Is Environmental Enrichment Neuroprotective?

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BACKGROUND

- ❖ Individuals who receive brain radiation are at increased risk of developing accelerated cognitive decline.
- ❖ Limited interventions exist to mitigate these progressive neurological complications.
- ❖ The aim of this abstract is to present preliminary findings examining if there is an association between environmental enrichment (EE) and health outcomes among individuals with low-grade glioma who received brain radiation.

METHODS

- ❖ Retrospective cohort design among persons with low-grade glioma treated with radiation approximately 5 years from the original brain tumor diagnosis
- ❖ EE as a construct includes social network/engagement, physical activity, and employment status/financial stability
- ❖ Health Outcomes:
  - ❖ Cognition: Montreal Cognitive Assessment (MOCA) & Symbol Digit Modality Test (SDMT)
  - ❖ Function: Karnofsky Performance Status (KPS)
  - ❖ Symptoms: MD Anderson Symptom Inventory – BT (MDASI-BT)
  - ❖ Cortical volume (temporal brain MRI images)
- ❖ Statistical analysis: Linear Regression to evaluate the relationship between EE and health outcomes. Covariates are age, sex, and radiation dose.

Composite Score from Environmental Enrichment Measures

Social Network Index (Range 0-4)	0: Least Socially Connected/ Most Isolated 4: Most Socially Connected/Not Isolated
International Physical Activity Questionnaire	1: Low activity 2: Moderate activity 3: High activity
Vocational Index Scale	1: Unemployed 2: Sheltered workshop 3: Community-volunteer 4: Part-time employment 5: Full employment/student
Two socioeconomic questions regarding concerns with economic/health-related cost.	1: Always 2: Often 3: Sometimes 4: Rarely 5: Never
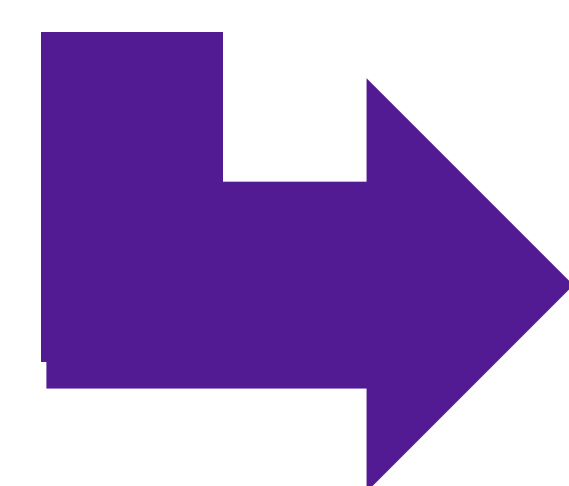
Categorization of EE

Low
Moderate
High

RESULTS

- ❖ Statistical analysis in progress.

Participant Demographics and Clinical Information (N=39)

Age, median (range) in years	44 (26-78)
Sex, n (%)	
Male	22 (43.6%)
Female	17 (56.4%)
Type of Low-Grade Glioma	
Astrocytoma	18 (48.6%)
Oligodendroglioma	19 (51.3%)
Type of Radiation, N (%)	
Photon	18 (46.2%)
Proton Beam	21 (53.8%)

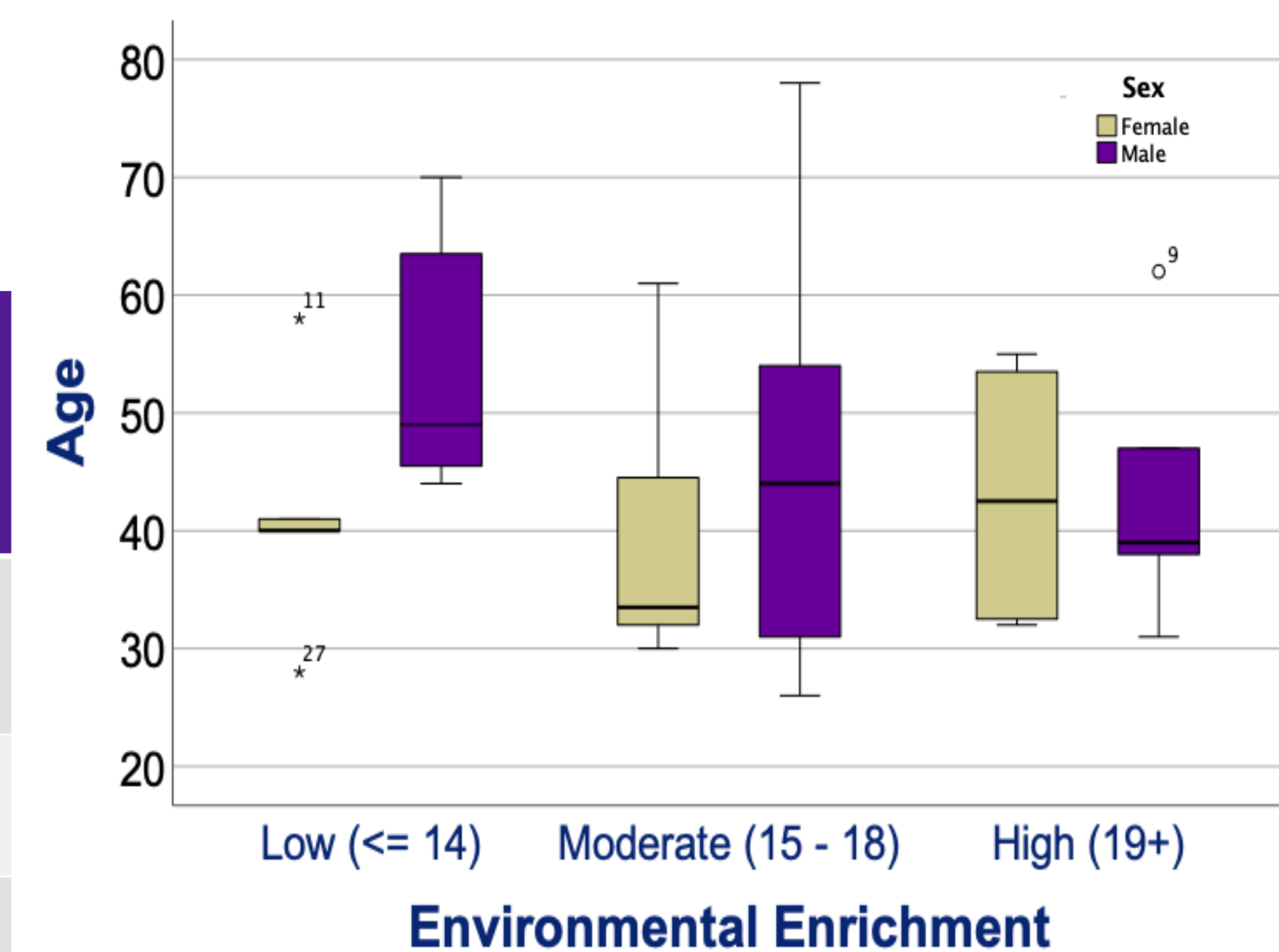| Health Outcomes	Median	Min	Max
MOCA	27	10	30
SDMT	-0.74	-5.22	1.46
KPS	90	60	100
MDASI-BT	1.41	0.091	7.09
Global cortical atrophy rate	-0.052	-0.479	0.295

CONCLUSION

- ❖ Research in progress.
- ❖ Limitations:
  - ❖ Cross-sectional evaluation of EE.
  - ❖ EE as a composite score from all measures
- ❖ Further research is needed to determine causation.
- ❖ Evaluating social, behavioral, and environmental factors may provide insight into managing neurological complications after brain irradiation.

ACKNOWLEDGEMENTS