Examining Longitudinal Cognitive and Mental Health Outcomes in Mild TBI using the Federal Interagency Traumatic Brain Injury Research (FITBIR) Informatics System and the Longitudinal CENC/LIMBIC Datasets

Presented by
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Disclosures

No disclosures to report.

This presentation does not represent the views of the federal government.

Meet the Team

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Agenda

- Complex associations between mental health and TBI
- Current limitations in the existing literature
- Federal Interagency Traumatic Brain Injury Research (FITBIR) Informatics System and CENC/LIMBIC datasets
- Results
- Conclusions

Mental Health and TBI

- PTSD, depression, and other mental health disorders/symptoms are common following TBI
- But it's complicated...
  - Moderators
  - Symptom Overlap
- Few large, longitudinal datasets are available

Carlson et al., 2011; Greer et al., 2020; Loignon et al., 2020

Limitations

- Existing studies are:
  - Small
  - Focused on specific populations
- Limited data on underrepresented groups
- Varied methodologies

Federal Interagency TBI Research Informatics System (FITBIR)

A biomedical informatics system and data repository for TBI research.

- Collaboration between the NIH ICs and the USAMRDC
- First developed to share TBI data.
- Our team was funded by the DoD to harmonize individual participant-level data in a large meta-dataset.

FITBIR
Federal Interagency Traumatic Brain Injury Research
INFORMATICS SYSTEM

Objective: Proof of concept study, demonstrating our ability to combine individual participant-level TBI data to evaluate associations between TBI and PTSD.

Method

- We developed a model system for harmonizing data across TBI studies.
- We created cross-sectional meta-datasets by merging key variables across studies (e.g., TBI severity, demographic info, PTSD outcomes)
- These efforts are in line with broader “FAIR” data sharing practices
- The meta dataset and code are available at https://fitbir.nih.gov

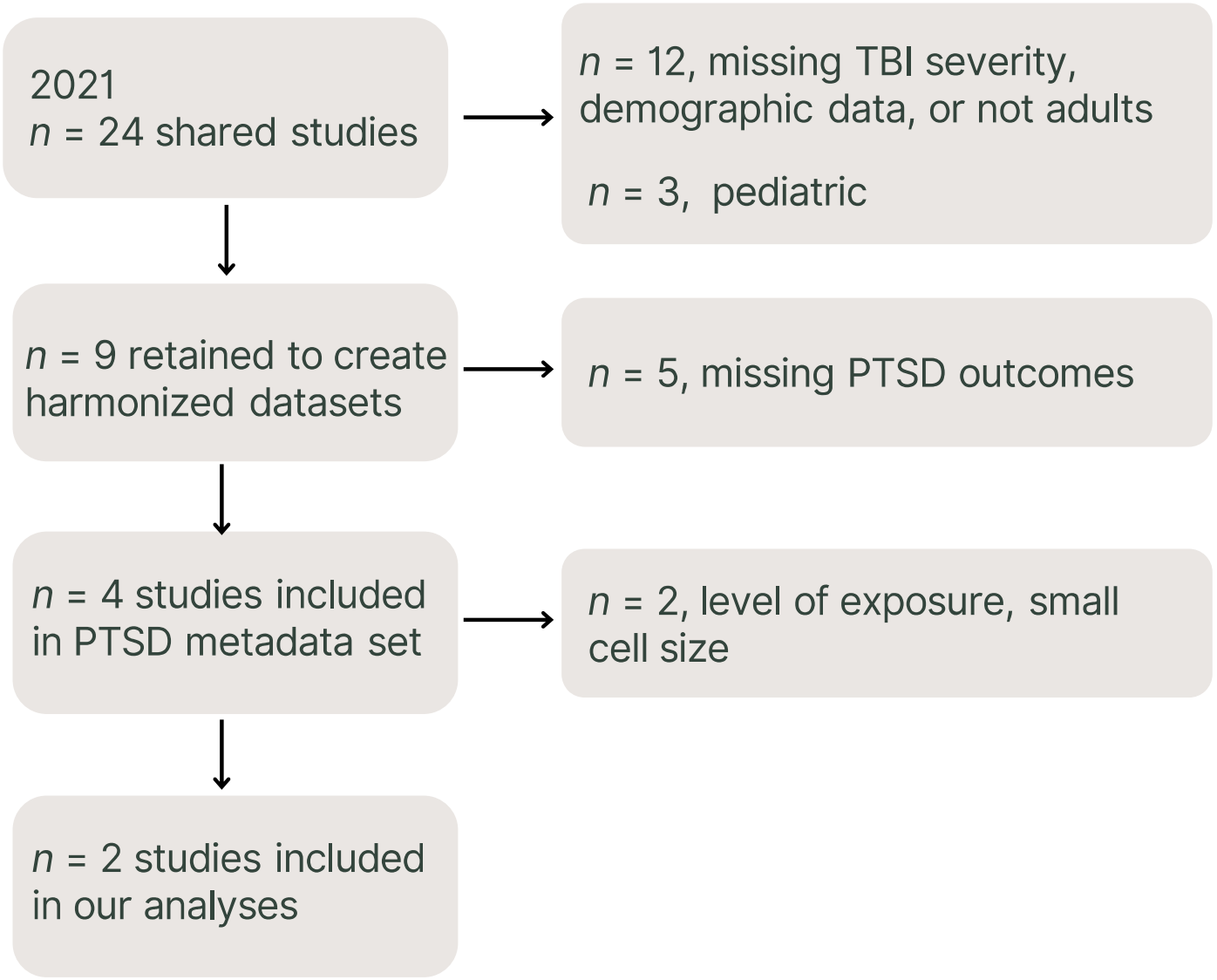
Inclusion Criteria

- TBI Severity Data
- Demographic Info
- Adult Sample
- PTSD Outcomes

Data Analytic Plan

- We based our approach on individual participant-level meta-analysis
- Created a function that extracted variables of interest and their respective timepoint, including demographic and TBI severity data
- Multivariate Logistic Regression: Mild TBI and Probable PTSD
- Separate model with age, gender, race and study ID as covariates
- Calculated E-Values to assess the potential contribution of unmeasured confounding on our results

Study Inclusion



The largest included study: CENC/LIMBIC

A multisite, prospective, longitudinal cohort study of deployed Veterans with and without mild TBI history.

- Prospective (*post TBI, but longitudinal and repeat assessments)
- Cohorts include deployed OEF/OIF/OND Veterans with and without a history of mild TBI.
- Extensive, detailed data collection including neuropsych, mental health, imaging, biomarkers.

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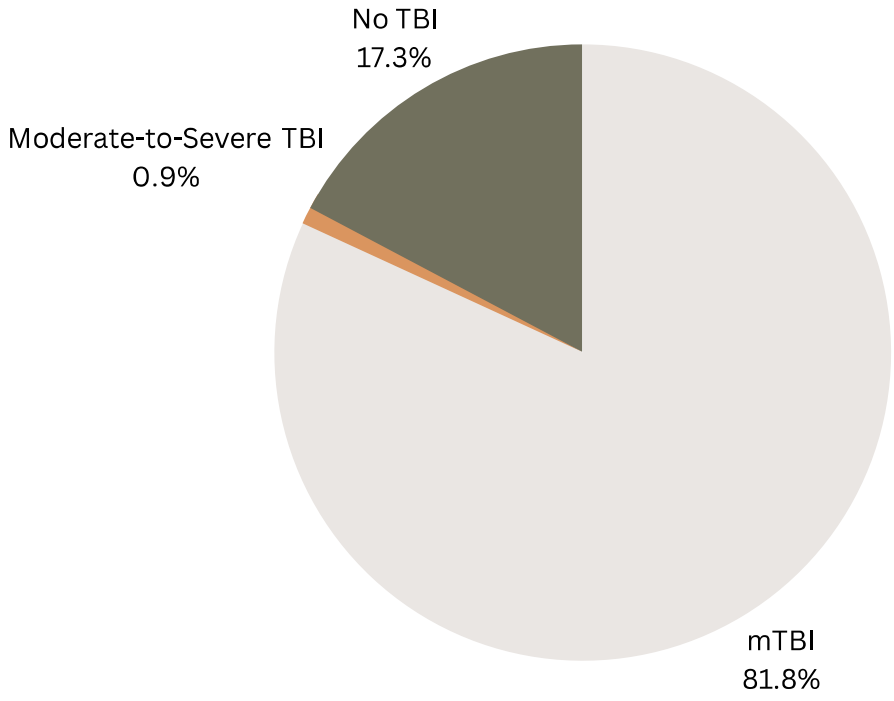
Results: Sample

- 2,312 participants from 4 studies
- 32% met criteria for probable PTSD
- Mostly male (83%), White (63%), Veterans (74%)
- 47% between 25-39 years old



Results: TBI and PTSD

- 1,633 participants from 2 studies

mTBI associated with 2.7 times greater odds of probable PTSD compared to no TBI

- E-value for mTBI and probable PTSD was 2.67 (meaning: it would take a strong unmeasured confounder to explain away the association we saw in the data)

Results: Deeper dive into CENC/LIMBIC data on TBI and PTSD

- 1,540 Service Members/Veterans with a history of combat exposure. Data collected between 1/1/2015 through 3/31/2019.

Ten years following an index date of mTBI exposure (or mid-point of military deployment for controls), combat-exposed SM/Vs with BOTH mTBI history and PTSD had the highest rates of depression symptoms, pain, and sleep apnea risk relative to SM/Vs without both conditions. SM/Vs with PTSD, *irrespective of mTBI history*, had high rates of obesity, sleep problems, and pain.

Discussion

- Individuals with a history of mTBI were nearly 3x more likely to meet criteria for probable PTSD
- FITBIR Proof-of-Concept: We were able to combine numerous datasets with varied measures of PTSD and TBI-severity
- We provided the code and the metadata set back to FITBIR
- CENC/LIMBIC data suggest that the relationship between PTSD and TBI is complicated and both impact associations with comorbidities and functional outcomes.

Thank you!

Feel free to reach out with any questions.

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