

# Relationship Between Emotional Symptoms and Neurobehavioral Symptoms in Veterans with History of TBI



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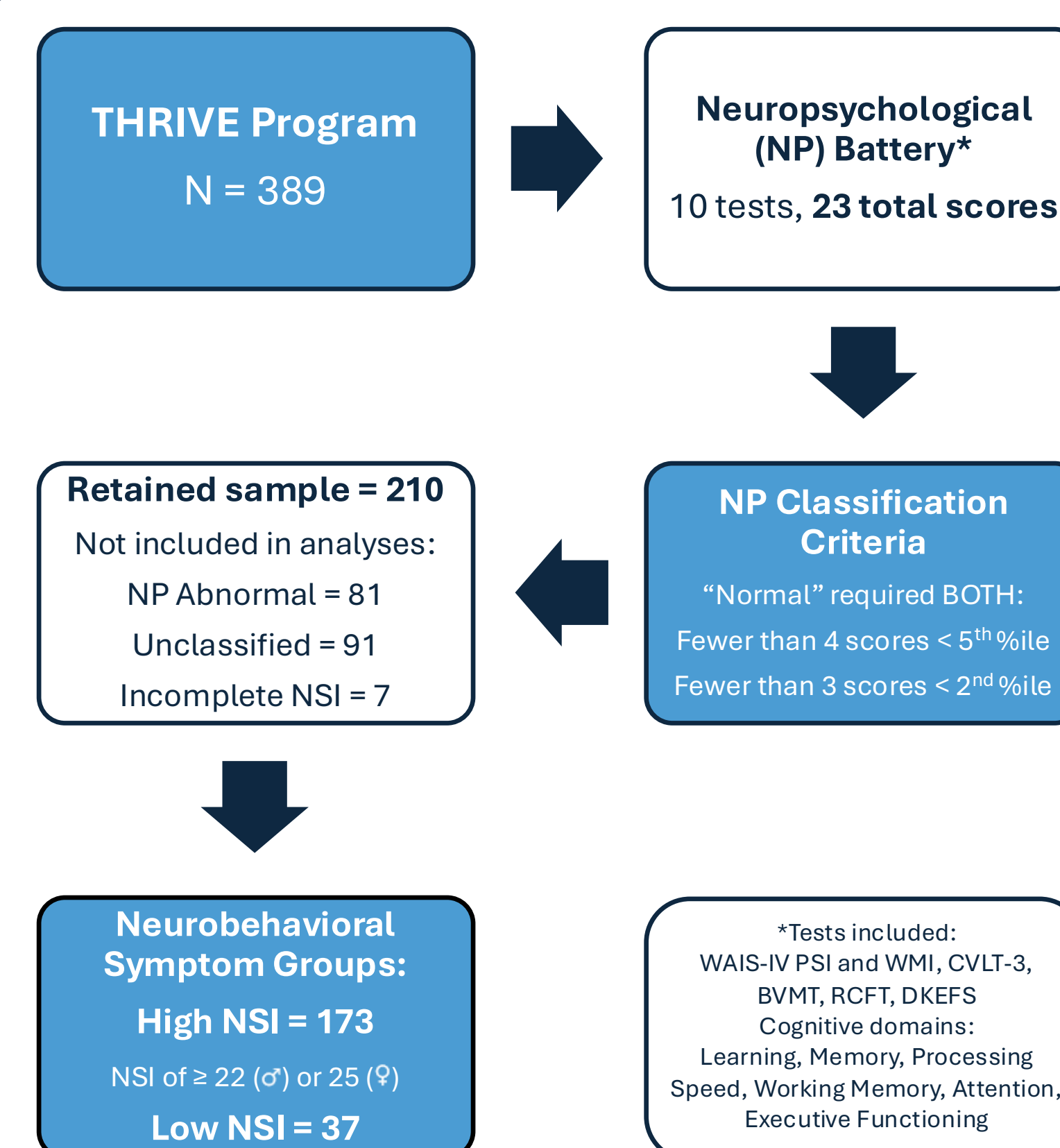
## BACKGROUND

- Subjective cognitive complaints following mild traumatic brain injury (mTBI) often exceed deficits identified through objective cognitive testing
- Veterans disproportionately experience PTSD, depression, anxiety, and moral injury, each of which may independently drive symptom perception
- Elevated self-reported symptoms may reflect psychological distress rather than measurable cognitive impairment

## METHODS

### Participants

- Participants N = 389 veterans, first responders, and late-career active-duty service members from UNC's THRIVE Program



**Figure 1.** Selection process “High NSI” and “Low NSI” in “Normal NP” sample

### Emotional Variables

- PCL-5: PTSD symptom severity; 20 items, scored 0–80
- PHQ-9: Depression severity; 9 items, scored 0–27
- GAD-7: Anxiety severity; 7 items, scored 0–21
- MIES: Moral injury emotional impact; 9 items, scored 9–45

### Data Analyses

- Individual and full parallel bootstrap mediation models (1,000 resamples)
- 210 “Normal NP” with complete NSI included, split into 173 High Symptoms and 37 Low Symptoms
- Significance determined by 95% bootstrap Confidence Intervals excluding zero
- All analyses conducted in R

## CONCLUSIONS

**Subjective symptom reporting does not always align with objective cognitive testing**

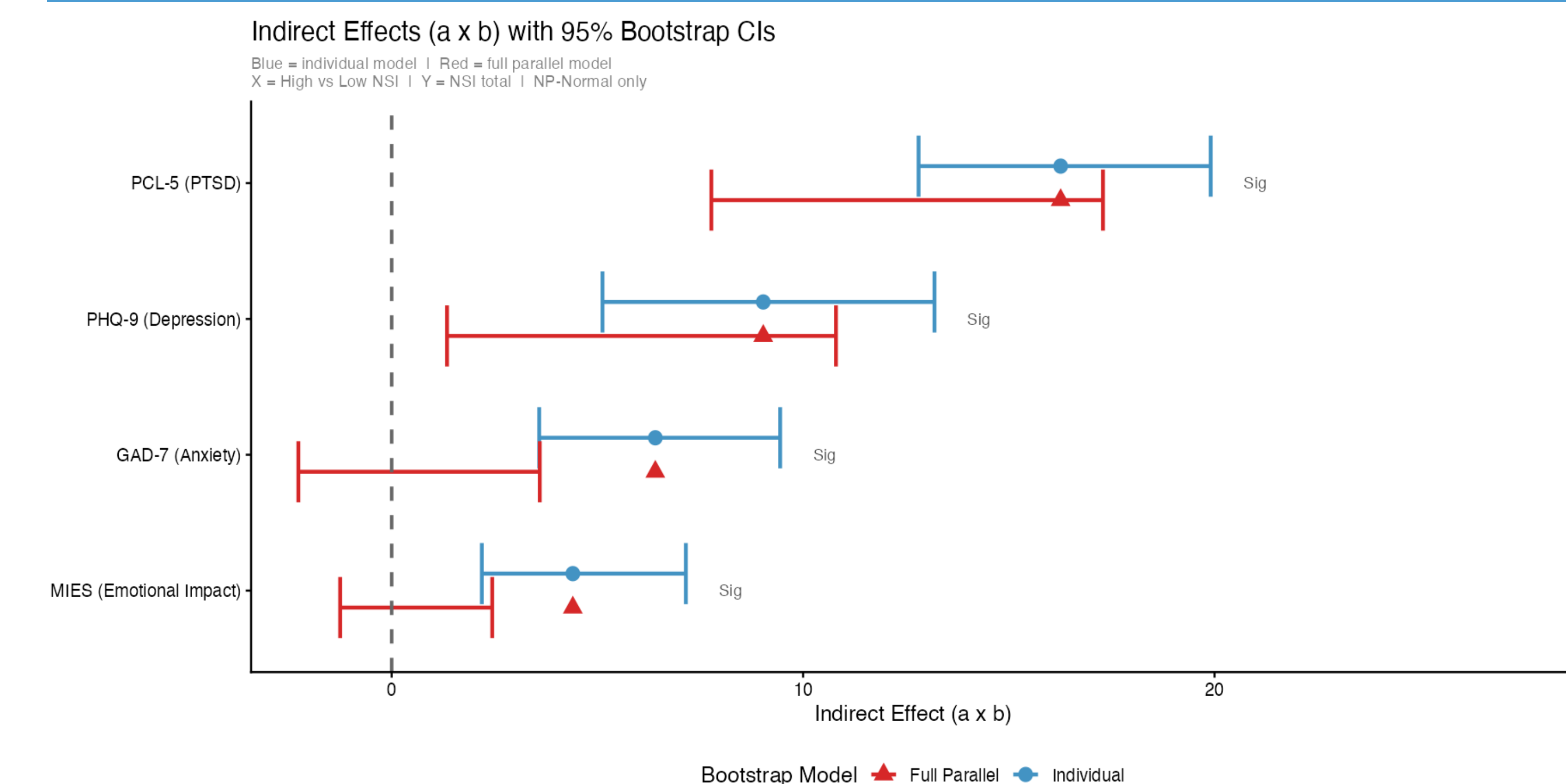
**PTSD severity appears to be the primary driver of elevated neurobehavioral symptom reporting**

**Self-reported cognitive difficulties may reflect underlying emotional distress rather than measurable impairment**

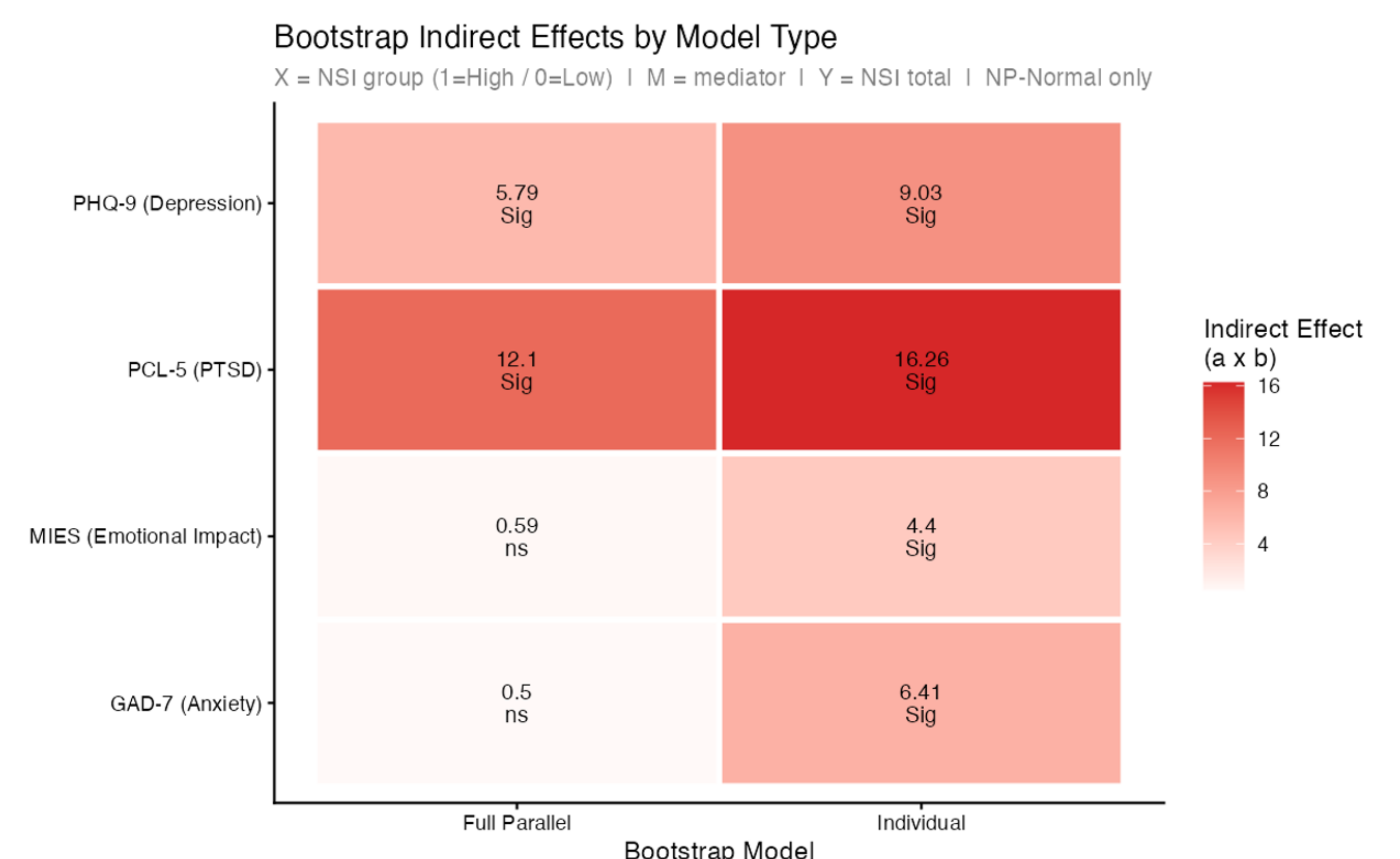
## FUTURE DIRECTIONS

- Examine if specific symptom profiles align with elevated emotional distress
  - Preliminary analyses suggest the same patterns hold when analyzing only NSI cognitive symptoms
  - Suggests overlap in measures on psychological symptoms is not driving findings
- Longitudinal studies examining how emotional distress and symptom reporting change over time and in response to treatment
- Explore additional variables such as pain and sleep, including impact on functioning and quality of life

## RESULTS



**Figure 2.** Bootstrap indirect effects ( $a \times b$ ) with 95% confidence intervals for emotional variables and total NSI symptom reporting. PCL-5 demonstrated the strongest individual effect ( $a \times b = 16.26$ , 95% CI [12.81, 19.91]), followed by PHQ-9 ( $a \times b = 9.03$ ), GAD-7 ( $a \times b = 6.41$ ), and MIES ( $a \times b = 4.40$ ).



**Figure 3.** Bootstrap associations between emotional variables and total NSI symptom reporting. PTSD severity and depression retained independent significance in the full parallel model; anxiety and moral injury were attenuated.

### Acknowledgments & Disclaimers

Data were collected from the UNC THRIVE Program. The views expressed are those of the authors and do not represent official positions of UNC or any affiliated institution. All data were de-identified prior to analysis in accordance with UNC's IRB protocols.

**Are you—or someone you know—a Veteran?**  
The Matthew Gfeller Center at UNC-Chapel Hill's **Transforming Health & Resilience in Veterans (THRIVE) Program** provides comprehensive evaluation and treatment for Veterans living with lasting effects of TBI, PTSD, and related conditions.

*Duty. Service. Honor.*

