



# VCU

Virginia Commonwealth University  
VCU Scholars Compass

---

Graduate Research Posters

Graduate School

---

2020

## Screening for Cognitive Impairment in Primary Brain Tumor Patients: A Preliminary Investigation with the MMSE and RBANS

Farah Aslanzadeh, M.S.  
*Virginia Commonwealth University*

Sarah Braun, M.S

Julia Brechbiel, M.S.

*See next page for additional authors*

Follow this and additional works at: <https://scholarscompass.vcu.edu/gradposters>



Part of the [Clinical Psychology Commons](#)

---

### Downloaded from

Aslanzadeh, M.S., Farah; Braun, M.S, Sarah; Brechbiel, M.S., Julia; Willis, M.S., Kelcie; Parker, Kyra; Lanoye, PhD, Autumn; and Loughan, PhD, Ashlee, "Screening for Cognitive Impairment in Primary Brain Tumor Patients: A Preliminary Investigation with the MMSE and RBANS" (2020). *Graduate Research Posters*. Poster 52.

<https://scholarscompass.vcu.edu/gradposters/52>

This Poster is brought to you for free and open access by the Graduate School at VCU Scholars Compass. It has been accepted for inclusion in Graduate Research Posters by an authorized administrator of VCU Scholars Compass. For more information, please contact [libcompass@vcu.edu](mailto:libcompass@vcu.edu).

---

## **Authors**

Farah Aslanzadeh, M.S.; Sarah Braun, M.S; Julia Brechbiel, M.S.; Kelcie Willis, M.S.; Kyra Parker; Autumn Lanoye, PhD; and Ashlee Loughan, PhD

# Screening for Cognitive Impairment in Primary Brain Tumor Patients: A Preliminary Investigation with the MMSE and RBANS

Farah Aslanzadeh, MS<sup>1</sup> Sarah Braun, MS<sup>1,2</sup> Julia Brechbiel, MS<sup>1</sup> Kelcie Willis, MS<sup>1</sup> Kyra Parker<sup>4</sup> Autumn Lanoye, PhD<sup>3</sup> & Ashlee Loughan, PhD<sup>1,3</sup>  
Virginia Commonwealth University, Department of Neurology, Division of Neuro-Oncology, Richmond VA;<sup>1</sup> Medical University of South Carolina, Charleston SC;<sup>2</sup> Massey Cancer Center, Richmond VA;<sup>3</sup> Virginia Polytechnic State Institute and State University, Blacksburg VA<sup>4</sup>

## BACKGROUND

- The Mini-Mental State Examination (MMSE) is regularly used to screen for cognitive impairment and is reported as the second most used cognitive screener by physicians.<sup>1-2</sup>
- However, the MMSE is less sensitive to mild neurocognitive disorders (mNCD) such as that commonly seen among primary brain tumor (PBT) patients.<sup>3</sup>
- In PBT patients, the MMSE has been shown to have dismal sensitivity to cognitive impairment and poor sensitivity to change.<sup>4-5</sup>
- Comparison between the MMSE, MoCA, and a comprehensive neuropsychological battery revealed extremely poor sensitivity of the MMSE to mNCD and that no cut score for either screener was adequate for optimal sensitivity and specificity.<sup>6</sup>
- More comprehensive screening tools, such as the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS), may be more suitable for use with PBT patients.<sup>7</sup>

## AIMS

- Compare the proportion of impairment indicated on both the MMSE-2 and RBANS in PBT patients and conduct preliminary analysis of the sensitivity and specificity of the MMSE-2 to the level of cognitive impairment identified on the RBANS.

## METHODS

### *Procedures & Participants:*

- Retrospective study of 81 PBT patients at a Mid-Atlantic urban academic medical cancer center.
- Inclusion criteria were as follows: (1) confirmed PBT diagnosis via histopathology; (2) a minimum of 2 weeks post-surgical resection or biopsy (if applicable); and (3) English speaking.
- M<sub>age</sub> = 49 yrs., 50.6% Men, 96.3% White
- Data obtained from neuropsychological evaluations and medical record

### *Neuropsychological Measures:*

- Test of Premorbid Functioning (TOPF)<sup>8</sup>
- MMSE-2<sup>1</sup>
  - Impairment defined as a score <27
- RBANS<sup>7</sup>
  - Impaired performance defined as at least one index score  $\geq 1$  standard deviation below TOPF<sup>10</sup>

## METHODS cont.

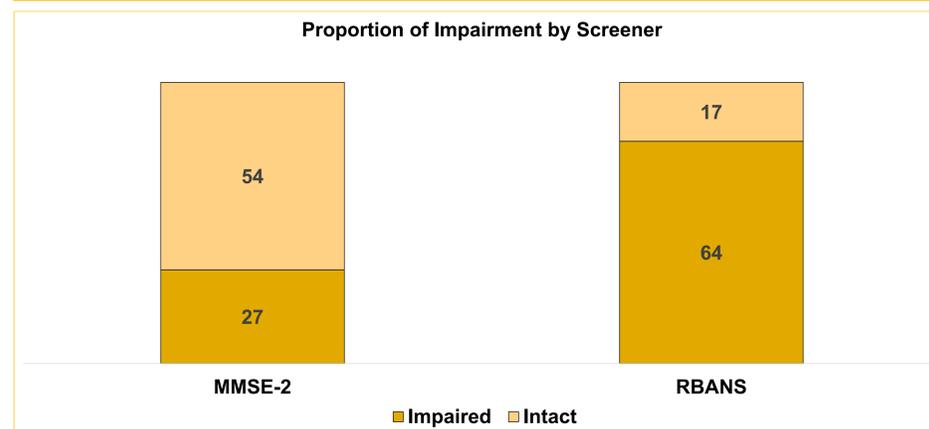
### *Data Analytic Plan:*

- Frequencies determined proportion of impairment for each screener. Chi-square analyses indicated difference between proportions.
- Binary logistical regression and ROC analysis assessed specificity and sensitivity for the MMSE-2 to detect the level of impairment identified on a "positive screen" of the RBANS.

Medical Characteristics	N (%)
<b>Tumor Grade</b>	
Low	28 (34.6%)
High	46 (56.8%)
Unknown	7 (8.6%)
<b>Therapy</b>	
Resection	62 (76.5%)
Radiation	47 (58.0%)
Chemotherapy	47 (58.0%)
<b>Seizure History</b>	
History	40 (49.4%)
Ongoing	12 (15.8%)
Current Anticonvulsant	35 (42.3%)

## RESULTS

- Significantly fewer patients were identified as impaired on the MMSE-2 (33%;  $n = 27$ ) than on the RBANS (52%;  $n=64$ ;  $\chi^2=17.57$ ,  $p<.01$ ).



- When evaluating the sensitivity of the MMSE-2 to a "positive screen" on the RBANS, defined as one or more impaired indices, sensitivity was 38.2% (95% CI = 26.71% to 50.82%) and specificity was 92.3% (CI = 63.97% to 99.81%).
- The positive predictive value of the MMSE-2 was 96.3% (CI = 79.43% to 99.43%). The negative predictive value was 22.2% (CI = 18.29% to 26.72%). Accuracy of the MMSE-2 was 46.91% (CI = 35.73% to 58.33%).

## SENSITIVITY & SPECIFICITY

		Positive screening on RBANS		
		+	-	
MMSE Screening Outcome	+	True Positive 24	False Positive 3	PPV = 96.3%
	-	False Negative 40	True Negative 14	NPV = 22.2%
		Sensitivity = 38.2%	Specificity = 92.3	

## DISCUSSION

- Medical practitioners should consider alternative screeners and rely less heavily on the MMSE-2 within neuro-oncology clinics given the relative rates of indicated impairment and preliminary evidence regarding the MMSE-2's sensitivity to the level of cognitive impairment detected on the RBANS.
- While it appears that the MMSE-2 accurately categorizes those with true cognitive impairment as impaired (i.e., true positives), results suggest that an individual scoring >27 on the MMSE-2 is still rather likely to be categorized as impaired on other, more comprehensive screeners (i.e., false negatives).
- More comprehensive screeners such as the RBANS may have greater clinical utility in screening for cognitive impairment among PBT patients, particularly if the objective of screening is to minimize false negatives and increase access to additional supports.
- Future studies should assess the relative utility of screeners among PBT patients by using a comprehensive neuropsychological test battery to assess sensitivity and specificity to a diagnosis of mNCD.
- Additionally, feasibility and acceptability research is needed to assess if use of the RBANS in neuro-oncology clinics for screening is a possible when a neuropsychologist is not part of the integrated care team.
- In sum, if clinicians rely solely on the MMSE-2, as is common practice in many medical centers, patients who could benefit from additional services may go undetected.