Evaluating Posttraumatic Neuropsychiatric Sequelae Trajectories during The First Eight Weeks After Trauma Exposure Across RDoC Constructs Using Brief Serial Smartphone-Based Self-Report Survey

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Background

- Adverse posttraumatic neuropsychiatric sequelae (APNS) are common among civilian trauma survivors and military veterans.
- APNS, as traditionally classified, include posttraumatic stress, post-concussion syndrome, depression, and regional or widespread pain.
- These traditional classifications artificially fragment APNS into siloed, syndromic diagnoses unmoored to discrete components of brain functioning. These traditional classifications are typically studied in isolation, and do not accurately reflect actual posttraumatic neuropsychiatric phenotypes. Most trauma survivors experience complex patterns of overlapping/co-occurring symptoms across multiple traditional classifications, and increasing evidence indicates that symptoms across classifications can share an interwoven/overlapping neurobiological substrate.
- Assessing more discrete, homogenous APNS outcomes over time, building from the NIMH Research Domain Criteria framework, may improve the ability to index APNS to domains of brain function, and categorizing individuals across these outcomes may provide more accurate phenotyping.
- Frequent administration of brief smartphone-based surveys can be deployed in trauma survivors to evaluate trajectories of specific symptom subgroups over time.

Methods

- The AURORA Study is a longitudinal study of civilian trauma survivors presenting to the emergency department (EDs) for care.
- The Discovery by Mindstrong™ App is used to assess common APNS symptoms 6 times during the initial 8 weeks after trauma (Table 2).
- Measurement models, latent growth curves (LGC), and growth mixture models/classes[1] were developed for an initial sample of 837 participants.

Table 1. AURORA study participant characteristics in the present sample (N=837)

Characteristics	Frequency
Age (mean)	35
Female (%)	69%
Income < $35,000 (%)	66%
Education (%)	
High school or less	37%
Some college	44%
College graduate	13%
Post graduate	7%

* N = 837 reflects the number of cases used in the final, full model

Table 2. Measured variables used to assess specific symptom subgroups

Construct	Item Content (reference period for all is past 24 hours)
Pain	Average pain severity, worst pain severity
Loss	Trouble having positive feelings; feeling sad/depressed/empty; down on yourself
Sleep	Trouble falling asleep; trouble staying asleep; trouble waking too early
Nightmare	Nightmares about event; other nightmares; panic attacks during the night
Avoidance	Avoided thinking about event; avoided event reminders
Re-experiencing	Had repeated event memories; upset about being reminded of event; strong physical reaction when reminded of event
Anxiety	Severe anxiety/panic; feel nervous/worried/anxious
Hyperarousal	Very alert or watchful; jumpy or easily startled
Somatic Symptoms	Headaches; dizziness; nausea
Thinking/ fatigue	Problem concentrating; taking longer to think; fatigue problems

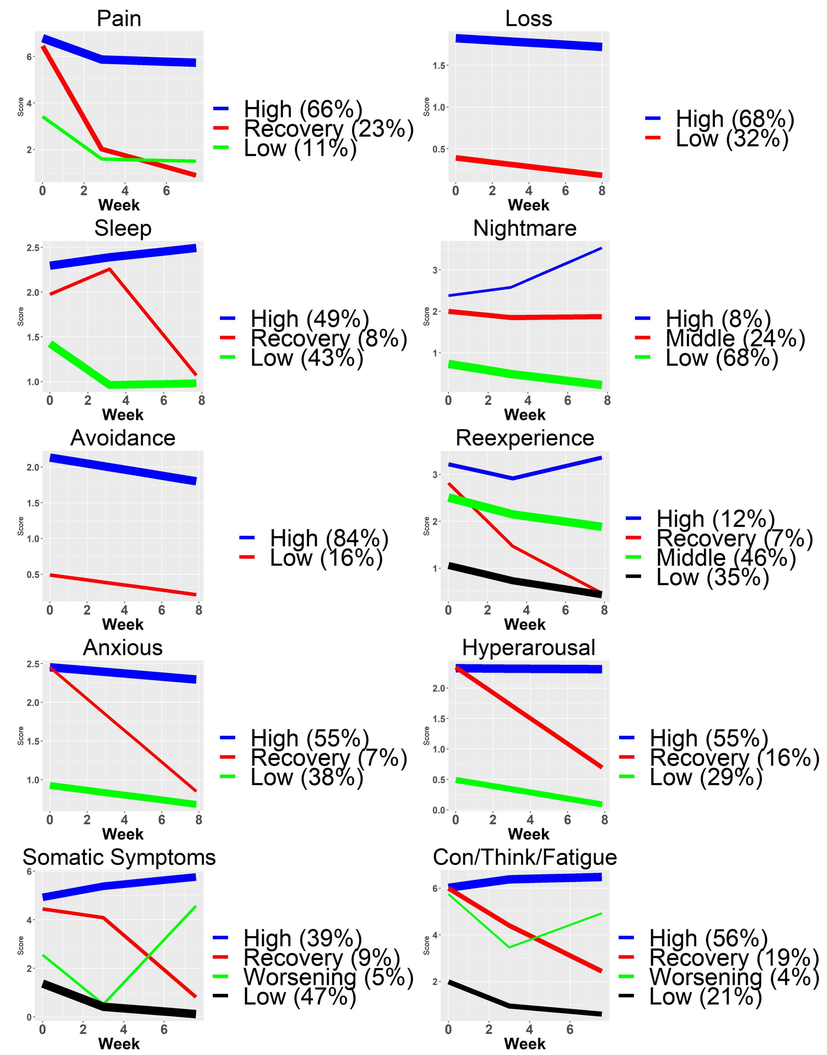

Figure 2. Trajectory patterns of common symptom subgroups, and % of participants within each pattern, based on growth mixture models

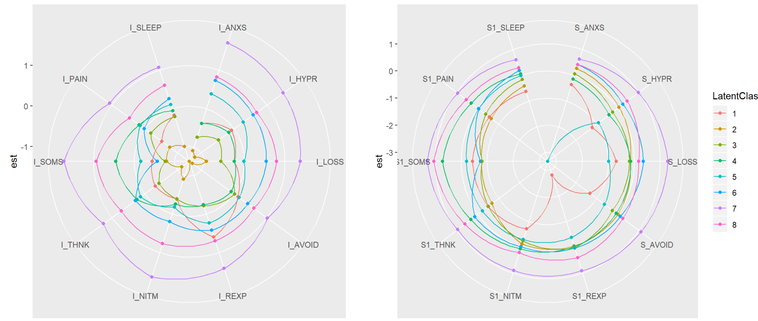

Figure 3. Example multidimensional outcome classifications across common self-report symptom subtypes*. Intercepts of symptom subgroups (initial post-traumatic symptom severity) shown at left, and change over time (slope) shown at right. Points closer to center represent more severe symptoms. *For piecewise models, only initial slope displayed

Results

- AURORA sample characteristics are shown in Table 1. Individuals are recruited after a range of exposures, including motor vehicle collision, physical assault, and other forms of traumatic stress.
- Measurement models were created for each construct (e.g., pain CFI 0.99, Loss CFI 0.97) and LGCs developed. Example latent classes were identified/selected based on relative model fit (primarily) and clinical utility (Figure 2). Persistent symptoms were common across discrete APNS symptom subtypes/constructs during the first 8 weeks after trauma exposure (Figure 2).
- Figure 3 displays an example multidimensional outcome classification using latent profile analysis. Intercept means across constructs for each multidimensional outcome group are shown at left, and means for initial slopes are shown at right. Individuals with the greatest recovery had no/low symptoms across constructs, however non-recovered groups had markedly different inter-construct profiles.

Conclusions

- Assessing common, homogenous APNS outcomes and developing multidimensional classifications using these outcomes has the potential to improve current fragmented syndromal classification.

References

[1]Bollen KA, Curran PJ (2006). Latent Curve Models: A Structural Equation Perspective. Hoboken: Wiley.

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