

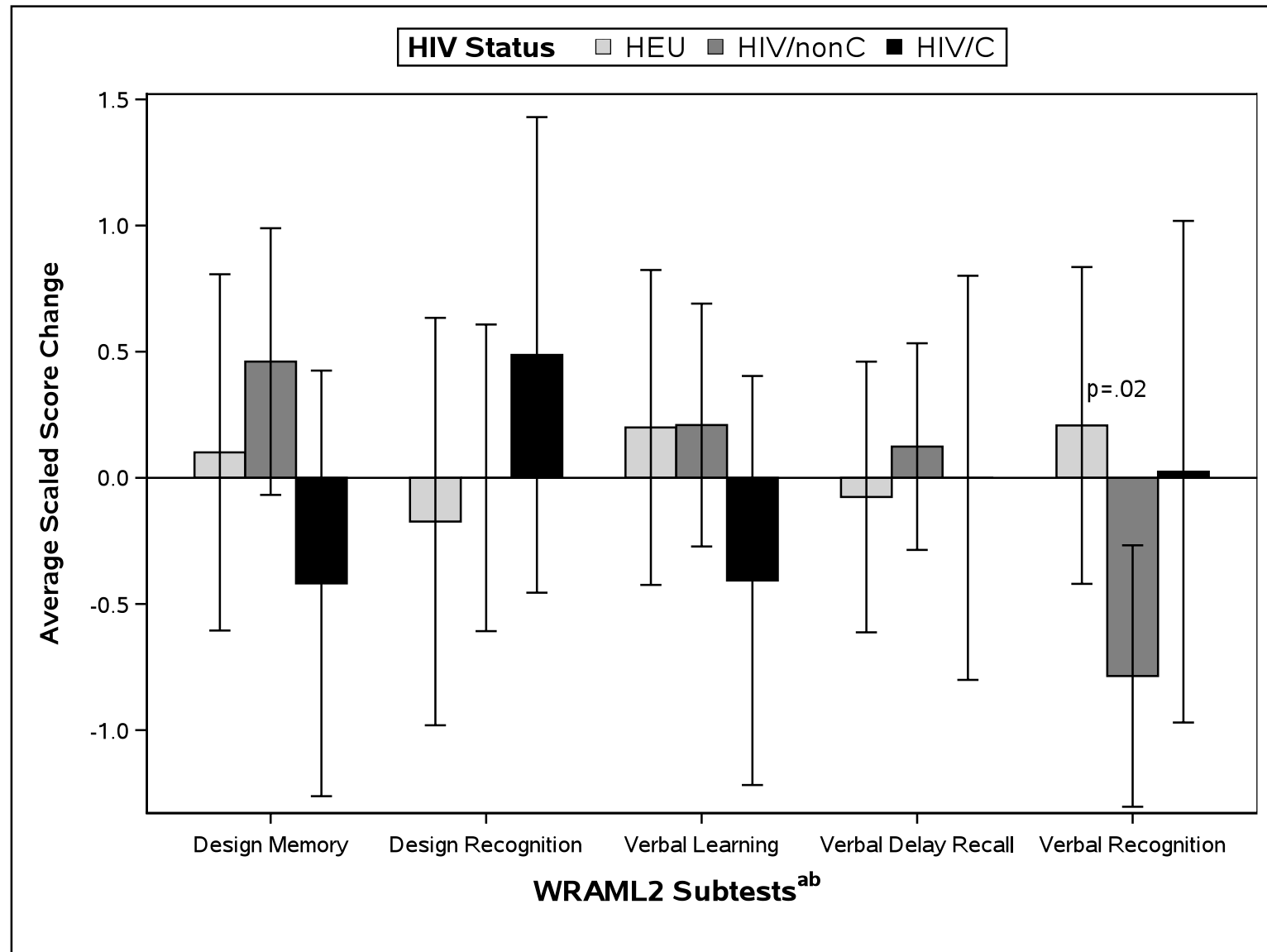
**Legend: Supplemental Figure 1**

**Scaled Score Change in Memory Scores, Baseline to Follow-Up**

Note:

<sup>a</sup> WRAML2 subtest mean=10; SD=3

<sup>b</sup> Scaled score change was adjusted for HIV status and the following covariates: Design Memory: Black race, household income > \$20,000; Verbal Learning: Black race, caregiver is biological parent; Verbal Recognition: Black race, age at study entry.



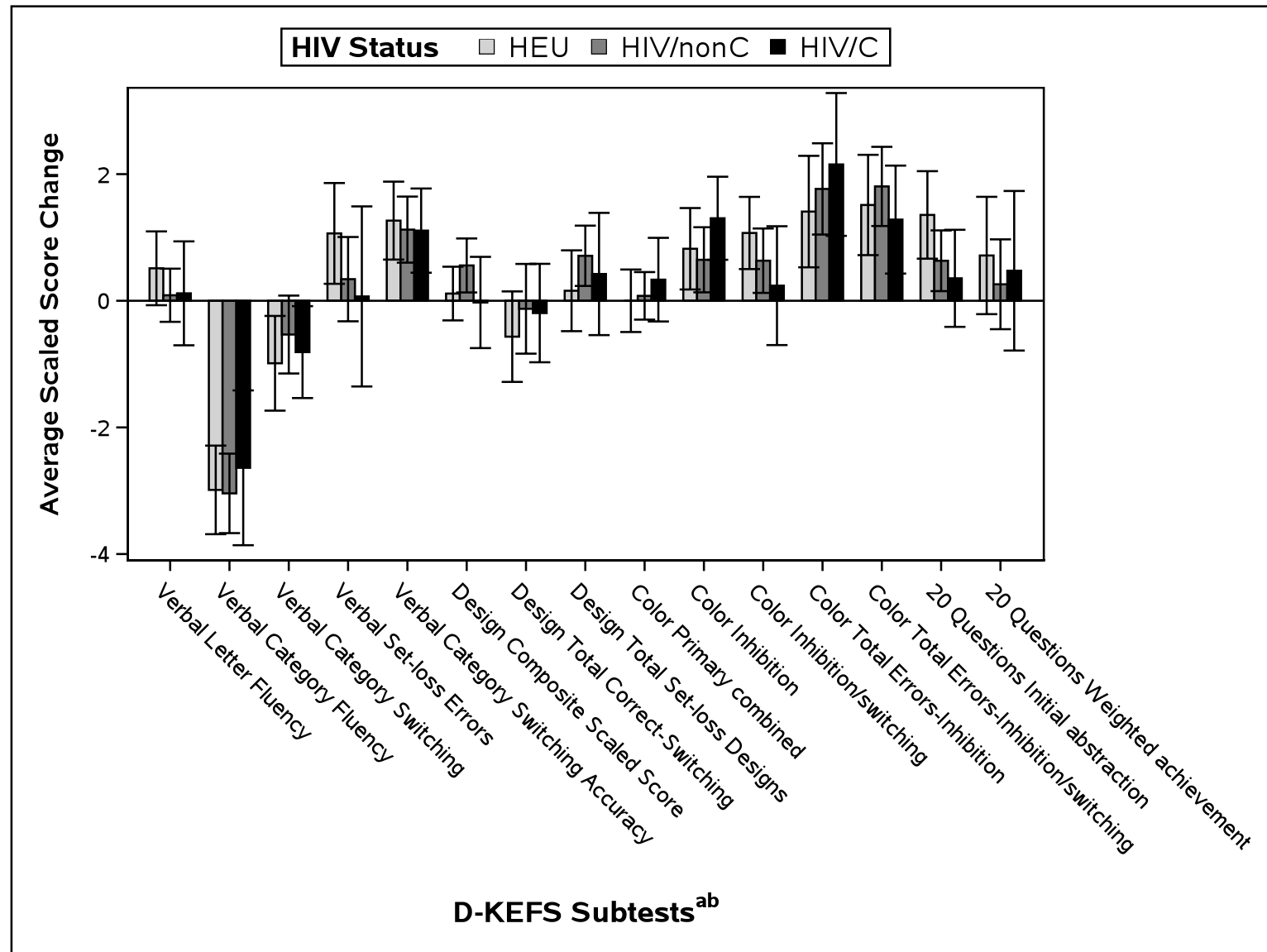
## **Legend: Supplemental Figure 2**

### **Scaled Score Change in Executive Function Scores, Baseline to Follow-up**

Note:

<sup>a</sup> D-KEFS subtest mean=10; SD=3

<sup>b</sup> Scaled score change was adjusted for HIV status and the following covariates: Verbal Letter Fluency: age at study entry; Verbal Category Fluency: age at study entry, male sex; Verbal Fluency Set Loss Errors: Caregiver is biological parent, annual household income > \$20,000; Design Fluency Switching: Hispanic ethnicity; Design Fluency Set Loss Errors: Age at study entry; Color-Word Interference Inhibition: Caregiver is high school graduate; Color-Word Interference Inhibition-Switching: Age at study entry; Color-Word Interference Inhibition Set Loss Errors: Black race, caregiver is high school graduate; Twenty Questions Initial Abstraction: Caregiver is high school graduate; Twenty Questions Weighted Achievement: Age at study entry, annual household income > \$20,000.



## Supplemental Table 1. Measures of Memory and Executive Function

### Wide Range Assessment of Memory and Learning, Second Edition (WRAML2)<sup>38</sup>

The assessment of verbal memory included three subtests from the WRAML2: Verbal Learning, Verbal Delay Recall, and Verbal Recognition. These measures require the examinee to listen to a list of 16 words, read by the examiner at a rate of approximately one word every two seconds, and recall as many words as possible immediately after the presentation. Three additional trials are presented, and after each one, the examinee is asked to recall as many words as possible, including words said before. Examinees are asked to recall the list again after 10-15 minutes of intervening nonverbal tasks, immediately followed by yes/no recognition of the 16 words embedded within a list of 40 words.

The assessment of visual memory included two subtests from the WRAML2: Design Memory and Design Memory Recognition. These measures assess visual (nonverbal) encoding and delayed visual recognition. During the Design Memory subtest, the examiner presents five geometric designs to the examinee, who is asked to draw each design from memory following a 10-second delay. Approximately 10-15 minutes later, the examinee is given a booklet containing 46 geometric shapes and asked to indicate which shapes were presented earlier.

### Delis-Kaplan Executive Function System (D-KEFS)<sup>39</sup>

Measures of verbal fluency were included to evaluate the individual's ability to generate words and concepts fluently while simultaneously shifting between overlearned concepts. The Verbal Fluency subtest includes three conditions: Letter Fluency (generating words beginning with specified letter), Category Fluency (generating words in specified semantic category), and Category Switching (generating words while alternating between two different semantic categories). Each condition requires the examinee to generate words as quickly as possible for 60 seconds. Measures include total correct words in each condition and Switching Accuracy, the number of correct switches between categories. Responses deviating from the response set (e.g., words not in the designated category) are designated as set-loss errors.

Three tasks were used to evaluate design fluency, inhibition, and cognitive flexibility. The Design Fluency subtest includes three conditions: Filled Dots, Empty Dots, and Switching, each requiring examinees to connect dots presented within rows of boxes to create as many different designs as possible in 60 seconds. In Filled Dots, a basic test of design fluency, the boxes contain only solid dots. In Empty Dots, boxes contain filled and unfilled dots and participants are instructed to connect only empty dots; both design fluency and inhibition are evaluated in this condition. In Switching, the participant must create designs by alternating between filled and unfilled dots; this task measures both design fluency and cognitive flexibility.

The Color-Word Interference subtest measures inhibition of an automatic verbal response, interference control, and cognitive flexibility using four timed conditions: Color Naming (naming color patches), Word Reading (reading color words), Inhibition (naming the ink color in which color words are printed), and Inhibition/Switching (naming ink colors or reading words depending on specific visual cues). The Inhibition condition typically results in slower responding than the first two conditions.

The Twenty Questions subtest is an untimed measure of visual attention and perception, object recognition and naming, concept formation, abstract reasoning, and the ability to use feedback to guide problem-solving. The examinee is instructed to ask the fewest number of yes/no questions to identify an unknown target embedded in an array of 30 pictured, everyday items.

Supplemental Table 2a: Unadjusted Memory/EF Means at Baseline and Follow-up

Outcome	PHEU				PHIV/Non-C				PHIV/C			
	Baseline		Follow-Up		Baseline		Follow-Up		Baseline		Follow-Up	
	N	Mean (95% CI)	N	Mean (95% CI)	N	Mean (95% CI)	N	Mean (95% CI)	N	Mean (95% CI)	N	Mean (95% CI)
<b>WRAML2 Memory and Learning</b>												
Design Memory	75	8.69 (7.98, 9.41)	79	9.14 (8.51, 9.77)	105	8.65 (8.11, 9.19)	105	9.10 (8.54, 9.67)	39	8.31 (7.50, 9.12)	39	8.08 (7.13, 9.02)
Design Recognition	75	9.20 (8.45, 9.95)	79	9.05 (8.25, 9.85)	105	8.68 (8.08, 9.27)	105	8.68 (8.16, 9.20)	39	8.26 (7.34, 9.18)	39	8.74 (7.79, 9.69)
Verbal Learning	79	8.91 (8.29, 9.53)	79	8.73 (8.17, 9.29)	105	8.30 (7.78, 8.81)	105	8.35 (7.80, 8.91)	39	7.92 (7.15, 8.69)	39	7.38 (6.56, 8.21)
Verbal Delay Recall	79	9.23 (8.58, 9.87)	79	9.15 (8.59, 9.71)	105	8.86 (8.38, 9.33)	105	8.98 (8.49, 9.47)	39	8.44 (7.62, 9.25)	39	8.44 (7.67, 9.20)
Verbal Recognition	78	9.90 (9.17, 10.62)	79	10.53 (9.97, 11.09)	104	10.30 (9.77, 10.83)	105	9.80 (9.31, 10.29)	39	9.41 (8.38, 10.44)	39	9.62 (8.68, 10.55)
<b>D-KEFS Verbal Fluency</b>												
Letter Fluency	79	8.35 (7.70, 9.01)	79	8.66 (8.02, 9.30)	105	8.91 (8.32, 9.51)	105	9.08 (8.50, 9.65)	38	7.63 (6.64, 8.62)	37	8.08 (7.03, 9.13)
Category Fluency	79	9.72 (8.98, 10.46)	79	6.52 (5.67, 7.37)	105	9.21 (8.61, 9.81)	105	6.30 (5.57, 7.04)	38	8.55 (7.65, 9.45)	37	6.51 (5.07, 7.96)
Category Switching	79	8.76 (8.05, 9.47)	79	7.77 (7.06, 8.49)	105	8.48 (7.88, 9.07)	105	7.94 (7.29, 8.60)	38	7.47 (6.57, 8.37)	37	6.70 (5.79, 7.61)
Category Switching Accuracy	79	8.75 (8.10, 9.39)	79	10.01 (9.61, 10.42)	105	8.71 (8.14, 9.29)	105	9.84 (9.47, 10.21)	38	8.03 (7.18, 8.87)	37	9.16 (8.71, 9.62)
Set-loss Errors	79	9.86 (9.27, 10.45)	79	10.86 (10.33, 11.39)	105	10.35 (9.93, 10.77)	105	10.63 (10.05, 11.21)	38	10.00 (9.22, 10.78)	37	10.00 (8.85, 11.15)

D-KEFS Design Fluency												
Composite Scaled Score	79	8.54 (8.09, 9.00)	79	8.66 (8.21, 9.11)	104	8.57 (8.16, 8.97)	105	9.11 (8.67, 9.56)	38	8.08 (7.24, 8.92)	38	7.92 (7.21, 8.63)
Total Correct-Switching	79	9.09 (8.52, 9.66)	79	8.78 (8.19, 9.38)	104	8.93 (8.46, 9.41)	105	9.12 (8.59, 9.66)	38	8.18 (7.45, 8.92)	38	8.11 (7.31, 8.9)
Total Set-loss Designs	79	11.29 (10.79, 11.79)	79	11.68 (11.13, 12.23)	104	11.42 (10.94, 11.9)	105	12.07 (11.62, 12.51)	38	11.29 (10.42, 12.16)	38	11.32 (10.59, 12.04)
D-KEFS Color-Word Interference												
Primary Combined	78	8.68 (7.91, 9.45)	79	8.63 (7.92, 9.34)	103	9.14 (8.58, 9.69)	103	9.21 (8.70, 9.73)	39	7.10 (5.88, 8.33)	39	7.44 (6.34, 8.53)
Inhibition	77	8.03 (7.32, 8.73)	79	8.52 (7.77, 9.27)	103	8.10 (7.42, 8.78)	103	8.44 (7.75, 9.12)	39	6.41 (5.26, 7.56)	39	7.49 (6.41, 8.56)
Inhibition/Switching	78	8.08 (7.35, 8.8)	79	8.86 (8.10, 9.62)	103	7.93 (7.27, 8.59)	103	8.63 (7.94, 9.32)	39	7.08 (5.93, 8.22)	39	7.51 (6.40, 8.63)
Total Errors-Inhibition	77	8.30 (7.52, 9.08)	79	9.72 (9.04, 10.4)	103	7.67 (6.94, 8.4)	103	9.48 (8.83, 10.12)	39	6.77 (5.49, 8.05)	39	8.74 (7.57, 9.91)
Total Errors-Inhibition/Switching	78	7.95 (7.19, 8.71)	79	9.39 (8.81, 9.98)	103	7.62 (6.9, 8.34)	103	9.43 (8.87, 9.99)	39	7.44 (6.37, 8.51)	39	8.72 (7.52, 9.92)
D-KEFS Twenty Questions												
Initial Abstraction	77	8.35 (7.69, 9.01)	78	9.44 (9.04, 9.83)	104	8.92 (8.34, 9.5)	104	9.24 (8.87, 9.61)	38	9.08 (8.15, 10.01)	39	9.15 (8.70, 9.60)
Weighted Achievement	77	7.97 (7.01, 8.94)	78	9.18 (8.74, 9.62)	104	9.06 (8.32, 9.79)	104	9.04 (8.53, 9.54)	38	8.74 (7.51, 9.96)	39	9.08 (8.33, 9.82)

Note: Scaled scores for WRAML2 and D-KEFS subtests have Mean = 10, SD = 3

Supplemental Table 2b: Unadjusted Memory/EF Means at Baseline and Follow-up

Outcome	PHEU				HIV/Non-C				HIV/C			
	Baseline		Follow-up		Baseline		Follow-up		Baseline		Follow-up	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
WRAML2 Memory And Learning												
Design Memory	75	8.69 (3.11)	79	9.14 (2.81)	105	8.65 (2.78)	105	9.10 (2.92)	39	8.31 (2.49)	39	8.08 (2.91)
Design Recognition	75	9.20 (3.25)	79	9.05 (3.59)	105	8.68 (3.09)	105	8.68 (2.69)	39	8.26 (2.84)	39	8.74 (2.93)
Verbal Learning	79	8.91 (2.76)	79	8.73 (2.50)	105	8.30 (2.66)	105	8.35 (2.88)	39	7.92 (2.38)	39	7.38 (2.55)
Verbal Delay Recall	79	9.23 (2.88)	79	9.15 (2.50)	105	8.86 (2.45)	105	8.98 (2.51)	39	8.44 (2.52)	39	8.44 (2.37)
Verbal Recognition	78	9.90 (3.22)	79	10.53 (2.50)	104	10.30 (2.73)	105	9.80 (2.51)	39	9.41 (3.18)	39	9.62 (2.90)
Intrusion Error Total	79	1.87 (2.50)	79	1.43 (1.90)	105	1.44 (1.83)	105	1.48 (2.03)	39	1.44 (1.77)	39	1.33 (1.90)
D-KEFS Verbal Fluency												
Letter Fluency	79	8.35 (2.94)	79	8.66 (2.86)	105	8.91 (3.10)	105	9.08 (2.97)	38	7.63 (3.02)	37	8.08 (3.15)
Category Fluency	79	9.72 (3.30)	79	6.52 (3.80)	105	9.21 (3.10)	105	6.30 (3.82)	38	8.55 (2.74)	37	6.51 (4.34)
Category Switching	79	8.76 (3.18)	79	7.77 (3.19)	105	8.48 (3.09)	105	7.94 (3.40)	38	7.47 (2.74)	37	6.70 (2.73)
Category Switching Accuracy	79	8.75 (2.88)	79	10.01 (1.80)	105	8.71 (2.97)	105	9.84 (1.92)	38	8.03 (2.57)	37	9.16 (1.36)
Set-loss Errors	79	9.86 (2.62)	79	10.86 (2.38)	105	10.35 (2.18)	105	10.63 (2.99)	38	10.00 (2.37)	37	10.00 (3.46)
D-KEF Design Fluency												
Composite Scaled Score	79	8.54 (2.02)	79	8.66 (2.01)	104	8.57 (2.08)	105	9.11 (2.28)	38	8.08 (2.55)	38	7.92 (2.16)
Total Correct-Switching	79	9.09 (2.53)	79	8.78 (2.66)	104	8.93 (2.44)	105	9.12 (2.75)	38	8.18 (2.23)	38	8.11 (2.41)
Total Set-loss Designs	79	11.29 (2.24)	79	11.68 (2.45)	104	11.42 (2.48)	105	12.07 (2.30)	38	11.29 (2.66)	38	11.32 (2.21)



Outcome	PHEU				HIV/Non-C				HIV/C			
	Baseline		Follow-up		Baseline		Follow-up		Baseline		Follow-up	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
<b>D-KEF Color-Word Interference</b>												
Primary Combined	78	8.68 (3.40)	79	8.63 (3.18)	103	9.14 (2.86)	103	9.21 (2.64)	39	7.10 (3.78)	39	7.44 (3.38)
Inhibition	77	8.03 (3.10)	79	8.52 (3.34)	103	8.10 (3.47)	103	8.44 (3.51)	39	6.41 (3.54)	39	7.49 (3.32)
Inhibition/Switching	78	8.08 (3.22)	79	8.86 (3.41)	103	7.93 (3.38)	103	8.63 (3.53)	39	7.08 (3.53)	39	7.51 (3.44)
Total Errors-Inhibition	77	8.30 (3.45)	79	9.72 (3.04)	103	7.67 (3.74)	103	9.48 (3.31)	39	6.77 (3.95)	39	8.74 (3.61)
Color Total Errors-Inhibition/Switching	78	7.95 (3.38)	79	9.39 (2.61)	103	7.62 (3.69)	103	9.43 (2.86)	39	7.44 (3.30)	39	8.72 (3.70)
<b>D-KEF 20 Questions</b>												
Initial Abstraction	77	8.35 (2.92)	78	9.44 (1.76)	104	8.92 (2.98)	104	9.24 (1.92)	38	9.08 (2.83)	39	9.15 (1.39)
Weighted Achievement	77	7.97 (4.24)	78	9.18 (1.96)	104	9.06 (3.78)	104	9.04 (2.60)	38	8.74 (3.73)	39	9.08 (2.30)

Note: Scaled scores for WRAML2 and D-KEFS subtests have Mean = 10, SD = 3

Supplemental Table 3: Proportion of Participants with Memory/EF Scaled Scores Greater than 2 SDs below General Population Mean

		PHEU				PHIV/Non-C				PHIV/C			
Test	Outcome	Baseline		Follow-Up		Baseline		Follow-Up		Baseline		Follow-Up	
		Total	N (%)	Total	N (%)	Total	N (%)	Total	N (%)	Total	N (%)	Total	N (%)
WRAML2 Memory and Learning	Design Memory	75	3 (4.0)	79	0 (0.0)	105	5 (4.8)	105	1 (1.0)	39	0 (0.0)	39	1 (2.6)
	Design Recognition	75	2 (2.7)	79	5 (6.3)	105	6 (5.7)	105	4 (3.8)	39	2 (5.1)	39	2 (5.1)
	Verbal Learning	79	3 (3.8)	79	1 (1.3)	105	4 (3.8)	105	5 (4.8)	39	1 (2.6)	39	2 (5.1)
	Verbal Delay Recall	79	3 (3.8)	79	1 (1.3)	105	2 (1.9)	105	0 (0.0)	39	0 (0.0)	39	0 (0.0)
	Verbal Recognition	78	3 (3.8)	79	1 (1.3)	104	1 (1.0)	105	1 (1.0)	39	2 (5.1)	39	1 (2.6)
D-KEFS Verbal Fluency	Letter Fluency	79	4 (5.1)	79	3 (3.8)	105	1 (1.0)	105	3 (2.9)	38	3 (7.9)	37	2 (5.4)
	Category Fluency	79	4 (5.1)	79	20 (25.3)	105	0 (0.0)	105	30 (28.6)	38	2 (5.3)	37	10 (27)
	Category Switching	79	5 (6.3)	79	8 (10.1)	105	6 (5.7)	105	10 (9.5)	38	3 (7.9)	37	5 (13.5)
	Category Switching Accuracy	79	3 (3.8)	79	0 (0.0)	105	4 (3.8)	105	0 (0.0)	38	1 (2.6)	37	0 (0.0)
	Set-loss Errors	79	2 (2.5)	79	2 (2.5)	105	1 (1.0)	105	6 (5.7)	38	1 (2.6)	37	3 (8.1)
D-KEFS Design Fluency	Composite Scaled Score	79	0 (0.0)	79	1 (1.3)	104	1 (1.0)	105	0 (0.0)	38	1 (2.6)	38	0 (0.0)
	Total Correct-Switching	79	1 (1.3)	79	1 (1.3)	104	1 (1.0)	105	1 (1.0)	38	1 (2.6)	38	0 (0.0)
	Total Set-loss Designs	79	0 (0.0)	79	0 (0.0)	104	0 (0.0)	105	1 (1.0)	38	1 (2.6)	38	0 (0.0)
D-KEFS Color-Word Interference	Primary Combined	78	7 (9.0)	79	5 (6.3)	103	6 (5.8)	103	4 (3.9)	39	9 (23.1)	39	5 (12.8)
	Inhibition	77	9 (11.7)	79	9 (11.4)	103	13 (12.6)	103	10 (9.7)	39	8 (20.5)	39	6 (15.4)
	Inhibition/Switching	78	8 (10.3)	79	8 (10.1)	103	14 (13.6)	103	11 (10.7)	39	7 (17.9)	39	7 (17.9)
	Total Errors-Inhibition	77	9 (11.7)	79	4 (5.1)	103	19 (18.4)	103	7 (6.8)	39	8 (20.5)	39	5 (12.8)
	Total Errors-Inhibition/Switching	78	10 (12.8)	79	2 (2.5)	103	19 (18.4)	103	5 (4.9)	39	6 (15.4)	39	3 (7.7)
D-KEFS Twenty Questions	Initial Abstraction	77	0 (0.0)	78	0 (0.0)	104	0 (0.0)	104	0 (0.0)	38	0 (0.0)	39	0 (0.0)
	Weighted Achievement	77	16 (20.8)	78	0 (0.0)	104	14 (13.5)	104	5 (4.8)	38	4 (10.5)	39	0 (0.0)