Socio-Demographics Were Stronger Classifiers of Cognitive Profiles Than Neuroimaging in HIV

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Raha Dastgheyb[1], **Sarah A Cooley[2]**, Alison Buchholz[3], Kalen J Petersen[2], Beau M Ances[2], Leah H Rubin[4]
[1]Johns Hopkins Hospital, Baltimore, MD, USA; [2]Washington University in St. Louis, St Louis, MO, USA; [3]Johns Hopkins University School of Medicine, Baltimore, MD, USA; [4]Johns Hopkins University, Baltimore, MD, USA

BACKGROUND

- Despite ART, cognitive issues persist in people with HIV (PWH)
- Cognitive change in PWH is heterogenous
- Recent research has begun identifying different cognitive profiles, or phenotypes, in PWH
- Neuroimaging metrics are rarely incorporated into determining factors associated with each cognitive profile

METHODS

- 225 PWH from Washington University in St. Louis (St. Louis, MO, USA)

- Data collected included:
  - Cognitive battery of 16 tests
  - Magnetic resonance imaging (MRI) to measure regional brain volumes and resting state functional connectivity (intra-network coefficients)
  - Sociodemographic features including age, race, education, premorbid IQ (WRAT3), area deprivation index (ADI)
  - Clinical factors (nadir and recent CD4, CD8, CD4/CD8 ratio, viral load, hep C co-infection)
  - Depression (Beck Depression Inventory II)
  - Early life stress (Early Life Stress Questionnaire)
  - Apolipoprotein E genotype

- Raw cognitive scores were converted to scaled scores

- Kohonen self-organizing maps were used to classify individuals with similar cognitive profiles

- Random forest models were used to compare all variables of interest between clusters, using the profile determined to be "average performance" as the reference profile

RESULTS

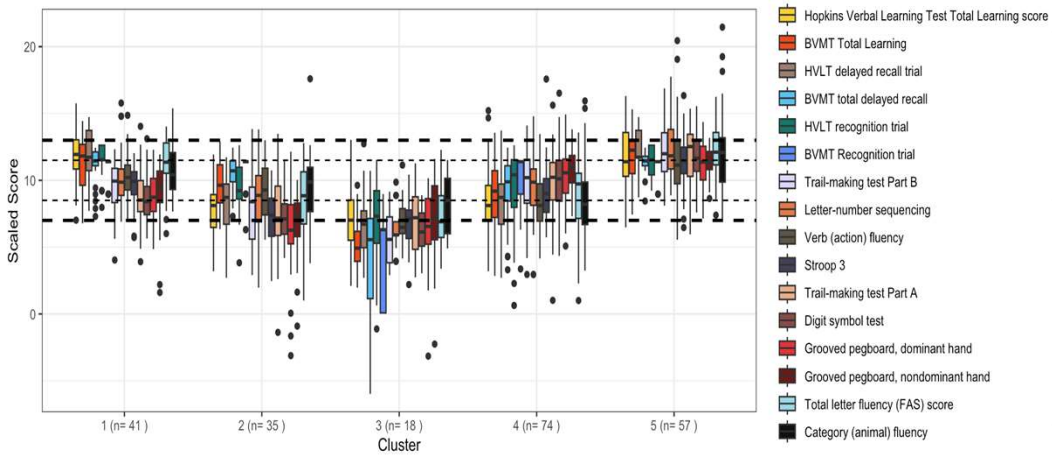


Figure 1. Five cognitive profiles were identified in 225 PWH: 1) relative strength in learning and memory, 2) weakness in motor and processing speed, 3) global impairment, 4) globally average performance, and 5) globally strong performance.

Table 1. Participant socio-demographic characteristics by cognitive profile

	Profile 1 (n=41) "Strength in learning/memory"	Profile 2 (n=35) "Weakness in motor/processing speed"	Profile 3 (n=18) "Impaired globally"	Profile 4 (n=74) "Average globally" (reference group)	Profile 5 (n=57) "Strong globally"
Age; M (SD)	54.0 (11.0)	55.0 (9.0)	**59.0 (8.0)^**	50.0 (12.0)	47.0 (14.0)
Sex; %Female	12%	26%	22%	19%	26%
Race; %Black/AA	49%	83%	100%	77%	**47%^**
Education; M (SD)	14.0 (2.4)	12.8 (2.0)	**10.9 (1.9)^**	12.9 (2.1)	**14.3 (2.5)^**
WRAT3; M(SD)	**49.0 (6.0)^**	41.0 (8.0)	**33.0 (6.0)^**	42.0 (8.0)	**49.0 (5.0)^**
Area deprivation index; M(SD)	67.0 (24.0)	74.0 (27.0)	82.0 (23.0)	79.0 (22.0)	70.0 (26.0)

Bolded^ values denote significant difference from Profile 4 (average globally) at p<.001

RESULTS

- 5 profiles were identified: 1) strength in learning and memory (n=41; 18%), 2) weakness in motor and processing speed (n=35; 15%), 3) impaired globally (n=18; 8%), 4) average globally (n=74; 33%-reference group), and 5) strong globally (n=57; 25%) (Figure 1)

- Compared to Profile 4 (average performance):
  - Profile 1 had higher premorbid IQ (WRAT3)
  - Profile 2 did not differ in any measures at p<.001
  - Profile 3 was older, less educated, and had lower premorbid IQ
  - Profile 5 was more educated, had higher premorbid IQ, and were less likely to be Black/AA

- Some neuroimaging measures, primarily brain volumes (ventricles; temporal lobe regions), did contribute to distinguishing cognitive profiles but did not reach *p*<.001 significance

CONCLUSIONS

- Socio-demographic features, not clinical or neurologic features, were the strongest distinguishers of cognitive profiles in PWH
- Education and premorbid IQ may be particularly important factors to consider when examining cognitive performance in PWH
- Future studies may need to include other neuroimaging metrics that may be more sensitive to subtle changes in brain integrity that can impact cognition

ADDITIONAL KEY INFORMATION

Author Contact Information: Sarah Cooley: SCooley22@wustl.edu
Raha Dastgheyb: raha@jhmi.edu

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