



Reduced Anticipatory and Reactive Skin Conductance: Evidence for an Adolescent Analogue of Psychopathy



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Introduction

Reduced anticipatory skin conductance to punishment is a well replicated finding among adult psychopaths, but it is unknown whether this deficit also characterizes children and adolescents with psychopathic tendencies. Research in psychophysiology has only recently begun to examine younger psychopaths (e.g. Blair, 1999).

This study, part of an ongoing longitudinal project, sought to determine whether psychopathic adolescents show similar patterns of hyporesponding in anticipation of and in response to aversive stimuli as psychopathic adults.

Method

- Sample:**
 - Pittsburgh Youth Study
 - 335 16-year-old boys
 - Psychopathic (n = 86) and Nonpsychopathic (n = 84) groups formed using extreme scores on the Child Psychopathy Scale (Lynam, 1996)
- Procedure:**
 - Participants seated in 72°F room, wearing headphones, monitor 1m away
 - Rest**
 - 3 minutes of recording without stimuli
 - Countdown Stressor**
 - Stimuli:**
 - Countdown – numbers from 12 to 0, displayed in center of monitor, 1 per second
 - White Noise – one second duration, 105-dB, 500ms rise and fall time
 - Intertrial Interval – range of 40-50 s
 - Signaled trials: 12-second countdown, then blast of white noise at 0
 - Nonsignaled trials: no countdown, random blast of white noise
 - Subjects aware of types of trials
- Skin Conductance Assessment:**
 - Apparatus:**
 - Electrodes – 9 mm Ag/AgCl, 4.5 mm collar
 - Electrolyte – Unibase with 0.9% saline
 - Placement – distal phalanges of first and second fingers of nondominant hand
 - Equipment – Colbourne SC coupler (S71-22), Optimus Pro 40 headphones

Possible Confounds

- Groups were compared on several demographic variables:

	Psychopaths		Nonpsychopaths	
	M	SD	M	SD
Age	16.04	10.35	15.94	8.03
ADHD Diagnosis ^a	46%		11%	
IQ **	88.27	15.91	96.33	18.17
Low SES ***	40%		18%	

^a t(20) = 2.68, p = .010
^{**} z(1, 121) = 17.783, p = .000
^{***} z(1, 119) = 7.038, p = .000

Data Reduction

- Rest Period**
 - average skin conductance level (SCL)
 - total nonspecific fluctuations (NSFs)
- Countdown Stressor**
 - skin conductance responses (SCRs): >0.05 μS, recorded in four conditions (see Figure 1)
 - Anticipatory SCRs:**
 - recorded for 12 s prior to white noise
 - Reactivity SCRs:**
 - recorded for 20 s following the white noise

Figure 1. SCRs in the Countdown Stressor

Recording Phase	Signal Condition	
	Signaled	Nonsignaled
Anticipatory	Signaled Anticipatory	Nonsignaled Anticipatory
Reactivity	Signaled Reactivity	Nonsignaled Reactivity

Results

- Rest:**
 - SCL – nonsignificant (p = 0.387)
 - NSFs – nonsignificant (p = 0.151)
- Analysis of Countdown Task:**
 - skewed responding distributions led to use of nonparametric tests:
 - SCRs totaled in each of the four conditions
 - for each condition, subjects were dichotomized as:
 - Nonresponders** (0 SCRs) or
 - Responders** (≥ 1 SCRs)
- Chi-Squares**
 - Groups did not differ in the Nonsignaled Anticipatory condition (Fig. 2)
 - Psychopaths showed greater rates of nonresponding than nonpsychopaths in the Signaled Anticipatory (Fig. 3), Nonsignaled Reactivity (Fig. 4) and Signaled Reactivity (Fig. 5) conditions

Confounds Analyses

- Possible confounds crossed with SCR responding in each condition were all nonsignificant
 - ADHD: $\chi^2(1, 328) = .017$ to 2.419, ps = .880 to .504.
 - IQ: $t(118) = -1.328$ to $-.662$, ps .187 to .510
 - SES: $\chi^2(1, 117) = .062$ to 3.040, ps .881 to .083

Figure 2



Figure 3

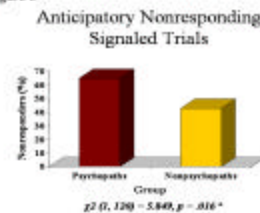


Figure 4

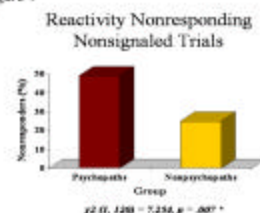
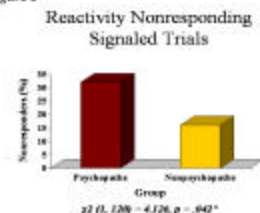


Figure 5



Conclusion

- hyporesponsivity findings in adult literature extend downward to adolescents with psychopathic tendencies
- deficit occurs both in anticipation of and in response to aversive stimuli
- psychopaths and nonpsychopaths did not differ on tonic arousal measures, including the Nonsignaled Anticipatory condition which most closely resembled rest
- deficit cannot be accounted for by group differences in ADHD diagnosis, IQ or SES

Implications and Directions

- support for adolescent form of psychopathy
- lack of anticipatory fear and reactivity to punishment may facilitate reckless, antisocial behavior
- replication should be attempted in younger, child samples to further explore origins of psychopathy

References

Blair, R.J.R. (1999). Insensitivity to distress cues in the child with psychopathic tendencies. *Personality & Individual Differences*, 27, 1, 135-145.

Hare, R.D. (1978). Hare, R.D. (1978a). Electrodermal and cardiovascular correlates of psychopathy. In R.D. Hare, & D. Schalling (Eds.), *Psychopathic Behavior: Approaches to research* (pp. 187-144). New York: Wiley.

Lynam, D. (1996). The early identification of chronic offenders: Who is the budding psychopath? *Psychology of Women*, 25, 289-324.