

Jennifer N. H. Watrous¹, Kara L. Kerr¹, Florence J. Breslin², Julie M. Croff², Courtney J. Cooper¹, Jennifer Hays-Grudo², Amanda Sheffield Morris¹
¹Oklahoma State University, Stillwater, OK, ²Oklahoma State University Center for Health Sciences, Tulsa, OK,

Objectives

- Adverse Childhood Experiences (ACEs) have significant long-lasting impacts on physical and mental health¹.
- Protective experiences mitigate some outcomes but has not been fully explored in neurodevelopment.
- Preliminary research suggests adversity attenuates volumetric growth in the hippocampus during early adolescence.
- Protective and Compensatory Experiences (PACEs)² are positive early life factors that promote resilience.
- This analysis uses several variables, collected at Baseline in the ABCD® Study, that align with measures of adversity and protection.
- The present analysis explored whether protective childhood experiences that promote resilience have an association with hippocampal structural development during adolescence.

Hypotheses:

- More ACEs will correlate with less hippocampal volume, and more positive experiences will correlate with greater hippocampal volume.
- The relation between adversity and hippocampal volume will be moderated by protective experiences, such that positive experiences buffer the negative effects of adversity on hippocampal volume.

Participant Characteristics

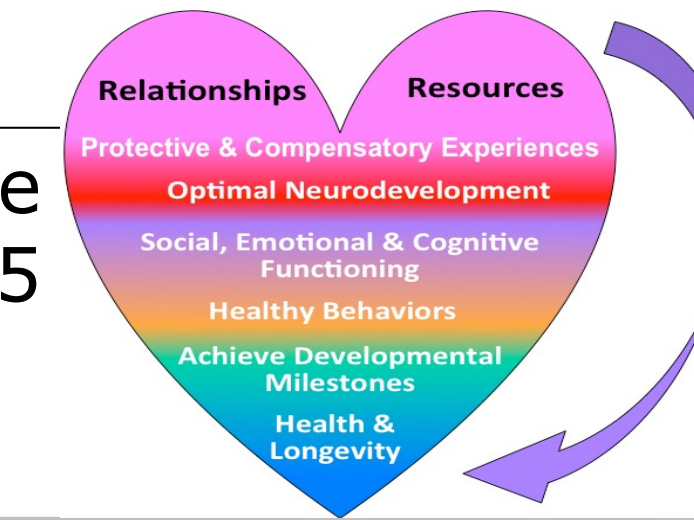
	%	
	n 6,362 (52.4% Male)	
Race/Ethnicity	58.1% White; 17.7% Hispanic; 12.1% Black; 10.2% Other; 1.9% Asian	
Parent Education	57.0% ≥ Bachelor's Degree	
	Mean ± SD	Range
Age (years)	9.9 ± 0.62	8.9 - 11.0
adapted ACEs	1.1 ± 1.63	0 - 19
adapted PACEs	5.6 ± 1.07	1 - 7

References

1. Felitti, V.J., Anda, R.F., Nordenberg, D., Williamson, D.F., Spitz, A.M., Edwards, V., & Marks, J.S. (1998) Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: the Adverse Childhood Experiences (ACE) study. *American Journal for Preventive Medicine*, 14(3), 387-421. [https://doi.org/10.1016/S0091-2718\(98\)00171-8](https://doi.org/10.1016/S0091-2718(98)00171-8)
 2. Hays-Grudo, J., & Morris, A. S. (2020). Adverse and protective experiences: A developmental perspective. *American Psychological Association*. <https://doi.org/10.1037/000177-000>
 3. Karcher, N.R., Niendam, T.A., & Barch, D.M. (2020). Adverse childhood experiences and psychotic-like experiences are associated above and beyond shared correlates: Findings from the adolescent brain cognitive development study. *Schizophrenia Research*, 222(2020), 235-242. <https://doi.org/10.1016/j.schres.2020.05.035>

Protective and Compensatory Experiences (PACEs)

Originally proposed by Hays-Grudo and Morris (2020)², Protective and Compensatory Experiences (PACEs) are 5 resources and 5 relationships factors that promote healthy development. Higher scores indicate the presence of more PACEs.



Calculating Protective and Compensatory Experiences (PACEs) in ABCD



The following PACEs were not assessed: Mentorship; Belongingness; Volunteering

Childhood Adversity and Trauma (ACEs)

Originally researched by Anda and Felitti (1998)¹, ACEs are 10 early life experiences that negatively impact development and have significant health consequences. An adversity score was calculated based on Karcher et al. (2020)³ at Baseline:

- 17 traumatic events from Kiddie-Structured Assessment for Affective Disorders & Schizophrenia (K-SADS);
 - 1 bullying question from ABCD Longitudinal Parent Diagnostic Interview for DSM-5; and,
 - 7 financial hardship questions from ABCD Longitudinal Parent Demographics Survey
- Higher scores indicate greater childhood adversity.

Model Results - Baseline Effects

Left-hemisphere Hippocampal Volume					
	b	SE _b	β	t	p
ACEs	-10.09	4.11	-.025	-2.46	.014*
PACEs	9.26	4.09	.023	2.27	.024*
ACEs*PACEs	0.03	3.62	.001	0.09	.928

Controlled for: Intracranial volume***, age (months)***, sex***, parent's education - master's*
 Fixed effects: MRI scanner, Family ID
 R²= 0.462; p<0.001***; p<0.01**, p<0.05*

Right-hemisphere Hippocampal Volume					
	b	SE _b	β	t	p
ACEs	-6.65	4.32	-0.016	-1.54	.124
PACEs	18.12	4.30	0.044	4.22	.000***
ACEs*PACEs	-0.14	3.81	-0.0003	-0.04	.970

Controlled for: Intracranial volume***, age (months)*, sex***, parent's education
 Fixed effects: MRI scanner, Family ID
 R²= 0.431; p<0.001***; p<0.01**, p<0.05*

This research differs from the pre-registered abstract by:
 1. Calculating adversity with Baseline surveys (K-SADS, Demographics);
 2. Longitudinal change analysis examining hippocampal volume are underway.

Conclusion & Limitations

- Among 9-11 year-olds, PACEs were significantly associated with greater hippocampal volume in both the left and right hemispheres, controlling for adversity.
- A moderation effect for PACEs on adversity was not confirmed at Baseline.
- Early life experiences may influence hippocampal volumes differently by hemisphere.
- Preliminary analyses did not indicate that PACEs predicted hippocampal growth from Baseline to Year 2.