Associations between symptom profiles, structural and functional neural circuitry, and quality of life among a large cohort of trauma survivors

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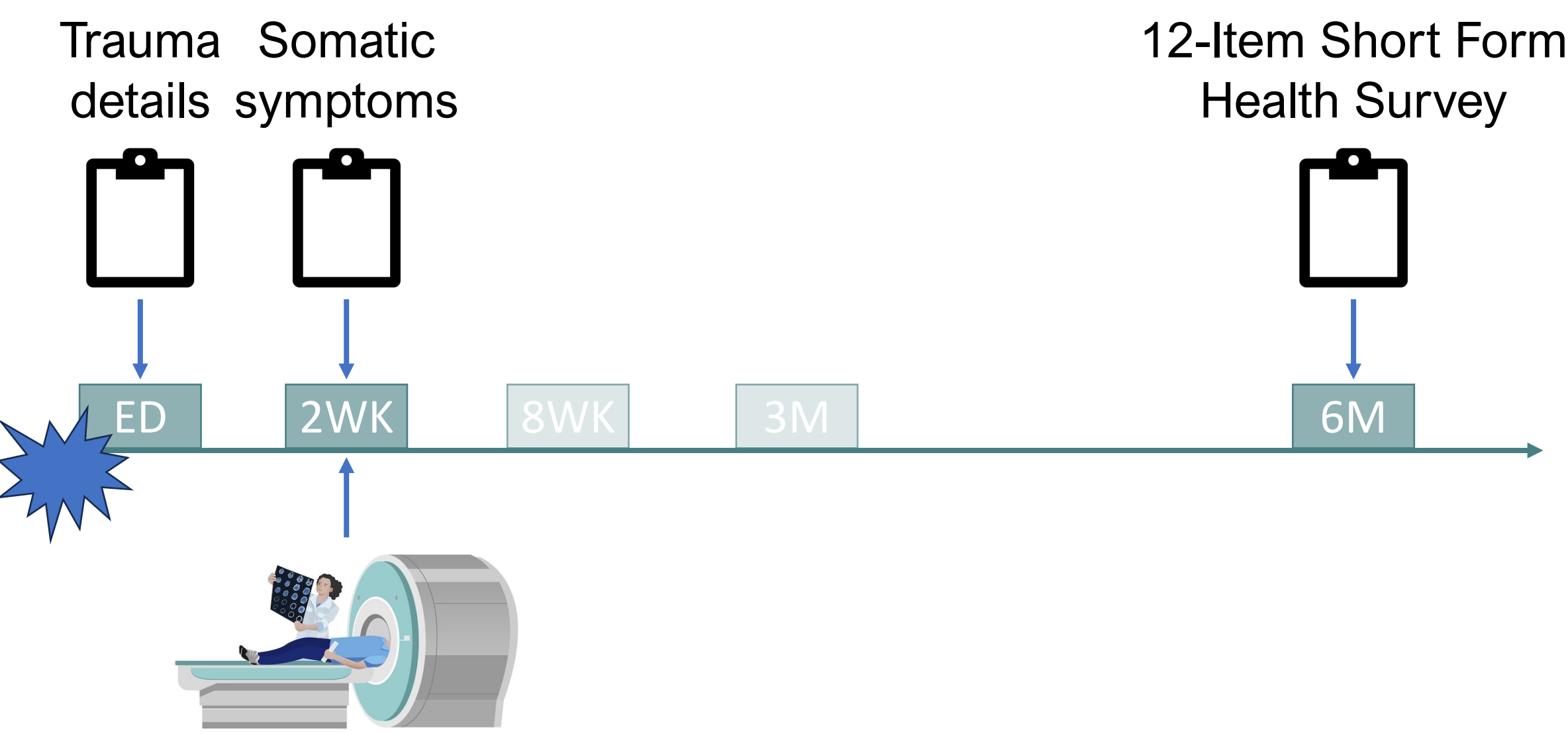
BACKGROUND

The relationships between symptom heterogeneity among trauma survivors who met traditional criteria for traumatic brain injury (TBI), neuroimaging biomarkers, and later quality of life remains unclear. We hypothesized that those with a greater burden of somatic symptoms two weeks after trauma would exhibit greater disruption in structural and functional neural circuits and would report worse physical and mental health related quality of life six months after trauma.

METHODS

We used data from the longitudinal AURORA study, restricting the analysis to individuals who met traditional criteria for TBI (N=842), that is, endorsed hitting their head during the qualifying traumatic event and an alteration in mental status. Latent profile analysis was performed using the "mclust" R package to identify profiles of somatic symptoms at two-weeks post-trauma. Models were compared using the BIC and ICL criterion. The effects of profile group on white matter tract integrity, internetwork connectivity strengths, and 6-month physical and mental health related quality of life were assessed using a series of one-way ANCOVA models, adjusting for age and sex.

Fig 1. Study design.

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ED patients who met criteria for TBI with **visual and vertigo-related symptoms** report **worse quality of life** six months later

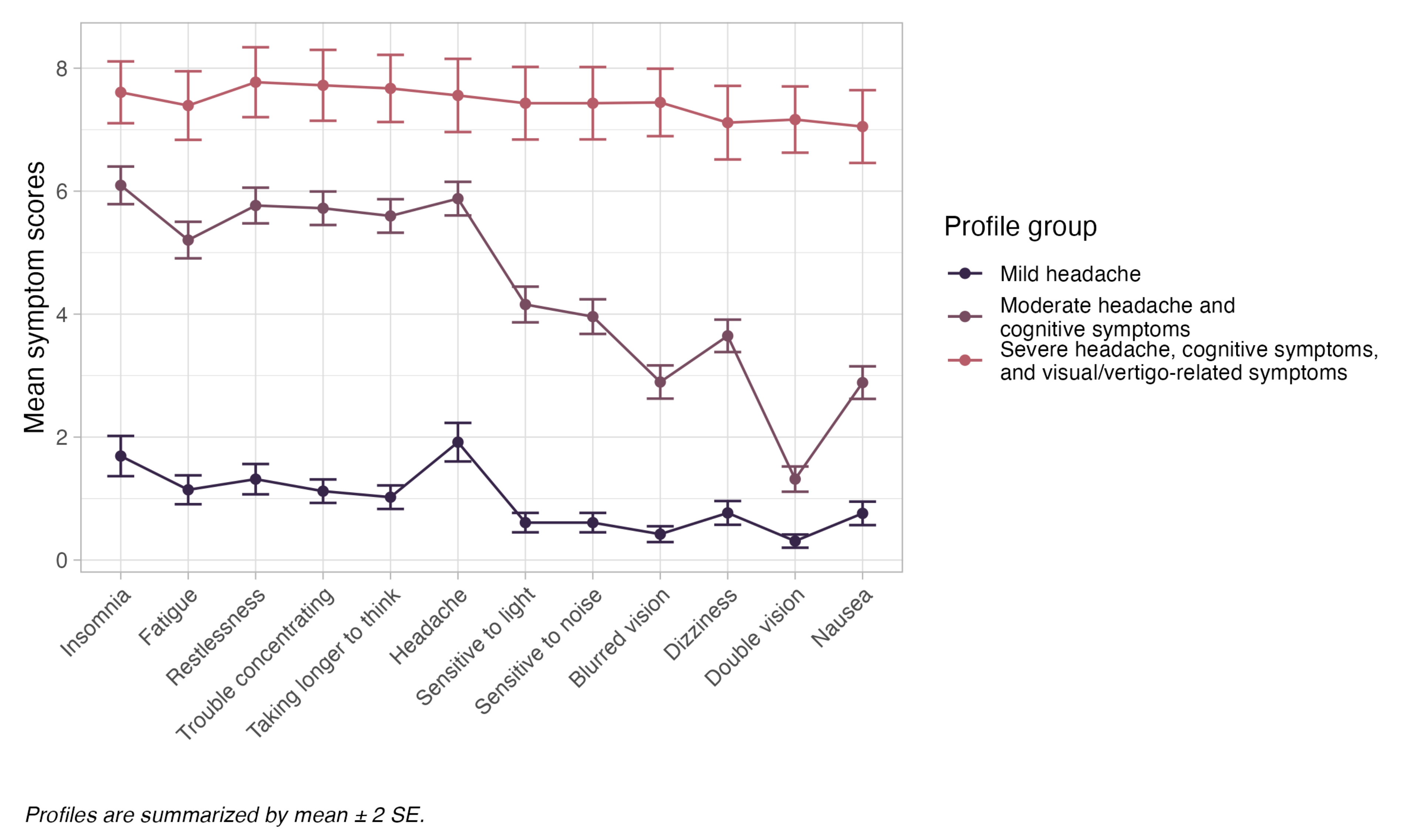**Fig 2. Latent profiles of symptoms at two-weeks post-trauma.**

Profiles are summarized by mean ± 2 SE.

Fig 3. Quality of life at 6-months post-trauma by profile group.

Profiles are summarized by mean ± 2 SE.
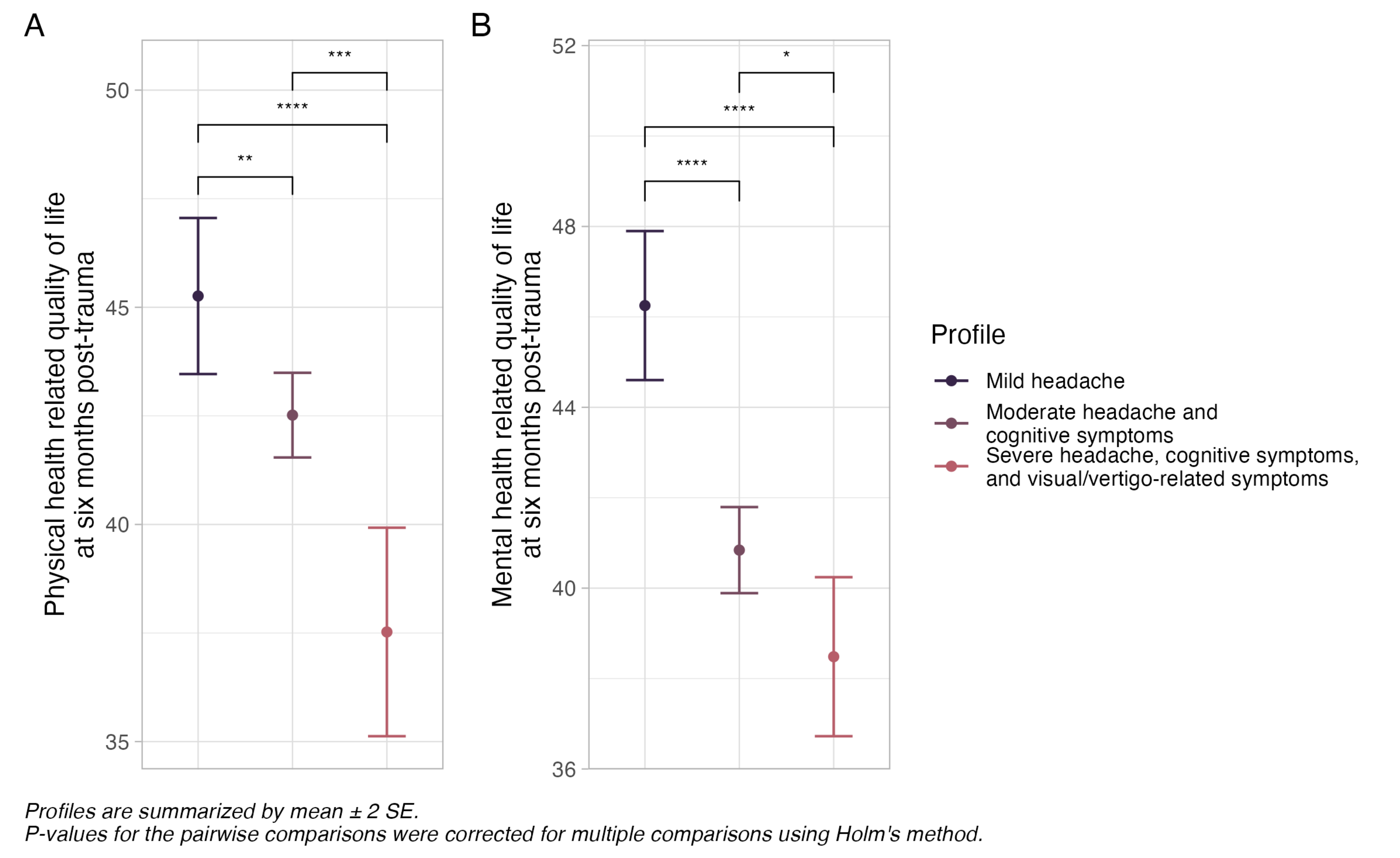*P-values for the pairwise comparisons were corrected for multiple comparisons using Holm's method.*

Table 1. Demographics of profile groups

	Mild headache	Moderate headache and cognitive symptoms	Severe symptoms, including visual/vertigo related symptoms
N	133	518	79
Age (y), M ± SD	32.1 ± 13.0	35.3 ± 12.9	34.6 ± 10.6
Female, n (%)	60 (45%)	313 (60%)	47 (59%)

RESULTS

- Latent profile analysis of the 10 somatic symptoms identified 3 subgroups
- Neither mean FA values for selected tracts nor inter-network functional connectivity strengths differed by profile group
- Both physical and mental health related quality of life differed significantly by profile group (physical: $F_{(2,725)}=11.4$, $p<.001$, $\eta^2=0.03$; mental: $F_{(2,725)}=18.9$, $p<.001$, $\eta^2=0.05$)

DISCUSSION

Participants who were more severe symptoms, particularly visual/vertigo-related symptoms, reported significantly worse physical and mental health related quality of life at six-months post-trauma. A major limitation is the use of self-reported data to identify possible TBI in the AURORA cohort. An objective assessment, such as concentration of a blood biomarker for brain injury, would be more sensitive and may uncover relationships between neural integrity and symptom profiles.

For more information about the AURORA study: