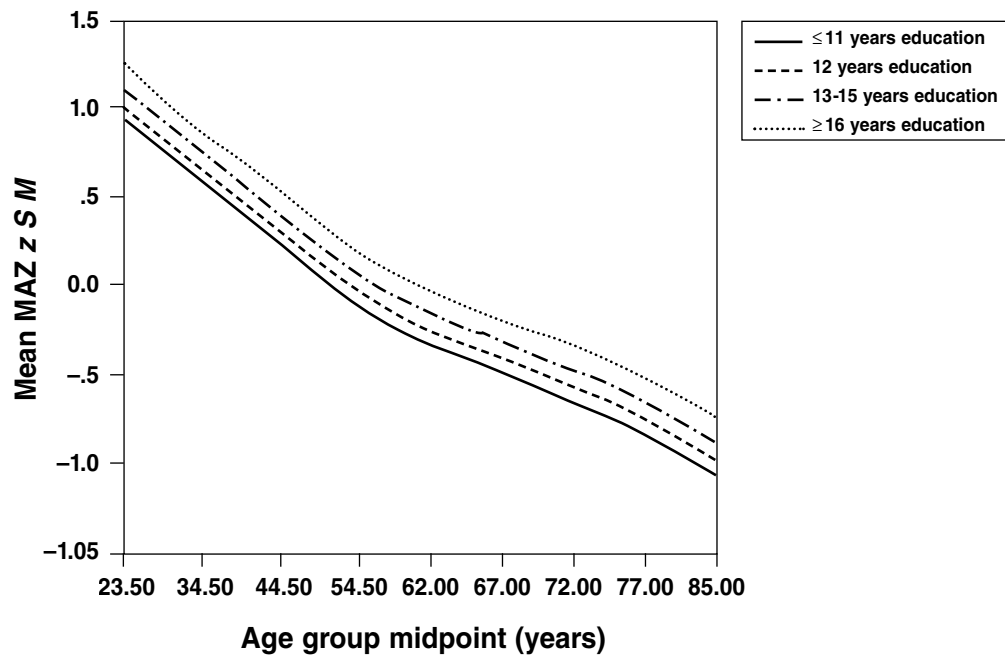
Figure 4.7. Smoothed mean Mazes (MAZ) *z* scores for female examinees, plotted by education group across age group.
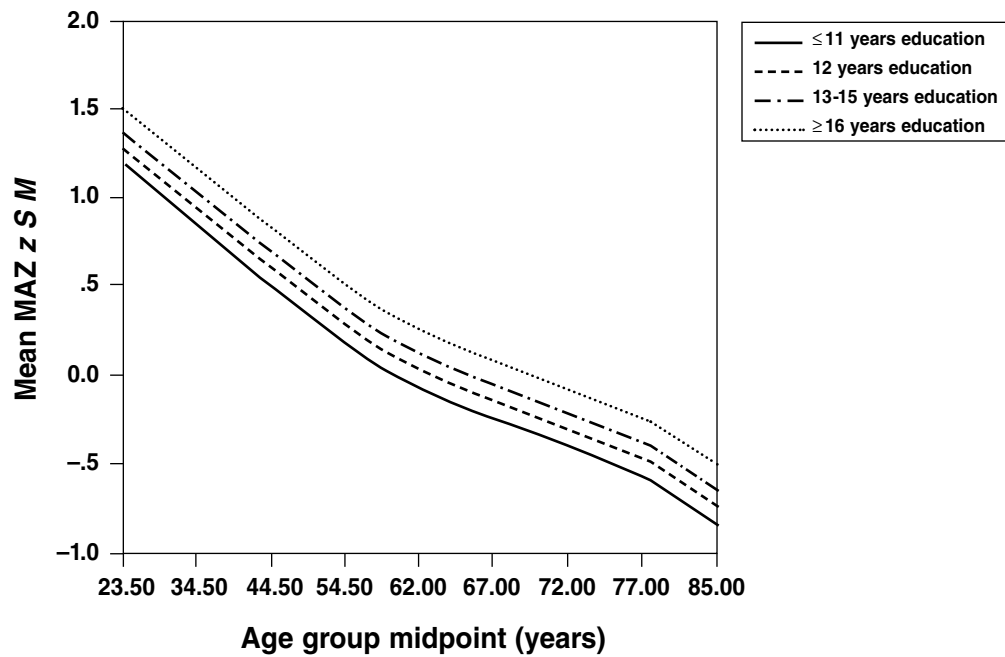
Figure 4.8. Smoothed mean Mazes (MAZ) *z* scores for male examinees, plotted by education group across age group.
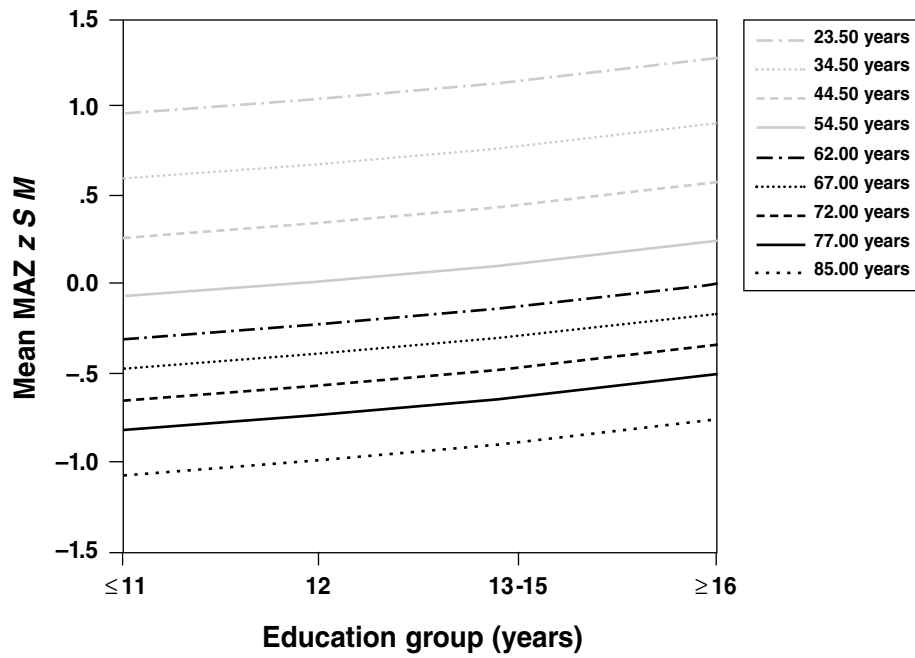
Figure 4.9. Smoothed mean Mazes (MAZ) *z* scores for female examinees, plotted by age group across education group.
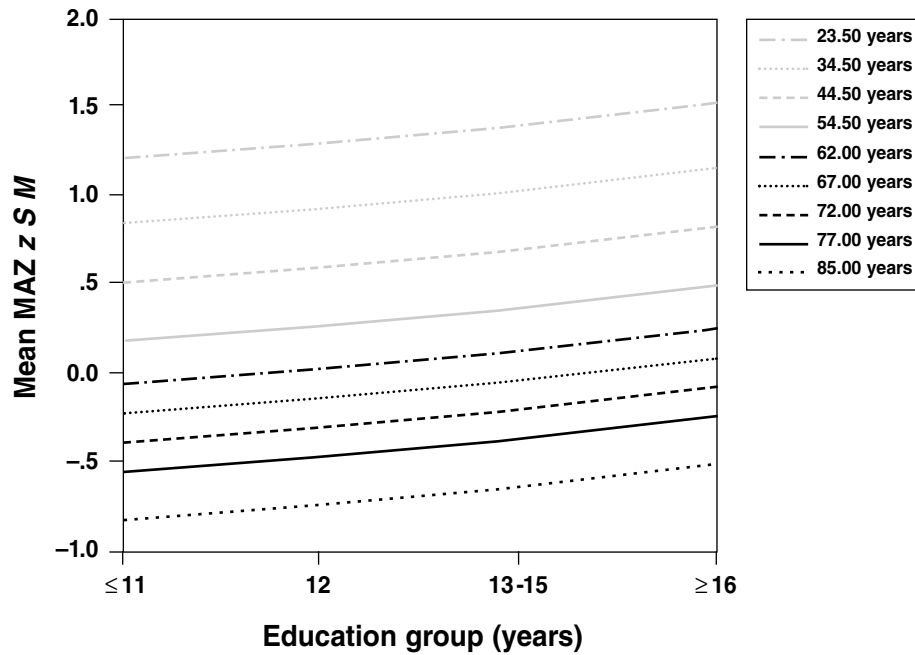
Figure 4.10. Smoothed mean Mazes (MAZ) *z* scores for male examinees, plotted by age group across education group.

Table 4.20

Table 4.20
Percentages of Demographically Corrected Standardization Participants Obtaining Scores
Within Seven *T*-Score Ranges for Screening Module Primary *T* Scores

| *T*-score range		0-24	25-34	35-44	45-54	55-64	65-74	≥75		
% predicted from normal distribution		0.5	5.5	22.9	38.2	25.4	6.7	0.7		
Test	**Acronym**	**% of NAB participants**							***M***	***SD***
Screening Digits Forward	S-DGF	0.7	6.4	22.5	37.8	24.7	7.5	0.5	49.9	10.2
Screening Digits Backward	S-DGB	0.8	6.7	19.1	40.6	25.8	6.6	0.4	49.9	10.1
Screening Numbers & Letters Part A Speed	S-N&L$_A$–spd	0.6	7.0	21.3	38.9	25.1	6.4	0.7	49.9	10.2
Screening Numbers & Letters Part A Errors	S-N&L$_A$–err	3.2	6.4	11.9	34.8	43.7	0.0	0.0	50.1	9.7
Screening Numbers & Letters Part A Efficiency	S-N&L$_A$–eff	0.5	6.4	22.4	38.0	25.3	6.5	1.0	49.9	10.2
Screening Numbers & Letters Part B Efficiency	S-N&L$_B$–eff	0.3	5.9	23.4	39.4	22.1	7.8	1.1	50.0	10.2
Screening Auditory Comprehension	S-AUD	6.1	2.3	4.9	56.7	28.2	1.7	0.1	50.5	9.7
Screening Naming	S-NAM	4.9	5.0	6.9	42.3	39.9	0.9	0.0	50.2	10.0
Screening Shape Learning Immediate Recognition	S-SHL–irg	0.6	7.2	24.5	32.8	27.6	7.4	0.0	50.0	10.1
Screening Shape Learning Delayed Recognition	S-SHL–drg	0.3	8.1	23.9	34.0	26.7	7.0	0.0	49.9	10.1
Screening Story Learning Immediate Recall	S-STL–irc	1.2	5.7	22.4	34.9	29.4	6.3	0.1	50.0	10.2
Screening Story Learning Delayed Recall	S-STL–drc	0.8	5.7	22.4	37.2	25.9	7.4	0.5	50.0	10.2
Screening Visual Discrimination	S-VIS	2.3	7.5	15.1	30.1	45.0	0.0	0.0	50.1	10.0
Screening Design Construction	S-DES	0.6	5.6	23.8	38.4	22.8	8.6	0.3	49.9	10.2
Screening Mazes	S-MAZ	1.8	5.8	20.9	35.6	29.4	6.5	0.0	49.9	10.2
Screening Word Generation	S-WGN	0.4	5.2	23.8	38.5	24.4	6.6	1.0	50.0	10.0

Note. N = 1,448.

Table 4.21
Percentages of Demographically Corrected Standardization Participants Obtaining Scores
Within Seven *T*-Score Ranges for Attention Module Primary *T* Scores

T-score range		0-24	25-34	35-44	45-54	55-64	65-74	≥75		
% predicted from normal distribution		0.5	5.5	22.9	38.2	25.4	6.7	0.7		
Test	**Acronym**	**% of NAB participants**							***M***	***SD***
Digits Forward	DGF	0.7	6.4	22.5	37.8	24.7	7.5	0.5	49.9	10.2
Digits Backward	DGB	0.8	6.7	19.1	40.6	25.8	6.6	0.4	49.9	10.1
Dots	DOT	1.2	5.9	21.1	38.6	26.3	6.8	6.8	50.0	10.0
Numbers & Letters Part A Speed	N&L$_A$–spd	0.8	6.0	23.1	36.7	26.6	6.1	0.8	49.9	10.1
Numbers & Letters Part A Errors	N&L$_A$–err	1.0	6.1	22.7	33.3	31.6	5.2	0.0	50.0	10.1
Numbers & Letters Part A Efficiency	N&L$_A$–eff	0.8	5.7	23.3	36.5	26.9	6.1	0.8	49.9	10.1
Numbers & Letters Part B Efficiency	N&L$_B$–eff	1.0	6.2	21.9	37.5	26.5	6.0	0.9	49.9	10.2
Numbers & Letters Part C Efficiency	N&L$_C$–eff	0.2	6.4	23.6	38.0	24.9	5.6	1.2	49.9	10.1
Numbers & Letters Part D Efficiency	N&L$_D$–eff	0.6	6.1	23.1	37.8	25.2	5.9	1.2	50.0	10.1
Numbers & Letters Part D Disruption	N&L$_D$–dis	0.7	5.6	23.1	37.2	26.6	6.1	0.8	50.0	10.1
Driving Scenes	DRV	1.4	5.3	22.9	36.1	27.4	6.3	0.6	50.0	10.3

Note. N = 1,448.

Table 4.22
Percentages of Demographically Corrected Standardization Participants Obtaining Scores Within Seven *T*-Score Ranges for Language Module Primary *T* Scores

T-score range		0-24	25-34	35-44	45-54	55-64	65-74	≥75		
% predicted from normal distribution		0.5	5.5	22.9	38.2	25.4	6.7	0.7		
Test	**Acronym**			**% of NAB participants**					**M**	**SD**
Oral Production	OPD	0.8	5.0	23.5	37.1	25.6	7.3	0.8	50.1	10.2
Auditory Comprehension	AUD	3.0	7.3	12.7	27.7	49.3	0.0	0.0	49.9	9.8
Naming	NAM	3.4	6.4	15.3	28.9	45.9	0.0	0.0	50.1	10.2
Writing	WRT	2.8	6.2	18.2	25.5	47.3	0.0	0.0	49.9	10.1
Bill Payment	BIL	3.0	5.6	15.9	29.3	46.3	0.0	0.0	50.2	9.7

Note. *N* = 1,448.

Table 4.23
Percentages of Demographically Corrected Standardization Participants Obtaining Scores Within Seven *T*-Score Ranges for Memory Module Primary *T* Scores

T-score range		0-24	25-34	35-44	45-54	55-64	65-74	≥75		
% predicted from normal distribution		0.5	5.5	22.9	38.2	25.4	6.7	0.7		
Test	**Acronym**			**% of NAB participants**					**M**	**SD**
List Learning List A Immediate Recall	LLA–irc	1.1	5.0	23.4	38.4	24.1	7.2	0.8	50.0	10.3
List Learning List B Immediate Recall	LLB–irc	0.9	6.0	22.7	36.0	27.6	6.1	0.6	49.9	10.2
List Learning List A Short Delayed Recall	LLA–sd:drc	1.1	5.7	21.2	37.6	27.6	6.6	0.2	50.1	10.2
List Learning List A Long Delayed Recall	LLA–ld:drc	0.9	6.6	20.8	35.8	28.5	7.2	0.2	50.0	10.1
Shape Learning Immediate Recognition	SHL–irg	1.2	5.1	22.9	36.0	27.7	6.8	0.3	50.0	10.2
Shape Learning Delayed Recognition	SHL–drg	0.8	6.3	22.4	34.3	30.0	6.2	0.0	50.0	10.1
Story Learning Phrase Unit Immediate Recall	STL–irc:phu	0.6	5.7	22.0	38.3	26.4	6.2	0.8	50.0	10.1
Story Learning Phrase Unit Delayed Recall	STL–drc:phu	0.8	5.9	22.9	37.6	26.0	5.9	1.0	50.1	10.1
Daily Living Memory Immediate Recall	DLM–irc	0.9	5.5	24.4	34.8	26.8	7.1	0.5	50.0	10.2
Daily Living Memory Delayed Recall	DLM–drc	2.3	5.9	20.0	31.5	39.8	0.5	0.0	49.9	10.2

Note. *N* = 1,448.

into various clinically relevant interpretive categories. The NAB uses the interpretive ranges first suggested by Heaton and colleagues (1991; 1993) and widely adopted in clinical neuropsychology (cf. Benedict, 1997; D'Elia et al., 1996). Tables 4.26 through 4.31 present these data, which show that the NAB demographic *T* scores continue to conform to expectations.

A final check on the accuracy of the demographic correction procedures involves the calculation of percentage of variance in *T* scores accounted for by age, education, and sex. Tables 4.32 through 4.37 present these data. As the data show, the correction process eliminates most, if not all, residual demographic variance in performance.

Table 4.24
**Percentages of Demographically Corrected Standardization Participants Obtaining Scores
Within Seven *T*-Score Ranges for Spatial Module Primary *T* Scores**

T-score range		0-24	25-34	35-44	45-54	55-64	65-74	≥75		
% predicted from normal distribution		0.5	5.5	22.9	38.2	25.4	6.7	0.7		
Test	**Acronym**	**% of NAB participants**							***M***	***SD***
Visual Discrimination	VIS	1.7	6.2	20.4	31.1	40.4	0.1	0.0	50.0	10.1
Design Construction	DES	1.2	5.4	22.0	39.2	24.3	7.2	0.6	50.0	10.2
Figure Drawing Copy	FGD−cpy	0.5	5.5	24.0	37.6	24.0	8.2	0.3	49.9	10.1
Figure Drawing Copy Organization	FGD−cpy:org	1.0	6.9	24.9	32.5	34.7	0.0	0.0	50.0	10.2
Figure Drawing Immediate Recall	FGD−irc	0.6	6.2	22.1	37.5	26.3	6.7	0.6	50.1	10.1
Map Reading	MAP	0.7	6.4	22.8	38.4	23.2	7.8	0.8	50.0	10.3

Note. N = 1,448.

Table 4.25
**Percentages of Demographically Corrected Standardization Participants Obtaining Scores
Within Seven *T*-Score Ranges for Executive Functions Module Primary *T* Scores**

T-score range		0-24	25-34	35-44	45-54	55-64	65-74	≥75		
% predicted from normal distribution		0.5	5.5	22.9	38.2	25.4	6.7	0.7		
Test	**Acronym**	**% of NAB participants**							***M***	***SD***
Mazes	MAZ	0.7	5.2	23.6	38.6	24.7	6.6	0.6	50.0	10.0
Judgment	JDG	1.0	5.4	21.1	39.8	25.0	6.9	0.8	50.1	10.2
Categories	CAT	0.5	6.8	22.2	37.3	26.3	5.7	1.1	50.0	10.2
Word Generation	WGN	0.7	4.7	23.8	38.5	24.8	6.6	0.8	49.9	10.1

Note. N = 1,448.

Derivation of Module Index and Total NAB Index Scores

Table 4.38 presents the NAB test composition of the module index and Total NAB Index scores. NAB module index scores were calculated in the following manner. For each participant in the demographically corrected standardization sample, the actual *T* scores on the tests that compose the composite score were summed, and the cumulative frequency distribution of this new score was calculated. The module indexes and Screening Domain scores were scaled by the conversion of the cumulative frequency distribution of the summed scores to a normalized standard score scale with a mean of 100 and a standard deviation of 15. The Total NAB Index was calculated as the sum of the five module indexes; therefore, each module contributes equally to the Total NAB Index, regardless of the number of tests that compose individual module indexes. An analysis of variance (ANOVA) confirmed the similarity of mean performance across the normative table groupings.

Derivation of Screening Domain and Total Screening Index Scores

Table 4.39 presents the Screening test composition of the Screening Domain scores and the Total Screening Index score. Screening Domain scores were calculated in the following manner. For each participant in the demographically corrected standardization sample, the actual *T* scores on the tests that compose the composite score were summed, and the cumulative frequency distribution of this new score was calculated. The Screening Domain scores were scaled by the conversion of the cumulative frequency distribution of the summed scores to a normalized standard score scale with a mean of 100 and a standard deviation of 15. The Total Screening Index was calculated as the sum of the five Screening Domain scores; therefore, each functional domain contributes equally to the Total Screening Index, regardless of the number of tests that compose individual Screening Domain scores. An analysis of variance (ANOVA) confirmed the similarity of mean performance across the normative table groupings.

Table 4.26
Percentages of Demographically Corrected Standardization Participants Obtaining Scores Within Suggested Clinically Relevant *T*-Score Ranges for Screening Module Primary *T* Scores

		Range of performance								
		Impaired range						Nonimpaired range		
		Severe	Moderate-to-severe	Moderate	Mild-to-moderate	Mild	Total impaired	Below average	Average	Above average
***T*-score range**		0–19	20–24	25–29	30–34	35–39	0–39	40–44	45–54	≥55
% predicted from normal distribution		0.1	0.4	1.5	4.0	8.6	14.6	14.4	38.2	32.8
Test	**Acronym**	% of NAB participants						% of NAB participants		
Screening Digits Forward	S-DGF	0.2	0.5	1.7	4.7	8.4	15.5	14.1	37.8	32.6
Screening Digits Backward	S-DGB	0.1	0.7	2.1	4.6	7.7	15.2	11.3	40.6	32.8
Screening Numbers & Letters Part A Speed	S-N&L$_A$–spd	0.0	0.6	2.9	4.1	6.8	14.4	14.5	38.9	32.2
Screening Numbers & Letters Part A Errors	S-N&L$_A$–err	2.3	0.9	2.3	4.0	4.5	14.0	7.4	34.8	43.7
Screening Numbers & Letters Part A Efficiency	S-N&L$_A$–eff	0.0	0.5	2.5	3.9	8.4	15.3	14.0	38.0	32.7
Screening Numbers & Letters Part B Efficiency	S-N&L$_B$–eff	0.1	0.1	1.5	4.5	8.4	14.6	15.0	39.4	31.0
Screening Auditory Comprehension	S-AUD	5.2	0.9	1.0	1.3	2.1	10.5	2.8	56.7	30.0
Screening Naming	S-NAM	3.1	1.8	2.6	2.5	3.9	13.9	3.0	42.3	40.8
Screening Shape Learning Immediate Recognition	S-SHL–irg	0.0	0.6	1.3	5.9	6.8	14.6	17.7	32.8	34.9
Screening Shape Learning Delayed Recognition	S-SHL–drg	0.0	0.3	1.9	6.3	5.5	14.0	18.4	34.0	33.7
Screening Story Learning Immediate Recall	S-STL–irc	0.2	1.0	2.1	3.7	9.1	16.1	13.3	34.9	35.8
Screening Story Learning Delayed Recall	S-STL–drc	0.1	0.8	1.9	3.8	8.7	15.3	13.7	37.2	33.8
Screening Visual Discrimination	S-VIS	1.2	1.1	3.1	4.4	5.6	15.4	9.5	30.1	45.0
Screening Design Construction	S-DES	0.1	0.5	1.4	4.2	10.1	16.3	13.7	38.4	31.6
Screening Mazes	S-MAZ	0.7	1.1	1.9	3.8	8.4	15.9	12.5	35.6	35.9
Screening Word Generation	S-WGN	0.0	0.4	1.5	3.7	8.9	14.5	14.9	38.5	32.0

Note. N = 1,448.

Table 4.27
Percentages of Demographically Corrected Standardization Participants Obtaining Scores Within Suggested Clinically Relevant *T*-Score Ranges for Attention Module Primary *T* Scores

		Range of performance								
		Impaired range						Nonimpaired range		
		Severe	Moderate-to-severe	Moderate	Mild-to-moderate	Mild	Total impaired	Below average	Average	Above average
T-score range		0–19	20–24	25–29	30–34	35–39	0–39	40–44	45–54	≥55
% predicted from normal distribution		0.1	0.4	1.5	4.0	8.6	14.6	14.4	38.2	32.8
Test	**Acronym**	% of NAB participants						% of NAB participants		
Digits Forward	DGF	0.2	0.5	1.7	4.7	8.4	15.5	14.1	37.8	32.6
Digits Backward	DGB	0.1	0.7	2.1	4.6	7.7	15.2	11.3	40.6	32.8
Dots	DOT	0.2	1.0	1.9	4.0	7.4	14.5	13.7	38.6	33.3
Numbers & Letters Part A Speed	N&L$_A$–spd	0.2	0.6	1.8	4.2	8.1	14.9	14.9	36.7	33.5
Numbers & Letters Part A Errors	N&L$_A$–err	0.5	0.5	2.1	4.1	8.4	15.6	14.4	33.3	36.9
Numbers & Letters Part A Efficiency	N&L$_A$–eff	0.1	0.6	1.6	4.1	8.1	14.5	15.2	36.5	33.8
Numbers & Letters Part B Efficiency	N&L$_B$–eff	0.1	0.8	2.1	4.1	8.4	15.5	13.5	37.5	33.4
Numbers & Letters Part C Efficiency	N&L$_C$–eff	0.0	0.2	1.8	4.6	9.5	16.1	14.1	38.0	31.8
Numbers & Letters Part D Efficiency	N&L$_D$–eff	0.1	0.4	1.3	4.8	8.3	14.9	14.8	37.8	32.3
Numbers & Letters Part D Disruption	N&L$_D$–dis	0.1	0.6	1.5	4.1	7.9	14.2	15.2	37.2	33.4
Driving Scenes	DRV	0.4	1.0	1.7	3.5	8.6	15.2	14.4	36.1	34.3

Note. N = 1,448.

Table 4.28
Percentages of Demographically Corrected Standardization Participants Obtaining Scores Within Suggested Clinically Relevant *T*-Score Ranges for Language Module Primary *T* Scores

		Range of performance								
		Impaired range						Nonimpaired range		
		Severe	Moderate-to-severe	Moderate	Mild-to-moderate	Mild	Total impaired	Below average	Average	Above average
T-score range		0-19	20-24	25-29	30-34	35-39	0-39	40-44	45-54	≥55
% predicted from normal distribution		0.1	0.4	1.5	4.0	8.6	14.6	14.4	38.2	32.8
Test	**Acronym**	% of NAB participants						% of NAB participants		
Oral Production	OPD	0.1	0.7	1.7	3.2	9.9	15.6	13.5	37.1	33.7
Auditory Comprehension	AUD	1.7	1.3	2.8	4.6	5.5	15.9	7.2	27.7	49.3
Naming	NAM	1.9	1.5	2.5	3.9	6.6	16.4	8.8	28.9	45.9
Writing	WRT	1.3	1.5	2.3	3.9	7.0	16.0	11.2	25.5	47.3
Bill Payment	BIL	1.6	1.4	2.1	3.5	7.0	15.6	8.9	29.3	46.3

Note. N = 1,448.

Table 4.29
Percentages of Demographically Corrected Standardization Participants Obtaining Scores Within Suggested Clinically Relevant *T*-Score Ranges for Memory Module Primary *T* Scores

		Range of performance								
		Impaired range						Nonimpaired range		
		Severe	Moderate-to-severe	Moderate	Mild-to-moderate	Mild	Total impaired	Below average	Average	Above average
***T*-score range**		0-19	20-24	25-29	30-34	35-39	0-39	40-44	45-54	≥55
% predicted from normal distribution		0.1	0.4	1.5	4.0	8.6	14.6	14.4	38.2	32.8
Test	**Acronym**	% of NAB participants						% of NAB participants		
List Learning List A Immediate Recall	LLA–irc	0.5	0.6	1.9	3.2	8.7	14.9	14.7	38.4	32.0
List Learning List B Immediate Recall	LLB–irc	0.2	0.7	1.9	4.1	8.5	15.4	14.2	36.0	34.3
List Learning List A Short Delayed Recall	LLA–sd:drc	0.5	0.6	2.6	3.2	8.1	15.0	13.1	37.6	34.4
List Learning List A Long Delayed Recall	LLA–ld:drc	0.2	0.7	2.1	4.5	8.2	15.7	12.6	35.8	35.9
Shape Learning Immediate Recognition	SHL–irg	0.3	0.8	1.7	3.4	9.5	15.7	13.5	36.0	34.8
Shape Learning Delayed Recognition	SHL–drg	0.3	0.5	2.4	3.9	8.4	15.5	14.0	34.3	36.3
Story Learning Phrase Unit Immediate Recall	STL–irc:phu	0.1	0.5	1.8	3.9	8.5	14.8	13.5	38.3	33.4
Story Learning Phrase Unit Delayed Recall	STL–drc:phu	0.1	0.7	1.9	3.9	6.9	13.5	16.0	37.6	32.9
Daily Living Memory Immediate Recall	DLM–irc	0.2	0.7	1.7	3.9	8.7	15.2	15.7	34.8	34.4
Daily Living Memory Delayed Recall	DLM–drc	1.5	0.9	2.2	3.7	7.0	15.3	13.0	31.5	40.3

Note. N = 1,448.

Table 4.30

Percentages of Demographically Corrected Standardization Participants Obtaining Scores Within Suggested Clinically Relevant *T*-Score Ranges for Spatial Module Primary *T* Scores

		Range of performance								
		Impaired range						Nonimpaired range		
		Severe	Moderate-to-severe	Moderate	Mild-to-moderate	Mild	Total impaired	Below average	Average	Above average
T-score range		0-19	20-24	25-29	30-34	35-39	0-39	40-44	45-54	≥55
% predicted from normal distribution		0.1	0.4	1.5	4.0	8.6	14.6	14.4	38.2	32.8
Test	**Acronym**	% of NAB participants						% of NAB participants		
Visual Discrimination	VIS	0.3	1.4	2.4	3.8	8.8	16.7	11.5	31.1	40.5
Design Construction	DES	0.2	1.0	1.7	3.7	8.4	15.0	13.6	39.2	32.1
Figure Drawing Copy	FGD–cpy	0.1	0.3	1.5	3.9	9.0	14.8	15.0	37.6	32.5
Figure Drawing Copy Organization	FGD–cpy:org	0.2	0.8	2.7	4.2	10.4	18.3	14.4	32.5	34.7
Figure Drawing Immediate Recall	FGD–irc	0.1	0.5	1.8	4.4	7.7	14.5	14.5	37.5	33.6
Map Reading	MAP	0.1	0.6	1.5	4.9	7.9	15.0	14.9	38.4	31.8

Note. N = 1,448.

Table 4.31

Percentages of Demographically Corrected Standardization Participants Obtaining Scores Within Suggested Clinically Relevant *T*-Score Ranges for Executive Functions Module Primary *T* Scores

		Range of performance								
		Impaired range						Nonimpaired range		
		Severe	Moderate-to-severe	Moderate	Mild-to-moderate	Mild	Total impaired	Below average	Average	Above average
T-score range		0-19	20-24	25-29	30-34	35-39	0-39	40-44	45-54	≥55
% predicted from normal distribution		0.1	0.4	1.5	4.0	8.6	14.6	14.4	38.2	32.8
Test	**Acronym**	% of NAB participants						% of NAB participants		
Mazes	MAZ	0.2	0.5	1.5	3.7	9.6	15.5	14.0	38.6	31.9
Judgment	JDG	0.2	0.8	1.7	3.7	8.9	15.3	12.2	39.8	32.7
Categories	CAT	0.2	0.3	1.4	5.4	7.9	15.2	14.3	37.3	33.2
Word Generation	WGN	0.1	0.6	1.2	3.5	9.3	14.7	14.6	38.5	32.3

Note. N = 1,448.

Table 4.32
Percentages of Variance in Screening Module
Primary *T* Scores Accounted for by Demographic Variables

Test	Acronym	Demographic variable (% variance)		
		Age	Education	Sex
Screening Digits Forward	S-DGF	0.0	0.0	0.0
Screening Digits Backward	S-DGB	0.0	0.0	0.0
Screening Numbers & Letters Part A Speed	S-N&L$_A$–spd	0.0	0.0	0.0
Screening Numbers & Letters Part A Errors	S-N&L$_A$–err	0.1	0.0	0.0
Screening Numbers & Letters Part A Efficiency	S-N&L$_A$–eff	0.0	0.0	0.0
Screening Numbers & Letters Part B Efficiency	S-N&L$_B$–eff	0.0	0.0	0.0
Screening Auditory Comprehension	S-AUD	0.0	0.1	0.2
Screening Naming	S-NAM	0.0	0.0	0.0
Screening Shape Learning Immediate Recognition	S-SHL–irg	0.0	0.0	0.0
Screening Shape Learning Delayed Recognition	S-SHL–drg	0.0	0.0	0.0
Screening Story Learning Immediate Recall	S-STL–irc	0.1	0.1	0.0
Screening Story Learning Delayed Recall	S-STL–drc	0.0	0.0	0.0
Screening Visual Discrimination	S-VIS	0.0	0.0	0.0
Screening Design Construction	S-DES	0.0	0.0	0.0
Screening Mazes	S-MAZ	0.1	0.0	0.0
Screening Word Generation	S-WGN	0.0	0.1	0.0

Note. *N* = 1,448.

Table 4.33
Percentages of Variance in Attention Module
Primary *T* Scores Accounted for by Demographic Variables

Test	Acronym	Demographic variable (% variance)		
		Age	Education	Sex
Digits Forward	DGF	0.0	0.0	0.0
Digits Backward	DGB	0.0	0.0	0.0
Dots	DOT	0.0	0.0	0.0
Numbers & Letters Part A Speed	N&L$_A$–spd	0.0	0.0	0.0
Numbers & Letters Part A Errors	N&L$_A$–err	0.0	0.0	0.0
Numbers & Letters Part A Efficiency	N&L$_A$–eff	0.0	0.0	0.0
Numbers & Letters Part B Efficiency	N&L$_B$–eff	0.0	0.0	0.0
Numbers & Letters Part C Efficiency	N&L$_C$–eff	0.0	0.0	0.0
Numbers & Letters Part D Efficiency	N&L$_D$–eff	0.0	0.0	0.0
Numbers & Letters Part D Disruption	N&L$_D$–dis	0.0	0.1	0.0
Driving Scenes	DRV	0.1	0.0	0.0

Note. *N* = 1,448.

Table 4.34
Percentages of Variance in Language Module
Primary *T* Scores Accounted for by Demographic Variables

Test	Acronym	Demographic variable (% variance)		
		Age	Education	Sex
Oral Production	OPD	0.0	0.0	0.0
Auditory Comprehension	AUD	0.3	0.0	0.0
Naming	NAM	0.0	0.0	0.0
Writing	WRT	0.1	0.0	0.0
Bill Payment	BIL	0.0	0.1	0.0

Note. N = 1,448.

Table 4.35
Percentages of Variance in Memory Module
Primary *T* Scores Accounted for by Demographic Variables

Test	Acronym	Demographic variable (% variance)		
		Age	Education	Sex
List Learning List A Immediate Recall	LLA–irc	0.0	0.0	0.0
List Learning List B Immediate Recall	LLB–irc	0.0	0.0	0.0
List Learning List A Short Delayed Recall	LLA–sd:drc	0.0	0.2	0.0
List Learning List A Long Delayed Recall	LLA–ld:drc	0.0	0.1	0.0
Shape Learning Immediate Recognition	SHL–irg	0.0	0.0	0.0
Shape Learning Delayed Recognition	SHL–drg	0.0	0.0	0.0
Story Learning Phrase Unit Immediate Recall	STL–irc:phu	0.0	0.0	0.0
Story Learning Phrase Unit Delayed Recall	STL–drc:phu	0.0	0.0	0.0
Daily Living Memory Immediate Recall	DLM–irc	0.0	0.1	0.0
Daily Living Memory Delayed Recall	DLM–drc	0.1	0.0	0.0

Note. N = 1,448.

Table 4.36
Percentages of Variance in Spatial Module
Primary *T* Scores Accounted for by Demographic Variables

Test	Acronym	Demographic variable (% variance)		
		Age	Education	Sex
Visual Discrimination	VIS	0.0	0.0	0.0
Design Construction	DES	0.0	0.1	0.0
Figure Drawing Copy	FGD–cpy	0.0	0.0	0.0
Figure Drawing Copy Organization	FGD–cpy:org	0.0	0.0	0.0
Figure Drawing Immediate Recall	FGD–irc	0.1	0.0	0.0
Map Reading	MAP	0.0	0.0	0.0

Note. N = 1,448.

Table 4.37
Percentages of Variance in Executive Functions Module
Primary *T* Scores Accounted for by Demographic Variables

Test	Acronym	Demographic variable (% variance)		
		Age	Education	Sex
Mazes	MAZ	0.0	0.0	0.0
Judgment	JDG	0.1	0.0	0.0
Categories	CAT	0.0	0.1	0.0
Word Generation	WGN	0.0	0.1	0.0

Note. N = 1,448.

Categorical Norms for Secondary and Descriptive Scores

Secondary Score Percentiles

The most parsimonious manner for presentation of the normative characteristics of the NAB secondary scores was determined by statistical and graphical methods. The distributional characteristics of the scores, in particular the skewness and kurtosis, were examined. The percentages of variance in secondary test raw scores attributable to age, education, and sex were calculated to determine the need to present normative data separately by these characteristics. In addition, raw scores were plotted across age and education and separately for sex to gauge changes in raw scores as a function of these demographic characteristics. On the basis of these analyses, normative data for secondary scores are presented by form for the following age groups: 18-29, 30-39, 40-49, 50-59, 60-64, 65-69, 70-74, 75-79, and 80-97 years. Note that a majority of the individuals in the oldest age group were less than 90 years of age. Percentiles are derived scores that indicate the percentage of scores that occur at or below a particular raw score. All secondary scores are scaled so that higher percentiles reflect better performance.

Descriptive Score Cumulative Percentages

The most parsimonious manner for presentation of the normative characteristics of the NAB descriptive scores was also determined by statistical and graphical methods. The distributional characteristics of the scores, in particular the skewness and kurtosis, were examined, as were the percentages of variance attributable to demographic characteristics. Raw scores were plotted across age and education and separately for sex to gauge changes in raw scores as a function of these demographic characteristics. By definition, descriptive scores have highly skewed and/or restricted score distributions. On the basis of these analyses, normative data for descriptive scores are presented for the overall standardization sample and not separately by age, education, or sex.

Normative data are presented as cumulative percentages derived from the entire sample of 1,448 individuals. Cumulative percentages represent the proportion of individuals in the demographically corrected standardization sample who scored at or below the respective raw scores. Higher cumulative percentages reflect better performance for all scores except List Learning Perseverations (LL–psv) and List Learning Intrusions (LL–int). For these two scores, higher cumulative percentages reflect poorer performance.

AGE-BASED, U.S. CENSUS-MATCHED NORMATIVE DATA

Derivation of Test *T* Scores

The Age-based, U.S. Census-matched sample was developed to closely match the proportions of the current population of the U.S. with respect to education, sex, race/ethnicity, and geographic region in each age group. As such, it would not be appropriate to "correct" for these demographic characteristics because the purpose of norms based on this sample is the interpretation of an individual's NAB performance relative to that of the U.S. population. The method of continuous norming was also used to derive the NAB age-based, U.S. Census-matched norms. First, polynomial regression was used to determine the lines or curves of best fit for the progression of means and standard deviations for the following age groups: 18-29, 30-39, 40-49, 50-59, 60-64, 65-69, 70-74, 75-79, and 80-97 years. The *z* scores derived from the equipercentile equating progress were used as the dependent variables. The means and standard deviations of *z* scores for each normative variable group were calculated. *T* scores were computed from these values and checked for accuracy.

Tables 4.40 through 4.45 present the percentages of the U.S. Census-matched standardization sample participants scoring in one of seven *T*-score ranges, the percentages in each range that would be expected given a perfectly normal

Table 4.38
NAB Test Composition of Index and Total Battery Scores

Module Index score	Component scores
Attention Index (ATT)	Digits Forward (DGF)
	Digits Backward (DGB)
	Dots (DOT)
	Numbers & Letters Part A Efficiency (N&L$_A$–eff)
	Numbers & Letters Part B Efficiency (N&L$_B$–eff)
	Numbers & Letters Part C Efficiency (N&L$_C$–eff)
	Numbers & Letters Part D Efficiency (N&L$_D$–eff)
	Driving Scenes (DRV)
Language Index (LAN)	Oral Production (OPD)
	Auditory Comprehension (AUD)
	Naming (NAM)
	Writing (WRT)
	Bill Payment (BIL)
Memory Index (MEM)	List Learning List A Immediate Recall (LLA–irc)
	List Learning List B Immediate Recall (LLB–irc)
	List Learning List A Short Delayed Recall (LLA–sd:drc)
	List Learning List A Long Delayed Recall (LLA–ld:drc)
	Shape Learning Immediate Recognition (SHL–irg)
	Shape Learning Delayed Recognition (SHL–drg)
	Story Learning Phrase Unit Immediate Recall (STL–irc:phu)
	Story Learning Phrase Unit Delayed Recall (STL–drc:phu)
	Daily Living Memory Immediate Recall (DLM–irc)
	Daily Living Memory Delayed Recall (DLM–drc)
Spatial Index (SPT)	Visual Discrimination (VIS)
	Design Construction (DES)
	Figure Drawing Copy (FGD–cpy)
	Map Reading (MAP)
Executive Functions Index (EXE)	Mazes (MAZ)
	Judgment (JDG)
	Categories (CAT)
	Word Generation (WGN)
Total NAB Index (T-NAB)	Attention Index (ATT)
	Language Index (LAN)
	Memory Index (MEM)
	Spatial Index (SPT)
	Executive Functions Index (EXE)

Table 4.39
NAB Test Composition of Screening Domain and Total Screening Scores

Domain/Index score	Component scores
Screening Attention Domain (S-ATT)	Screening Digits Forward (S-DGF)
	Screening Digits Backward (S-DGB)
	Screening Numbers & Letters Part A Efficiency (S-N&L$_A$–eff)
	Screening Numbers & Letters Part B Efficiency (S-N&L$_B$–eff)
Screening Language Domain (S-LAN)	Screening Auditory Comprehension (S-AUD)
	Screening Naming (S-NAM)
Screening Memory Domain (S-MEM)	Screening Shape Learning Immediate Recognition (S-SHL–irg)
	Screening Shape Learning Delayed Recognition (S-SHL–drg)
	Screening Story Learning Immediate Recall (S-STL–irc)
	Screening Story Learning Delayed Recall (S-STL–drc)
Screening Spatial Domain (S-SPT)	Screening Visual Discrimination (S-VIS)
	Screening Design Construction (S-DES)
Screening Executive Functions Domain (S-EXE)	Screening Mazes (S-MAZ)
	Screening Word Generation (S-WGN)
Total Screening Index (S-NAB)	Screening Attention Domain (S-ATT)
	Screening Language Domain (S-LAN)
	Screening Memory Domain (S-MEM)
	Screening Spatial Domain (S-SPT)
	Screening Executive Functions Domain (S-EXE)

distribution, and the mean *T* scores and standard deviations. The derived *T* scores closely approximate a normal distribution, and their means and standard deviations are all very close to 50.0 and 10.0, respectively. Tables 4.46 through 4.51 present the percentages of participants in the U.S. Census-matched sample who obtained scores that fall into various clinically relevant interpretive categories. As can be seen from these data, the NAB U.S. Census-matched *T* scores conform to expectations.

Derivation of Module Index and Total NAB Index Scores

NAB Module Index scores were calculated in the following manner. For each participant in the age-based, U.S. Census-matched standardization sample, the actual *T* scores on the tests that compose the composite score were summed, and the cumulative frequency distribution of this new score was calculated. The Module Index and Screening Domain scores were scaled by the conversion of the cumulative frequency distribution of the summed scores to a normalized standard score scale with a mean of 100 and a standard deviation of 15. The Total NAB Index was calculated as the sum

of the five Module Indexes; therefore, each module contributes equally to the Total NAB Index, regardless of the number of tests that compose individual module indexes (see Table 4.38). An analysis of variance (ANOVA) confirmed the similarity of mean performance across the normative table groupings.

Derivation of Screening Domain and Total Screening Index Scores

Screening Domain scores were calculated in the following manner. For each participant in the age-based, U.S. Census-matched standardization sample, the actual *T* scores on the tests that compose the composite score were summed, and the cumulative frequency distribution of this new score was calculated. The Screening Domain scores were scaled by the conversion of the cumulative frequency distribution of the summed scores to a normalized standard score scale with a mean of 100 and a standard deviation of 15. The Total Screening Index was calculated as the sum of the five Screening Domain scores; therefore, each functional domain contributes equally to the Total Screening Index, regardless of the number of tests that compose individual Screening

Table 4.40
Percentages of Age-Based, U.S. Census-Matched Standardization Participants Obtaining Scores Within Seven *T*-Score Ranges for Screening Module Primary *T* Scores

T-score range		0-24	25-34	35-44	45-54	55-64	65-74	≥75		
% predicted from normal distribution		0.5	5.5	22.9	38.2	25.4	6.7	0.7		

Test	Acronym	% of NAB participants							*M*	*SD*
Screening Digits Forward	S-DGF	0.6	6.3	22.6	38.5	23.6	7.8	0.5	50.08	10.04
Screening Digits Backward	S-DGB	0.3	6.4	18.4	42.7	25.3	6.3	0.5	50.01	10.02
Screening Numbers & Letters Part A Speed	S-N&L$_A$–spd	0.7	6.2	19.8	41.2	24.9	6.5	0.6	49.97	9.97
Screening Numbers & Letters Part A Errors	S-N&L$_A$–err	3.6	5.4	11.1	39.4	40.6	0.0	0.0	50.17	9.38
Screening Numbers & Letters Part A Efficiency	S-N&L$_A$–eff	0.6	6.1	20.3	40.2	26.2	5.8	0.7	49.98	10.01
Screening Numbers & Letters Part B Efficiency	S-N&L$_B$–eff	0.2	5.8	23.9	39.2	22.5	7.4	1.1	50.01	9.97
Screening Auditory Comprehension	S-AUD	4.4	2.4	3.8	79.1	10.3	0.0	0.0	50.42	8.14
Screening Naming	S-NAM	4.1	5.8	6.0	42.2	41.9	0.0	0.0	50.39	9.38
Screening Shape Learning Immediate Recognition	S-SHL–irg	0.4	6.5	26.1	34.0	25.7	7.3	0.0	49.96	10.07
Screening Shape Learning Delayed Recognition	S-SHL–drg	0.0	8.4	23.2	35.5	25.4	7.6	0.0	49.99	10.08
Screening Story Learning Immediate Recall	S-STL–irc	0.6	6.9	21.4	37.2	28.4	5.5	0.0	49.96	10.02
Screening Story Learning Delayed Recall	S-STL–drc	0.3	6.2	23.3	37.3	25.7	7.1	0.2	49.98	10.00
Screening Visual Discrimination	S-VIS	2.0	7.9	16.0	28.7	45.4	0.0	0.0	50.00	9.88
Screening Design Construction	S-DES	0.3	5.1	24.6	37.7	23.6	8.5	0.2	49.99	10.01
Screening Mazes	S-MAZ	2.0	4.5	22.8	37.4	28.1	5.1	0.0	49.98	9.89
Screening Word Generation	S-WGN	0.4	5.5	24.1	38.1	22.9	8.3	0.6	50.04	10.08

Note. *N* = 950.

Table 4.41
Percentages of Age-Based, U.S. Census-Matched Standardization Participants Obtaining Scores Within Seven *T*-Score Ranges for Attention Module Primary *T* Scores

T-score range		0-24	25-34	35-44	45-54	55-64	65-74	≥75		
% predicted from normal distribution		0.5	5.5	22.9	38.2	25.4	6.7	0.7		

Test	Acronym	% of NAB participants							*M*	*SD*
Digits Forward	DGF	0.6	6.3	22.6	38.5	23.6	7.8	0.5	50.08	10.04
Digits Backward	DGB	0.3	6.4	18.4	42.7	25.3	6.3	0.5	50.01	10.02
Dots	DOT	1.2	5.3	22.5	37.1	26.5	7.1	0.4	50.00	10.03
Numbers & Letters Part A Speed	N&L$_A$–spd	1.1	5.6	22.7	36.8	27.9	5.4	0.5	49.98	10.01
Numbers & Letters Part A Errors	N&L$_A$–err	1.3	5.7	22.4	34.9	30.9	4.7	0.0	50.02	10.04
Numbers & Letters Part A Efficiency	N&L$_A$–eff	0.8	5.5	22.9	37.4	26.6	6.1	0.6	49.95	10.06
Numbers & Letters Part B Efficiency	N&L$_B$–eff	0.7	6.2	21.6	37.8	27.6	5.4	0.7	49.97	10.10
Numbers & Letters Part C Efficiency	N&L$_C$–eff	0.0	6.5	24.0	36.2	25.7	6.9	0.6	49.95	10.00
Numbers & Letters Part D Efficiency	N&L$_D$–eff	0.6	5.4	23.3	38.4	25.4	5.6	1.4	50.02	10.01
Numbers & Letters Part D Disruption	N&L$_D$–dis	0.5	6.2	22.0	39.7	24.6	6.0	0.9	49.99	10.04
Driving Scenes	DRV	0.9	6.0	22.7	37.3	26.8	5.8	0.4	49.97	10.08

Note. *N* = 950.

Table 4.42

Percentages of Age-Based, U.S. Census-Matched Standardization Participants Obtaining Scores Within Seven _T_-Score Ranges for Language Module Primary _T_ Scores

_T_-score range		0-24	25-34	35-44	45-54	55-64	65-74	≥75		
% predicted from normal distribution		0.5	5.5	22.9	38.2	25.4	6.7	0.7		
Test	**Acronym**	**% of NAB participants**							**_M_**	**_SD_**
Oral Production	OPD	0.3	6.7	22.5	37.8	24.8	7.3	0.5	50.03	10.03
Auditory Comprehension	AUD	2.8	7.3	13.6	18.8	57.5	0.0	0.0	50.11	9.62
Naming	NAM	2.4	7.4	16.7	33.2	39.5	0.8	0.0	50.10	9.86
Writing	WRT	1.8	5.9	20.5	25.5	46.3	0.0	0.0	50.04	9.86
Bill Payment	BIL	2.7	8.1	14.3	28.7	46.1	0.0	0.0	50.05	9.84

Note. N = 950.

Table 4.43

Percentages of Age-Based, U.S. Census-Matched Standardization Participants Obtaining Scores Within Seven _T_-Score Ranges for Memory Module Primary _T_ Scores

_T_-score range		0-24	25-34	35-44	45-54	55-64	65-74	≥75		
% predicted from normal distribution		0.5	5.5	22.9	38.2	25.4	6.7	0.7		
Test	**Acronym**	**% of NAB participants**							**_M_**	**_SD_**
List Learning List A Immediate Recall	LLA–irc	0.9	5.2	22.9	39.1	25.1	6.2	0.6	50.00	10.04
List Learning List B Immediate Recall	LLB–irc	0.2	6.1	24.0	36.5	25.9	7.1	0.2	49.99	10.08
List Learning List A Short Delayed Recall	LLA–sd:drc	1.2	6.0	19.4	40.0	27.3	6.2	0.0	49.99	10.00
List Learning List A Long Delayed Recall	LLA–ld:drc	0.7	6.9	20.6	37.3	27.4	6.7	0.3	49.96	10.04
Shape Learning Immediate Recognition	SHL–irg	1.2	5.9	21.7	36.7	28.1	6.2	0.2	49.99	10.08
Shape Learning Delayed Recognition	SHL–drg	1.5	5.2	21.5	36.2	29.6	6.1	0.0	49.94	10.04
Story Learning Phrase Unit Immediate Recall	STL–irc:phu	0.7	5.8	23.4	36.3	25.9	7.1	0.8	50.01	10.05
Story Learning Phrase Unit Delayed Recall	STL–drc:phu	0.2	5.9	22.6	38.9	24.4	7.1	0.8	49.99	9.99
Daily Living Memory Immediate Recall	DLM–irc	0.7	4.8	23.3	39.3	24.2	7.5	0.2	49.97	10.07
Daily Living Memory Delayed Recall	DLM–drc	1.7	6.7	20.3	30.7	40.5	0.0	0.0	49.96	9.92

Note. N = 950.

Table 4.44
Percentages of Age-Based, U.S. Census-Matched Standardization Participants Obtaining Scores Within Seven *T*-Score Ranges for Spatial Module Primary *T* Scores

T-score range		0-24	25-34	35-44	45-54	55-64	65-74	≥75		
% predicted from normal distribution		0.5	5.5	22.9	38.2	25.4	6.7	0.7		
Test	**Acronym**			**% of NAB participants**					***M***	***SD***
Visual Discrimination	VIS	1.4	7.1	20.7	28.2	41.9	0.7	0.0	50.00	10.03
Design Construction	DES	0.8	5.9	21.6	40.3	24.8	5.9	0.6	50.03	10.05
Figure Drawing Copy	FGD–cpy	0.8	5.8	21.8	38.8	24.6	7.9	0.2	49.99	9.98
Figure Drawing Copy Organization	FGD–cpy:org	0.9	6.9	20.5	37.7	34.0	0.0	0.0	49.99	9.95
Figure Drawing Immediate Recall	FGD–irc	1.2	6.2	20.4	34.2	30.5	7.6	0.0	50.65	10.58
Map Reading	MAP	0.4	5.5	24.7	38.2	22.4	8.0	0.7	49.98	10.03

Note. *N* = 950.

Table 4.45
Percentages of Age-Based, U.S. Census-Matched Standardization Participants Obtaining Scores Within Seven *T*-Score Ranges for Executive Functions Module Primary *T* Scores

T-score range		0-24	25-34	35-44	45-54	55-64	65-74	≥75		
% predicted from normal distribution		0.5	5.5	22.9	38.2	25.4	6.7	0.7		
Test	**Acronym**			**% of NAB participants**					***M***	***SD***
Mazes	MAZ	1.2	5.2	23.5	36.6	26.8	5.9	0.7	50.00	10.01
Judgment	JDG	0.6	5.9	24.0	37.3	25.6	5.6	0.9	50.07	10.01
Categories	CAT	0.3	6.3	21.8	37.9	26.1	6.8	0.6	50.03	10.05
Word Generation	WGN	0.6	6.1	21.4	38.7	25.4	6.8	0.9	49.99	10.10

Note. *N* = 950.

Domain scores (see Table 4.39). An analysis of variance (ANOVA) confirmed the similarity of mean performance across the normative table groupings.

Categorical Norms for Secondary and Descriptive Scores

Secondary Score Percentiles

Percentiles for the secondary scores in the age-based, U.S. Census-matched standardization sample were calculated in the same manner as they were for the demographically corrected sample. The distributional characteristics of the scores, in particular the skewness and kurtosis, were examined. The percentages of variance in secondary test raw scores attributable to age, education, and sex were calculated to determine the need to present normative data separately by these characteristics. In addition, raw scores were plotted across age and education and separately for sex to gauge

changes in raw scores as a function of these demographic characteristics. On the basis of these analyses, normative data for secondary scores are presented by form for the following age groups: 18-29, 30-39, 40-49, 50-59, 60-64, 65-69, 70-74, 75-79, and 80-97 years. Note that a majority of the individuals in the oldest age group were less than 90 years of age. Percentiles are derived scores that indicate the percentage of scores that occur at or below a particular raw score. All secondary scores are scaled so that higher percentiles reflect better performance.

Descriptive Score Cumulative Percentages

Cumulative percentages for the secondary scores in the age-based, U.S. Census-matched standardization sample were calculated in the same manner as they were for the demographically corrected sample. The distributional characteristics of the scores, in particular the skewness and kurtosis, were examined, as were the percentages of variance

attributable to demographic characteristics. Raw scores were plotted across age and education and separately for sex to gauge changes in raw scores as a function of these demographic characteristics. By definition, descriptive scores have highly skewed and/or restricted score distributions. On the basis of these analyses, normative data for descriptive scores are presented for the overall standardization sample. Normative data are presented as cumulative percentages derived from the entire sample of 950 individuals. Cumulative percentages represent the proportion of individuals in the census-matched standardization sample who scored at or below the respective raw scores. Higher cumulative percentages reflect better performance for all scores except List Learning Perseverations (LL–psv) and List Learning Intrusions (LL–int). For these two scores, higher cumulative percentages reflect poorer performance.

NAB Performance by Level of Estimated Intelligence

Some referral questions may require the clinician to interpret an individual's NAB test performance data relative to his or her level of psychometric intelligence. Participants in the NAB standardization sample also completed the Reynolds Intellectual Screening Test (RIST; Reynolds & Kamphaus, 2003; see chapter 6 for additional information on the RIST). To facilitate this type of score interpretation, Tables B.1 through B.6 in Appendix B present means and standard deviations of NAB Form 1 module raw scores by five levels of estimated intelligence (RIST Index score): ≤79, 80-89, 90-109, 110-119, and ≥120. Tables B.7 through B.12 in Appendix B present means and standard deviations of NAB Form 2 module raw scores by these five levels of estimated intelligence.

Table 4.46
Percentages of Age-Based, U.S. Census-Matched Standardization Participants Obtaining Scores Within Suggested Clinically Relevant *T*-Score Ranges for Screening Module Primary *T* Scores

| | | Range of performance | | | | | | | | |
| | | Impaired range | | | | | | Nonimpaired range | | |
Test	Acronym	Severe	Moderate-to-severe	Moderate	Mild-to-moderate	Mild	Total impaired	Below average	Average	Above average
T-score range		0-19	20-24	25-29	30-34	35-39	0-39	40-44	45-54	≥55
% predicted from normal distribution		0.1	0.4	1.5	4.0	8.6	14.6	14.4	38.2	32.8
		% of NAB participants						% of NAB participants		
Screening Digits Forward	S-DGF	0.2	0.4	1.5	4.8	6.3	13.2	16.3	38.5	31.9
Screening Digits Backward	S-DGB	0.0	0.3	2.3	4.1	9.3	16.0	9.2	42.7	32.1
Screening Numbers & Letters Part A Speed	S-N&L$_A$–spd	0.0	0.7	2.2	4.0	5.5	12.4	14.3	41.2	32.1
Screening Numbers & Letters Part A Errors	S-N&L$_A$–err	2.1	1.5	1.9	3.5	4.2	13.2	6.8	39.4	40.6
Screening Numbers & Letters Part A Efficiency	S-N&L$_A$–eff	0.0	0.6	2.2	3.9	7.4	14.1	12.9	40.2	32.7
Screening Numbers & Letters Part B Efficiency	S-N&L$_B$–eff	0.1	0.1	1.5	4.3	7.4	13.4	16.5	39.2	30.9
Screening Auditory Comprehension	S-AUD	3.1	1.4	1.4	1.1	2.6	9.6	1.2	79.1	10.3
Screening Naming	S-NAM	2.6	1.5	2.4	3.4	2.8	12.7	3.2	42.2	41.9
Screening Shape Learning Immediate Recognition	S-SHL–irg	0.0	0.4	1.8	4.7	7.8	14.7	18.3	34.0	32.9
Screening Shape Learning Delayed Recognition	S-SHL–drg	0.0	0.0	2.5	5.9	5.2	13.6	18.0	35.5	32.9
Screening Story Learning Immediate Recall	S-STL–irc	0.0	0.6	1.9	5.1	8.2	15.8	13.2	37.2	33.9
Screening Story Learning Delayed Recall	S-STL–drc	0.0	0.3	2.1	4.1	8.4	14.9	14.8	37.3	32.9
Screening Visual Discrimination	S-VIS	1.1	0.9	2.5	5.4	6.2	16.1	9.8	28.7	45.4
Screening Design Construction	S-DES	0.0	0.3	1.4	3.7	9.7	15.1	14.8	37.7	32.3
Screening Mazes	S-MAZ	0.5	1.5	1.7	2.9	7.6	14.2	15.2	37.4	33.2
Screening Word Generation	S-WGN	0.0	0.4	1.5	4.0	9.6	15.5	14.5	38.1	31.9

Note. N = 950.

Table 4.47

Percentages of Age-Based, U.S. Census-Matched Standardization Participants Obtaining Scores Within Suggested Clinically Relevant T-Score Ranges for Attention Module Primary T Scores

		Range of performance								
		Impaired range						Nonimpaired range		
		Severe	Moderate-to-severe	Moderate	Mild-to-moderate	Mild	Total impaired	Below average	Average	Above average
T-score range		0-19	20-24	25-29	30-34	35-39	0-39	40-44	45-54	≥55
% predicted from normal distribution		0.1	0.4	1.5	4.0	8.6	14.6	14.4	38.2	32.8
Test	**Acronym**	% of NAB participants						% of NAB participants		
Digits Forward	DGF	0.2	0.4	1.5	4.8	6.3	13.2	16.3	38.5	31.9
Digits Backward	DGB	0.0	0.3	2.3	4.1	9.3	16.0	9.2	42.7	32.1
Dots	DOT	0.2	0.9	1.9	3.4	8.2	14.6	14.3	37.1	34.0
Numbers & Letters Part A Speed	N&L$_A$–spd	0.3	0.7	1.3	4.3	8.2	14.8	14.5	36.8	33.8
Numbers & Letters Part A Errors	N&L$_A$–err	0.3	0.9	1.8	3.9	7.7	14.6	14.7	34.9	35.7
Numbers & Letters Part A Efficiency	N&L$_A$–eff	0.4	0.4	1.5	4.0	8.5	14.8	14.4	37.4	33.4
Numbers & Letters Part B Efficiency	N&L$_B$–eff	0.2	0.5	1.9	4.3	8.5	15.4	13.1	37.8	33.7
Numbers & Letters Part C Efficiency	N&L$_C$–eff	0.0	0.0	1.6	4.9	8.7	15.2	15.3	36.2	33.3
Numbers & Letters Part D Efficiency	N&L$_D$–eff	0.2	0.4	0.8	4.5	8.2	14.1	15.1	38.4	32.3
Numbers & Letters Part D Disruption	N&L$_D$–dis	0.0	0.5	2.2	4.0	7.3	14.0	14.7	39.7	31.6
Driving Scenes	DRV	0.5	0.4	2.3	3.7	7.5	14.4	15.3	37.3	33.1

Note. N = 950.

Table 4.48
Percentages of Age-Based, U.S. Census-Matched Standardization Participants Obtaining Scores Within Suggested Clinically Relevant *T*-Score Ranges for Language Module Primary *T* Scores

		Range of performance								
		Impaired range						Nonimpaired range		
		Severe	Moderate-to-severe	Moderate	Mild-to-moderate	Mild	Total impaired	Below average	Average	Above average
***T*-score range**		0-19	20-24	25-29	30-34	35-39	0-39	40-44	45-54	≥55
% predicted from normal distribution		0.1	0.4	1.5	4.0	8.6	14.6	14.4	38.2	32.8
Test	**Acronym**	% of NAB participants						% of NAB participants		
Oral Production	OPD	0.1	0.2	1.6	5.2	7.9	15.0	14.6	37.8	32.6
Auditory Comprehension	AUD	1.4	1.5	2.6	4.6	6.6	16.7	7.0	18.8	57.5
Naming	NAM	1.2	1.3	3.1	4.3	5.3	15.2	11.5	33.2	40.3
Writing	WRT	1.1	0.7	3.3	2.6	9.7	17.4	10.8	25.5	46.3
Bill Payment	BIL	1.2	1.6	2.7	5.4	4.3	15.2	10.0	28.7	46.1

Note. N = 950.

Table 4.49

Percentages of Age-Based, U.S. Census-Matched Standardization Participants Obtaining Scores Within Suggested Clinically Relevant *T*-Score Ranges for Memory Module Primary *T* Scores

		Range of performance								
		Impaired range						Nonimpaired range		
		Severe	Moderate-to-severe	Moderate	Mild-to-moderate	Mild	Total impaired	Below average	Average	Above average
Test	**Acronym**	0-19	20-24	25-29	30-34	35-39	0-39	40-44	45-54	≥55
T-score range										
% predicted from normal distribution		0.1	0.4	1.5	4.0	8.6	14.6	14.4	38.2	32.8
		% of NAB participants						% of NAB participants		
List Learning List A Immediate Recall	LLA–irc	0.4	0.5	1.3	3.9	7.7	13.8	15.3	39.1	31.9
List Learning List B Immediate Recall	LLB–irc	0.0	0.2	2.3	3.8	8.6	14.9	15.4	36.5	33.2
List Learning List A Short Delayed Recall	LLA–sd:drc	0.3	0.8	2.2	3.8	8.1	15.2	11.3	40.0	33.5
List Learning List A Long Delayed Recall	LLA–ld:drc	0.2	0.5	1.2	5.8	10.0	17.7	10.6	37.3	34.4
Shape Learning Immediate Recognition	SHL–irg	0.3	0.8	1.5	4.4	7.8	14.8	13.9	36.7	34.5
Shape Learning Delayed Recognition	SHL–drg	0.2	1.3	1.5	3.7	9.5	16.2	12.0	36.2	35.7
Story Learning Phrase Unit Immediate Recall	STL–irc:phu	0.1	0.6	1.8	4.0	8.3	14.8	15.1	36.3	33.8
Story Learning Phrase Unit Delayed Recall	STL–drc:phu	0.0	0.2	1.6	4.3	8.6	14.7	14.0	38.9	32.3
Daily Living Memory Immediate Recall	DLM–irc	0.0	0.7	2.0	2.8	9.6	15.1	13.7	39.3	31.9
Daily Living Memory Delayed Recall	DLM–drc	0.6	1.1	2.0	4.7	8.3	16.7	12.0	30.7	40.5

Note. N = 950.

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Table 4.50
Percentages of Age-Based, U.S. Census-Matched Standardization Participants Obtaining Scores Within Suggested Clinically Relevant *T*-Score Ranges for Spatial Module Primary *T* Scores

		Range of performance									
		Impaired range						Nonimpaired range		
		Severe	Moderate-to-severe	Moderate	Mild-to-moderate	Mild	Total impaired	Below average	Average	Above average
T-score range		0-19	20-24	25-29	30-34	35-39	0-39	40-44	45-54	≥55
% predicted from normal distribution		0.1	0.4	1.5	4.0	8.6	14.6	14.4	38.2	32.8
		% of NAB participants						% of NAB participants		
Test	**Acronym**									
Visual Discrimination	VIS	0.2	1.2	2.8	4.2	9.6	18.0	11.2	28.2	42.6
Design Construction	DES	0.1	0.7	2.2	3.7	8.1	14.8	13.5	40.3	31.4
Figure Drawing Copy	FGD–cpy	0.2	0.6	0.9	4.9	8.3	14.9	13.5	38.8	32.7
Figure Drawing Copy Organization	FGD–cpy:org	0.2	0.6	1.9	5.0	9.1	16.8	11.4	37.7	34.0
Figure Drawing Immediate Recall	FGD–irc	0.5	0.6	2.2	3.9	8.7	15.9	11.7	34.2	38.0
Map Reading	MAP	0.0	0.4	2.0	3.5	8.3	14.2	16.4	38.2	31.2

Note. N = 950.

Table 4.51
Percentages of Age-Based, U.S. Census-Matched Standardization Participants Obtaining Scores Within Suggested Clinically Relevant *T*-Score Ranges for Executive Functions Module Primary *T* Scores

		Range of performance									
		Impaired range						Nonimpaired range		
		Severe	Moderate-to-severe	Moderate	Mild-to-moderate	Mild	Total impaired	Below average	Average	Above average
T-score range		0-19	20-24	25-29	30-34	35-39	0-39	40-44	45-54	≥55
% predicted from normal distribution		0.1	0.4	1.5	4.0	8.6	14.6	14.4	38.2	32.8
		% of NAB participants						% of NAB participants		
Test	**Acronym**									
Mazes	MAZ	0.3	0.8	1.0	4.2	7.9	14.2	15.6	36.6	33.5
Judgment	JDG	0.1	0.5	2.0	3.9	7.3	13.8	16.8	37.3	32.1
Categories	CAT	0.0	0.3	1.9	4.4	9.2	15.8	12.6	37.9	33.6
Word Generation	WGN	0.2	0.4	0.9	5.2	9.7	16.4	11.7	38.7	33.2

Note. N = 950.