Fear conditioning in preadolescent children with and without anxiety disorders

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INTRODUCTION

- Impaired fear acquisition and extinction are key components in the maintenance of anxiety disorders (ADs).[1]
- A feature of pathological anxiety is exaggerated fear of anticipated threats and aberrant threat learning.[2]
- The current study compared physiological and subjective to a fear conditioning and extinction task, which was adapted the "screaming lady" paradigm[3], between preadolescent children with and without ADs to examine potential differences in fear conditioning, extinction, and generalization.

PARTICIPANTS

- 126 preadolescent (8 to 12 years) boys and girls with and without ADs. Data were collected from four sites: University of Wisconsin-Madison, Vanderbilt University, National Institute of Mental Health, University of Nebraska.
- Diagnoses were determined with the Kiddie Schedule for Affective Disorders and Schizophrenia (KSADS) semi-structured interview, which was administered by a trained study team member.
  - AD participants met DSM-5 criteria for current generalized, separation, and/or social AD, Control participants had no current or past psychopathology.

Measure	Anxiety disorder (n = 71)	Control (n = 55)	T-test P value
Age, years, mean (±SD)	10.90 (1.63)	10.88 (1.57)	0.952
Female, n (%)	43 (60.56)	28 (50.91)	0.282
Parent SCARED (Anxiety), mean (±SD)	30.77 (13.80)	5.65 (4.74)	<.001
Child SCARED (Anxiety), mean (±SD)	31.76 (13.61)	8.79 (6.99)	<.001
Parent MFQ (Depression), mean (±SD)	6.27 (5.13)	0.35 (0.68)	<.001
Child MFQ (Depression), mean (±SD)	6.14 (5.51)	0.85 (1.15)	<.001
CPRS (ADHD)	57.07 (11.15)	44.22 (4.04)	<.001
Diagnosis, n (%)			
Generalized anxiety disorder	57 (80.28)	-	-
Separation anxiety disorder	25 (35.21)	-	-
Social anxiety disorder	32 (45.07)	-	-
Anxiety disorder not otherwise specified	1 (1.41)	-	-
Specific phobia	13 (18.31)	-	-
Attention-deficit/hyperactivity disorder	11 (15.49)	-	-

TASK STRUCTURE

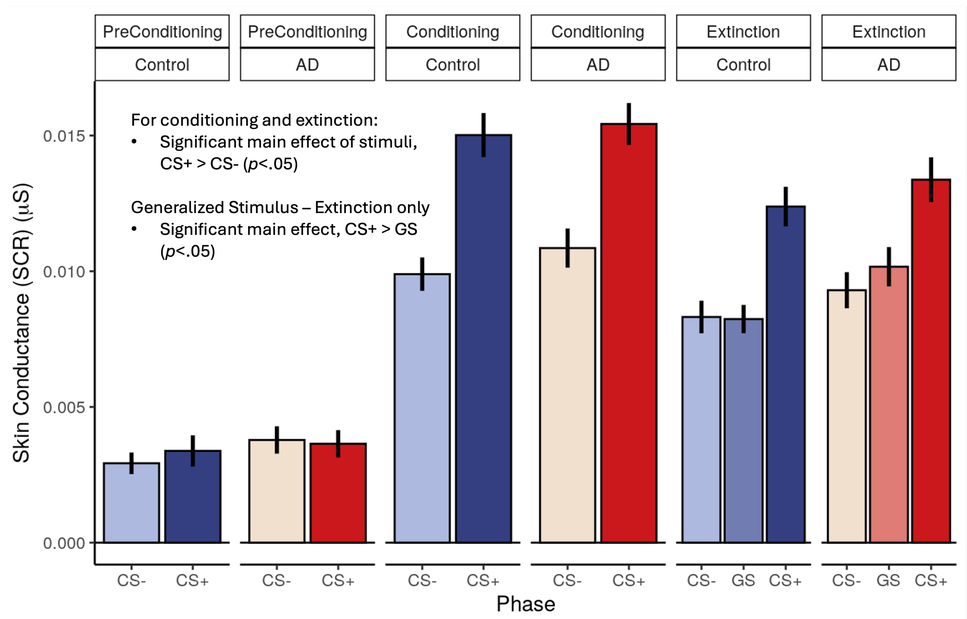
- Participants completed a differential threat learning paradigm.
- Images of two women with neutral expressions were used as the CS+ and the CS-.
- The unconditioned stimulus (UCS), which occurred at the offset of the CS+, was a 1-second 85-dB female scream presented with the CS+ woman displaying a fearful expression.
- The paradigm had three phases: preconditioning, conditioning, and extinction
- During extinction, a generalization stimulus (GS) was introduced, which was a 50/50 morph of the CS+ and the CS-.
- Outcome measures:
  - Skin conductance response (SCR), a non-specific measure of physiological arousal, was collected continuously throughout the task using two electrodes on the participant's non-dominant hand. SCR to stimuli was quantified as the average SCR across a 7-second window after stimulus onset.
  - Self-reported fear (i.e. "How afraid are you of this woman?") was collected during preconditioning, after conditioning, and after extinction.

ANALYSES

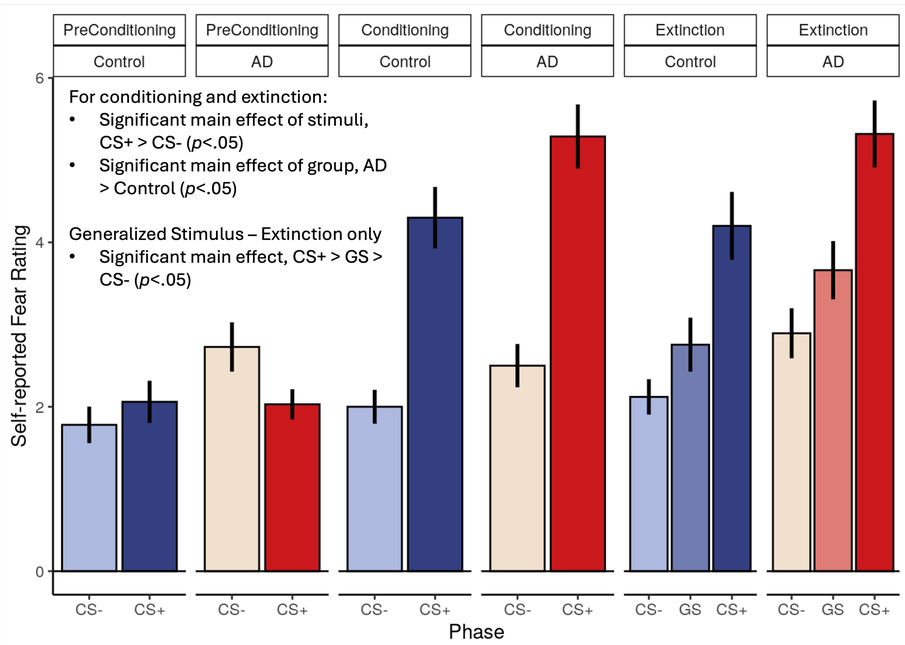
- Separate linear mixed effect models for each experimental phase (preconditioning, conditioning, and extinction) were used to test effects of group (AD, control), stimuli (CS+, CS-), and their interaction for SCR and self-reported fear.[4,5]
- A linear mixed effect model was also used to test the effects of group on SCR to the UCS.[4,5]
- All models controlled for site of data collection and participant sex.

RESULTS - *SCR and Self-Reported Fear to Potential Threat (CS+ and CS-)*

Mean SCR by stimuli, group, and phase

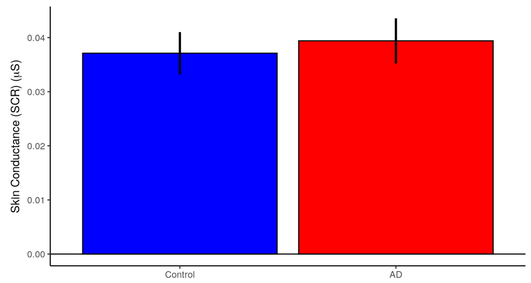


Mean self-reported fear rating by group, stimuli, and phase

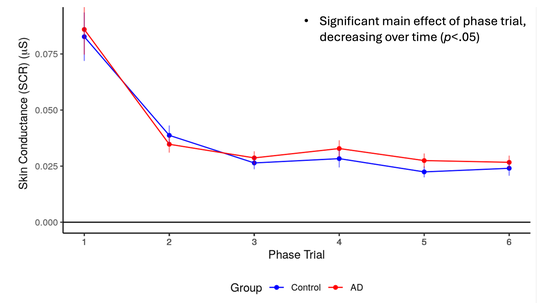


RESULTS - *SCR to Immediate Threat (UCS)*

Mean SCR by group



SCR by group over time



CONCLUSIONS

- Results demonstrate that ADs are not associated with higher physiological responses to threat or safety cues, or differential fear generalization.
- Conversely, AD youth reported higher self-reported fear levels to threat and safety cues after fear learning and extinction.
- Taken together, results suggest that youth with and without ADs have similar physiological responses to threat and safety cues, but they interpret these physiological responses differently, as shown by a significant difference in subjective responses.
- Youth with and without ADs have similar physiological responses to threats, and they also habituate to threats at a similar rate.

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