



## Background

### Impulsive Aggression & Intermittent Explosive Disorder (IED)

- Impulsive aggression is maladaptive, anger-driven interpersonal aggression; its correlate in DSM-5, Intermittent Explosive Disorder (IED) has a 4.5% of the US population (Coccaro & Lee, 2020)
- Aggressive outbursts in persons with IED are frequently motivated by perceived moral transgressions (e.g., unfair treatment) (Coccaro *et al.*, 2009)

### Moral Emotions: Why Shame & Guilt Are Important

- Moral emotions such as guilt and shame are related to evolutionarily preserved behavioral responses and motivations, but are learned over time from repeated cultural and context-specific social interactions
- Guilt tends to increase prosocial reparatory behaviors such as apologizing and amending (Cohen *et al.*, 2012)
- Shame proneness is associated with maladaptive social avoidance (Tagney *et al.*, 2007)

- Key differences between guilt and shame (Fig. 1):

- Inciting transgression:
  - public incident ⇒ shame
  - private incident ⇒ guilt
- Attribution:
  - negative behavioral attribution ⇒ guilt
  - negative self-attribution ⇒ shame

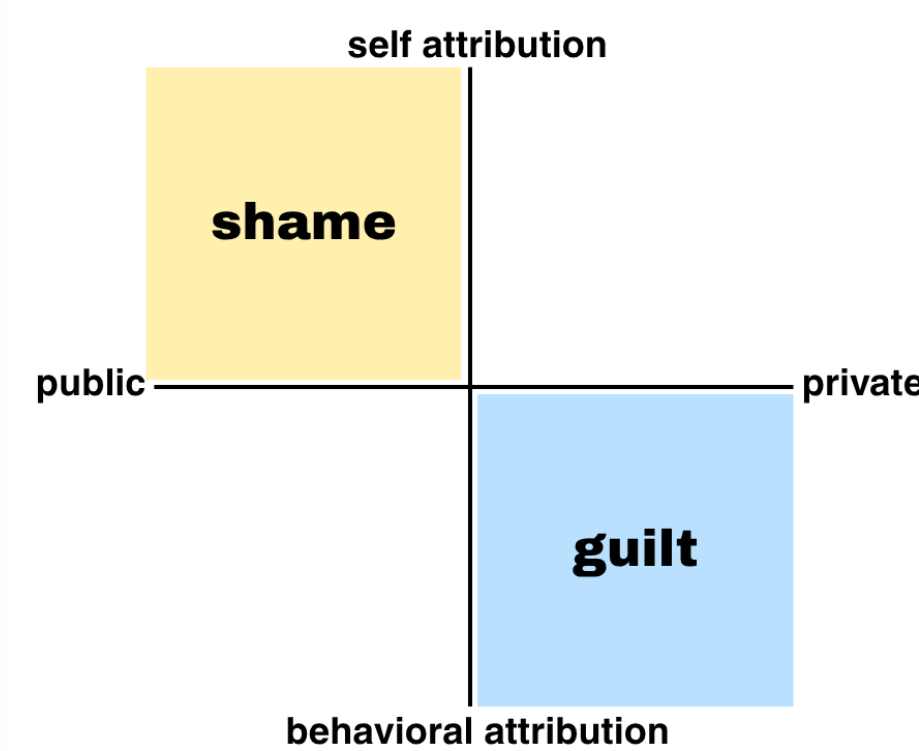


Figure 1. Distinctions between Guilt & Shame: Private/Public and Self/Behavior (Wolf & Cohen, 2011)

### Hypothesis

**Hypothesis 1:** Compared to healthy controls, individuals with IED would report higher shame sensitivity in response to social conflict and would be more prone to shame avoidance.

**Hypothesis 2:** Compared to healthy controls, individuals with IED would report lower guilt sensitivity in response to social conflict and a decreased tendency to engage in reparatory behaviors.

**Hypothesis 3:** Laboratory-tested aggression would be associated with decreased guilt sensitivity and increased shame avoidance.

## Methods & Study Population

- This study was reviewed and approved by the Institutional Review Board of the Biological Sciences Division of the University of Chicago
- All subjects gave informed, written consent on forms approved by the IRB
- Recruitment: IRB-approved advertisements posted in public areas in Chicago, IL + social media
- Exclusion Criteria:
  - History of more-than-mild TBI, psychosis, or acute suicidality;
  - Unstable neurological or medical disorder;
  - Positive urine drug screen/alcohol breathalyzer test at the beginning of screening and study visits.
- 299 adults completed semi-structured interviews for DSM-IV-TR disorders using the *Structured Interview for DSM-IV* and *Structured Interview for the Diagnosis of DSM Personality Disorder*

### Study Groups

**Intermittent Explosive Disorder (“IED”):** n=99, met DSM-IV criteria for current IED

**Healthy Controls (“HC”):** n=100, no current or past history of DSM-IV-TR psychiatric disorders

**Psychiatric Controls (“PC”):** n=100, met criteria for at least one non-psychotic DSM-5 psychiatric disorder (MDD, GAD, PD); included as a control group for non-impulsive aggressive psychopathology

Table 1. Demographics & Comorbidities by Group

	HC n=100	PC n=100	IED n=99
Age (Mean ± SD)	32.9 ± 8.0	32.2 ± 9.1	34.6 ± 10.3
Sex (F/M)	51/49	52/48	52/47
Race			
White	77	70	32
African American	13	21	48
Other	10	9	19
SES (Hollingshead)	52.0	48.4	38.5
Depression (Mean BDI Score)	3.95	7.85	9.11
Anxiety (Mean BAI Score)	4.44	6.55	5.87

## Key Measures

### The Guilt & Shame Proneness (GASP) Scale (Wolf & Cohen, 2011)

Uses 16 two-sentence vignettes of commonly experienced social conflicts to measure individual differences in the emotional and behavioral tendencies to experience and react to shame and guilt.

- Guilt Negative Behavioral Evaluation (GNBE): tendency to make a negative behavioral evaluation in response to feeling guilt
  - “You secretly commit a felony. What is the likelihood that you would feel remorse about breaking the law?”
- Guilt Repair (GR): behavioral tendency to repair a situation that elicited guilt
  - “You strongly defend a point of view in a discussion, and though nobody was aware of it, you realize that you were wrong. What is the likelihood that this would make you think more carefully before you speak?”
- Shame Negative Self-Evaluation (SNSE): tendency to make a negative self evaluation in response to feeling shame
  - “You make a mistake at work and find out a coworker is blamed for the error. Later, your coworker confronts you about your mistake. What is the likelihood that you would feel like a coward?”
- Shame Withdrawal (SW): behavioral tendency to withdraw in response to a situation that elicited shame
  - “You take office supplies home for personal use and are caught by your boss. What is the likelihood that this would lead you to quit your job?”

### Taylor Aggression Paradigm (TAP)<sup>4</sup> (Taylor, 1967)

- Adversarial competition task developed as a lab-based model of provoked aggression
- Subjects are attached via fingertip electrodes to an electrical stimulator, which delivers a safe but uncomfortable level of shock calibrated to each subject
- 1 = noticeable shock, 10 = highest level subject was willing to receive.
- Introduced to the task with a cover story of competing against another person in a different room
- Before each of four 6-trial blocks, the level of shock their opponent sets is revealed, modeling social provocation. The level of provocation from fictive opponent increases every block
- Previously established that mean shock and number of extreme shock trials were higher in impulsive aggressive groups (Timmins *et al.*, 2023)

## Discussion

**H1:** As hypothesized, IED is associated with increased shame avoidance compared to healthy and psychiatric controls. Psychiatric controls have elevated shame avoidance than healthy controls, but to a lesser degree than IED.

**H2:** Contrary to what was hypothesized, IED was not associated with differences in shame sensitivity, guilt sensitivity, or guilt repair compared to controls.

**H3:** Aggressive responding in a lab-tested behavioral aggression task was associated with decreased shame sensitivity, with no findings in shame avoidance, guilt sensitivity or guilt repair.

- Few studies have examined the relationship between shame and aggression in people with clinically significant aggression (Shanahan *et al.*, 2011), and have found complex relationships between shame, anger, and aggression
- Anger is a well-characterized moral emotion in impulsive aggression, which has been scientifically destigmatizing by dissociating impulsive aggression from psychopathic motivations (Coccaro *et al.*, 2009)
- This is one of few studies to investigate the relationship between shame, guilt and the DSM-IV diagnosis of IED
- Overall, our findings support the perception of shame avoidance as maladaptive, especially so for IEDs even when compared to psychiatric controls
- The consequence of a social norm violation appears to be increased withdrawal from social settings; this hyperreactivity may be the cause or result of having an aggression disorder, a distinction which this study’s methods cannot make

- However, actual aggressive behavior (aggressive responding on the TAP) was not correlated with shame withdrawal, but in fact with decreased shame sensitivity

- Points at a potential limitation of the TAP in assessing the diagnostic construct of IED (i.e. clinically significant impulsive aggression)

- This gets at a complex relationship between emotional sensitivity and behavioral reactivity
- Further studies on aggression with newer approaches can integrate newer models of interpersonal disorders to better understand the cause/effect relationship between moral sensitivity and distress associated with clinical diagnoses

## Results

### Hyp 1: Shame

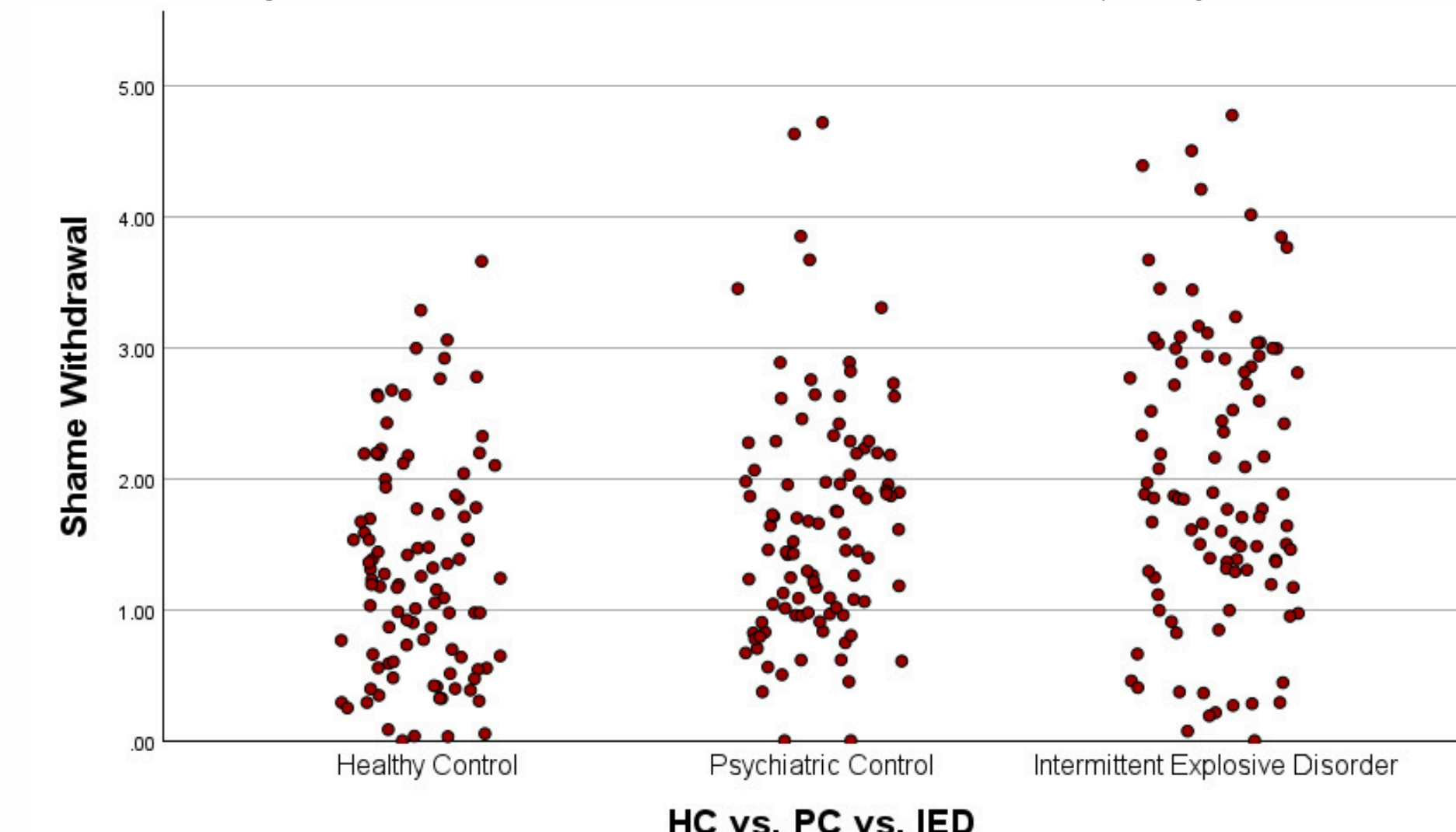
Linear regression models of GASP subscale scores and diagnosis revealed that IED was a significant predictor for increased shame Withdrawal ( $\beta = .531, p = .001$ ) but not Shame Negative Self Evaluation.

Table 3. OLS Linear Regression Model of Shame Withdrawal (SW) Scores

Variable	$\beta$	SE	t	Sig.	95% CI
Diagnosis <sup>1</sup> (PC)	0.268	0.135	1.99	0.047	0.003 0.533
Diagnosis <sup>1</sup> (IED)	0.531	0.156	3.4	0.001	0.224 0.838
Race <sup>2</sup> (AA)	-0.085	0.141	-0.6	0.548	-0.363 0.193
Race <sup>2</sup> (Other)	0.131	0.175	0.75	0.454	-0.213 0.475
Sex <sup>3</sup>	-0.305	0.11	-2.77	0.006	-0.522 -0.088
Age	0.008	0.006	1.35	0.178	-0.004 0.020
SES <sup>4</sup>	-0.011	0.006	-1.93	0.055	-0.022 0.000

Notes: <sup>1</sup>Healthy Controls as reference group. <sup>2</sup>Male as reference group. <sup>3</sup>White as reference group. <sup>4</sup>Measured by Hollingshead scores. SE = Standard Error; Sig = Significance; CI = Confidence Interval; estimates are pooled across 20 imputations using MVN.

Figure 2. Scatter Plot of Shame Withdrawal Scores by Diagnosis



Group SW means are significantly different,  $F(2, 296) = 12.4, p < .001$ . IEDs report more shame withdrawal than PCs (.367,  $p = .018$ ) and HCs (.670,  $p < .001$ ). The difference between HCs and PCs is nonsignificant.

### Hyp 3: TAP

Controlling for multiple measures, lab-tested behavioral aggression was significantly associated with decreased shame sensitivity ( $r = -.325, p < .001$ ) but not with differences in behavioral reactivity to shame or guilt.

Table 2. Model Summary Statistics for GASP Subscales

Subscale	n	F (df <sub>1</sub> , df <sub>2</sub> )	Sig.	Imputations
Guilt Negative Behavioral Evaluation	298	4.27 (6, 290)	0.0004	20
Guilt Repair	299	1.11 (6, 290)	0.35	20
Shame Negative Self Evaluation	299	7.18 (6, 290)	<.0001	20
Shame Withdrawal	299	5.61 (6, 290)	<.0001	20

### Hyp 2: Guilt

Linear regression models of GASP subscale scores and diagnosis revealed that IED was not a significant predictor for neither Guilt Negative Behavioral Evaluation nor Guilt Repair.

Table 4.

Variable	$\beta$	SE	t	Sig.	95% CI
Diagnosis <sup>1</sup> (PC)	0.291	0.154	1.9	0.059	-0.011 0.594
Diagnosis <sup>1</sup> (IED)	0.078	0.178	0.4	0.662	-0.272 0.438
Race <sup>2</sup> (AA)	-0.658	0.161	-4.09	<.001	-0.974 -0.341
Race <sup>2</sup> (Other)	-0.458	0.199	-2.3	0.022	-0.85 -0.065
Sex <sup>3</sup>	-0.333	0.126	-2.65	0.008	-0.581 -0.086
Age	-0.004	0.007	-0.59	0.558	-0.018 0.010
SES <sup>4</sup>	0.011	0.006	1.69	0.092	-0.002 0.024

Notes: <sup>1</sup>Healthy Controls as reference group. <sup>2</sup>Male as reference group. <sup>3</sup>White as reference group. <sup>4</sup>Measured by Hollingshead scores. SE = Standard Error; Sig = Significance; CI = Confidence Interval; estimates are pooled across 20 imputations using MVN.

Table 5.

Variable	$\beta$	SE	t	Sig.	95% CI
Diagnosis <sup>1</sup> (PC)	0.231	0.155	1.49	0.137	-0.074 0.538
Diagnosis <sup>1</sup> (IED)	-0.081	0.181	-0.45	0.653	-0.437 0.274
Race <sup>2</sup> (AA)	-0.303	0.163	-1.86	0.064	-0.624 0.018
Race <sup>2</sup> (Other)	-0.358	0.202	-1.78	0.077	-0.754 0.039
Sex <sup>3</sup>	-0.231	0.127	-1.82	0.07	-0.482 0.019
Age	0.018	0.007	2.56	0.011	0.004 0.032
SES <sup>4</sup>	0.008	0.007	1.27	0.207	-0.005 0.021

Notes: <sup>1</sup>Healthy Controls as reference group. <sup>2</sup>Male as reference group. <sup>3</sup>White as reference group. <sup>4</sup>Measured by Hollingshead scores. SE = Standard Error; Sig = Significance; CI = Confidence Interval; estimates are pooled across 20 imputations using MVN.

Table 6. Correlations between TAP Metrics and GASP Scores

	GNBE	GR	SNSE	SW
Mean Log	-0.174	-0.032	-0.183	0.010
TAP All	.362	8.33	.275	10.8
Blocks	155	155	155	155
Mean Log	-0.219	-0.093	-0.325	0.037
TAP-10/20	.073	3.01	<.001*	7.82
Subject	155	155	155	155
Chose 10/20	-0.109	-0.060	-0.192	0.003
	2.12	5.50	.198	11.7
	155	155	155	155

\*Bonferroni corrected for 12 measures.

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