

Feasibility & Utility of Cognitive Screening of Older Prisoners in HMP & YOI Grampian.



Older Adults Psychology & Neuropsychology of Mental Health Dept, NHS Grampian

Dr Vivienne Barnett (Principal Clinical Psychologist)
Dr Pawel Lucjan (Clinical Psychologist)
Demi McDonald (Assistant Psychologist)



Background

An older prisoner is aged 50 or older. Most of the research literature, prison scrutiny bodies and third-party organisations working in this area adopt this definition, which is based on evidence that the health needs of prisoners are advanced by about 10 years (Ministry of Justice, 2020). The number of people aged ≥ 50 in prison is steadily increasing. In Scotland, the proportion aged 55 years or older has more than doubled, rising from 3.5% to 8.1% from 2010-11 to 2021-22, respectively (The Scottish Government, 2022).

Prevalence rates of suspected dementia and mild cognitive impairment (MCI) in the prison population of England and Wales is 8% and only 3% had this recorded in their notes (Forsyth et al., 2020). These findings are based on validated cognitive impairment assessments (using the Addenbrooke's Cognitive Examination III (ACE-III)) and not on a clinical diagnosis.

To the best of our knowledge, the feasibility and utility of cognitive screening has not yet been explored within a Scottish prison population.

In the general population, the ACE-III has shown high diagnostic accuracy for MCI (Matias-Guiu et al., 2017b) and high diagnostic accuracy in individuals with subjective cognitive impairment (Elamin et al., 2015). Moreover, good levels of sensitivity have been reported in the distinction between healthy controls and patients with early onset dementia (Hsieh et al., 2013) among the general population. Yet again, to the best of our knowledge, little is known about the utility, feasibility, and diagnostic accuracy among a Scottish prison population.

Purpose

The current project/study sought to:

- (1) Pilot the utility of the ACE-III as a cognitive screening tool for older prisoners;
- (2) Identify prisoners whose score on the ACE-III indicates they may benefit from further more comprehensive cognitive assessment which may then identify MCI or dementia;
- (3) Understand the relationships between ACE-III scores, age and years of education in this population.

Methods

1. The ACE-III is a cognitive screening tool with good diagnostic and psychometric properties for assessing for cognitive impairment, and discriminating between healthy people and those with cognitive impairment (Hsieh et al., 2013; Matias-Guiu et al., 2017a); Bruno & Schurmann-Vignaga, 2019; Matias-Guiu et al., 2017b). The ACE-III was used in the current study to screen participants.
2. Cognitive Screening Clinics offered by Clinical Psychologist and Assistant Psychologist in HMP Grampian to prisoners aged ≥ 50 years during 2023.
3. Participants:-
 - a) Prisoners aged ≥ 50 years within HMP Grampian ($N=26$; 4 females)
 - b) Average age 56 years
 - c) 37.7 % of total older prison population in HMP Grampian screen using ACE-III (Nov, 2023)

Results

This study sought to understand the relationship between ACE-III scores, age, and years of education among an old age prison population within Grampian. Twenty-six participants took part in the study in 2023. Participants' total scores were generally below the healthy cognition score of 88/100 (*median* score = 83.5, *SD* = 15.6).

Regression models (Table 1.) indicated that age and years of full-time education accounted for 20% of the variance in total score on ACE-III. Hierarchical regression (not presented here) further indicated that education accounted for 19% of the total ACE-III score, whereas age explained only 1% of the score variability. The results indicated that each year spent in formal education contributed to an extra 1.33 points on the total score in a group of screened prisoners aged 50 years or older.

Table 1. Regression Coefficients, Standard Errors, and Model Summary Information for the robust regressions

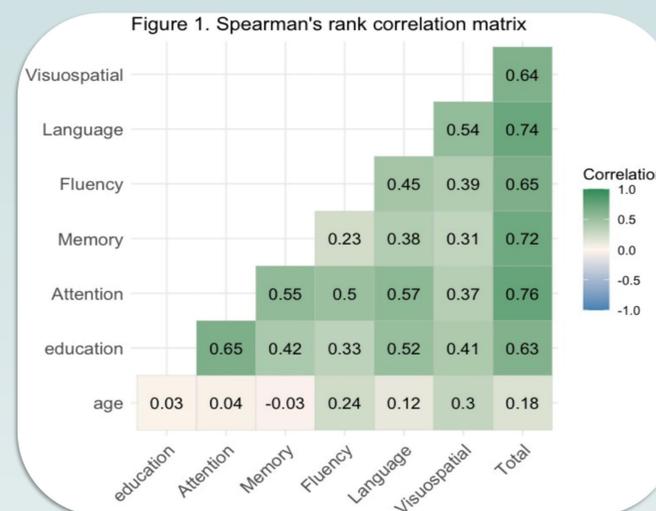
Predictor variables	Outcome variables ($n = 26$) ¹								
	Attention			Memory			Fluency		
	Coeff.	SE	p	Coeff.	SE	p	Coeff.	SE	p
age	0.07	0.13	ns	-0.04	0.23	ns	0.08	0.13	ns
education	0.39	0.18	0.04	0.45	0.31	ns	0.37	0.17	0.04
	R ² = 0.18			R ² = 0.08			R ² = 0.21		
	Language			Visuospatial			Total		
	Coeff.	SE	p	Coeff.	SE	p	Coeff.	SE	p
age	0.04	0.10	ns	0.13	0.09	ns	0.23	0.40	ns
education	0.25	0.11	0.03	0.18	0.13	ns	1.33	0.55	0.02
	R ² = 0.22			R ² = 0.17			R ² = 0.20		

Note: robust regression model was used based on M-estimator using iteratively reweighted least squares (IRWLS).

¹ One individual was excluded from the analysis as the assessment was deemed invalid.

The following sub-score domains were significantly influenced by the years of formal education: Attention, Language, and Fluency. Age did not significantly influence any of the sub-scores.

Figure 1 shows that education was weakly to moderately correlated with ACE-III total scores and sub-scores ($r_s = 0.33$ to 0.65), whereas age correlations were in the range from negligible to weak ($r_s = -0.03$ to 0.24).



Discussion

This study found a significant effect of years of education on ACE-III scores. A similar effect has been found in the general population (Matias-Guiu et al., 2017b). However, our findings did not support the role of age on ACE-III scores, previously reported elsewhere (e.g., Elamin et al., 2015). However, this lack of age effect in our study might partly be explained by the relatively young age of our sample (an average of 56 years). Indeed, the literature has shown that age begins to noticeably impact the ACE-III score at approx. 75 years old (Bruno & Schurmann-Vignaga, 2019). Thus, it may be valuable for future research to explore the ACE-III's diagnostic accuracy among different age groups and better understand the ACE-III's overall clinical value as a cognitive screening tool. Nevertheless, the ACE-III was shown to be an appropriate tool to utilise in a prison setting within Scotland and, importantly, was acceptable to the study's population.

Recommendations/Clinical Implications

Our preliminary findings suggest that the accuracy of the ACE-III could be improved if we adjust ACE-III scores by years of education. This has been suggested elsewhere in the literature (Bruno & Schurmann-Vignaga, 2019). It is important to remember that in clinical practice, the ACE-III is a screening tool, is not diagnostic in and of itself, and the low scores should be followed by a more comprehensive assessment. With a relatively low prevalence of cognitive impairment, the risk of false-positive findings is very high.

References

- Bruno, D., & Schurmann-Vignaga, S. (2019) Addenbrooke's cognitive examination III in the diagnosis of dementia: a critical review. *Neuropsychiatric Disease and Treatment*, 15(441-447).
- Calderon, C., Beyle, C., Veliz-Garcia, O., & Bekios-Calfa, J. (2021) Psychometric properties of Addenbrooke's Cognitive Examination III (ACE-III): An item response theory approach. *PLoS ONE*, 16(5), e0251137.
- Elamin, M., Holloway, G., Bak, T. H., & Pal, S. (2016). The Utility of the Addenbrooke's Cognitive Examination Version Three in Early-Onset Dementia. *Dementia and geriatric cognitive disorders*, 41(1-2), 9-15.
- Forsyth, K., Heathcote, L., Senior, J., Malik, B., Meacock, R., Perryman, K., ... & Shaw, J. (2020). Dementia and mild cognitive impairment in prisoners aged over 50 years in England and Wales: a mixed-methods study. *Health Services and Delivery Research*, 8(27).
- Hsieh, S., Schubert, S., Hoon, C., Mioshi, E., & Hodges, J. R. (2013). Validation of the Addenbrooke's Cognitive Examination III in frontotemporal dementia and Alzheimer's disease. *Dementia and geriatric cognitive disorders*, 36(3-4), 242-250.
- Lucza, T., Ascherman, Z., Kovács, M., Makkos, A., Harmat, M., Juhász, A., Janszky, J., Komoly, S., Kovács, N., Dorn, K., & Karádi, K. (2018). Comparing Sensitivity and Specificity of Addenbrooke's Cognitive Examination-I, III and Mini-Addenbrooke's Cognitive Examination in Parkinson's Disease. *Behavioural neurology*, 2018, 5932028.
- Matias-Guiu, J. A., Cortes-Martinez, A., Valles-Salgado, M., Rognoni, T., Fernandez-Matarrubia, M., Moreno-Ramos, T., & Matias-Guiu, J. (2017a) Addenbrooke's cognitive examination III: diagnostic utility for mild cognitive impairment and correlation with standardized neuropsychological tests. *International psychogeriatrics*, 29(1), 105-113.
- Matias-Guiu, J. A., Valles-Salgado, M., Rognoni, T., Hamre-Gil, F., Moreno-Ramos, T., Matias-Guiu, J. (2017b) Comparative Diagnostic Accuracy of the ACE-III, MIS, MMSE, MoCA, and RUDAS for Screening of Alzheimer Disease. *Dementia and geriatric cognitive disorders*, 43(5-6), 237-246.
- Ministry of Justice, Department of Health and Social Care, Public Health England, NHS England and Improvement, Written Evidence from. URL: committees.parliament.uk/publications/1740/documents/16889/default/ (accessed on 20 November 2023).
- The Scottish Government, Scottish Prison Population Statistics 2021-2022. URL: https://www.gov.scot/binaries/content/documents/govscot/publications/statistics/2022/11/scottish-prison-population-statistics-2021-22/documents/scottish-prison-population-statistics/scottish-prison-population-statistics/govscot%3Adocument/scottish-prison-population-statistics.pdf (accessed 20 November 2023).