

Education Effects and Base-Rate Information for Delis-Kaplan Executive Function System (D-KEFS) Fluency Measures

B-45

Gordon J. Chelune¹, James Holdnack², and James Levy¹

¹University of Utah, Salt Lake City, UT; ²Harcourt Assessment, San Antonio, TX

BACKGROUND

- Generative fluency is considered an important aspect of executive function, and measures of both verbal and design fluency have been shown to be sensitive to frontal lobe lesions (Baldo et al., 2001)
- Demographic factors, especially age and education, are known to affect phonemic and semantic fluency, as well as design fluency (cf. Ivnik et al., 1996; Lucas et al., 1998; Strauss et al., 2006).
- The Delis-Kaplan Executive Function System (D-KEFS; 2001) is designed to assess several important aspects of executive functions, including verbal and design fluency.
- While the D-KEFS tasks were standardized and co-normed on a large representative US sample of children and adults (n=1750; ages 8-89), demographic corrections are only provided for age, with subjects grouped into 16 age bands.

OBJECTIVES

- To determine the degree to which education affects performance on the Verbal and Design Fluency tasks of the D-KEFS among adults.
- To enhance the diagnostic sensitivity of the age-corrected D-KEFS Fluency scores by providing Education level base-rate tables for each of the Fluency trials and their corresponding discrepancy scores.

METHODS

- Participants** were drawn from the D-KEFS standardization sample (N= 1750), and data were obtained with permission from Harcourt Assessment, Inc. Normal adult subjects ages 20 to 89 (n=875) were stratified into four Education Levels: "Less-than-High School" (n=165), "High School" (n=310), "Some College" (n=225), and "College+/" (n=175).
- Data** consisted of the age-corrected scaled scores for the Verbal Fluency Letter, Category and Switching trials and the Design Fluency Filled, Open and Switching trials.

RESULTS

- Education Level x Age band ANOVAs showed significant education effects for all variables except the discrepancies between Letter-Category and Category-Design Switching. Means by Education Level are presented in Table 1. Table 1 Also presents Spearman correlations between Education Level and age-corrected scaled scores for each of the D-KEFS variables.
- Base rates are presented in Table 2 designating the scaled score at which the bottom 5%, 10% or 15% of the population occurs in a given Education Level. Base rates for the discrepancy scores are presented for unidirectional discrepancies.

Tables

Table 1. Mean Scaled Scores by Education Level and Spearman correlations between Education Level and D-KEFS Fluency Variables

D-KEFS Fluency Variables	< High School n=165	High School n=310	Some College n=225	≥ College n=175	Spearman rho	p
Verbal Fluency						
Letter Fluency	8.11	9.54	10.75	11.81	.356	.000
Category Fluency	8.24	6.67	10.66	11.24	.330	.000
Category Switching	9.00	9.76	10.29	10.77	.160	.000
Design Fluency						
Filled Dots	9.54	9.85	10.48	11.09	.160	.000
Open Dots	9.33	9.76	10.44	10.78	.163	.000
Switching	9.44	9.90	10.48	10.31	.129	.000
Discrepancy Scores						
Letter-Category	-.133	-.130	.160	.566	.076	.025
Letter-Filled Dots	-1.428	-.130	.281	.722	.193	.000
Category-Open Dots	-1.089	-.089	.233	.458	.137	.000
Category Switching-Design Switching	-.486	-.132	-.167	.456	.039	.247

Table 2. Scaled-Score Base Rates by Education Level for the D-KEFS Fluency measures and their associated discrepancy scores.

D-KEFS Variables	Total N=875			< High School n=165			High School n=310			Some College n=225			≥ College n=175		
	5%	10%	15%	5%	10%	15%	5%	10%	15%	5%	10%	15%	5%	10%	15%
Verbal Fluency	<i>Age corrected Scaled Score at which bottom 5%, 10%, or 15% of population falls</i>														
Letter Fluency	5	6	7	3	4	5	5	6	7	6	7	8	7	8	8
Category Fluency	5	6	7	4	5	6	5	6	7	6	7	8	7	8	8
Category Switching	4	5	6	4	5	6	4	5	6	5	6	7	5	6	8
Design Fluency	<i>Age corrected Scaled Score at which bottom 5%, 10%, or 15% of population falls</i>														
Filled Dots	5	6	7	5	6	6	5	6	7	6	7	8	6	8	8
Open Dots	5	6	7	4	5	6	5	6	6	6	7	8	6	7	8
Switching	4	6	7	4	5	6	4	6	7	5	7	7	5	6	7
Discrepancy Scores	<i>Unidirectional differences between Scaled Scores at which 5%, 10%, or 15% of population falls</i>														
Letter-Category	+ 5	4	3	5	4	3	5	4	3	5	3	3	5	4	3
	- 5	-4	-3	-5	-4	-3	-5	-4	-3	-5	-4	-3	-5	-4	-3
Letter-Filled Dots	+ 6	5	4	5	3	3	6	4	3	7	6	4	6	5	5
	- 6	-5	-4	-8	-6	-5	-6	-5	-4	-5	-5	-4	-6	-4	-3
Category-Open Dots	+ 6	5	4	6	4	3	6	5	4	6	5	4	7	5	4
	- 6	-5	-4	-7	-6	-5	-6	-5	-4	-5	-4	-4	-5	-4	-3
Category Switching-Design Switching	+ 7	5	4	6	4	4	7	5	4	7	5	4	8	6	5
	- 7	-5	-4	-7	-5	-4	-7	-6	-5	-6	-5	-4	-7	-4	-4

CONCLUSIONS

- Results indicate that education is significantly associated with performance on the D-KEFS Fluency tasks, especially Letter and Category Fluency. As a result, lower educated individuals may be more likely to be classified as "impaired" on these measures, whereas higher educated individuals may be under classified as being "impaired."
- Base-rate data by Education Level are presented for each of the D-KEFS Fluency trials and their associated discrepancy scores to increase the diagnostic sensitivity and utility of the age-corrected Fluency scaled scores.