

Etiology and Treatment of Intermittent Explosive Disorder



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Aggression

Behavior by an individual directed at another person or object in which either verbal force or physical force is used to injure / coerce or to express anger

How Much Aggression is “Out There”?

- ◆ 13-20% of school aged children engage in bullying
- ◆ 90+% of adolescents report being verbally aggressive to their dating partner
- ◆ Among young adults, 22% men and 13% women report being physically aggressive in the past year
- ◆ 9% of young adults report being hurt in the past year due to physical aggression

Types of Aggression

*Premeditated /
Instrumental*

vs.

*Affective /
Reactive*



Intermittent Explosive Disorder (IED)



DSM-IV IED Criteria

- Several discrete episodes of failure to resist aggressive impulses that result in serious assaultive acts or destruction of property.
- The degree of aggressiveness expressed is grossly out of proportion to any precipitating psychosocial stressors.
- The aggressive behavior is not better accounted for by another mental disorder and are not due to the direct physiological effects of a substance or a general medical condition.

Epidemiology of IED

- *Prevalence:* ~5% in community samples
- *Onset:* Teens *Offset:* 40's – 50's
- *Course:* Chronic waxing / waning course
- *Gender:* ~ 60 % male
- *Race:* No consistent findings
- *Education:* Without college degree higher prevalence

Phenomenology of IED

- *Typical Outbursts*
 - *Rapid onset with increased tension / energy*
 - *Short lived (~30 minutes)*
 - *Response to minor provocation by loved one or associate*
 - *Can include verbal aggression, property assault, violence*
 - *Guilt, Shame (but sometimes also justification) afterward*

A “typical” outburst



Consequences

- Two assaults requiring medical attention
- ~ \$1500-\$2000 damage to property
- Poor relationships, work difficulties
- Intergenerational transmission of aggression

IED and Physical Health (N = 10,366)

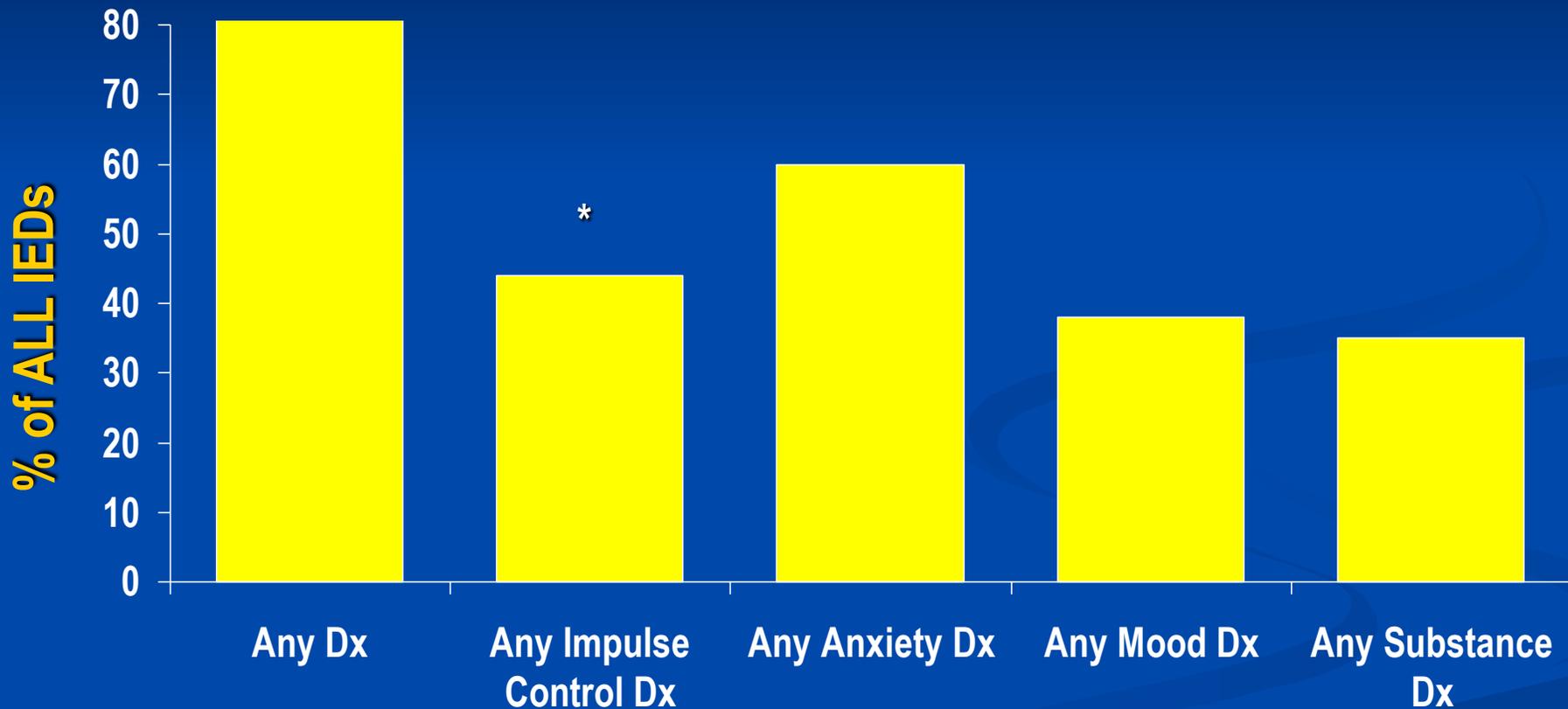
Table 3

Logistic Regression of IED Status on Health Outcomes After Controlling for Demographic Variables and Risk Factors (Including MDD)

Outcome	B	SE (B)	Wald	OR	95% CI
Heart attacks	0.12	.24	0.26	1.13	0.71–1.81
Heart disease	0.35	.17	4.07*	1.42	1.01–1.99
Hypertension	0.27	.10	7.40**	1.31	1.08–1.59
Stroke	0.70	.23	9.51**	2.01	1.29–3.14
Lung disease	0.42	.24	2.94	1.52	0.94–2.45
Diabetes	0.29	.15	3.88*	1.33	1.00–1.77
Cancer	0.29	.19	2.33	1.33	0.92–1.91
Arthritis	0.27	.10	7.86**	1.31	1.09–1.58
Neck/back pain	0.33	.08	17.02***	1.39	1.19–1.62
Headaches	0.49	.08	38.75***	1.64	1.40–1.91
Ulcer	0.31	.12	7.44**	1.36	1.09–1.69
Other chronic pain	0.23	.11	4.70*	1.27	1.02–1.58

* $p < .05$. ** $p < .01$. *** $p < .001$.

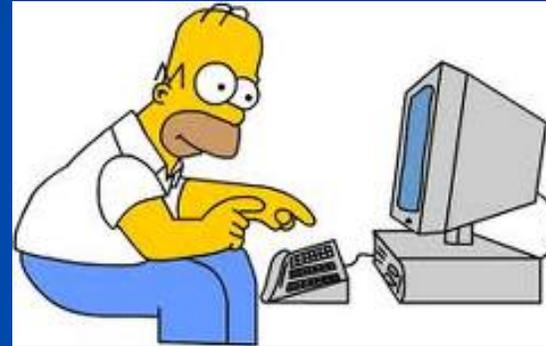
Co-Morbid Dx in IED Subjects (Epidemiological Study N = 9282)



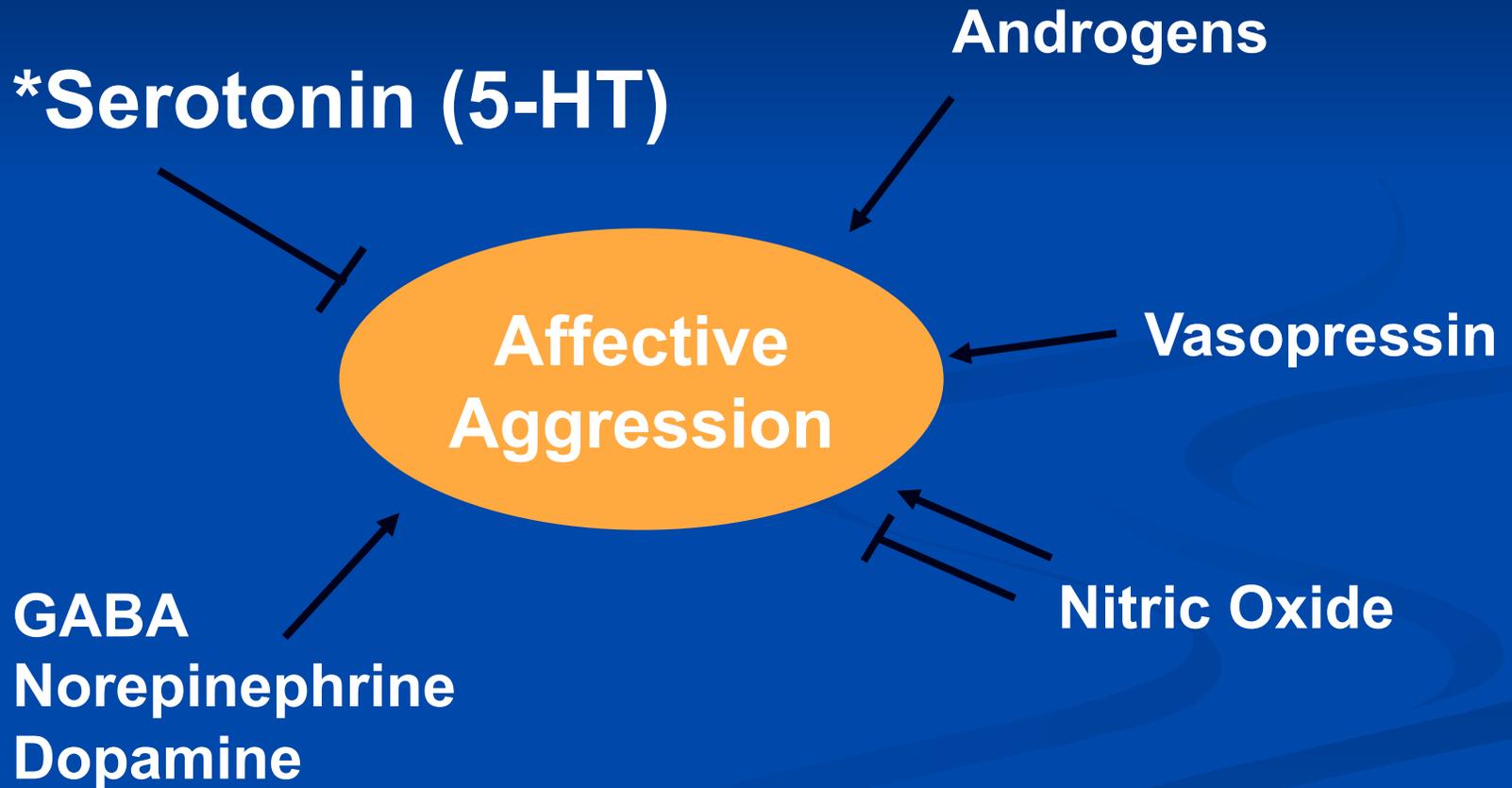
* Included ADHD, ODD, CD

Kessler et al, 2006

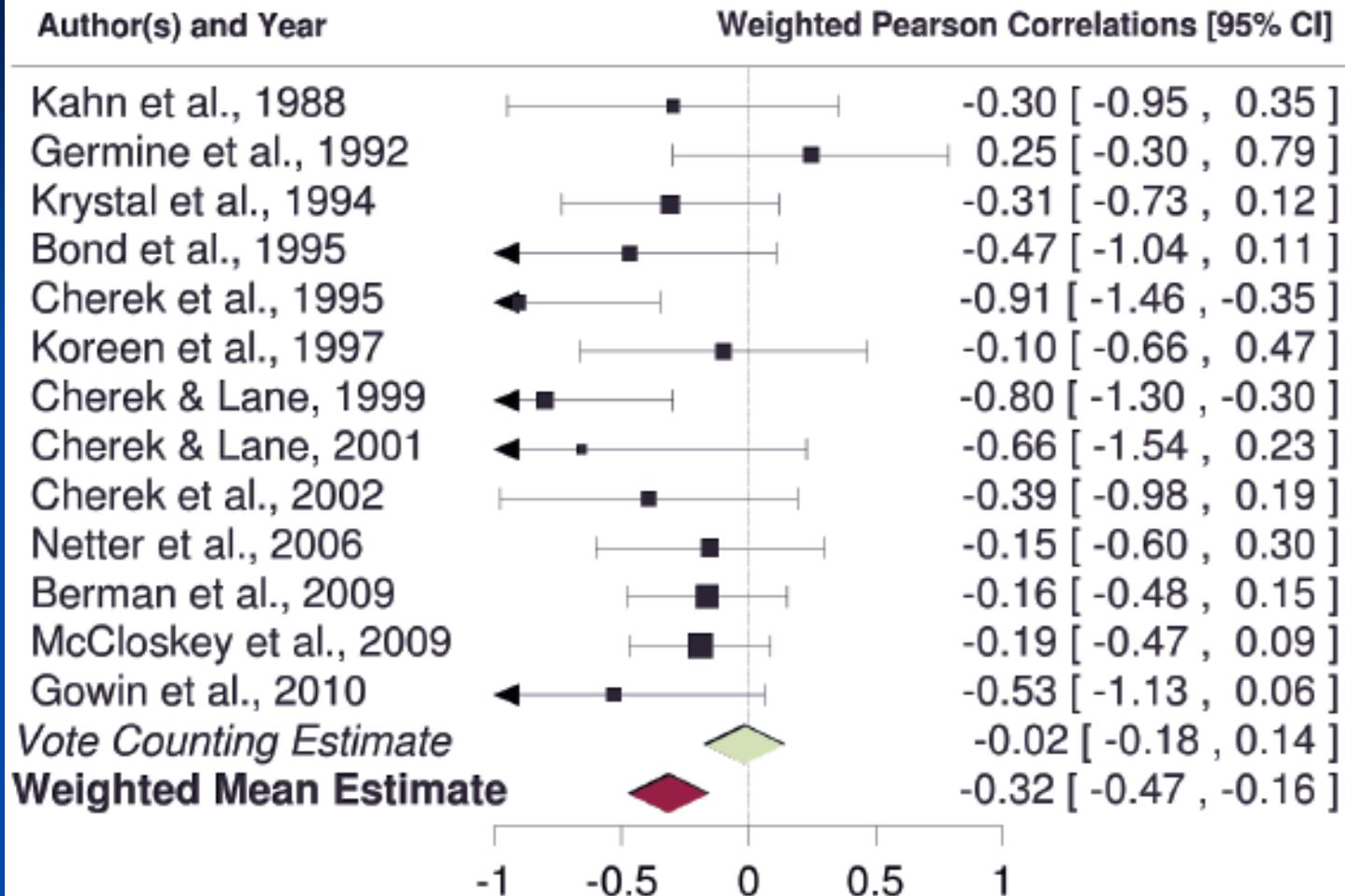
Etiology of IED



Biological Factors



Pharmacological Challenge Studies



Cognitive Deficits

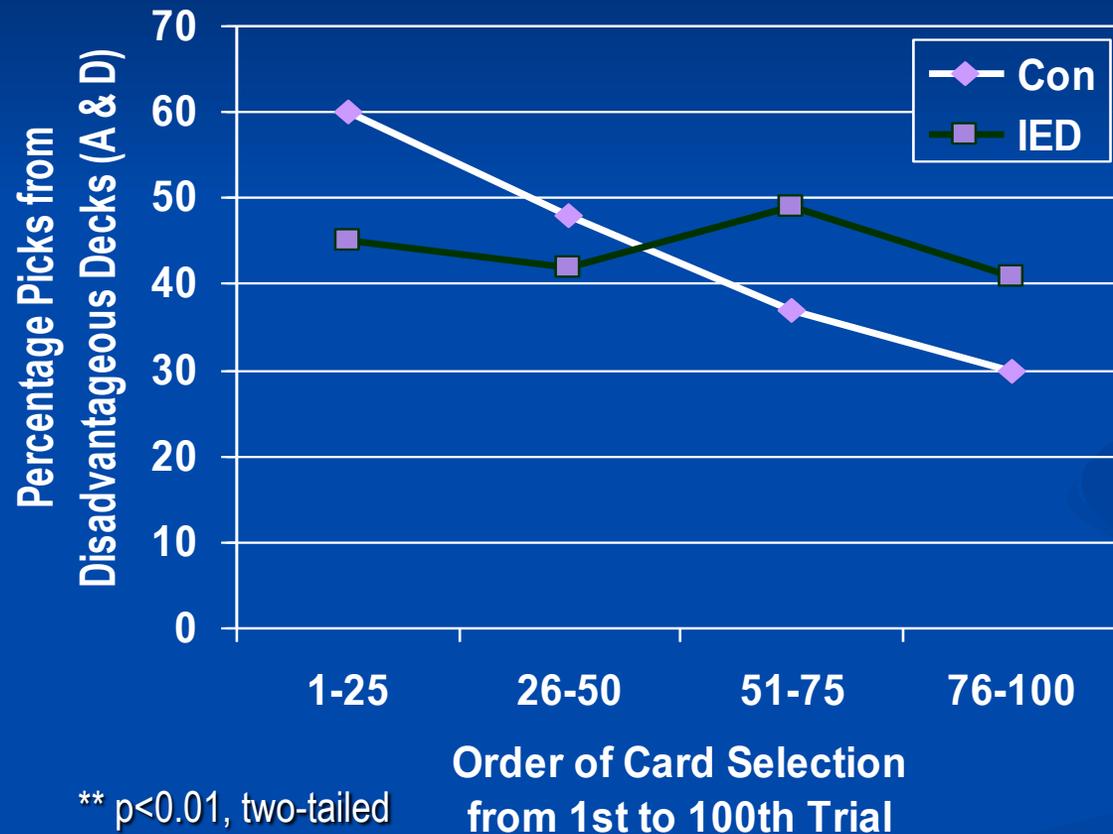
- Impulsivity
- Socio-Emotional Information Processing
- Emotion Regulation

Impulsivity

- The general tendency to act on one's impulses rather than to inhibit them (Joiner, 2005)
- A personality trait characterized by initiation of behavior without adequate forethought as to the consequences of this behavior. OR acting on the spur of the moment without thinking about the consequences of those actions (Connor, 2012).

Gambling Task

Percentage of Cards Selected from Disadvantageous Decks (A & D) Across Time



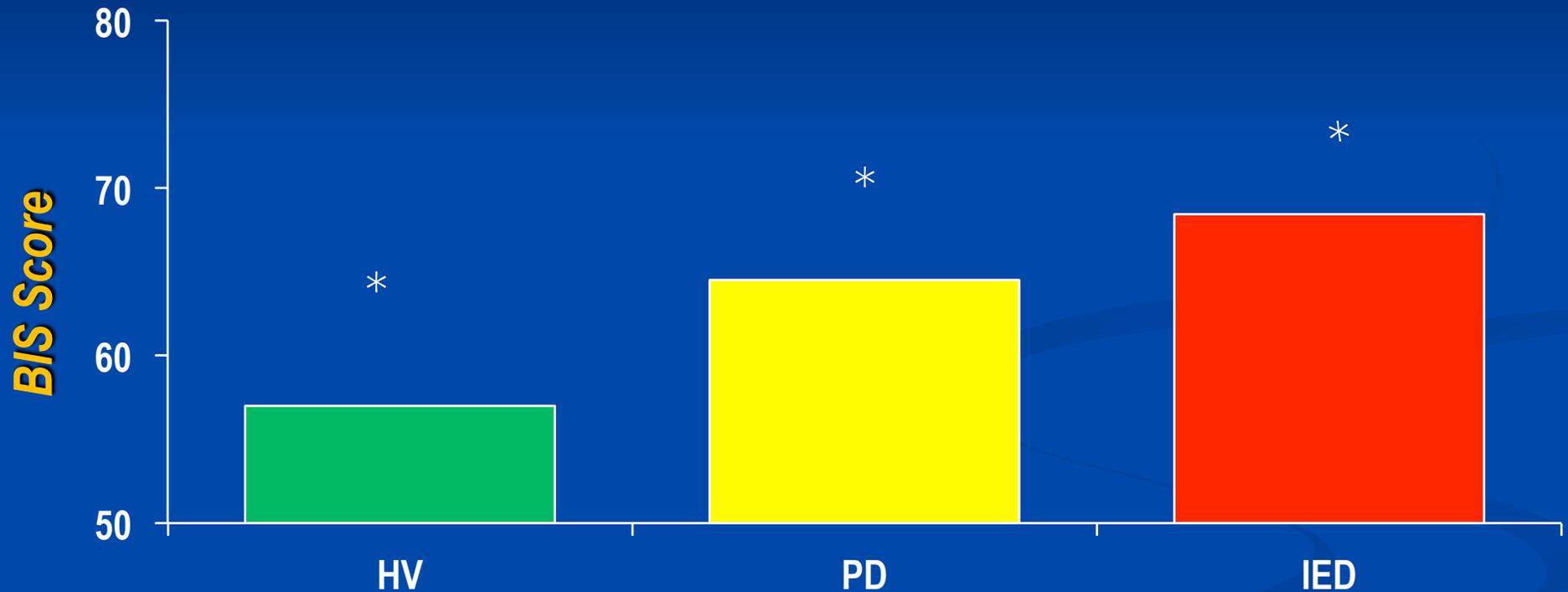
- IED subjects picked significantly more cards from disadvantageous decks over the final 25 trials

Best et al., 2002

IED and Impulsivity

- Compared IED, PD and HV groups on self-report (Barratt Impulsivity Scale) and behavioral (Immediate Memory Task, Bechara Gambling Task) measures of impulsivity
 - IED N = 302
 - PD N = 141
 - NV N = 281

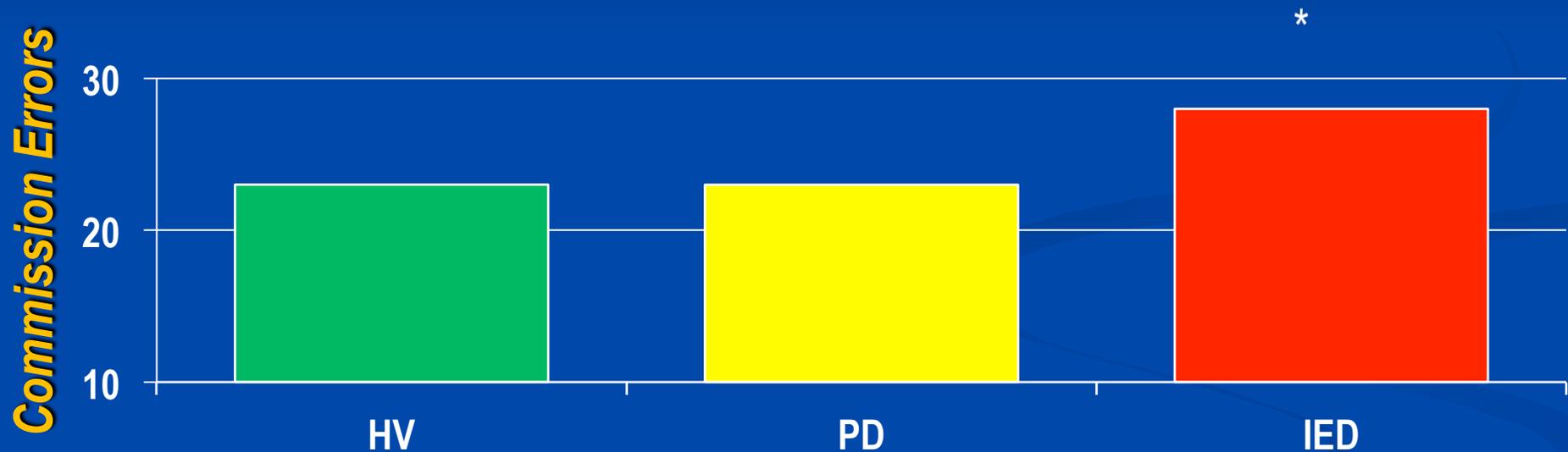
IED and Self-Reported Impulsivity



McCloskey, et al, in prep

** IED > PD > HV p < .001*

IED and Behavioral (IMT) Impulsivity



* IED > PD, HV ; $p < .05$

McCloskey, et al, in prep

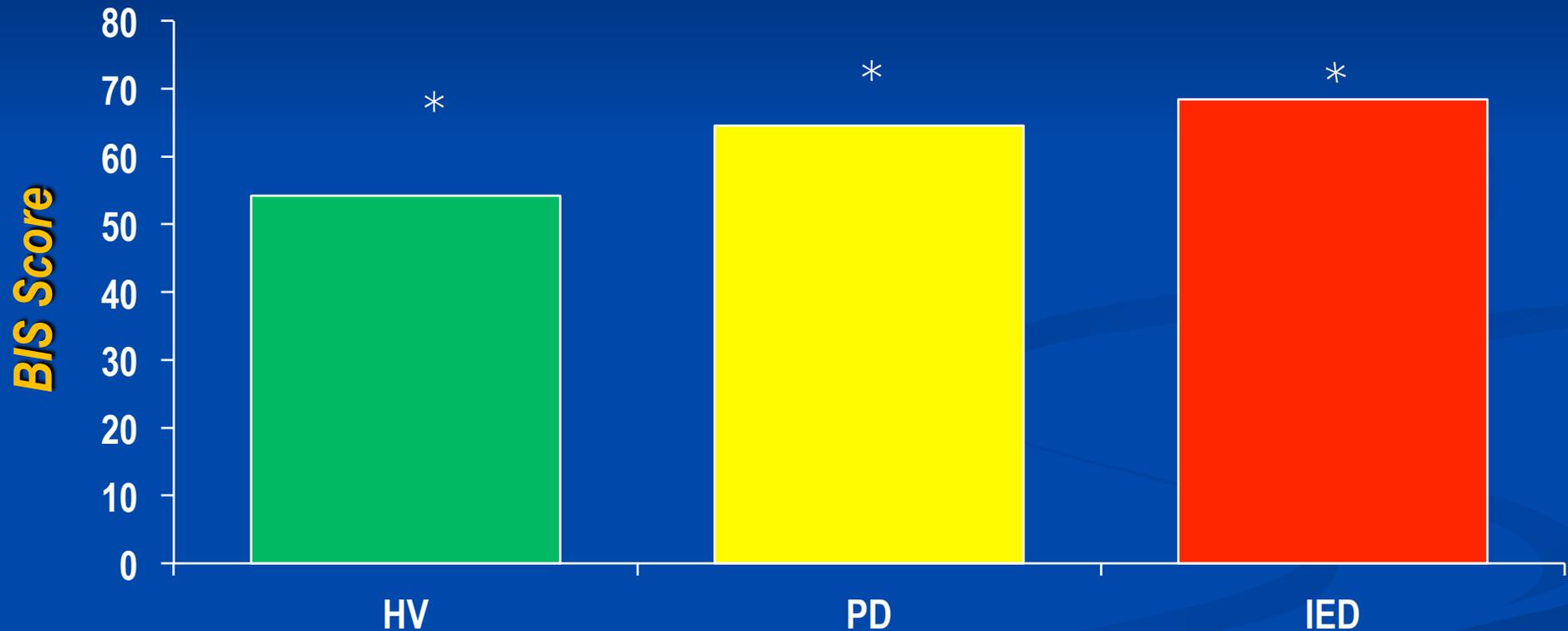
But.....

The image features a solid blue background. In the upper center, the text "But....." is written in a yellow, serif font. In the bottom right corner, there are several overlapping, wavy, light blue lines that create a sense of motion or depth.

IED and Impulsivity

- A second study compared IED, PD and HV groups on self-report (BIS) and behavioural (Passive Avoidance Task, Go-Stop) measures of impulsivity
 - IED N = 251
 - PD N = 80
 - NV N = 135

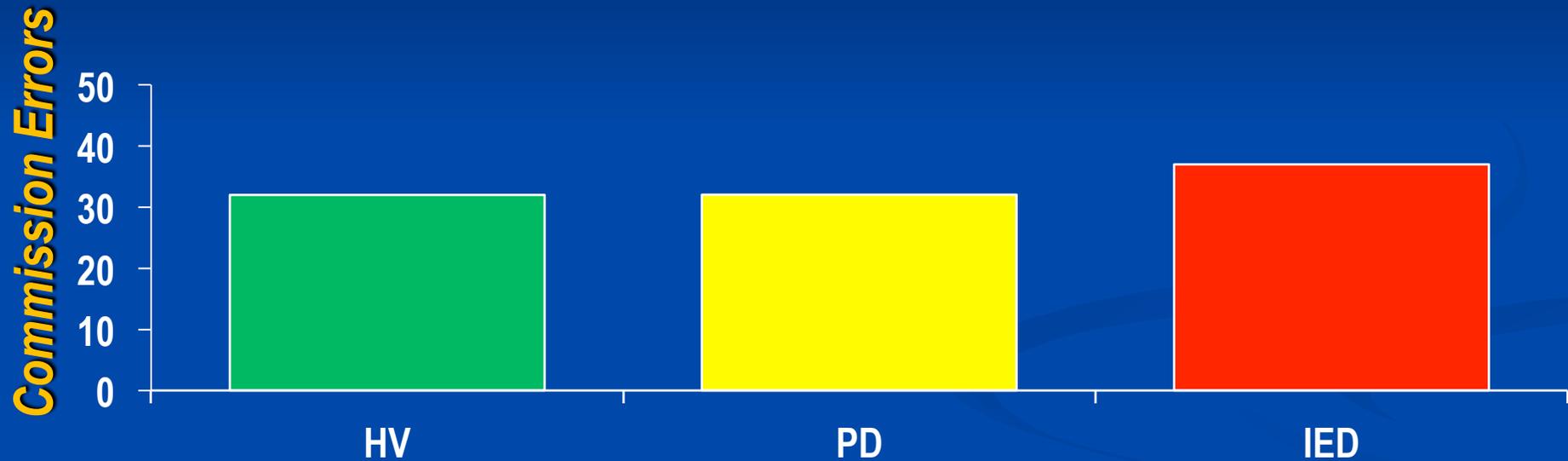
IED and Self-Reported Impulsivity



McCloskey, et al, in prep

** IED > PD > HV p < .01*

IED & Behavioral (GO-STOP) Impulsivity



IED = PD = HV ; $p > .10$

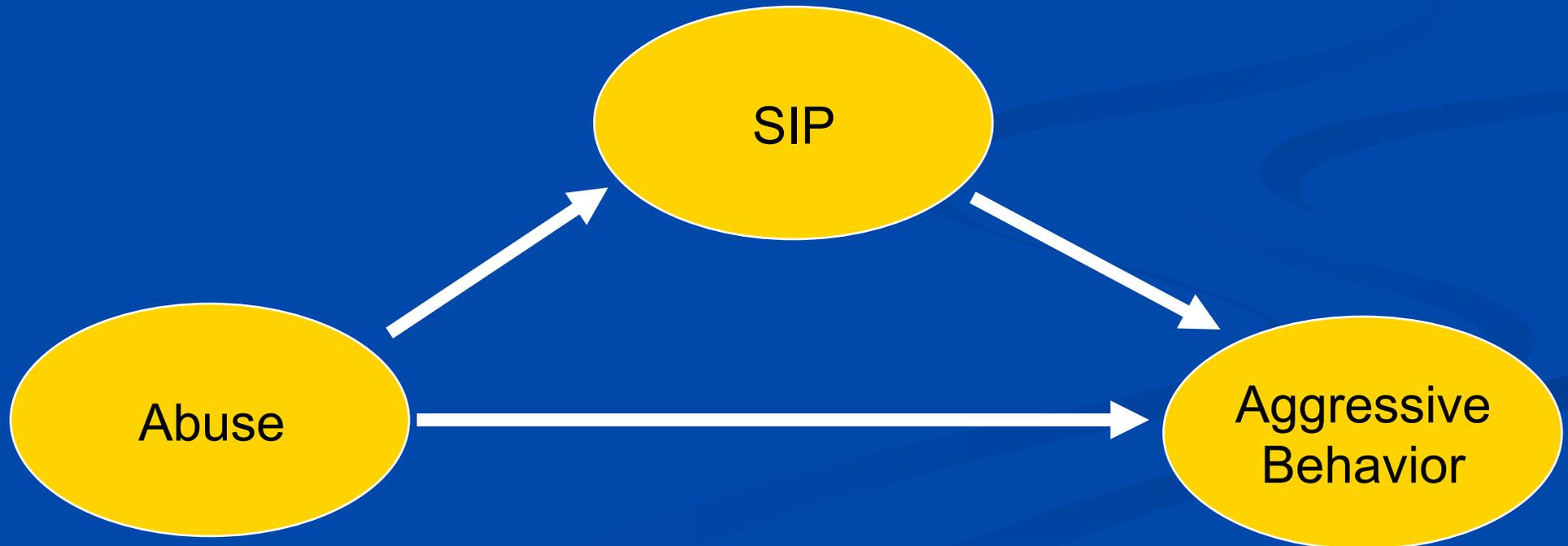
McCloskey, et al, in prep

Social Information Processing (SIP)

- **Encoding / Attention**
- **Making attributions / interpretations**
- Clarifying goals
- Generating responses
- Evaluating responses
- Enacting responses

SIP as a Mediator of Aggression

- Social Information Processing Deficient in Aggressive Children (Dodge et al., 1990, 1994). SIP was found to mediate the relationship between history of child abuse and aggression



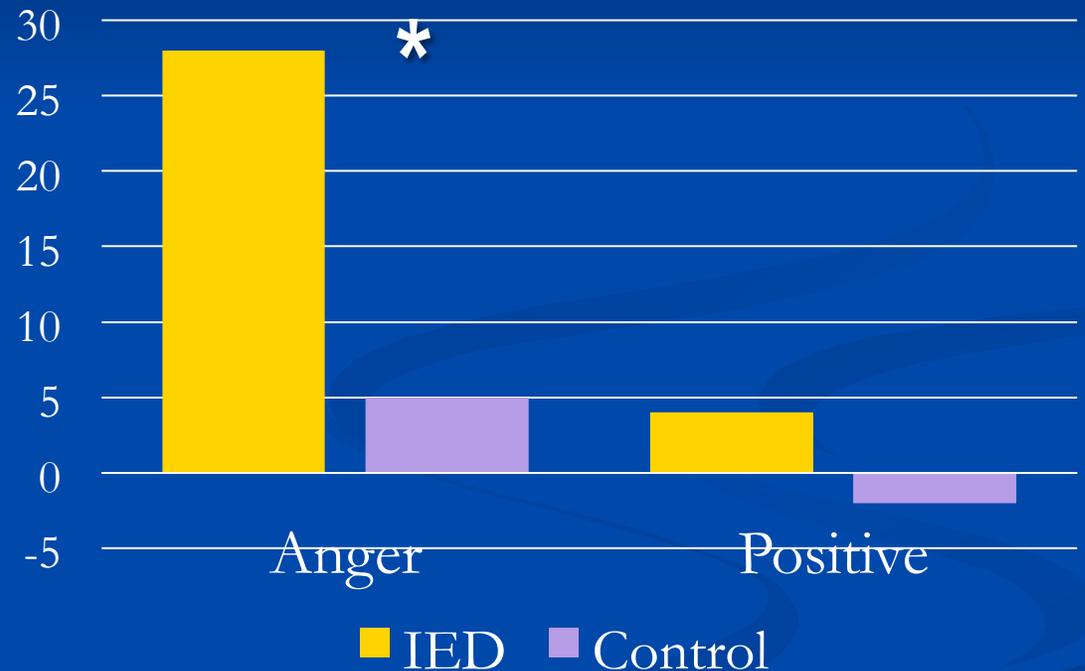
IED and Attention Bias

Emotional Stroop

SLAP
ATTACK
INSULT
HARM

CHAIR
TOWEL
PHONE
DOOR

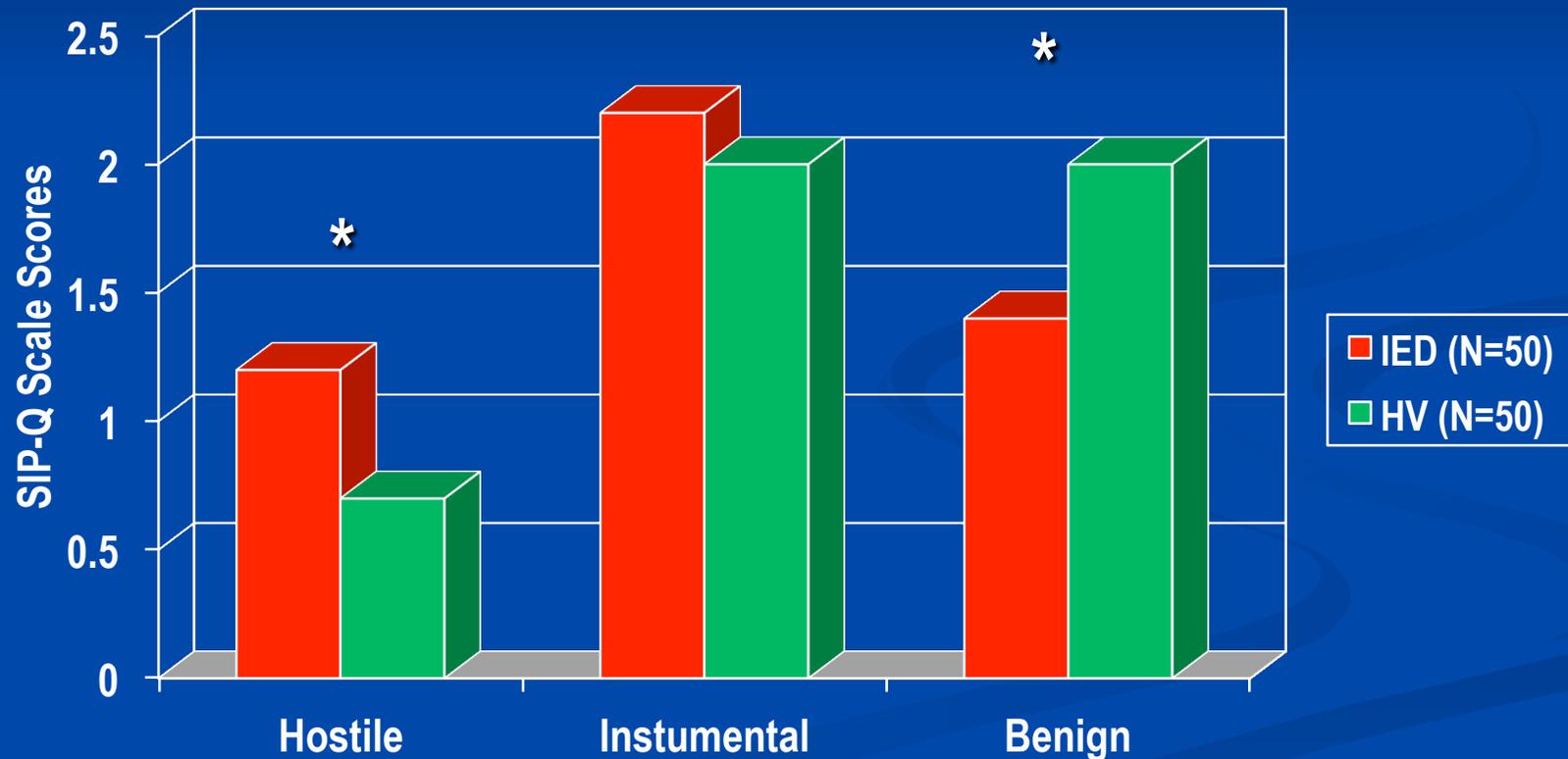
Stroop Interference (N = 28)



* $p < .05$

IED and Attribution Bias

You tell a friend something personal and ask your friend not to discuss it with anyone else. However, a couple of weeks later, you find out that a lot of people know about it. You ask your friend why she/he told other people and your friend says: Well, I don't know, it just came up and I didn't think it was a big deal."



* $P < .05$

Coccaro, Noblett & McCloskey 2009

Emotional Information Processing

- *The ability to accurately identify the emotional valence of stimuli such as facial expressions, vocal intonation, and body posture*

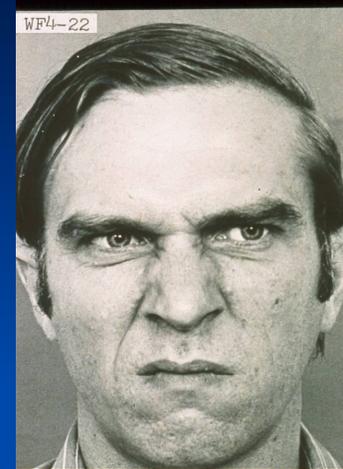
FEAR



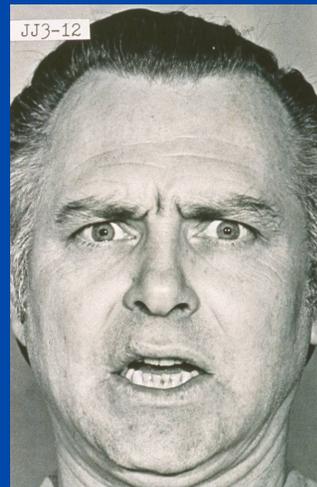
HAPPY



DISGUST



SURPRISE



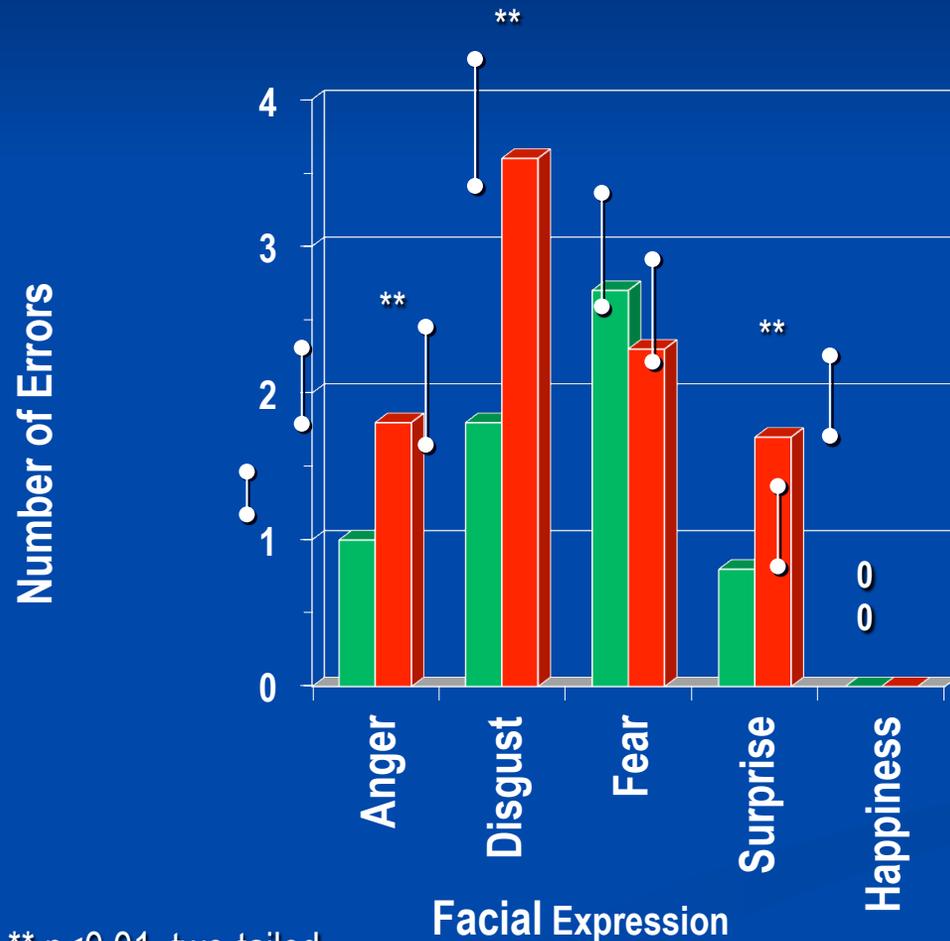
ANGER



NEUTRAL

Test of Facial Expressions

Number of Errors Made by Each Group for 5 Facial Expressions



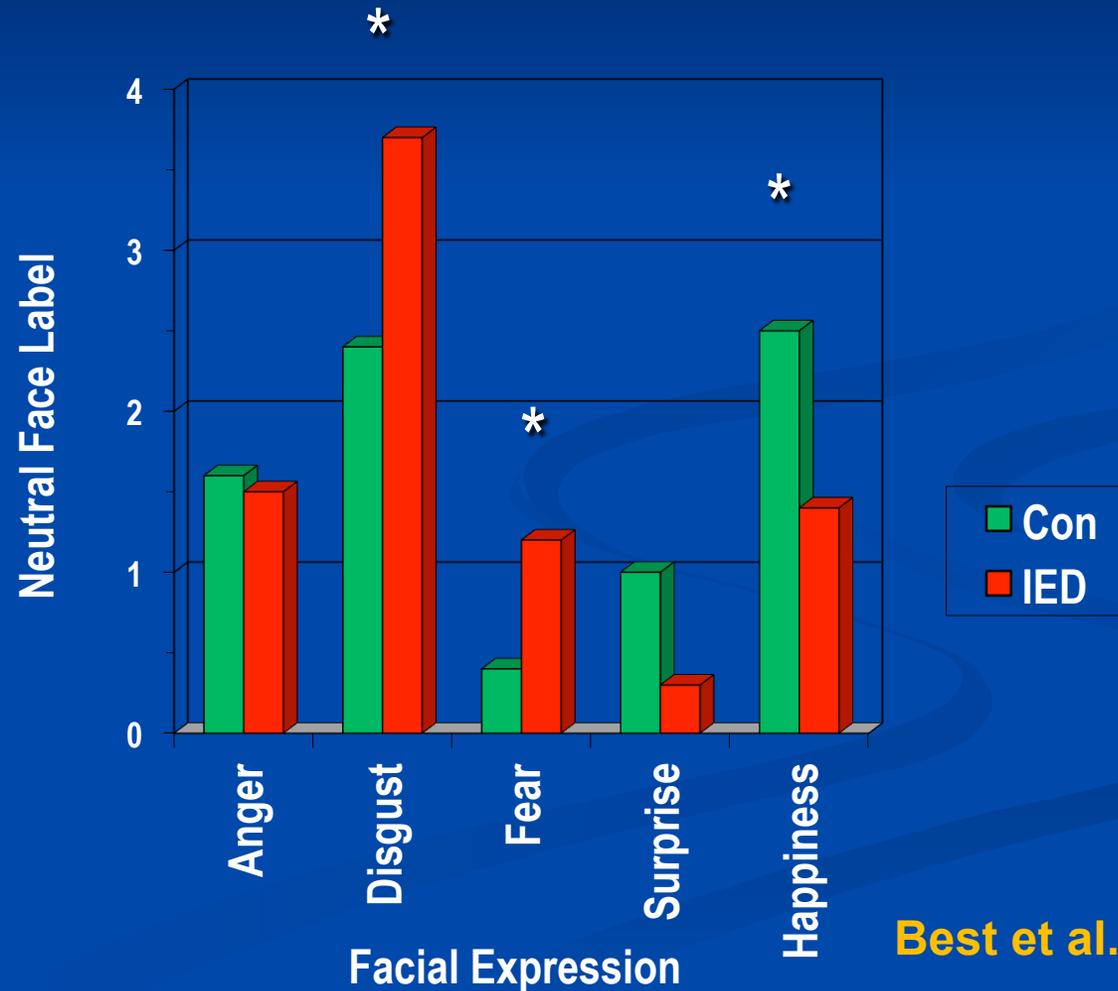
■ IED subjects made significantly more errors for anger, disgust and surprise

Best et al., 2002

** p < 0.01, two-tailed

IED and Emotional Information Processing

Number of Times Subjects Labeled Neutral Faces With Each of 5 Expressions



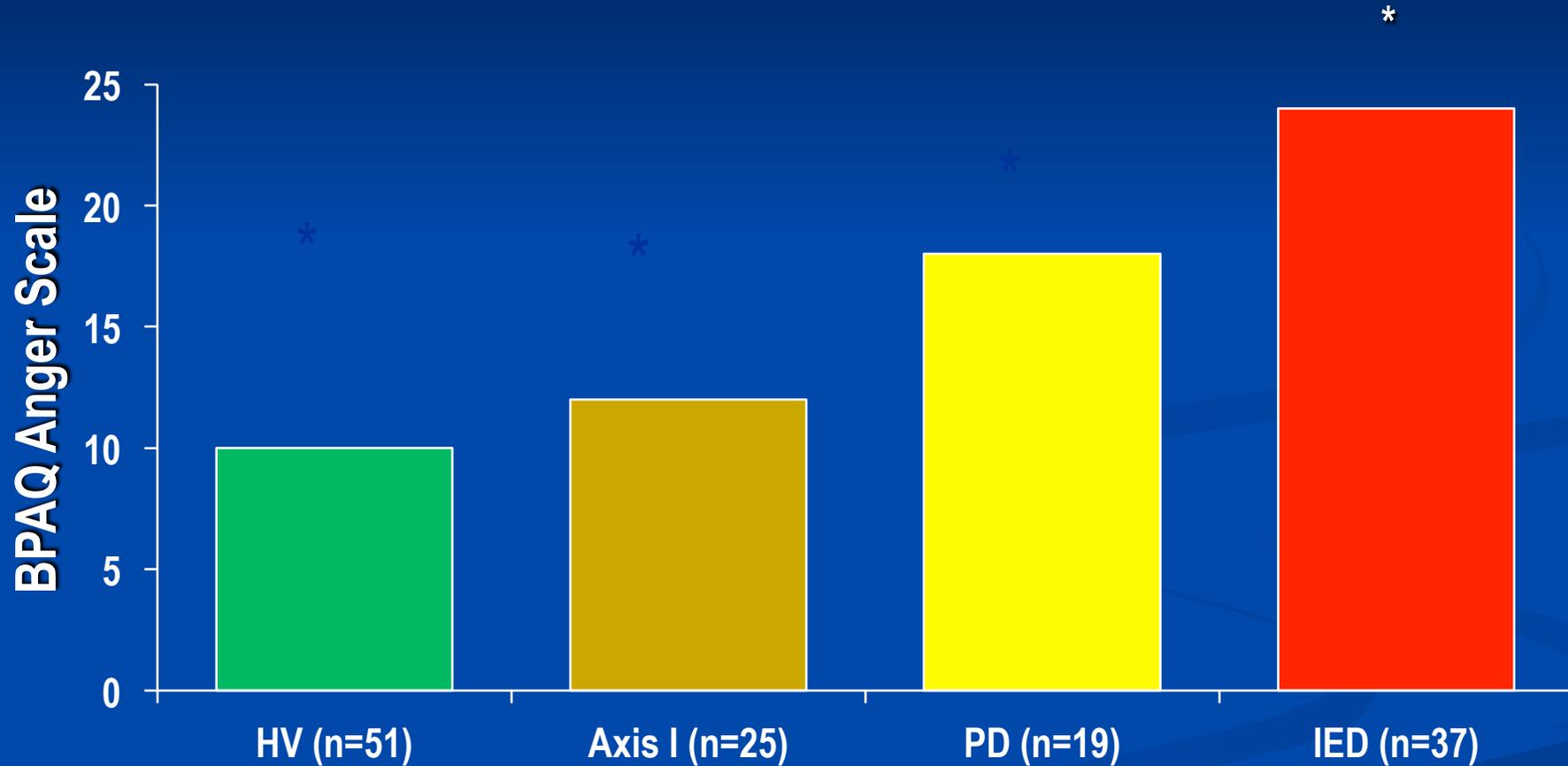
* $p < 0.05$

Best et al., 2002

Emotional Regulation

- The capacity to adjust one's emotional arousal level so that an optimal intensity of engagement with one's environment is achieved (Cicchetti, Ganiban, & Barnett, 1991).
- Implicit and explicit efforts to maximize positive and minimize negative moods and feeling states (Westen , 1985 / 1994)
- The processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions. (Gross ,1998)
- The processes by which people seek to change their emotional experience or expression. (Gross , 2001)

IED and Anger



* $p < 0.05$

McCloskey, Berman, Noblett & Coccaro, 2006

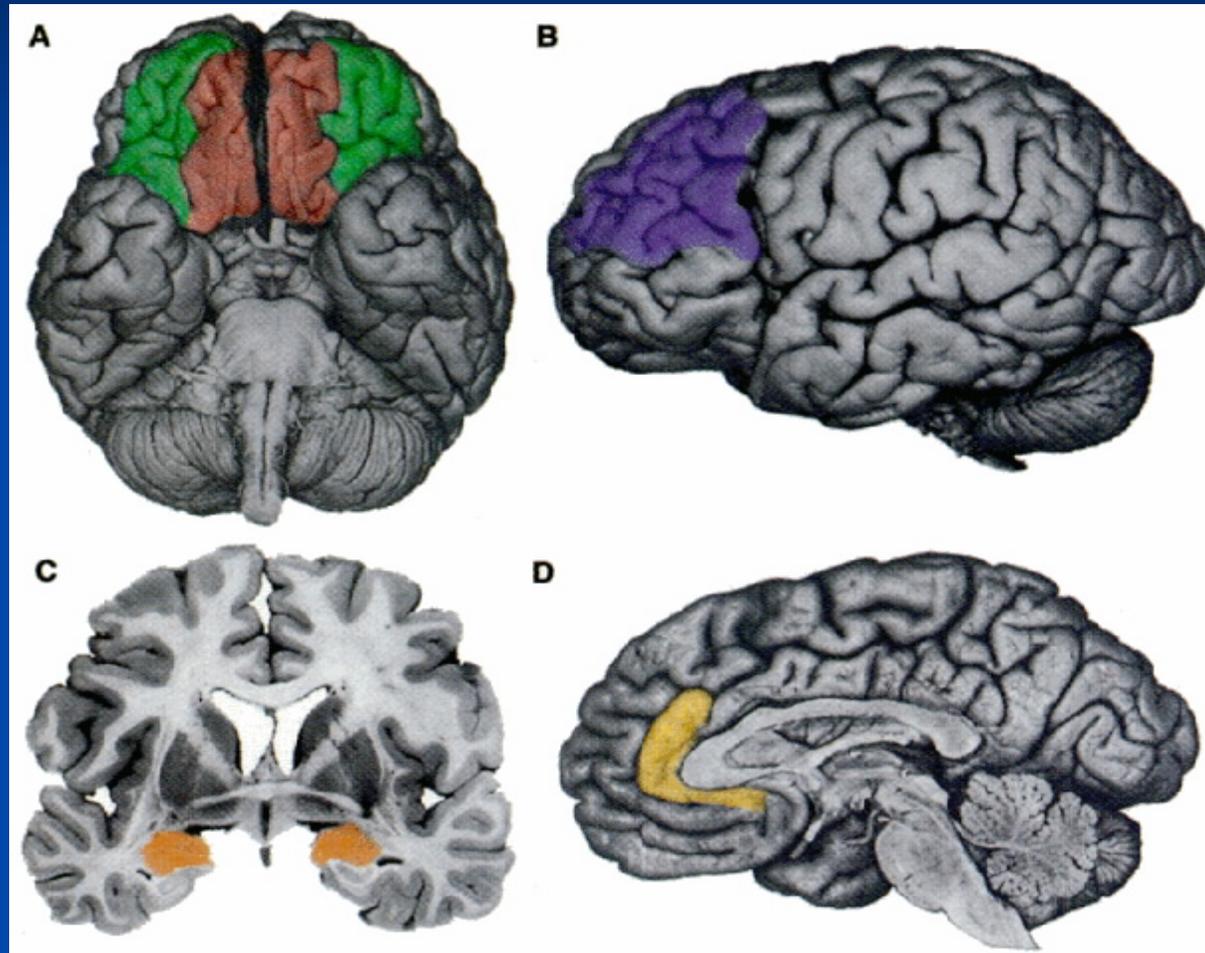
Emotion Regulation and IED

	HV (n=103)	PC (n = 67)	IED (n = 207)	<i>F</i>	η_p^2	Post-hoc
Affect Lability Scale						
Depression	15.44 (4.73)	20.90 (7.27)	25.66 (6.67)	89.29***	0.33	IED > PC > HV
Hypomania	17.40 (5.66)	22.62 (7.67)	27.48 (7.30)	71.72***	0.28	IED > PC > HV
Biphasic	11.45 (3.27)	15.48 (5.90)	19.36 (6.21)	70.85***	0.28	IED > PC > HV
Anxiety	8.35 (2.56)	11.49 (5.04)	14.73 (4.50)	80.49***	0.31	IED > PC > HV
Anger	7.89 (1.99)	10.52 (4.24)	17.84 (5.02)	206.52***	0.53	IED > PC > HV
Anxiety/Depression	9.21 (2.58)	13.25 (5.83)	17.34 (5.98)	82.69***	0.31	IED > PC > HV
Affect Intensity Measure						
Negative Intensity	13.81 (4.73)	18.70 (7.00)	21.35 (5.62)	60.47***	0.25	IED > PC > HV
Negative Reactivity	20.65 (4.78)	22.61 (4.87)	21.96 (5.07)	4.89**	0.03	IED, PC > HV

** $p < .01$, *** $p < .001$.

Fettich, McCloskey, Look & Coccaro, in prep

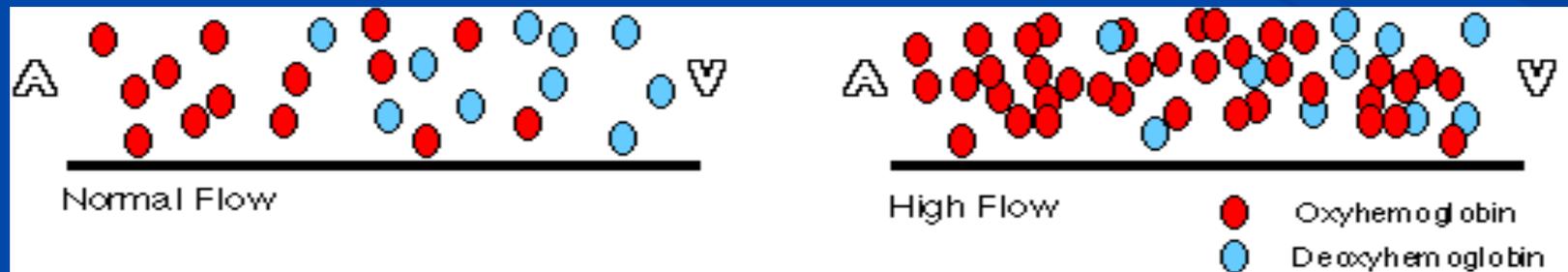
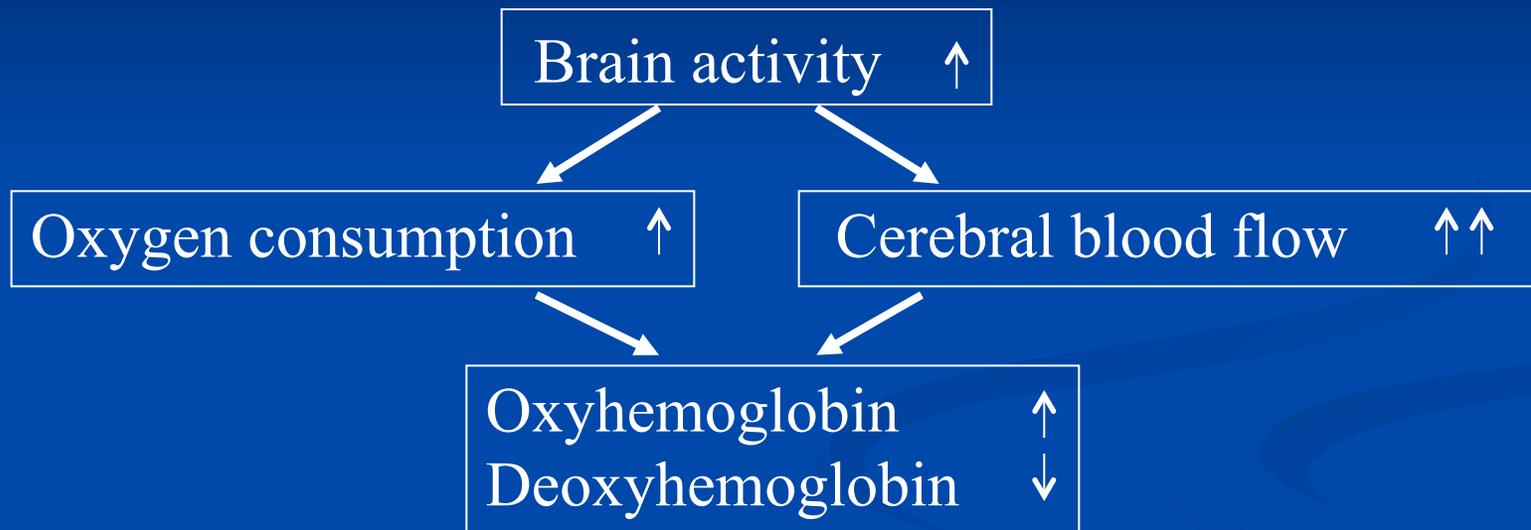
Hypothesized Emotion Information Processing / Regulation Pathway



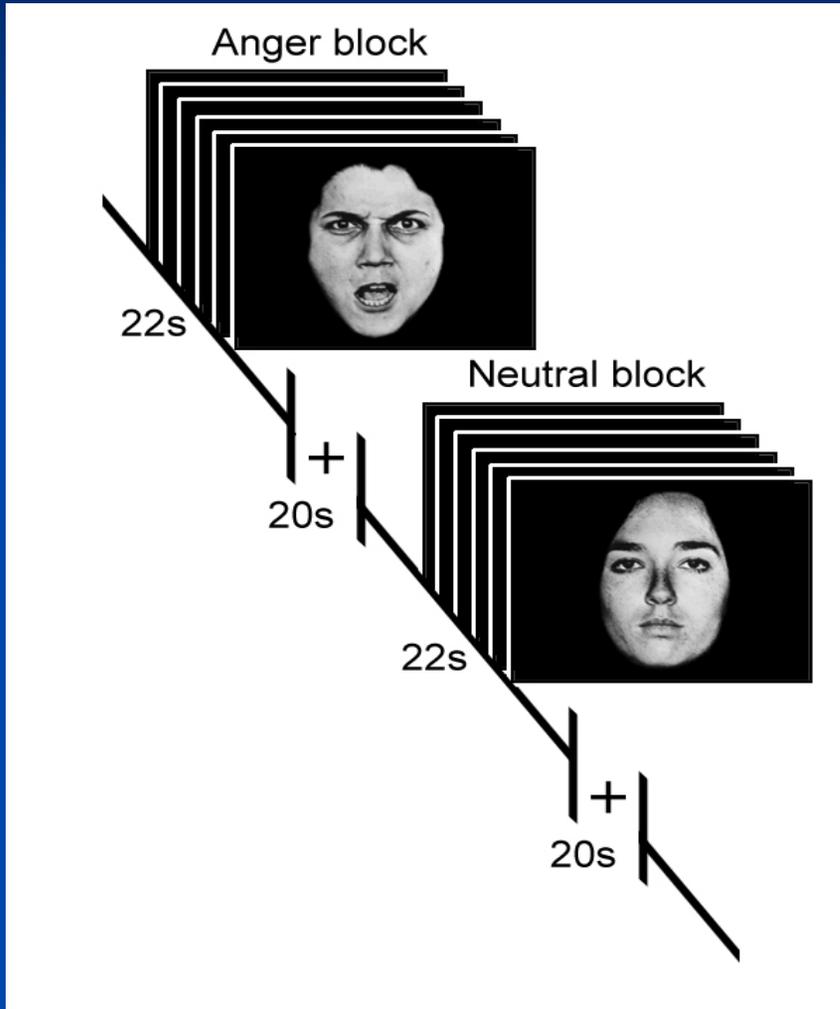
Slide from Davidson 1999

Mechanism of BOLD Functional MRI

- BOLD = Blood Oxygenation Level Dependent



fMRI Study of Implicit EIP in IED

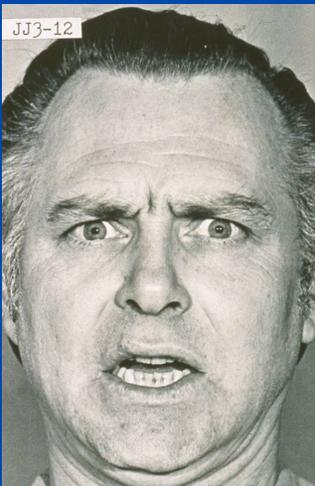


Paradigm:

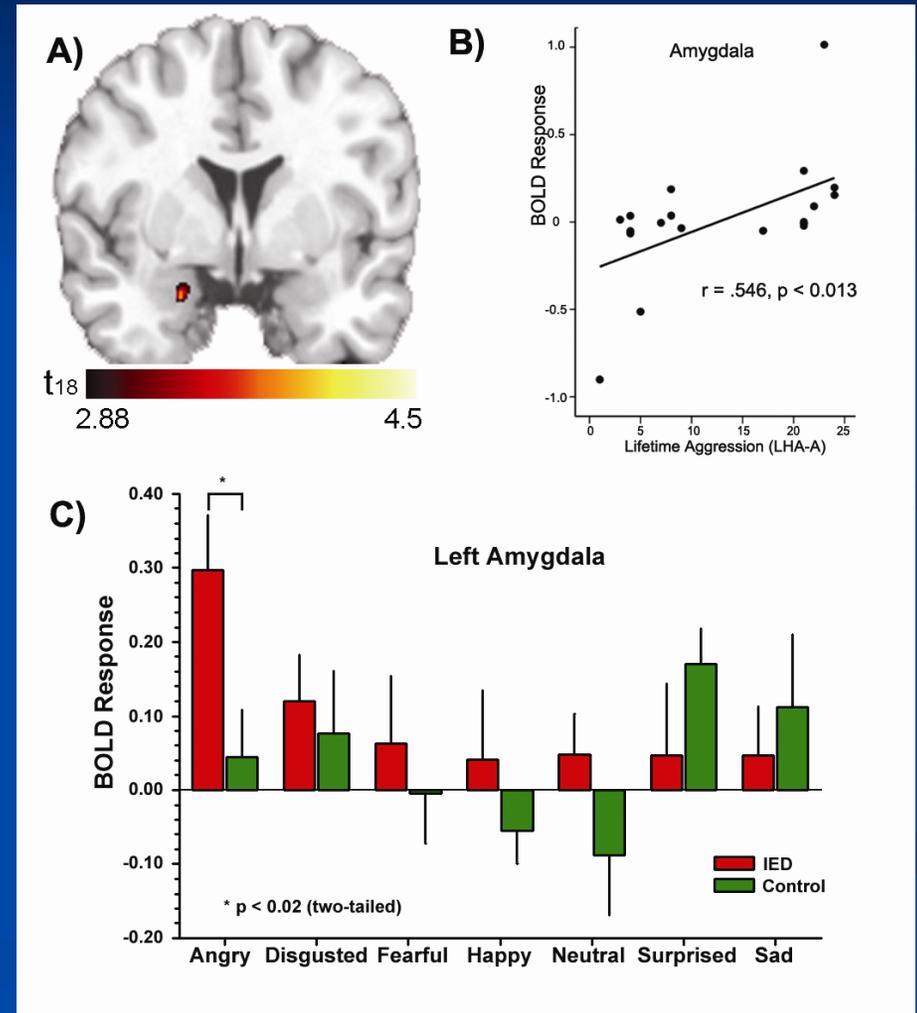
- Block design using the Ekman and Friesen Pictures of Facial Affect.
- 5 minute runs, 6 runs per scan
- Blocks each contained one expression type (*Anger, Fear, Disgust, Happy, Sad, Surprise, Neutral*), a crosshair was used as baseline.
- Subjects were asked to identify gender only.

FMRI of EIP in IED (N=20)

- IED subjects show increased amygdala activation and decreased orbitofrontal activation to angry faces (compared to controls)



“man”



fMRI Study of Explicit EIP in IED

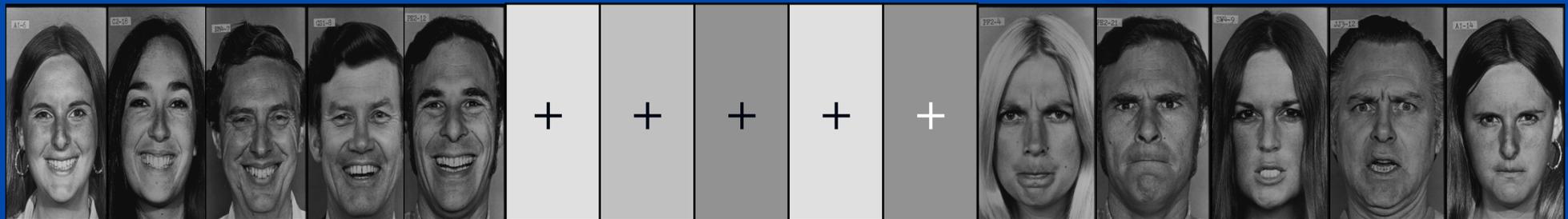
Paradigm:

- Block design using the Ekman and Friesen Pictures of Facial Affect.
- 4 minute 20 second runs, 4 runs per scan
- Blocks each contained one expression type (*Anger, Fear, Disgust, Happy, Sad*) interleaved with a crosshair condition that was used as baseline.
- Subjects were asked to identify the valence of the pictures (positive, neutral, negative)

20 seconds

20 seconds

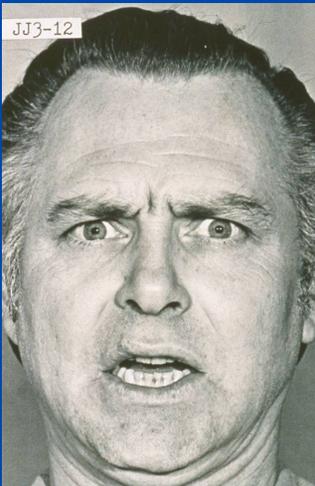
20 seconds



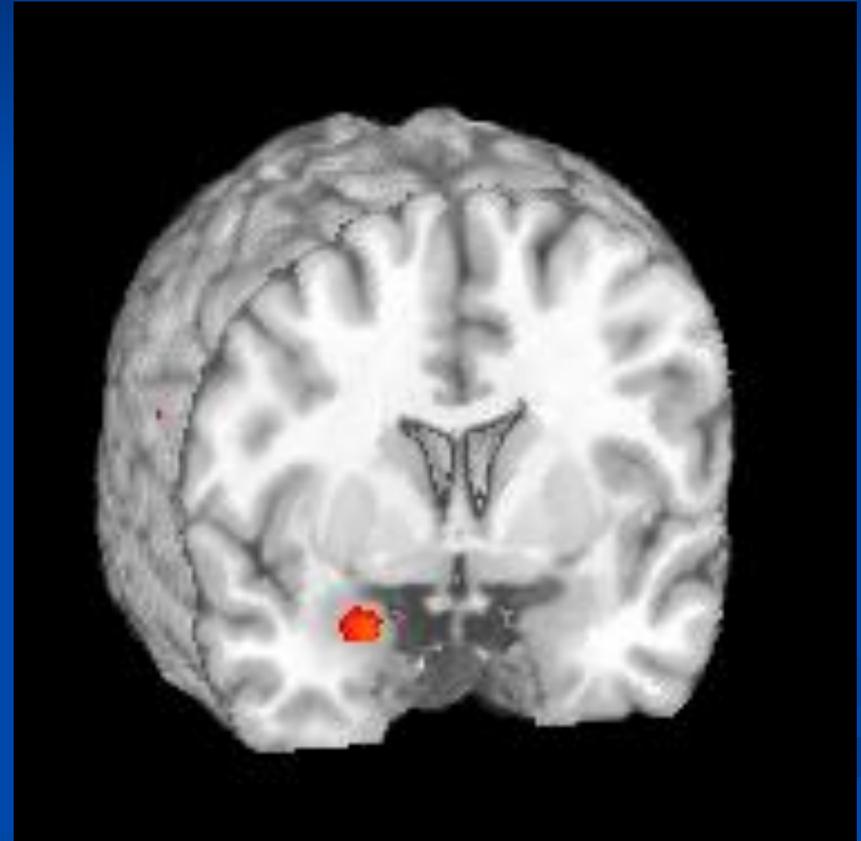
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fMRI of EIP in IED (N=40)

- IED again subjects show increased amygdala activation but this time do **not show** orbitofrontal deactivation to angry faces (compared to controls)

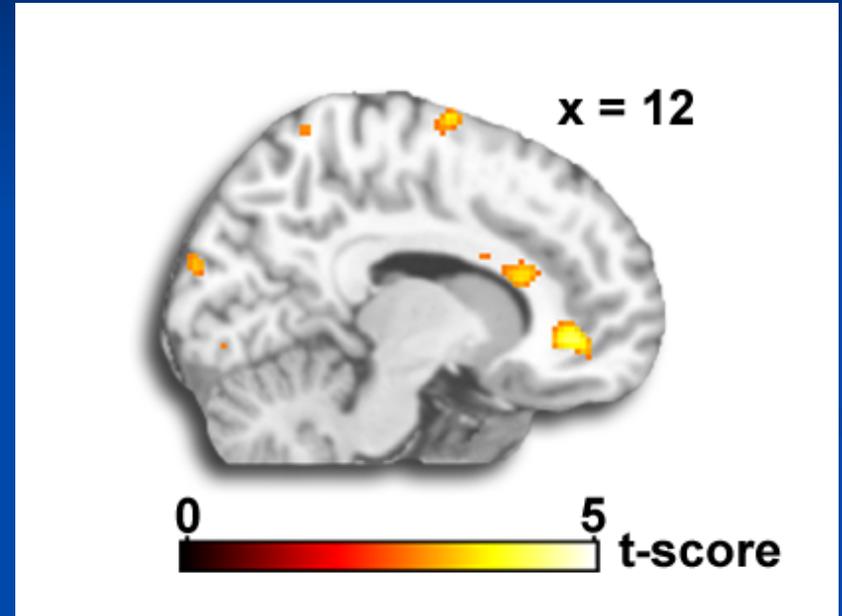
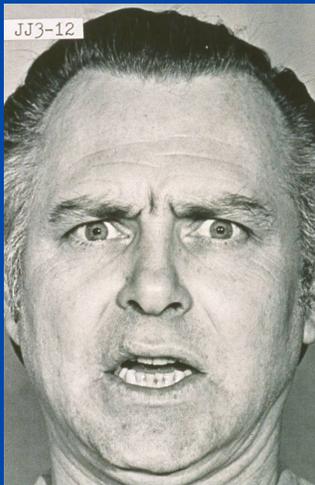


“negative”



fMRI of EIP in IED (N=40)

- Furthermore, in contrast to HV's who showed a negative feedback between AMY and OFC, IED subjects showed positive AMY –OFC coupling



fMRI Study of Emotion Response in IED

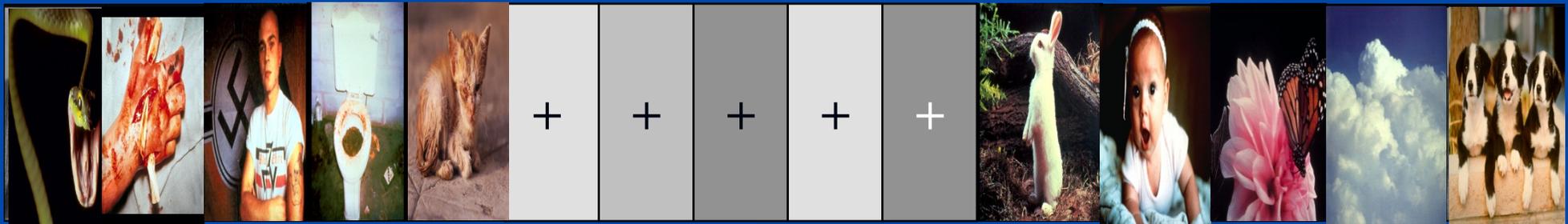
Paradigm:

- Block design using the IAPS picture series (5 pics, 4 sec per pic).
- 4 minute runs, 4 runs per scan
- Blocks each contained one valance (*Positive, negative, neutral*) interleaved with a crosshair condition that was used as baseline.
- Subjects were asked to identify the valence of the pictures (positive, neutral, negative)

20 seconds

20 seconds

20 seconds



4

4

4

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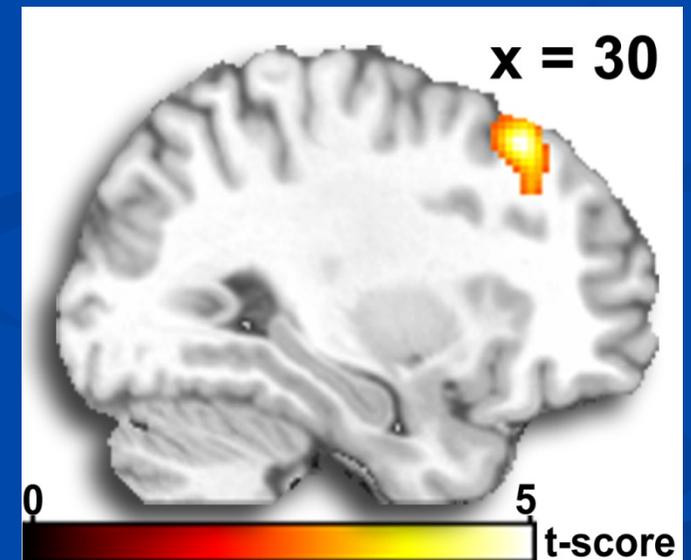
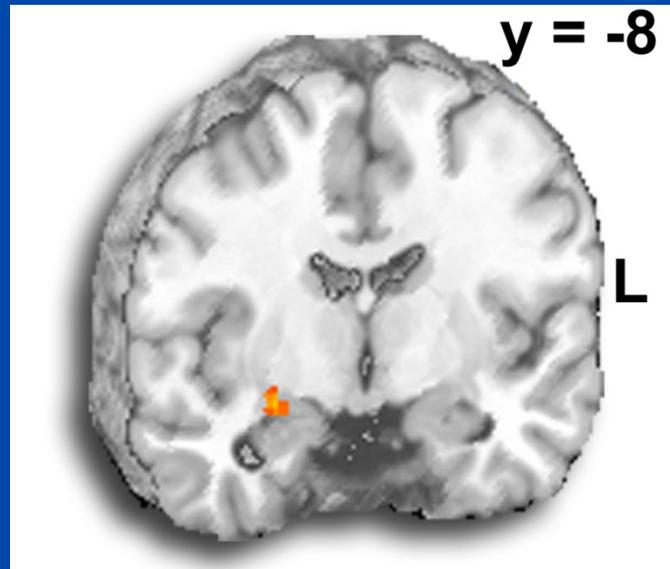
4

4

fMRI of Emotion in IED (N=20)

- IED subjects show increased amygdala activation but this time also **showed increased DLPFC** to negative stimuli (compared to controls)

“negative”



Psychotherapy for IED



- No published studies had directly examined the efficacy of psychotherapy for IED
- Only one study (Galovski & Blanchard, 2002) has assessed IED in a psychotherapy study
 - Examined the effectiveness of a brief cognitive-behavioral intervention on aggressive drivers
 - Overall the treatment was effective in reducing aggressive driving
 - However, the IED subjects (n=9) showed less improvement than non-IED subjects (n=18)

Cognitive Restructuring, Relaxation and Coping Skills Training (CRCST)

- Developed by Deffenbacher and McKay
- Empirical support as treatment for anger
- 8 treatment sessions
- 3 key components
 - Relaxation
 - Cognitive Restructuring
 - Coping Skills Training (Imaginal Exposure)

CRCST for IED

- ◆ Modifications of CRCST included
 - ◆ Focus on aggression
 - ◆ Lengthening the treatment from 8 to 12 sessions
 - ◆ Explanation of cognitive restructuring 2 sessions
 - ◆ Inclusion of “time out” technique
 - ◆ Increased emphasis on relapse prevention
 - ◆ Individual and group format

Anger Distortions / Strategies

<u>Anger Distortion</u>	<u>Strategies</u>
Catastrophizing	<ul style="list-style-type: none">• Be <i>realistically</i> negative• Look at the whole picture
Overgeneralization	<ul style="list-style-type: none">• Be specific, accurate• Counter-examples/ exceptions to the rule
Shoulds	<ul style="list-style-type: none">• Preferences, not shoulds• People do what they want, not what I want
Name calling	<ul style="list-style-type: none">• Describe the behavior, not the person• Visualize the language
Mind reading	<ul style="list-style-type: none">• How do I know what they're thinking?• Think of other explanations
Blaming	<ul style="list-style-type: none">• How can I solve this myself?• Acknowledge that they're probably taking care of their needs as best they can.

CRCST SESSIONS

Sessions	1-3	Relaxation Training
Sessions	3	Time Out
Session	4-5	Cognitive Concepts
Session	6	Coping Skills (Anticipatory)
Sessions	7-8	Coping Skills (Medium)
Sessions	9-10	Coping Skills (High)
Sessions	11-12	Coping Skills (Highest)

Pilot RCT of CRCST for IED

■ Participants

- IED

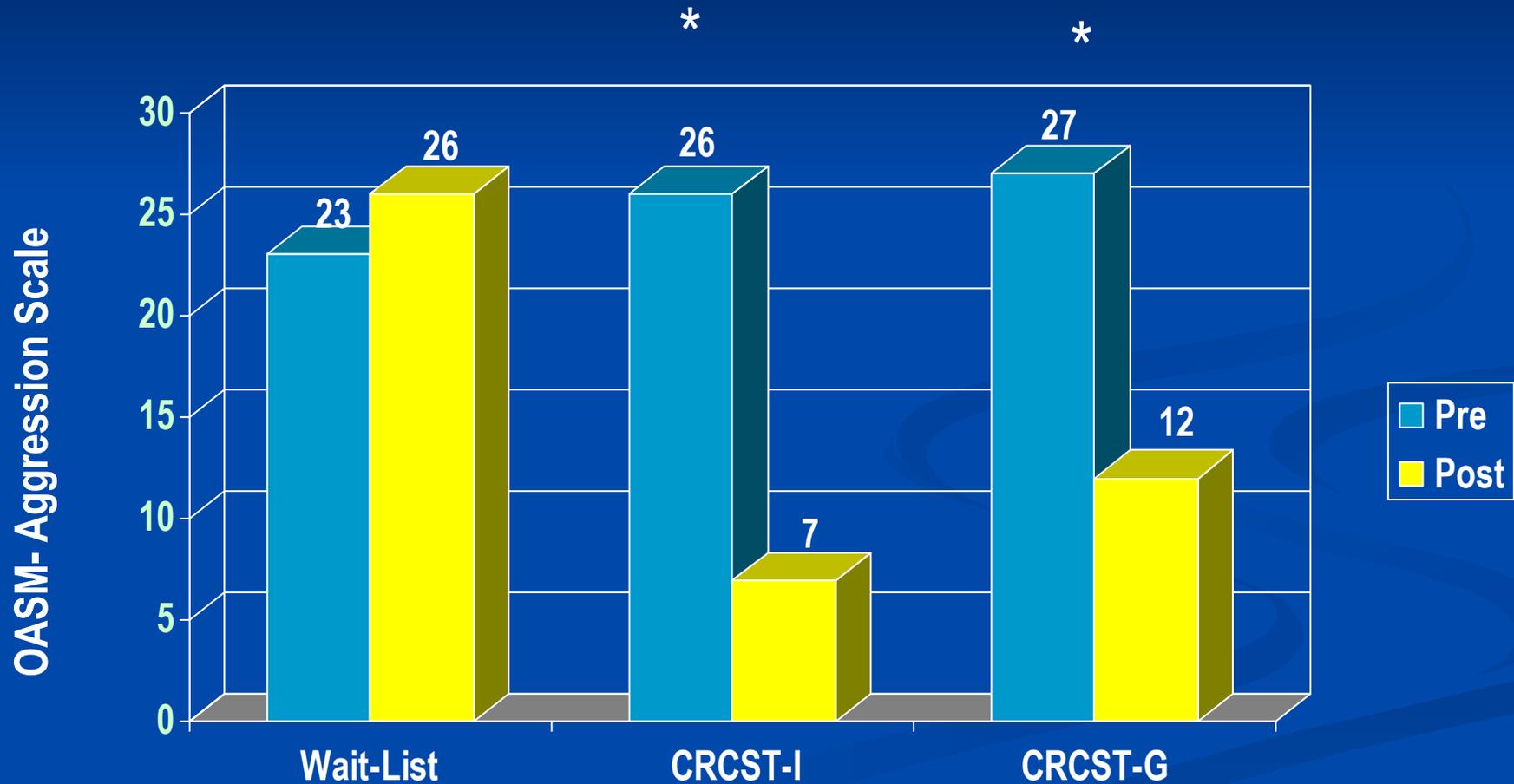
■ Conditions

1. Individual CRCST (12 50-minute sessions)
2. Group CRCST (4-6 group members, 1-2 therapists, 12 75-minute sessions)
3. Wait list + self-monitoring control (kept weekly anger log for 12 weeks)

■ Outcome measures

- Aggression: Overt Aggression Scale Modified (OASM)
- Anger: State Trait Anger Expression Inventory 2 – Trait Aggression Scale
- Depression: Beck Depression Inventory-II (BDI-II)
- Hostile Bias: Hostile Automatic Thoughts (HAT)

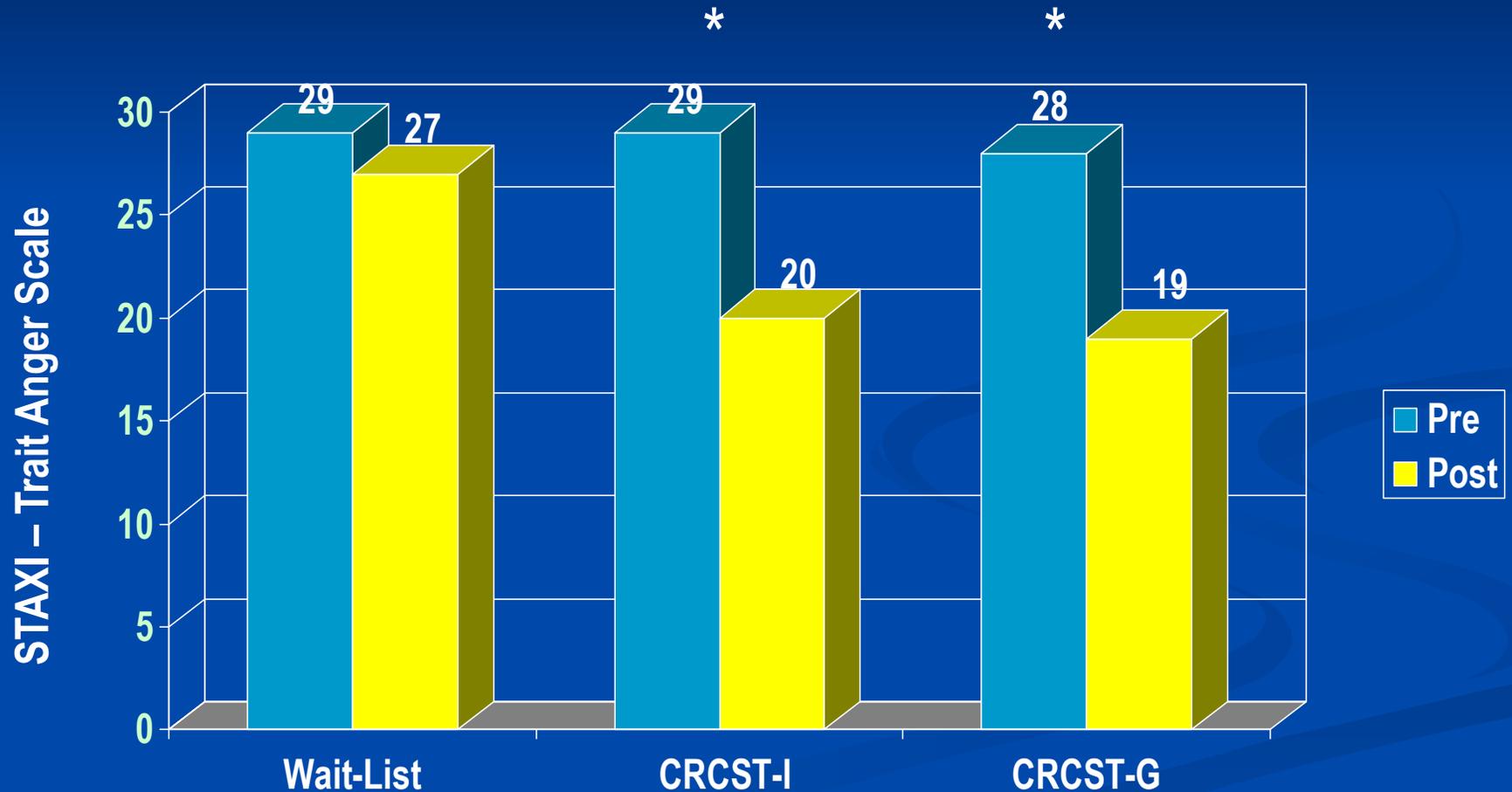
Efficacy of CBT in Reducing Aggression



* $p < .05$

McCloskey et al, 2008

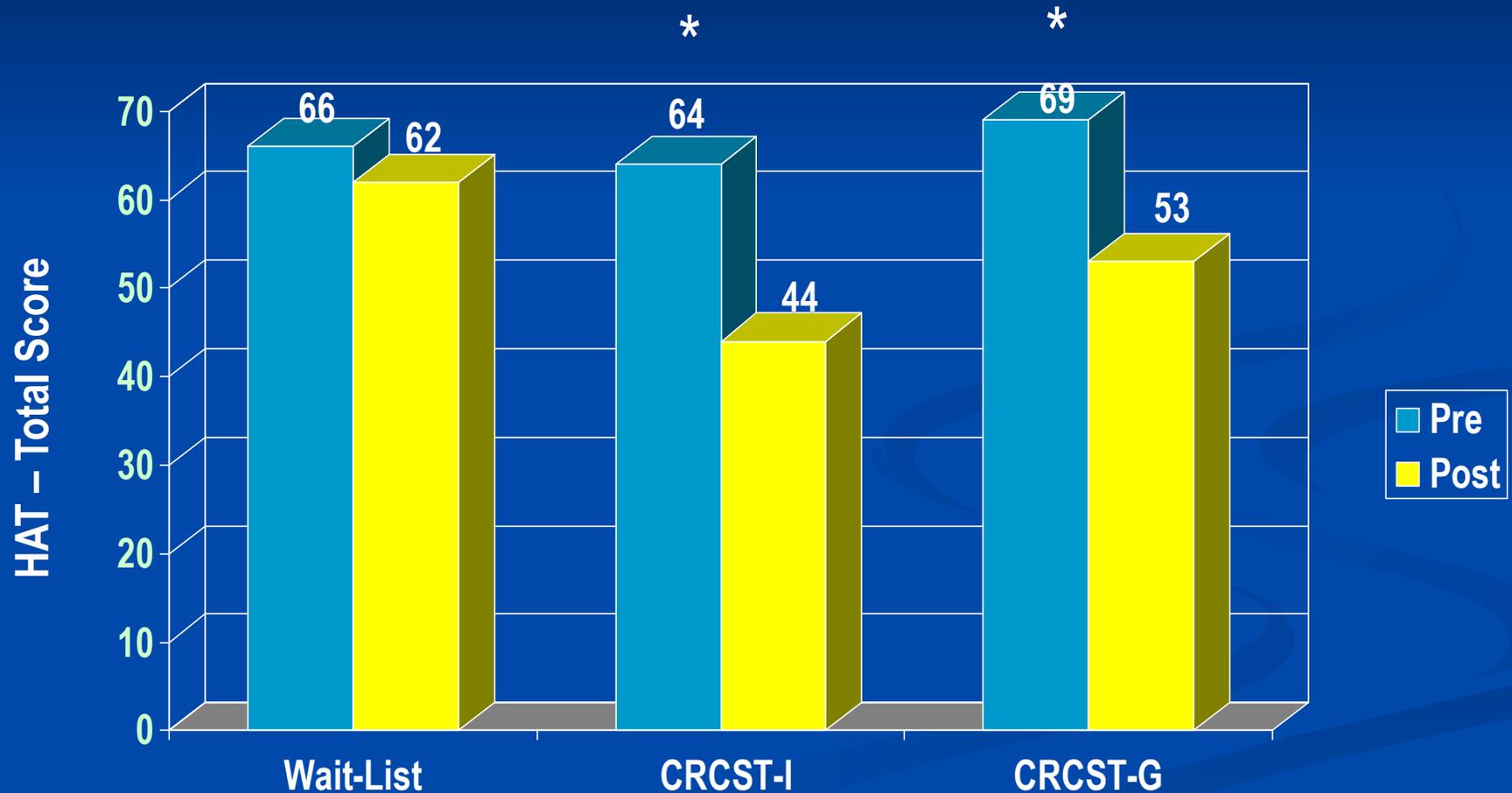
Efficacy of CRCST in Reducing Anger



* $p < .05$

McCloskey et al, 2008

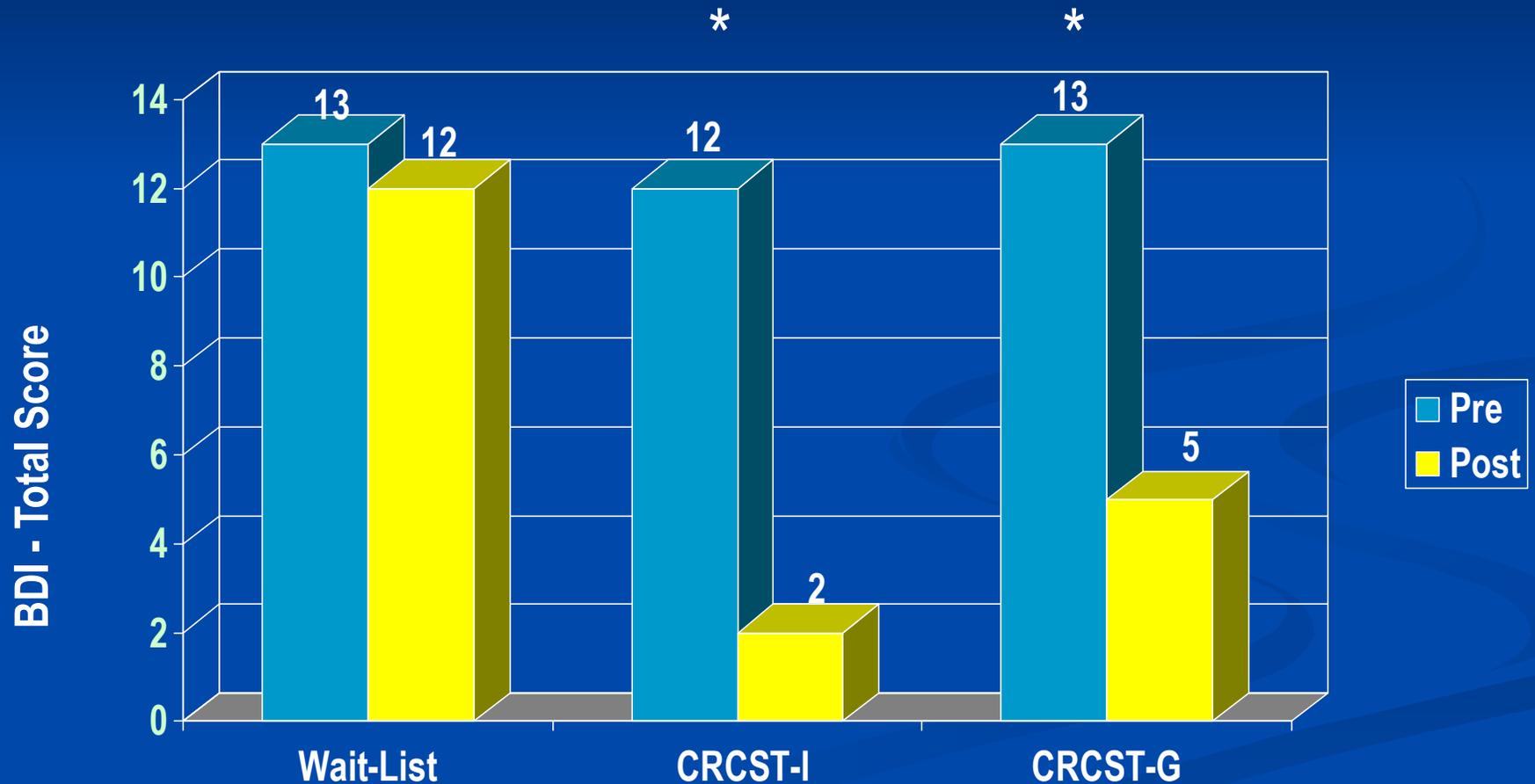
Efficacy in Reducing Hostile Thoughts



* $p < .05$

McCloskey et al, 2008

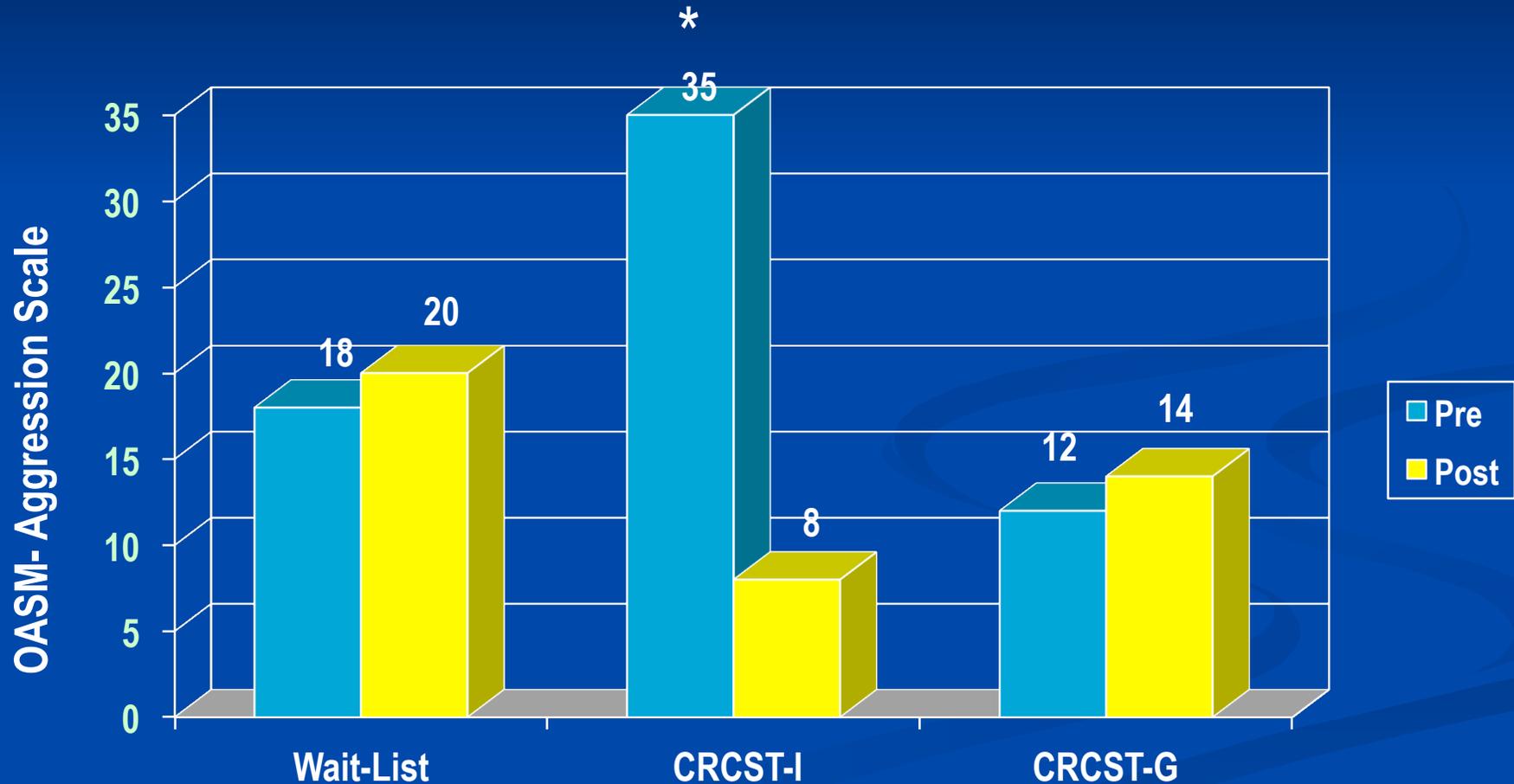
Efficacy in Reducing Depression



* $p < .05$

McCloskey et al, 2008

Efficacy of CRCST in Reducing Aggression Among subjects with BPD (N = 12)



* $p < .05$

McCloskey et al, unpublished

CRCST vs. SUP for IED

■ Participants

- IED (N = 50)

■ Conditions

1. Individual CRCST (12 50-minute sessions)
2. Individual Supportive Psychotherapy (12 50-minute sessions)

■ Outcome measures

- Aggression: Overt Aggression Scale Modified (OASM)
- Anger: State Trait Anger Expression Inventory 2 – Trait Aggression Scale
- Depression: Beck Depression Inventory-II (BDI-II)
- Hostile Bias: Hostile Automatic Thoughts (HAT)

Efficacy of CRCST vs. SUP in Reducing Aggression



* $p < .05$

McCloskey et al, in prep

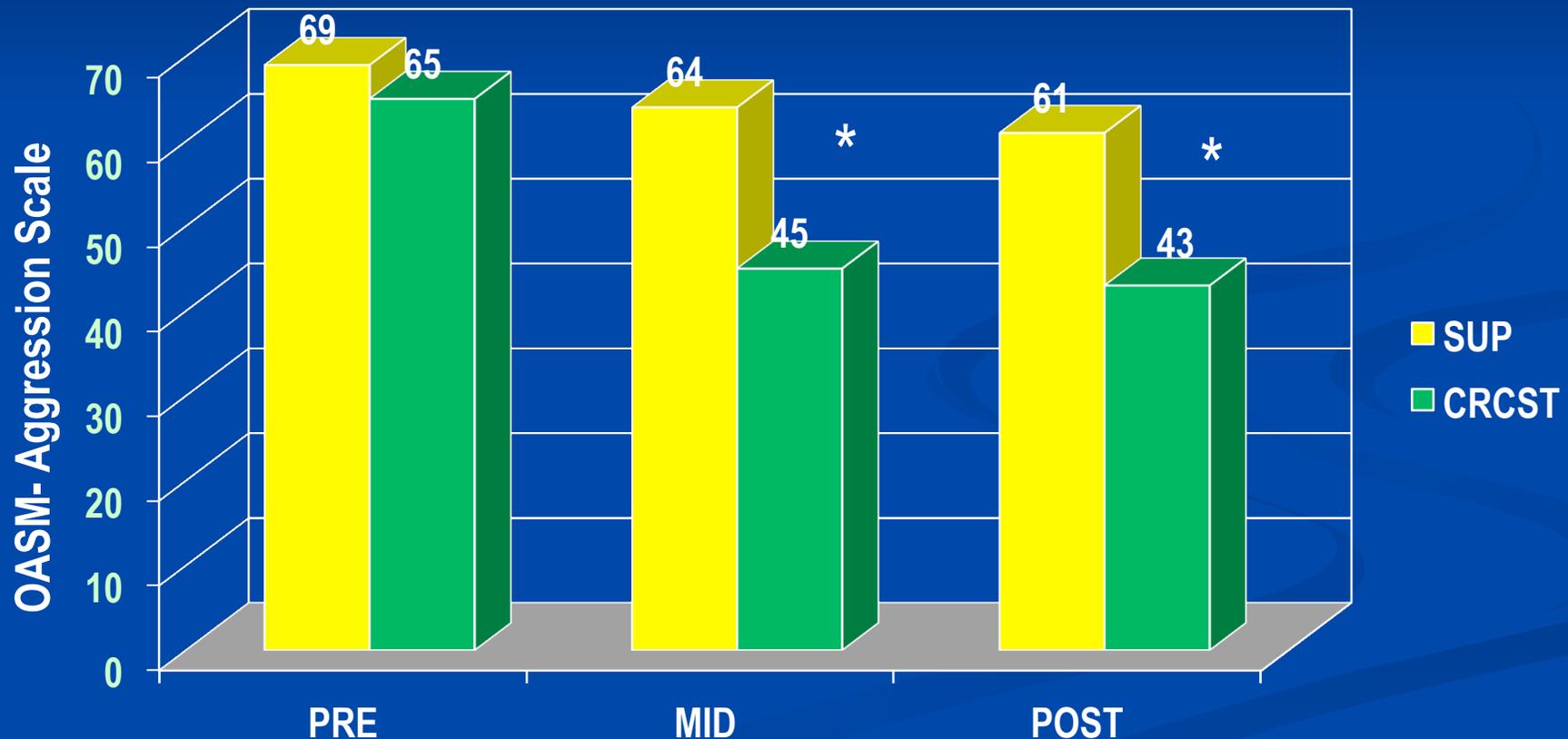
Efficacy of CRCST vs. SUP in Reducing Anger



* $p < .05$

McCloskey et al, in prep

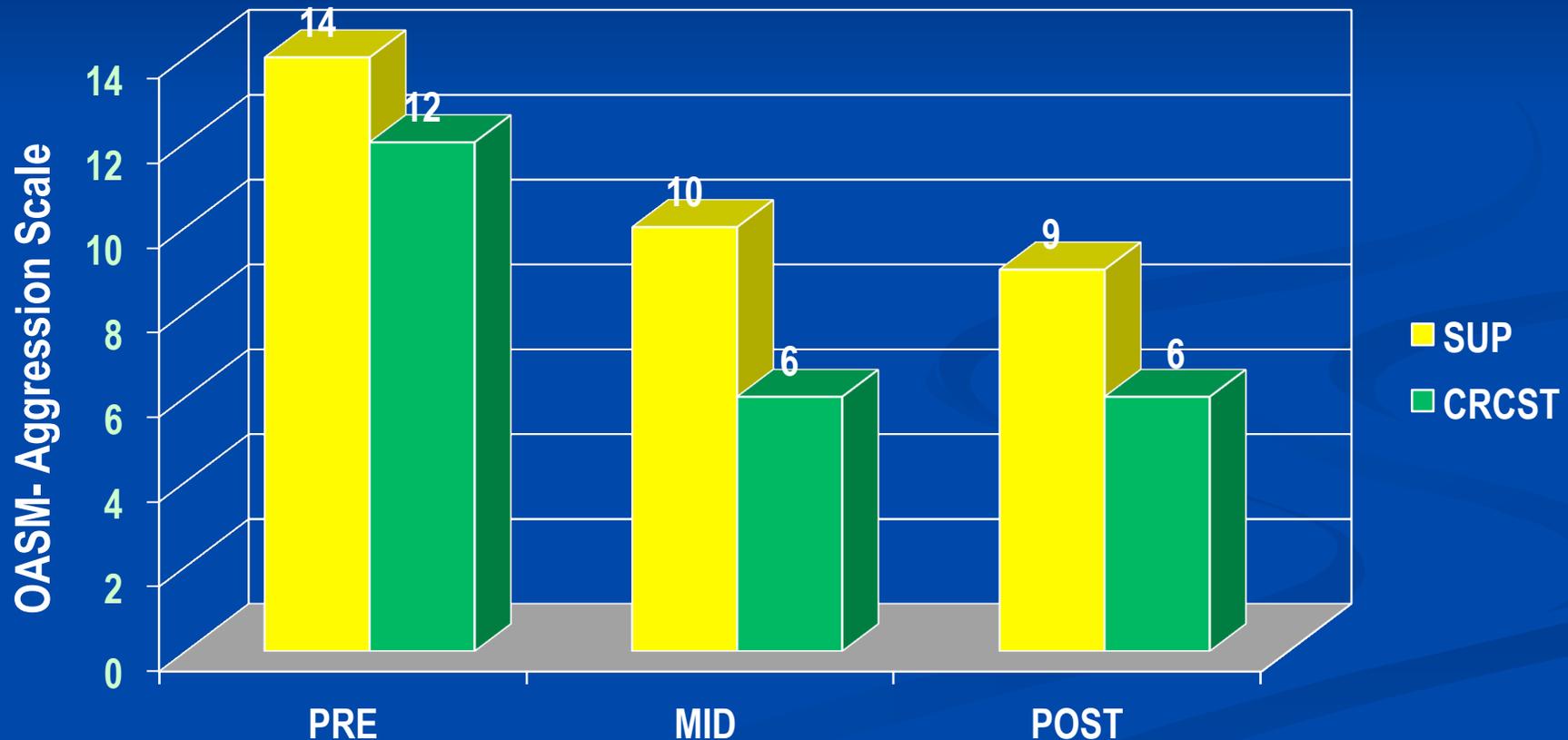
Efficacy of CRCST vs. SUP in Reducing Hostile Thoughts



* $p < .05$

McCloskey et al, in prep

Efficacy of CRCST vs. SUP in Reducing Depressive Sx



* $p < .05$

McCloskey et al, in prep

Conclusions

- IED appears to be associated with deficits in socio-emotional information processing and emotion regulation.
- These deficits appear to be linked to dysregulated corticolimbic circuits
- Early data supports the efficacy of treatments that focus on correcting these cognitive-affective deficits

Collaborators

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