



Prior exposure to sexual trauma is associated with greater posttraumatic dysfunction and variability in amygdala connectivity following a subsequent traumatic event

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Introduction

- Prior exposure to trauma is a major risk factor for the development of PTSD after experiencing a subsequent traumatic event, and sexual trauma (ST) is unique in that it carries the greatest conditional risk of PTSD.
- Limited studies to date have investigated how prior exposure to ST may uniquely impact posttraumatic symptoms and associated neural circuitry after a new trauma.
- The present study investigated participants' severity of posttraumatic dysfunction following admission to an Emergency Department (ED) and probed activity and connectivity of the amygdala in recently trauma-exposed participants with and without prior history of ST.

Methods

- Participants were recruited from EDs through a longitudinal, multisite study of neuropsychiatric sequelae after trauma (the AURORA study¹). MR scanning was completed 2 weeks after ED admission.
- Prior history of sexual trauma was assessed from the CTQ-SF² and LEC-5³ and was defined as at least 1 experience of childhood sexual abuse, rape or sexual assault, or another unwanted sexual experience. The final sample with complete ST and MRI data included $n=242$.
- Repeated-measures ANCOVAs assessed the effect of prior ST on posttraumatic symptoms over time. Primary models covaried for demographic variables (age, yearly income, education), and secondary models added cumulative trauma load variables.
- Threat-related amygdala activity was assessed during an fMRI task of fearful and neutral face viewing. Voxelwise maps of amygdala connectivity were assessed from a resting-state scan, with same primary and secondary models as previous analyses.

Prior sexual trauma exacerbates posttraumatic dysfunction over time following new trauma

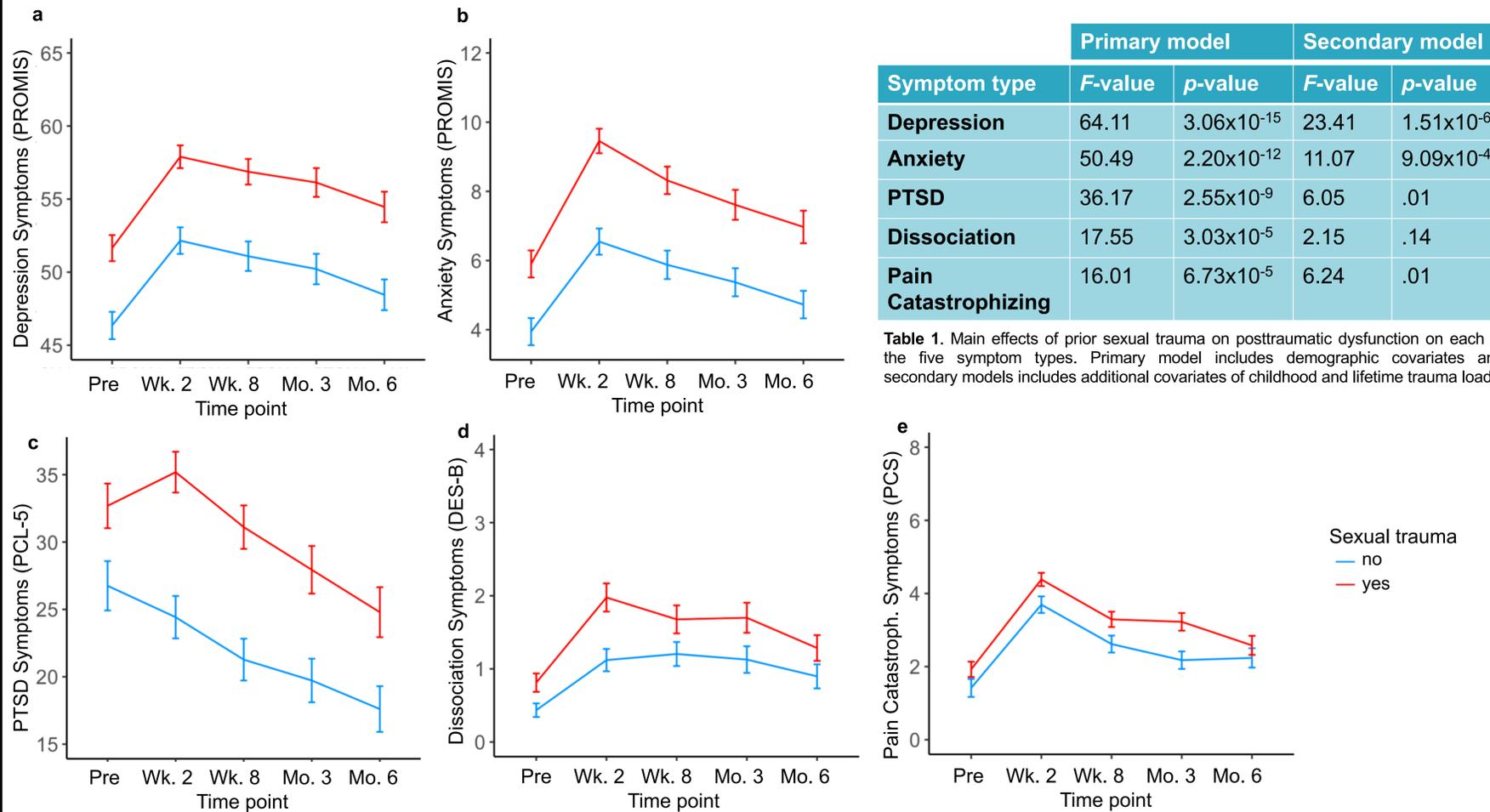


Table 1. Main effects of prior sexual trauma on posttraumatic dysfunction on each of the five symptom types. Primary model includes demographic covariates and secondary models includes additional covariates of childhood and lifetime trauma load

Figure 1. Relationship between posttraumatic dysfunction and prior sexual trauma after ED admission. About half of participants endorsed prior history of sexual trauma. Those with a prior history of ST endorsed significantly higher symptoms of depression (Panel A), anxiety (Panel B), PTSD (Panel C), dissociation (Panel D), and pain catastrophizing (Panel E) prior to and in the six months following trauma, after adjusting for demographic covariates. Main effects of ST remained significant for all symptom types except for dissociation after including covariates of other lifetime trauma load. Plots are shown without adjustment for either demographic or trauma covariates.

Effect of sexual trauma on resting state connectivity is moderated by lifetime trauma

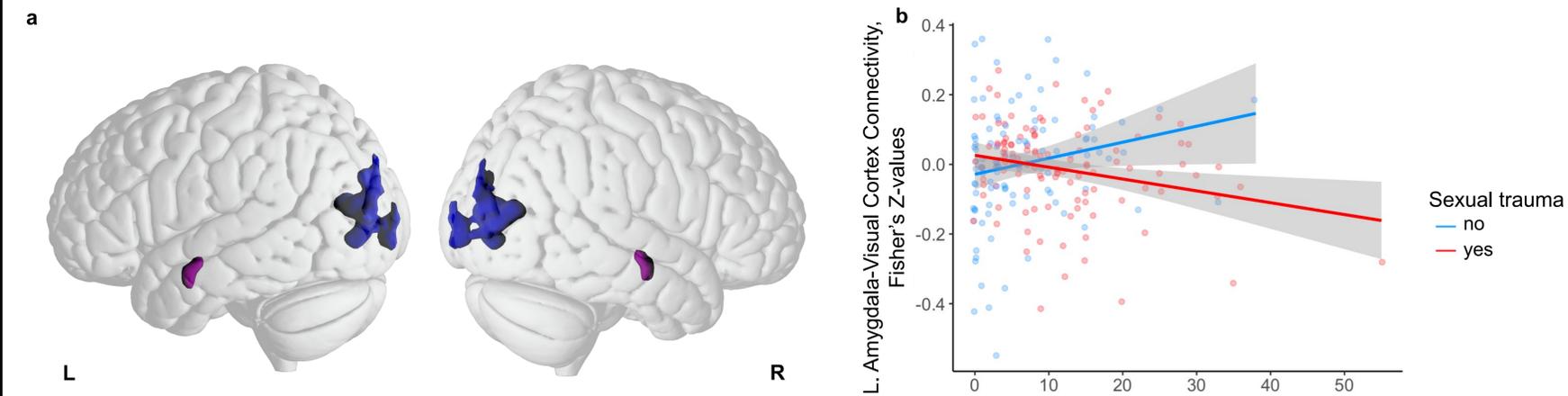


Figure 2. Differences in connectivity between amygdala and visual cortex of ST groups is moderated by prior trauma. There was no significant effect of ST on amygdala activity in a fearful > neutral face paradigm. However, after including trauma related variables, we found that lifetime trauma moderated the effect of ST on amygdala to visual cortex connectivity during resting state (peak Z-value: -4.41, corrected $p < 0.01$) (Panel A). The group with prior sexual trauma had significantly higher lifetime trauma loads ($M=12.90$) than the group without ($M=6.54$, $p < 0.001$; Panel B).

Discussion

Major findings:

- **Prior history of sexual trauma predicted worse outcomes on most psychometric symptoms persisting in the six months after an acute trauma.**
- **There was no association between prior ST and amygdala reactivity to threat in a fearful and neutral face paradigm.**
- **The interaction between ST and other trauma was associated with differential patterns of functional connectivity between left amygdala and visual cortex, such that stronger connectivity in the group without ST was positively associated with other trauma exposure and was negatively associated with other trauma exposure in the ST group.**

Our findings suggest that sexual trauma is a significant risk factor for posttraumatic dysfunction following a new trauma exposure, e.g., car accident. Future work should seek to better elucidate the relationship between visual neurocircuitry and trauma history with a particular focus on sexual trauma types. Screening in the ED to assess for prior history of rape and childhood sexual abuse may help identify those most at risk for acute psychopathology after subsequent traumas and implement targeted early interventions.

References

¹McLean, S. A., Ressler, K., Koenen, K. C., Neylan, T., Germine, L., Jovanovic, T., Clifford, G. D., Zeng, D., An, X., Linnstaedt, S., Beaudoin, F., House, S., Bollen, K. A., Musey, P., Hendry, P., Jones, C. W., Lewandowski, C., Swor, R., Datner, E., ... Kessler, R. (2020). The AURORA Study: A longitudinal, multimodal library of brain biology and function after traumatic stress exposure. *Molecular Psychiatry*, 25(2), 283–296. <https://doi.org/10.1038/s41380-019-0581-3>

²Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., Stokes, J., Handelsman, L., Medrano, M., Desmond, D., & Zule, W. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse & Neglect*, 27(2), 169–190. [https://doi.org/10.1016/s0145-2134\(02\)00541-0](https://doi.org/10.1016/s0145-2134(02)00541-0)

³Weathers, F. W., Blake, D. D., Schnurr, P. P., Kaloupek, D. G., Marx, B. P., & Keane, T. M. (2013). *Life Events Checklist for DSM-5 (LEC-5) - PTSD: National Center for PTSD* [General Information]. https://www.ptsd.va.gov/professional/assessment/te-measures/life_events_checklist.asp

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