



The association between anticholinergic medication use and cognitive function in older people with HIV in the Pharmacokinetic and clinical Observations in People over fifty (POPPY) Study

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BACKGROUND

- Effective antiretroviral treatment (ART) has been shown to improve the life expectancy of people with living with HIV to a level that is similar to that seen in people without HIV [1].
- Older people may be more susceptible to ACM-associated adverse events including a higher risk of dementia [2,5] and evidence suggests that ACM use in older people with HIV is associated with several negative health outcomes, including cognitive impairment (CI) [1,2].
- Anticholinergic medications (ACMs) are used to treat a variety of conditions such as depression, respiratory conditions, allergies, pain, and overactive bladder [3,4].
- Currently there are limited studies exploring the association between ACM use and cognitive function in people with HIV, particularly in older people.

AIM

To examine the association of the use of ACM drugs and measures of cognitive function in people with HIV aged >50 years participating in the POPPY study.

METHODS

PARTICIPANTS

POPPY is a multicentre, prospective, observational study examining the effects of ageing on people with HIV in the UK and Ireland. The study **collects information on demographic, social, lifestyle, clinical and HIV-related factors**

The study recruited 699 people with HIV aged ≥ 50 years and 374 aged <50 years between 2013 and 2016

For this study, participants completed a computerised assessment of cognitive function (CogState) covering six domains (visual learning, psychomotor, visual attention, executive function, verbal learning, working memory) at baseline. Raw test scores were standardised into T-scores (mean 0, SD 1) and averaged to obtain global/domain-specific T-scores.

DEFINING ANTICHOLINERGIC MEDICATIONS

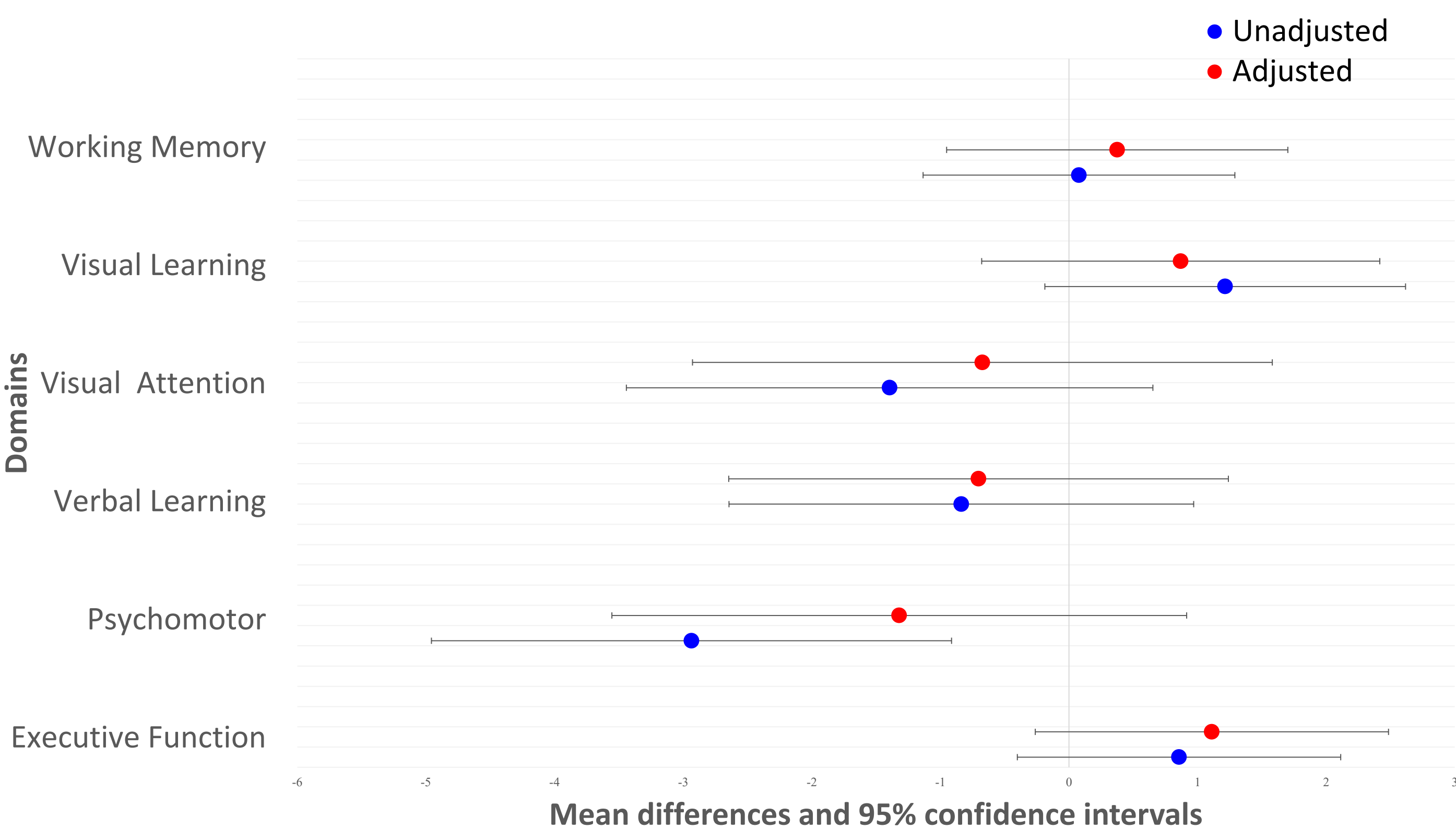
Co-medications scoring one or greater in any of the following three scales were classed as ACM drugs:

- Anticholinergic burden scale (ACB)
- Anticholinergic risk scale (ARS)
- Scottish Intercollegiate Guidelines Network (SIGN)

STATISTICAL ANALYSES

Associations of ACM use with global T-scores were analysed using linear regression; associations with binary classifications of CI (Gisslen, Global Deficit Score, Multivariable Normative Comparison) were analysed using logistic regression. Multivariable analyses included adjustment for age, sex, ethnicity, marital status, educational attainment, employment, alcohol use, recent recreational drug use, smoking, depressive symptoms (Patient Health Questionnaire, PHQ-9), number of co-medications and number of comorbidities.

Figure 1: Results from a series of univariate and multivariable linear regression models to test the association of ACM with each of the individual cognitive function domains (visual learning, psychomotor, visual attention, executive function, verbal learning, and working memory)



*Estimates are derived from separate linear regression models with ACM as the exposure and the cognitive function domain as the outcome.

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RESULTS

DEMOGRAPHIC, SOCIO-ECONOMIC AND LIFESTYLE FACTORS

- Among the 608 participants with a complete cognitive assessment, the majority of participants were in the 50-60 year age category, most were male (89.3%), white (87.8%), single (61.5%), and had a high educational level (69.9%) (Table 1).
- Overall, 171 participants reported the use of ACM; this group were more likely to be of white ethnicity (93.6% vs 85.6% of non-ACM users, $p=0.01$), to be single (67.8% vs 59.0%, $p=0.06$), to be sick/disabled/unknown (30.4% vs. 14.9%, $p=0.0001$), and to be on 5 or more co-medications ($p=0.0001$) and were more likely to have depressive symptoms (41.5% vs. 61.6%, $p=0.0001$) (Table 1).

Table 1: Demographic, socioeconomic, and lifestyle factors of participants, stratified by ACM use

Variable	Category	Overall (n=608)	ACM users (n=171 [28.1%])	Non-ACM users (n=437 [71.9%])	p-value
Age (years)	50-59	392 (64.5%)	113 (66.1%)	279 (63.8%)	0.24
	60-69	182 (29.9%)	45 (26.3%)	137 (31.4%)	
	≥ 70	34 (5.6%)	13 (7.6%)	21 (4.8%)	
Sex	Female	65 (10.7%)	17 (9.9%)	48 (11.0%)	0.82
	Male	543 (89.3%)	154 (90.1%)	389 (89.0%)	
Ethnicity	Black African	74 (12.2%)	11 (6.4%)	63 (14.4%)	0.01
	White	534 (87.8%)	160 (93.6%)	374 (85.6%)	
Educational attainment ¹	High	425 (69.9%)	117 (68.4%)	308 (70.5%)	0.69
	Not high	183 (30.1%)	54 (31.6%)	129 (29.5%)	
Work	Employed	251 (41.3%)	56 (32.7%)	195 (44.6%)	<0.0001
	Retired	156 (25.7%)	36 (21.1%)	120 (27.5%)	
	Sick/disabled/unknown	117 (19.2%)	52 (30.4%)	65 (14.9%)	
	Unemployed	84 (13.8%)	27 (15.8%)	57 (13.0%)	
Marital Status	Not single	234 (38.5%)	55 (32.2%)	179 (41.0%)	0.06
	Single	374 (61.5%)	116 (67.8%)	258 (59.0%)	
Current alcohol use	Current alcohol use	486 (79.9%)	134 (78.4%)	352 (80.5%)	0.62
	Not current alcohol use	122 (20.1%)	37 (21.6%)	85 (19.5%)	
Recreational drug use ²	No	451 (74.2%)	118 (69.0%)	333 (76.2%)	0.09
	Yes	157 (25.8%)	53 (31.0%)	104 (23.8%)	
Smoking	Current smoking	139 (22.9%)	38 (22.2%)	101 (23.1%)	0.88
	Ex-smoker	232 (38.2%)	68 (39.8%)	164 (37.5%)	
	Never smoked/unknown	237 (39.0%)	65 (38.0%)	172 (39.4%)	
Depressive symptoms (PHQ-9)	Moderate-severe/Severe	68 (11.2%)	25 (14.6%)	43 (9.8%)	<0.0001
	Mild/moderate	200 (32.9%)	75 (43.9%)	125 (28.6%)	
	None/minimal/unknown	340 (55.9%)	71 (41.5%)	269 (61.6%)	
Number of co-medications	0	194 (31.9%)	19 (11.1%)	175 (40.0%)	<0.0001
	1-4	320 (52.6%)	95 (55.6%)	225 (51.5%)	
	≥ 5	94 (15.5%)	57 (33.3%)	37 (8.5%)	
Number of comorbidities	No comorbidities	29 (4.8%)	1 (0.6%)	28 (6.4%)	<0.0001
	0-4	441 (72.5%)	101 (59.1%)	340 (77.8%)	
	4-8	138 (22.7%)	69 (40.4%)	69 (15.8%)	

¹'High' education level is considered to be completion of A levels (or equivalent), a university degree or above, or 'Other.' A 'Not high' education level is considered to be completion of education with no qualifications, O levels/GCSE's (or equivalent), or 'Not known.'; ²Defined as use in the last 6 months

ASSOCIATION OF ACM USE WITH COGNITIVE FUNCTION

- The mean [SD] global T-score was 48.32 [5.66] with no significant difference between those reporting (48.00 [6.30]) and not reporting (48.50 [5.40]) ACM use, either before [mean difference -0.50 (95% CI: -1.51, 0.50), $p=0.32$] or after (-0.06 (95% CI -1.15, 1.04), $p=0.94$) adjustment for confounders.
- No significant associations were seen between ACM use and domain-specific T-scores, nor with any binary classification of CI, after adjustment for confounders.

Table 2: Prevalence of cognitive impairment, stratified by ACM use, defined by the three criteria considered, with results from unadjusted and adjusted logistic regression analyses to demonstrate the association of ACM use with each measure of cognitive impairment

Classification of cognitive impairment	N (%) with cognitive impairment		Unadjusted	Adjusted
	No ACM use	ACM use	OR (95% CI)	OR (95% CI)
Gisslen	42 (9.6)	26 (15.2)	1.69 (1.00, 2.85); $p=0.05$	1.82 (0.98, 3.38); $p=0.06$
GDS	103 (23.6)	49 (28.7)	1.30 (0.87, 1.94); $p=0.19$	1.34 (0.84, 2.13); $p=0.22$
MNC	87 (19.9)	32 (18.7)	0.93 (0.59, 1.45); $p=0.74$	0.98 (0.58, 1.67); $p=0.95$

CONCLUSION

Our findings suggest no strong or consistent associations between commonly reported measures of cognitive function in people with HIV; further analyses will explore the contribution of specific ACM drug types in this population and the possible reasons why findings in this group may differ from those in the general population.