

Predicting Posttraumatic Stress from Multi-modular Data

Sisi Ma¹, Isaac Galatzer-Levy², Arie Shalev², Alexander Statnikov²

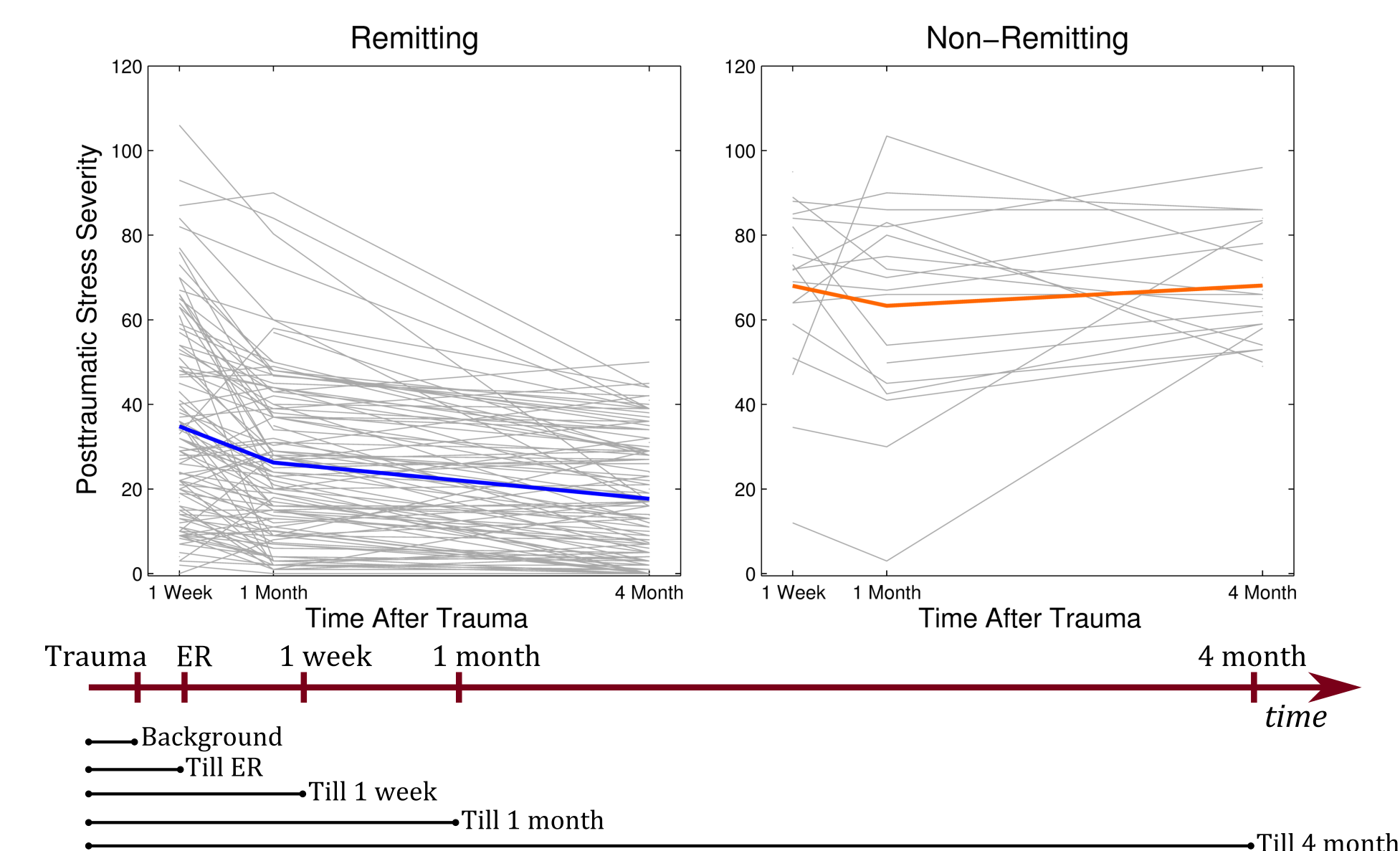
¹ Institute for Health Informatics, University of Minnesota ² New York University School of Medicine

Introduction

- Prolonged stress responses are detrimental to the psychological and physiological well-being of individuals.
- Traumatic events often induce acute stress responses.
- Although trauma induced stress responses decline over time in most individuals, about 10% to 20% of individuals who experienced trauma display non-remitting stress responses.

Method

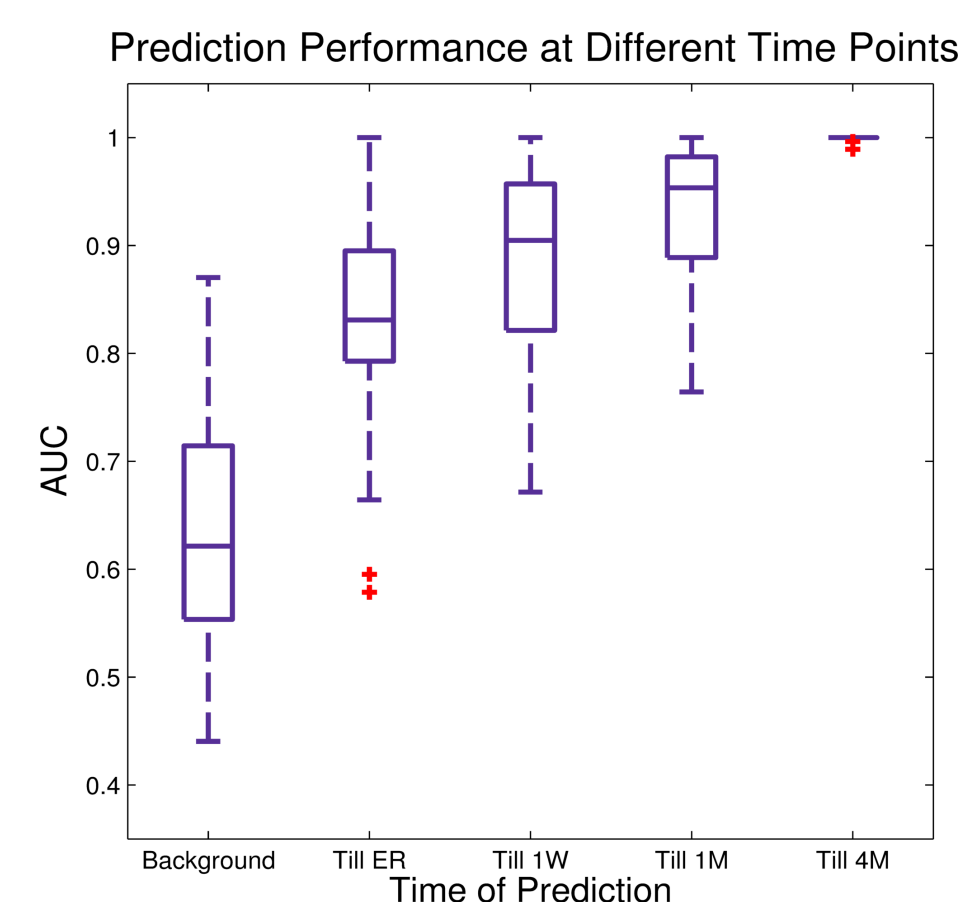
- 152 adult survivors of traumatic events participated in the current study.
- Data including demographics and background information, self-reports, clinical interviews, and neuroendocrine levels were collected in the emergency room, 1 week, 1 month, and 4 month after the trauma.
- Latent Growth Mixture Modeling (LGMM) was employed to identify heterogeneous symptom trajectories, which is the target of the predictive task.



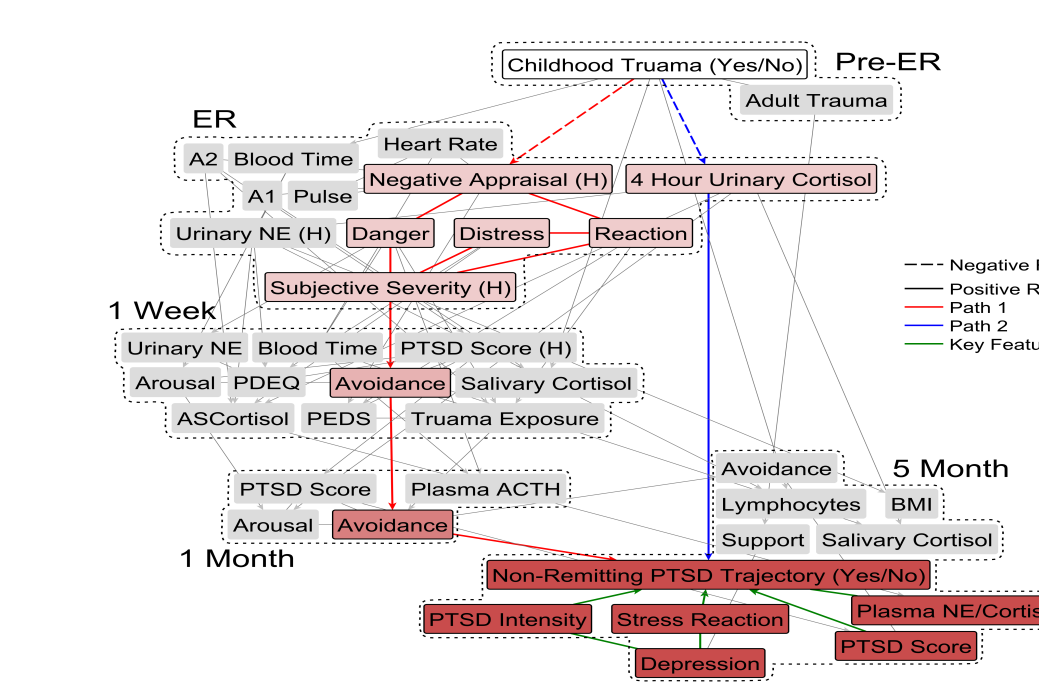
Question 1: Could trajectory membership be predicted?

Prediction Performance (AUC) at Different Time Points

Classifier	Time of Prediction				
	Background	Till ER	Till 1 week	Till 1 Month	Till 4 Month
SVM linear	0.63	0.70	0.75	0.79	0.92
SVM poly	0.61	0.68	0.72	0.79	0.94
BLR (Gaussian)	0.65	0.72	0.76	0.79	0.94
BLR (Laplace)	0.66	0.69	0.69	0.78	0.97
CART	0.54	0.53	0.59	0.63	0.96
random_forest	0.69	0.71	0.82	0.85	1.00
# of features	23	73	131	177	223



Question 3: What are the causal relationships?



- The contribution of early neuroendocrine responses to post-traumatic psychopathology is contingent upon childhood trauma exposure.
- ML based causal graph induction methods can uncover specific pathogenic pathways in small subsets of survivors.
- There are multiple pathways to the same clinical outcome.

Question 2: Which features/modalities are more important for prediction?

