Resting State Functional Connectivity in Adolescents with Early Life Stress and Non-Suicidal Self-Injury

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INTRODUCTION

- Adverse early caregiving environment
- Exposure to trauma during development
- 10% of US children

Early Life Stress

?

Non-Suicidal Self-Injury

- Deliberate harm to self without suicidal intent
- 23% of adolescents

This research examines the neurological connection between early life stress and non-suicidal self-injury through the use of resting state functional connectivity. The current study examines whole-brain connectivity, stemming from the hippocampus and amygdala in adolescents and young adults with a history of early life stress and non-suicidal self-injury. It is imperative to study the adolescent population, as it is a critical period in development known for a marked increase in psychopathology, especially non-suicidal self-injury.

METHODS

Participants
- Females ages 13 to 21 years
- History of NSSI and/or ELS and healthy controls

Assessment
- Adolescents and parents interviewed
- K-SADS-PL or SCID; ISAS; DSHI

MRI Data Acquisition
- Siemens 3T TIM Trio scanner coil
- Resting state fMRI

https://www.healthcare.siemens.ch/magnetic-resonance-imaging/for-installed-base-business-only-do-not-publish/magnetom-trio-tim

Preprocessing of fMRI
- Brain extraction & quality assurance (motion and distortion correction)
- Computation of DVARS and independent component analysis
- Removal of noise components and registration of ROIs
- Extraction of mean BOLD time series

First-level analyses
- Seed-based, whole-brain approach of right and left amygdala and right and left hippocampus

RESULTS

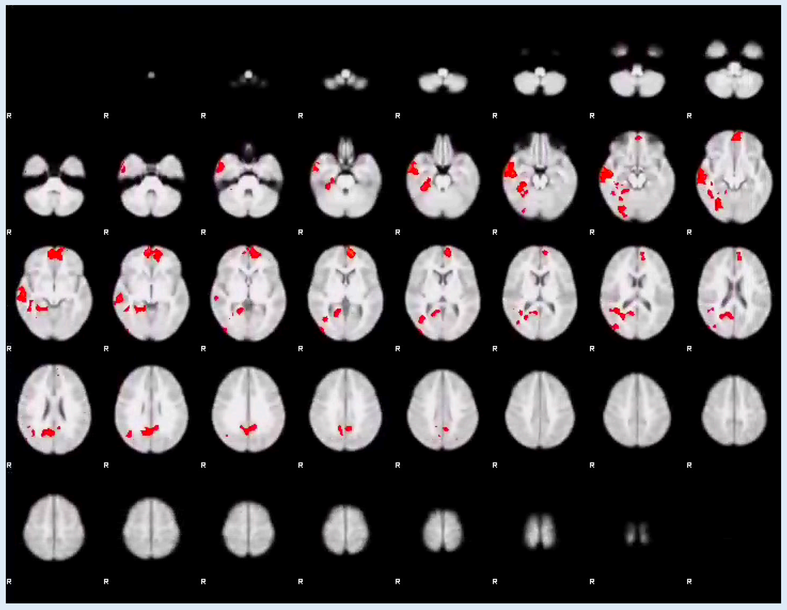

Figure 1: Right Amygdala Whole-Brain Connectivity. Clusters on brain images indicate regions in the brain where adolescents with NSSI had greater right amygdala RSFC than adolescents with no NSSI.

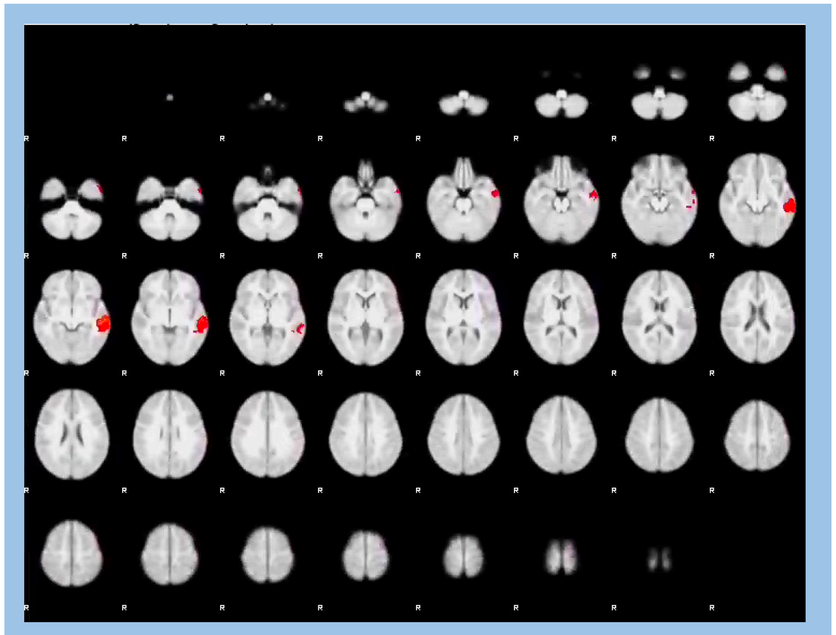

Figure 2: Left Amygdala Whole-Brain Connectivity. Clusters on brain images indicate regions in the brain where adolescents with NSSI had greater left amygdala RSFC than adolescents with no NSSI.

Seed Region	Contrast	Brain Region	Control Mean z-stat	NSSI mean z-stat	# of voxels	Peak z-value
Right Amygdala	NSSI > HC	Bilateral anterior cingulate cortex and supplementary motor area	-0.64 ± 1.01	0.39 ± 0.94	313	3.71
	HC > NSSI	Left anterior cingulate cortex and supplementary motor area	0.79 ± 1.10	-0.46 ± 1.11	313	3.41
Left amygdala	NSSI > HC	Bilateral anterior cingulate cortex and supplementary motor area	-0.95 ± 1.03	0.28 ± 0.88	879	4.38
	HC > NSSI	Left angular gyrus and occipital cortex	0.87 ± 0.88	-0.33 ± 0.79	1225	4.19
	HC > NSSI	Left middle temporal gyrus and superior temporal gyrus	0.60 ± 0.58	-0.49 ± 0.70	799	4.33
	HC > NSSI	Right frontal pole	0.62 ± 0.73	-0.36 ± 0.60	396	4.90
	HC > NSSI	Right inferior temporal gyrus, middle temporal gyrus, temporal pole	0.80 ± 0.81	-0.33 ± 0.72	492	4.38
	HC > NSSI	Right angular gyrus and occipital cortex	0.98 ± 1.02	-0.20 ± 0.78	370	4.20

Table 1: Location, size and peak z-values of the significant clusters from the RSFC whole brain analysis

DISCUSSION

- Adolescents with NSSI, compared to healthy controls, had abnormal amygdala-frontal connectivity and greater amygdala RSF in the supplementary motor area and dorsal anterior cingulate
- Amygdala connectivity did not differ between adolescents with NSSI and ELS and NSSI without ELS.
- Contrary to predictions there were no group differences in the hippocampus.

- These abnormalities in amygdala connectivity in adolescents with NSSI may represent an important circuit underlying NSSI and target areas for intervention.

ACKNOWLEDGEMENTS

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**References available upon request.*