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Association Between Spatial Navigation Performance and Inflammatory Markers in cognitively normal adults

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BACKGROUND

- Spatial navigation (SN) performance is associated with Alzheimer's disease (AD) and clinical progression.
- There is increasing evidence that inflammation contributes to neurodegeneration and represents an early AD marker. Sex differences are well-established in other disorders with an inflammatory component.
- Rodent literature has observed associations between spatial memory and inflammation.
- This pilot study aims to explore associations between SN ability and inflammatory markers in cognitively normal adults.

METHODS

- **Participants:** Cognitively normal participants from the Women's Alzheimer's Movement and Prevention Center at Cleveland Clinic and the Center for Neurodegeneration and Translational Neuroscience. **See Sample Characteristics.**
- **Spatial Navigation:** Participants completed three four-minute learning trials where they were allowed to freely explore a computerized virtual environment. After a 15-minute delay, participants were instructed to find goal locations within the learned environment (six test-trials). Spatial navigation ability was operationalized by z-score composites of time and distance taken to reach the goal location.
- **Inflammatory Markers:** Plasma tumor necrosis factor alpha (TNF- α), interleukin 6 (IL-6) and interleukin 1 β (IL-1 β) are pro-inflammatory cytokines highlighted as potential AD biomarkers and screened using Bio-Plex Pro Human Cytokine 48-Plex Screening Panel.

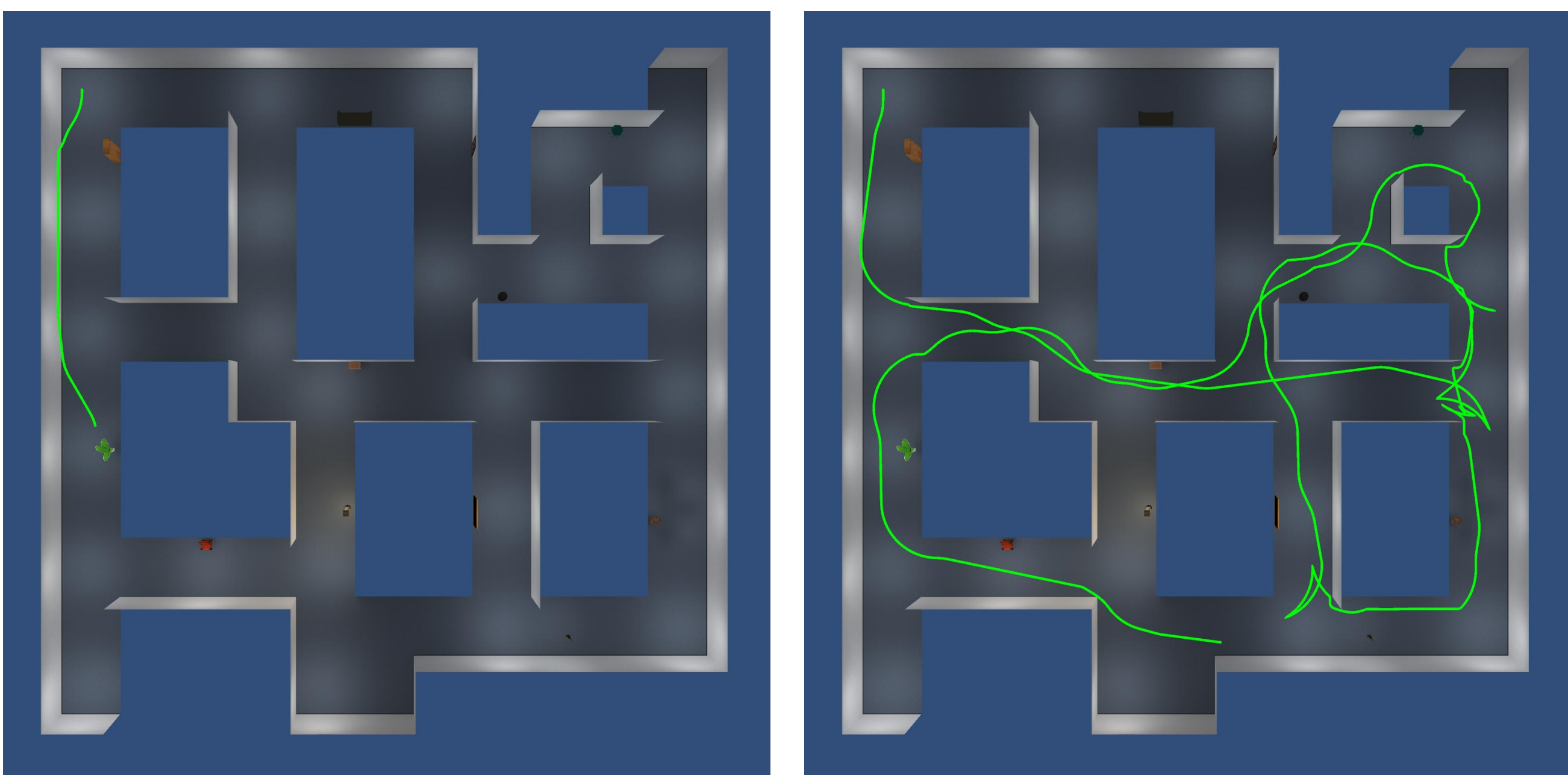
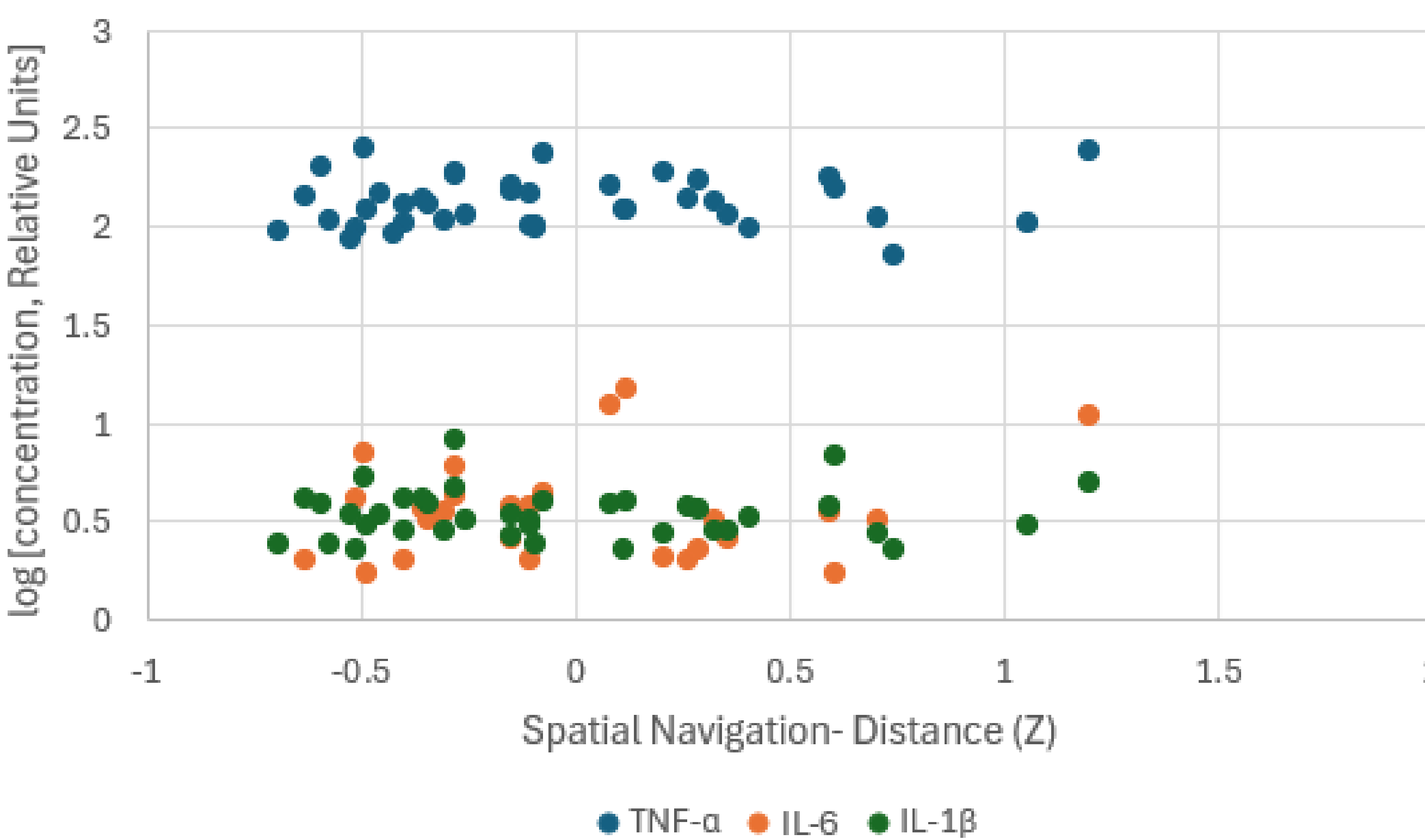
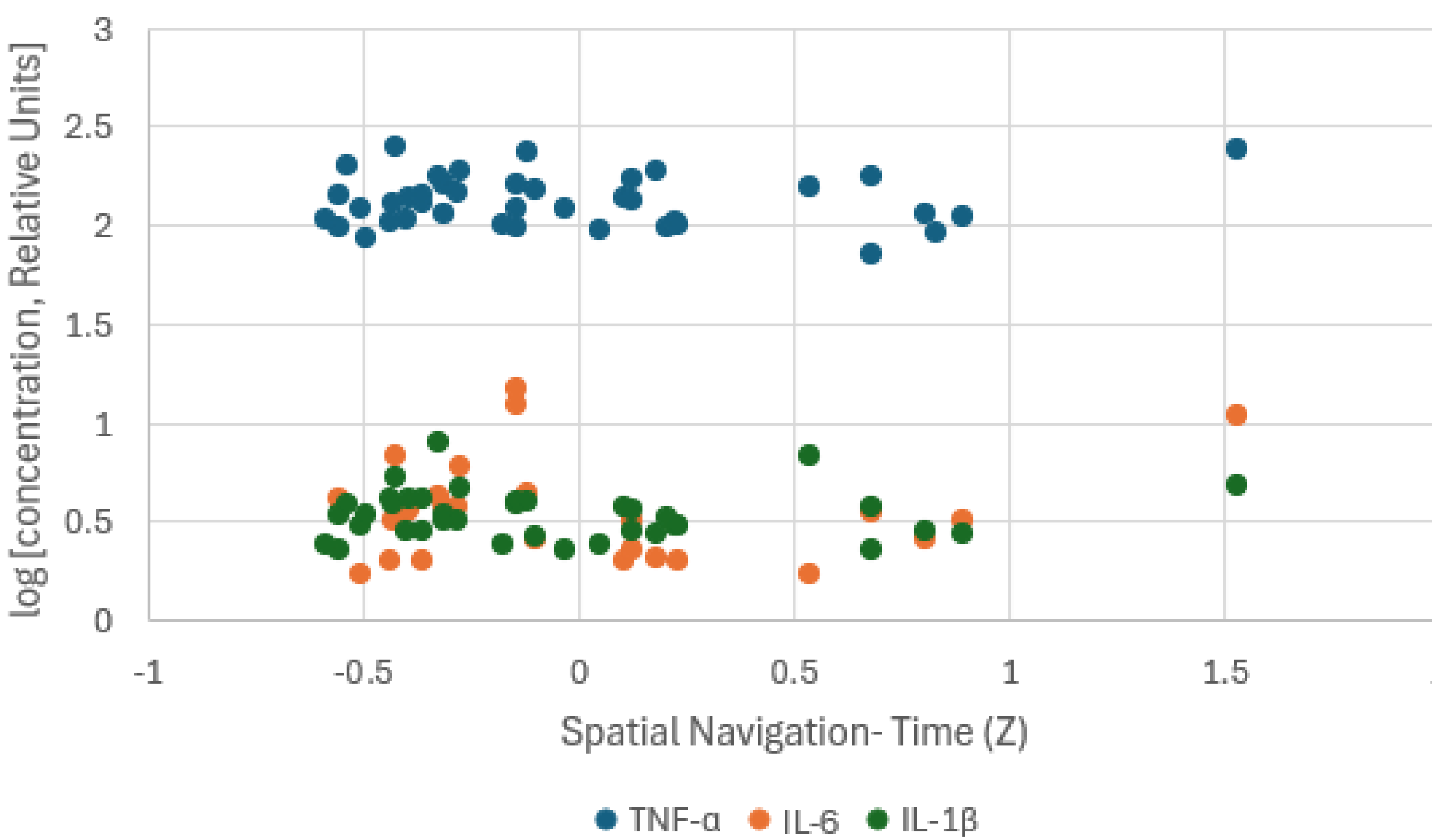


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SAMPLE CHARACTERISTICS

	Total Sample	Men	Women
N	45	21	24
Age (years) (M, SD)*	70.16 (11.09)	72.19 (10.12)	68.38 (11.81)
Age range	37-85	52-85	37-85
Education (years) (M, SD)	16.62 (2.33)	16.48 (2.11)	16.75 (2.35)
Education range	10-20	12-20	10-20

KEY RESULTS SUMMARY



RESULTS

Inflammatory Marker	SN-Time (<i>r</i> , <i>p</i> .)	SN-Distance (<i>r</i> , <i>p</i> .)
TNF- α	<i>r</i> =.06, <i>p</i> =.69	<i>r</i> =.11, <i>p</i> =.52
IL-6	<i>r</i> =.11, <i>p</i> =.60	<i>r</i> =.21, <i>p</i> =.31
IL-1 β	<i>r</i> =.02, <i>p</i> =.90	<i>r</i> =.03, <i>p</i> =.85

- Pearson correlations were used to examine the association between inflammatory markers and cognitive measures. If significant, models were corrected for age. Sex differences were examined using t-tests.
- No significant correlations were observed between neuroinflammation and SN.
- When stratified by sex, males showed trend-level positive correlations between IL-6 and SN (SN-Time *r*=.63, *p*=.07; SN-Distance *r*=.64, *p*=.06).
- No other sex-specific associations were found.

CONCLUSIONS

- This study did not demonstrate associations between spatial memory and inflammatory markers, inconsistent with rodent literature.
- Exploratory analyses suggested a male-specific association between IL-6 and SN.

FUTURE DIRECTIONS

- The current study is a pilot and subsequently underpowered. Future research would benefit from continued data collection.
- Examination of other plasma biomarkers or inflammatory markers (e.g., ptau217, IL-8).

CONTACT INFORMATION

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