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Abnormal cognitive aging is detected despite clinically defined cognitive stability

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BACKGROUND

- Australia has surpassed the UNAIDS targets of 90% ART coverage and viral suppression among treated people living with HIV (PLHIV). This national HIV treatment success provides us with a unique context to study cognitive trajectories, cognitive aging, and a comprehensive set of health, social and lifestyle factors that may influence cognition during chronic and stable HIV disease.

METHODS

Study Population

- The Predictors of Adherence to Antiretroviral Therapy (PAART) study recruited 523 PLHIV (median age=52) with undetectable plasma HIV RNA (<50 copies/mL) in the 3 months prior to enrolment from 17 HIV treatment facilities in Australia. Participants were followed-up annually for 2 years.
- We included 457 participants at baseline, 316 at Month 12, and 276 at Month 24, who completed cognitive screening: Cogstate Computerized Battery (CCB).

Data Collection

- Demographics, socioeconomic factors, healthcare-seeking behaviors, alcohol and drug use, HIV-disease variables, health status and comorbidities were assessed.

Determination of cognitive impairment and clinically significant cognitive change

- The CCB data were corrected for age and sex, and practice effect (follow-up data) and averaged into a global z-score (GZS).
- Individual z-scores were transformed into deficit scores and then averaged into a Global Deficit Score (GDS). A GDS >0.5 was defined as cognitively impaired
- Clinically relevant cognitive trajectories (decline, stability, and improvement) were defined using linear mixed-effect regression (LMER)-based GZS change scores (i.e., within or +/- 90% CI).

Determination of abnormal cognitive aging effect and factors influencing longitudinal cognitive performance

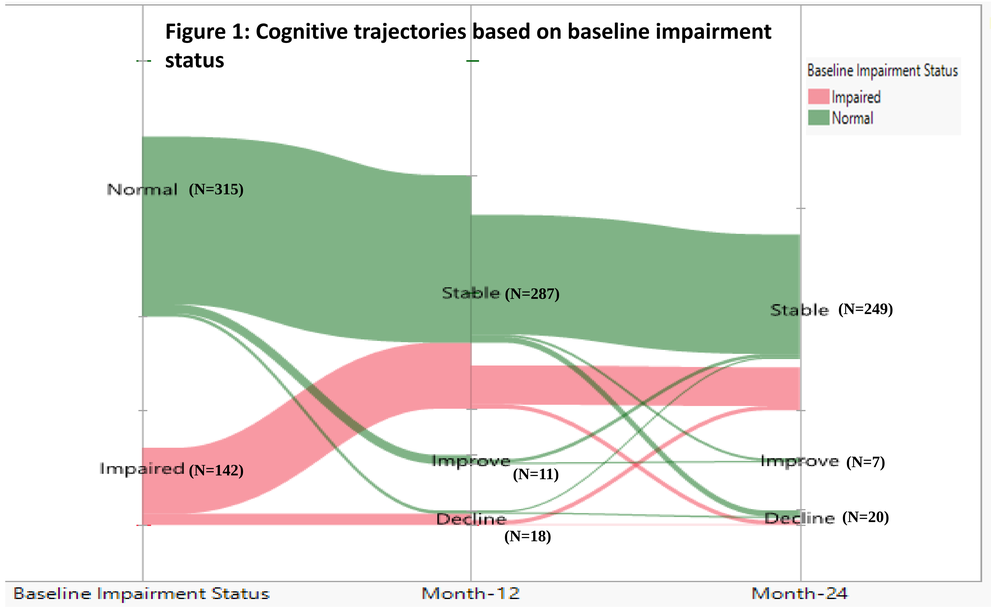
- A LMER model with a top-down variable selection approach identified the independent effects of age and other demographic, socioeconomic and health-related factors on the demographically corrected GZS.

Clinically significant cognitive decline is uncommon in virally suppressed HIV. However, there was a signal for abnormal aging and complex impact of psychosocial and socio-economic factors on longitudinal cognitive performance.

RESULTS

- Among 457 participants at baseline, 270 participants (59%) were over 50 years of age. All the participants had undetectable plasma HIV RNA at baseline and only two participants had a viral rebound (increase back to >1000 copies mL) over the follow-up. The median duration of being diagnosed with HIV is 15 years and only 22% (n=100) had a history of previous AIDS illness.
- Thirty one percent (n=142) were classified as cognitively impaired at baseline. At Month-12 and Month-24, 6% and 7% of the sample showed clinically-relevant cognitive decline and 4% and 3% improved respectively (Figure 1).

Figure 1: Cognitive trajectories based on baseline impairment status



- In the LMER model with GZS as the outcome (Table 1), interaction between older age (>50 years) and follow-up time was associated with poorer GZS (P=<0.001).
- Having a regular relationship (P=<0.05), excellent English proficiency (P=<0.05), and perceived stigma (avoidance) (P=<0.05) were independently associated with better GZS.
- Relying on government subsidy (P=<0.05), severe depression (P=<0.05), and lower belief in ART necessity and acceptability (P=<0.05) were independently associated with poorer GZS.

Table 1: LMER model results to identify the effect of age and other factors on longitudinal cognitive performance

Variable	B	Standard Error (SE)	95% CI
Young vs. Old*Time (Year)	-0.23***	0.03	-0.30, -0.17
Married /regular relationship	0.09*	0.04	0.002, 0.17
Excellent English	0.14*	0.06	0.03, 0.25
Social welfare as main income	-0.18*	0.08	-0.33, -0.02
Severe Depression	-0.17*	0.08	-0.33, -0.02
Perceived stigma (avoidance)	0.10*	0.05	0.008, 0.18
Beliefs About Medications Scales	-0.006*	0.002	-0.01,-0.002

*p<0.05; **p<0.01, ***p<0.001
Table presented only signficant variables. Other covariates were gender, sex, eligible for medicare, education, financial support, general health status, inpatient hisotry, stress events, alcohol use, smoking, drug use, HIV disclosure, ART adherence, psychiatric disorder, alanine aminotransferase level, Syphilis, comorbidity, hypertension, diabetes, heptatitis C, HIV brain involvement history, and duration of diagnosed with HIV

CONCLUSIONS

- The rate of clinically meaningful cognitive decline was low probably afforded by the clinical stability of the study sample.
- In spite of this, abnormal aging is evident.
- Also, not having a regular relationship, severe depression, and less belief in necessity and acceptability of ART were associated with lower longitudinal cognitive performance.
- Based on these findings, we recommend longitudinal cognitive screening among older PLHIV. Integrated care through a multidisciplinary team composed of clinicians, mental healthcare providers, and psychosocial support workers and counselors is warranted for persons living with chronic HIV infection to maintain not only their physical health but also social, mental, and cognitive health which could have a large influence on quality of life and activities of daily living.

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We thank participants of the PAART study for their contribution.