UCL

Biological embedding and the impact of childhood adversity:

What can we learn?

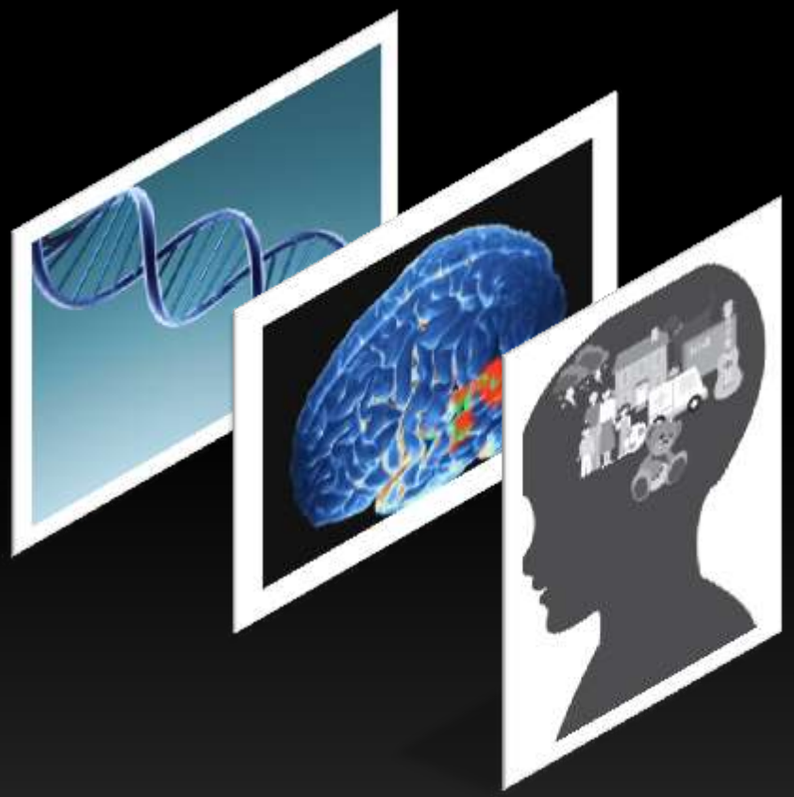
SafeLives 25th February 2015

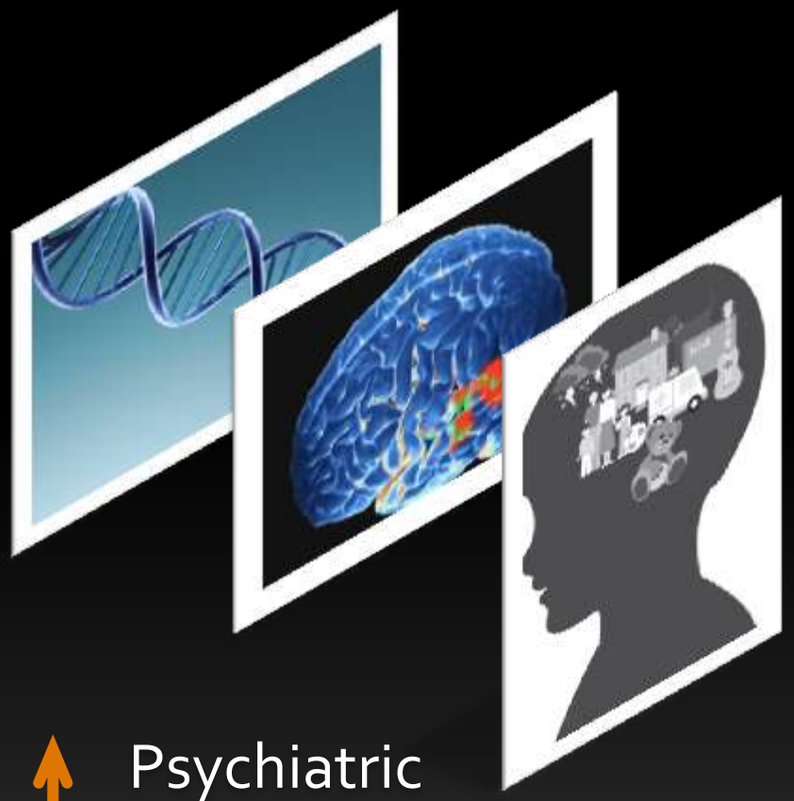
Caring for young minds
Anna Freud Centre

Eamon McCrory PhD DClinPsy

Developmental Risk and Resilience Unit

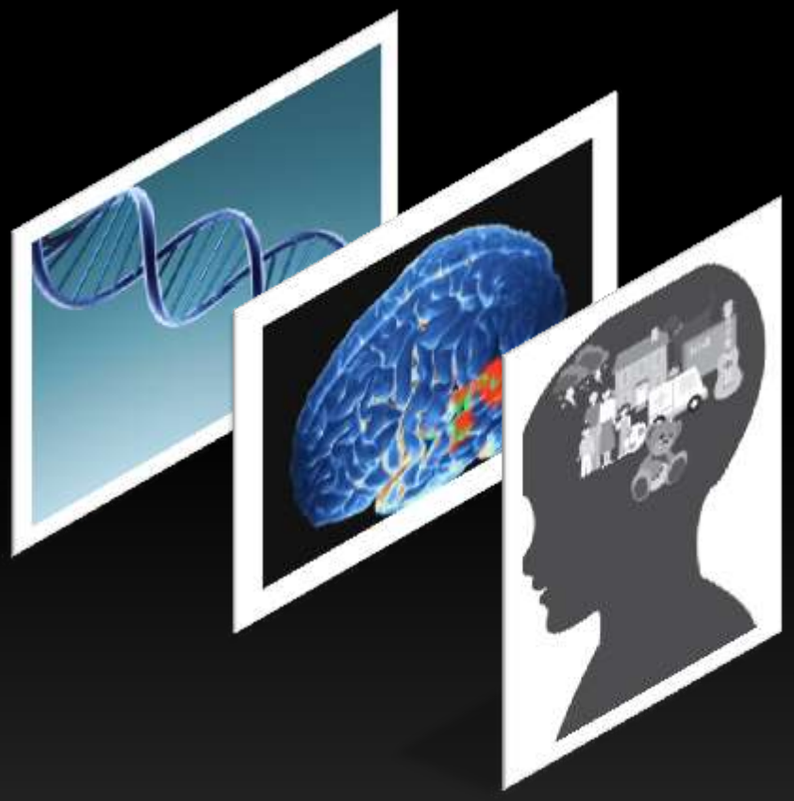
Infancy.....Childhood.....Adolescence.....Adulthood





- ↑ Psychiatric disorders
- ↓ Attainment
- ↓ Economic productivity
- ↓ Physical Health

Infancy.....Childhood.....Adolescence.....Adulthood



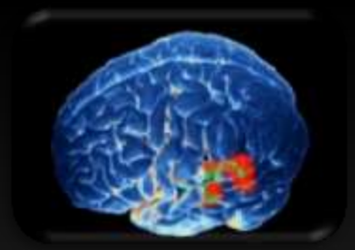
How is it that the impact of domestic violence and maltreatment can endure across the lifespan with such varied outcomes?

- The concept of Latent Vulnerability as a framework for thinking about possible mechanisms of vulnerability that increase risk of psychiatric disorder.

Maltreatment / Domestic Violence

Genetic

Neurobiological



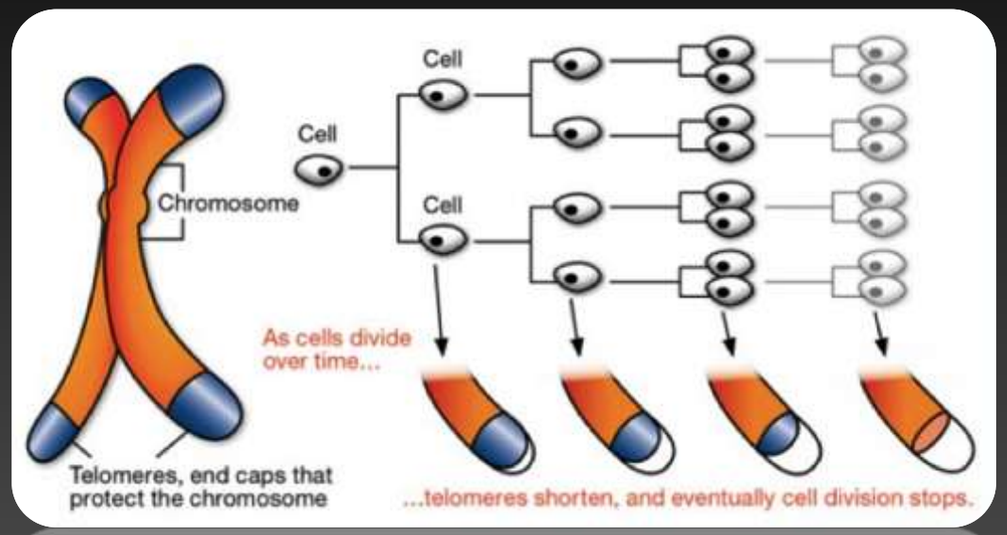
Cognitive

Behavioural

Epigenetics

The study of changes in gene expression without changes to the genes themselves.

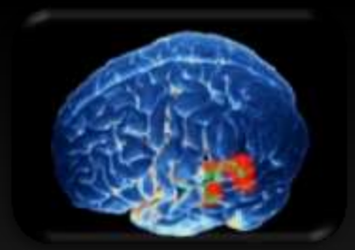
Telomere Length



Maltreatment / Domestic Violence

Genetic

Neurobiological



Cognitive

Behavioural

The concept of Latent Vulnerability

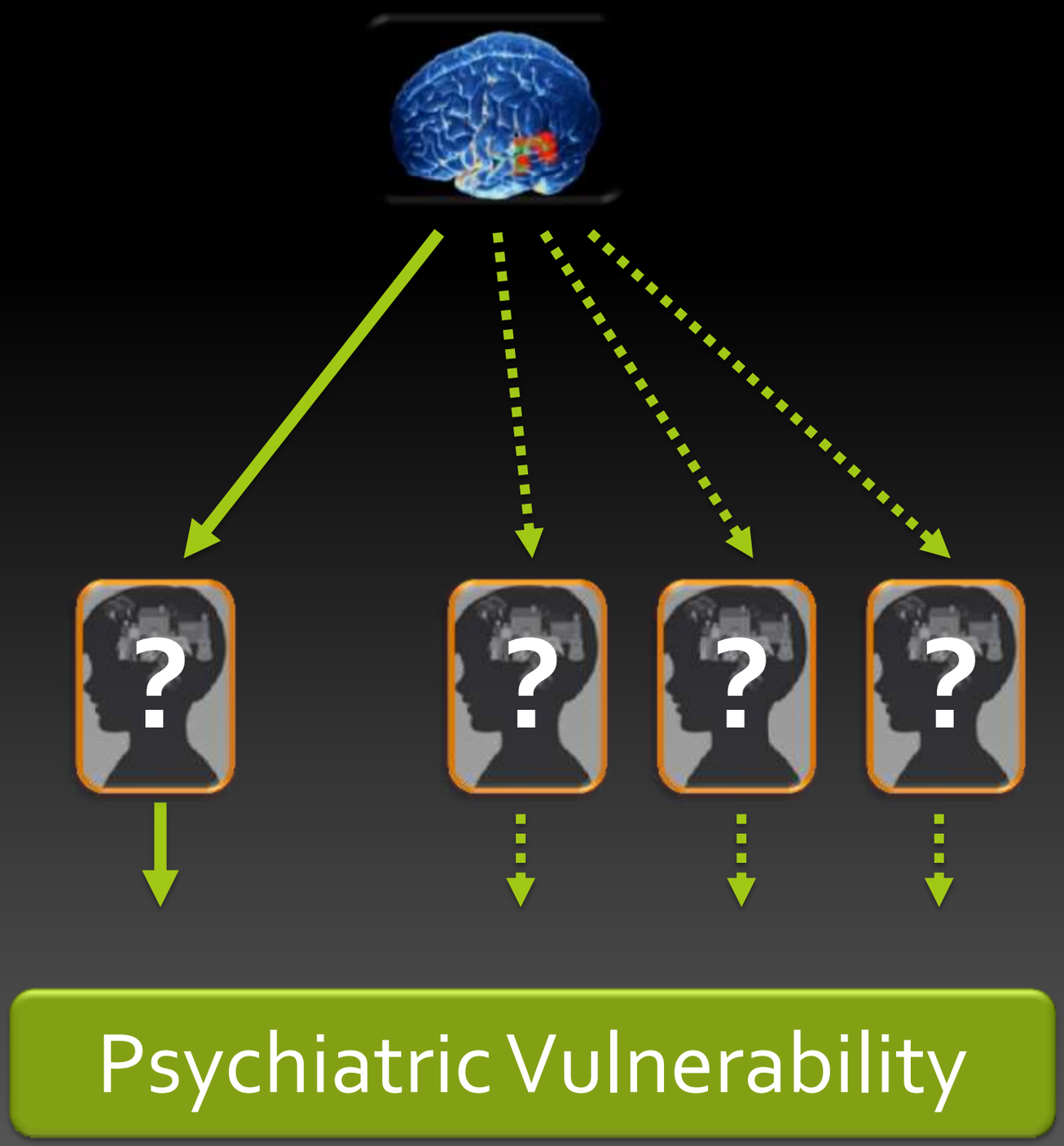
McCrory & Viding, *in press*
Development and Psychopathology

Development and Psychopathology **27** (2015), 493–505
© Cambridge University Press 2015
doi:10.1017/S0954579415000115

The theory of latent vulnerability: Reconceptualizing the link between childhood maltreatment and psychiatric disorder

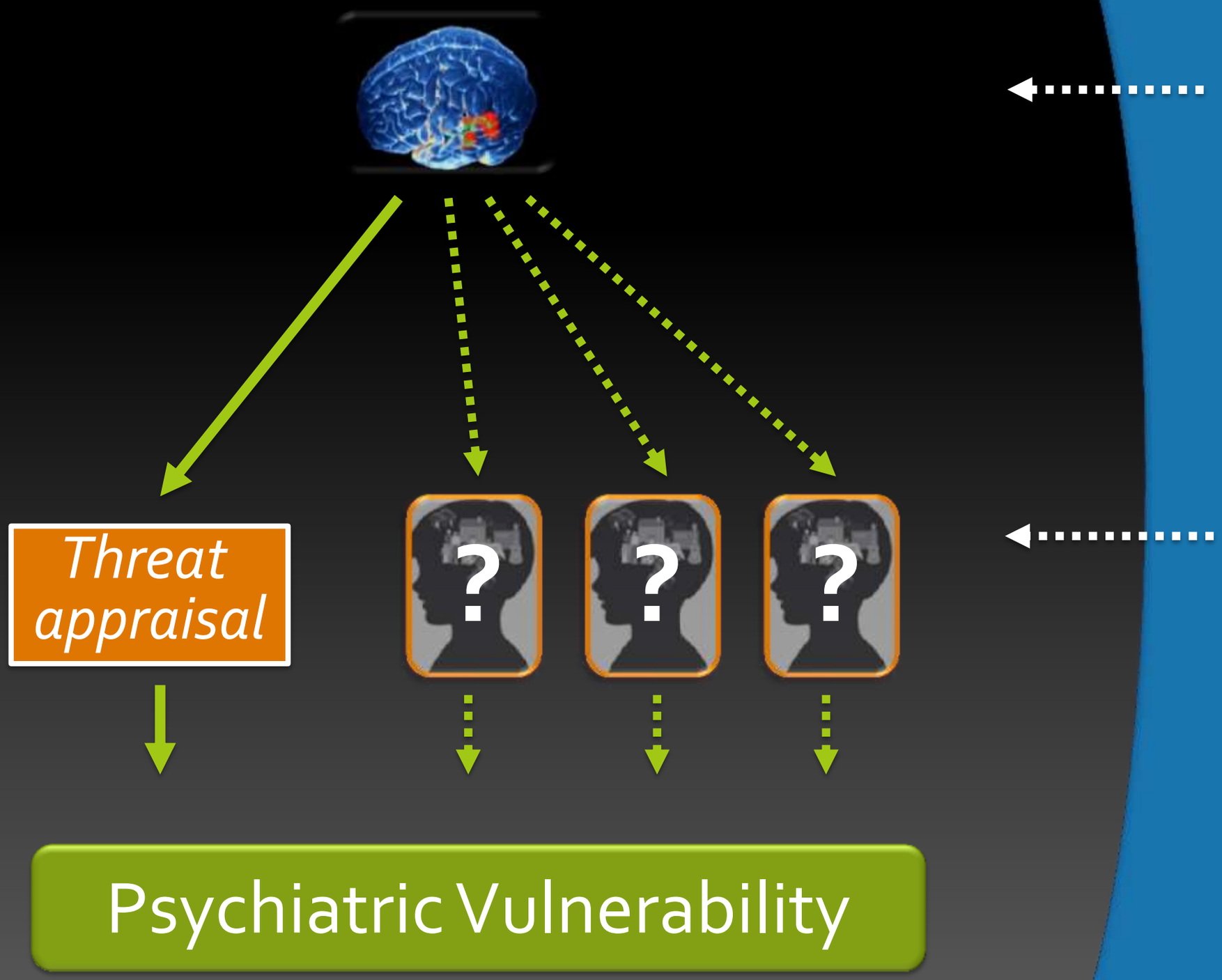
"An index of Latent Vulnerability captures the degree to which an ostensibly healthy individual previously exposed to maltreatment or domestic violence is at future risk of developing a psychiatric disorder"

Latent Vulnerability



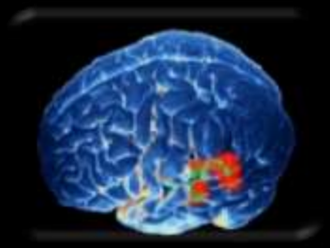
- A systems level approach
- Multiple systems recalibrated to 'fit' with adverse environment
- Markers of latent vulnerability are not necessarily symptoms
- Latent vulnerability is present and can be indexed prior to onset of psychiatric disorder
- A true marker of latent vulnerability must have a predictive value

Maltreatment / Domestic Violence



Altered threat processing as one candidate system

Altered threat appraisal



Children exposed to physical maltreatment have been shown to have altered processing of angry faces:

- able to more accurately identify angry facial expressions using sparse perceptual information than peers
- devote more attentional resources to the processing of angry faces
- Interpreted as increased hypervigilance to threat

Pollak & Sinha, 2002, Pollak, Klorman, Thatcher, & Cicchetti, 2001, . Pollak et al., 2001

Cognition 110 (2009) 242–247

Contents lists available at ScienceDirect

Cognition

journal homepage: www.elsevier.com/locate/COGNIT

Brief article

Development of perceptual expertise in emotion recognition

Seth D. Pollak [a,*], Michael Messner [a], Doris J. Kistler [b], Jeffrey F. Cohn [c]

[a] Department of Psychology and Waisman Center, University of Wisconsin at Madison, 1500 Highland Avenue, Madison, WI 53711, USA
[b] University of Louisville, The Heuser Hearing Institute, 117 E. Kentucky Street, Louisville, KY 40203, USA
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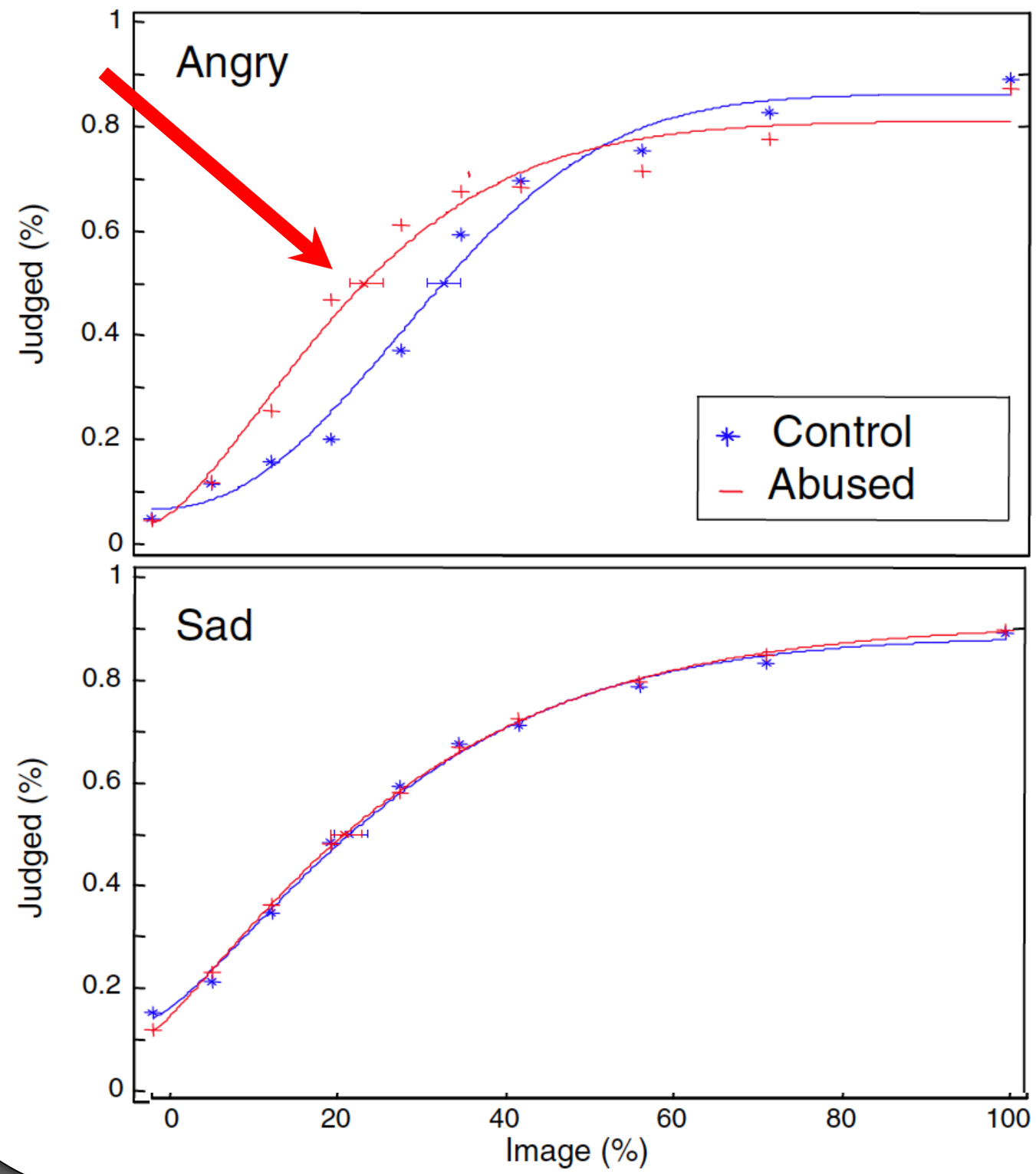
Angry
Sad
Control
Abused
Judged (%)
Image (%)
0
0.2
0.4
0.6
0.8
1
0
20
40
60
80
100

What is the neural basis of altered face processing in maltreated children?

Who are the children in our studies?

Children exposed to maltreatment (MT)

- Aged 10-14 male and female
- Recruited from a Social Services department
- Documented experiences of abuse:
  - *Physical abuse:* 45%
  - *Sexual abuse:* 30%
  - *Domestic violence:* *84%*
  - *Neglect*: 90%
- Without formal diagnosis of psychiatric disorder.

Control children recruited from local schools, matched for:

- Age – Pubertal stage – IQ – Gender – Ethnicity –Socioeconomic status

Table 3 Psychopathology data for non-maltreated and maltreated groups

	Mean (s.d.)		
	Non-maltreated group ($n = 23$)	Maltreated group ($n = 18$)	P
Child rated			
Mood and Feelings Questionnaire, total score	11.70 (7.90)	11.17 (9.17)	0.85
Trauma Symptom Checklist for Children			
Anxiety	46.95 (12.03)	47.06 (13.69)	0.98
Depression	44.68 (9.38)	45.53 (12.23)	0.81
Anger	43.32 (7.83)	46.65 (10.77)	0.27
Post-traumatic stress	44.50 (6.30)	49.53 (11.60)	0.09
Dissociation	46.32 (6.40)	51.76 (10.99)	0.06
State–Trait Anxiety Inventory for Children			
Trait	32.61 (7.68)	32.24 (8.58)	0.89
State	27.57 (4.53)	25.76 (2.82)	0.16
Total	60.17 (10.29)	58.69 (9.78)	0.65
Parent rated			
Strengths and Difficulties Questionnaire			
Emotional symptoms score	2.83 (1.78)	2.78 (1.59)	0.93
Conduct problems score	1.48 (1.24)	3.44 (2.28)	0.00
Hyperactivity score	3.43 (2.76)	5.57 (3.04)	0.02
Peer problems score	2.00 (1.73)	1.61 (1.98)	0.51
Prosocial behaviour score	8.26 (2.38)	7.99 (1.96)	0.70

Heightened neural reactivity to threat in child victims of family violence

Eamon J. McCrory[1,2,*], Stéphane A. De Brito[1,2,*], Catherine L. Sebastian[1], Andrea Mechelli[3], Geoffrey Bird[4,5], Phillip A. Kelly[1,2], and Essi Viding[1]

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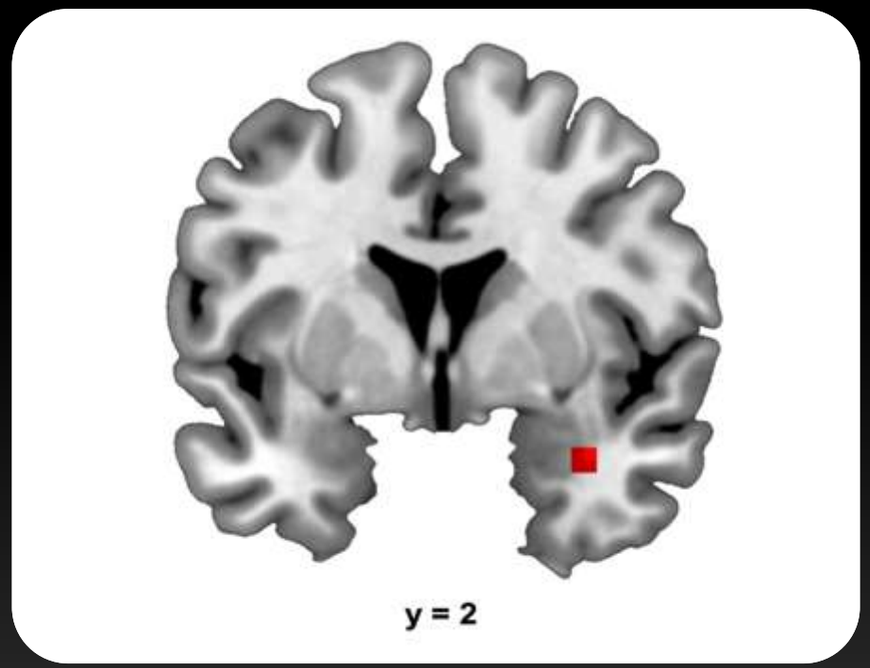
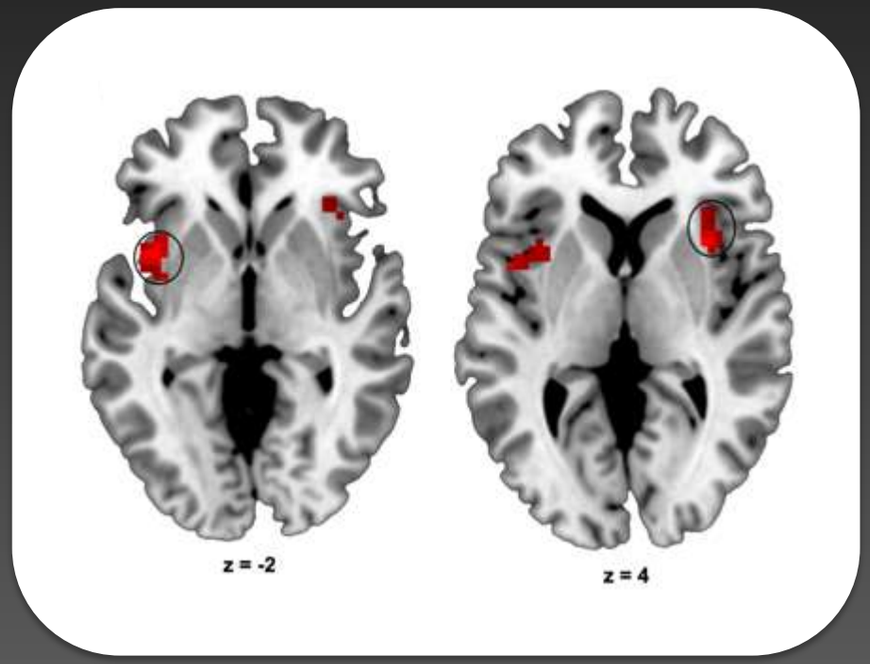
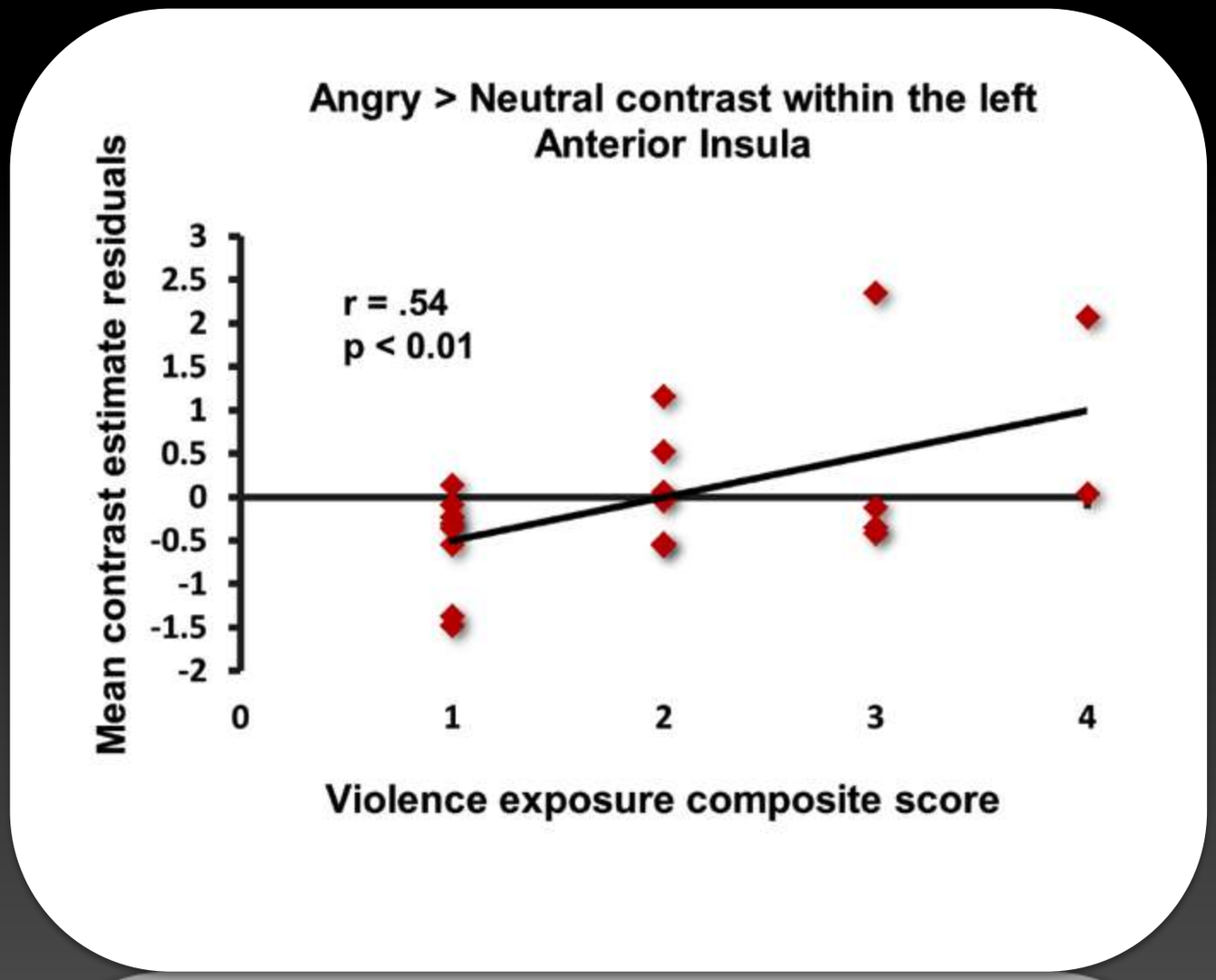


Increased right amygdala reactivity and increased bilateral anterior insula reactivity to angry vs. calm faces in children exposed to family violence.



Meta-analysis of adults with anxiety disorders indicates that this is a common neural signature in clinical populations (Etkin & Wager, 2007).



Left anterior insula activation was greatest in those children exposed to higher levels of family violence.

Exposure to family violence may ‘recalibrate’ responsiveness of the anterior insula and amygdala in processing potential threat.

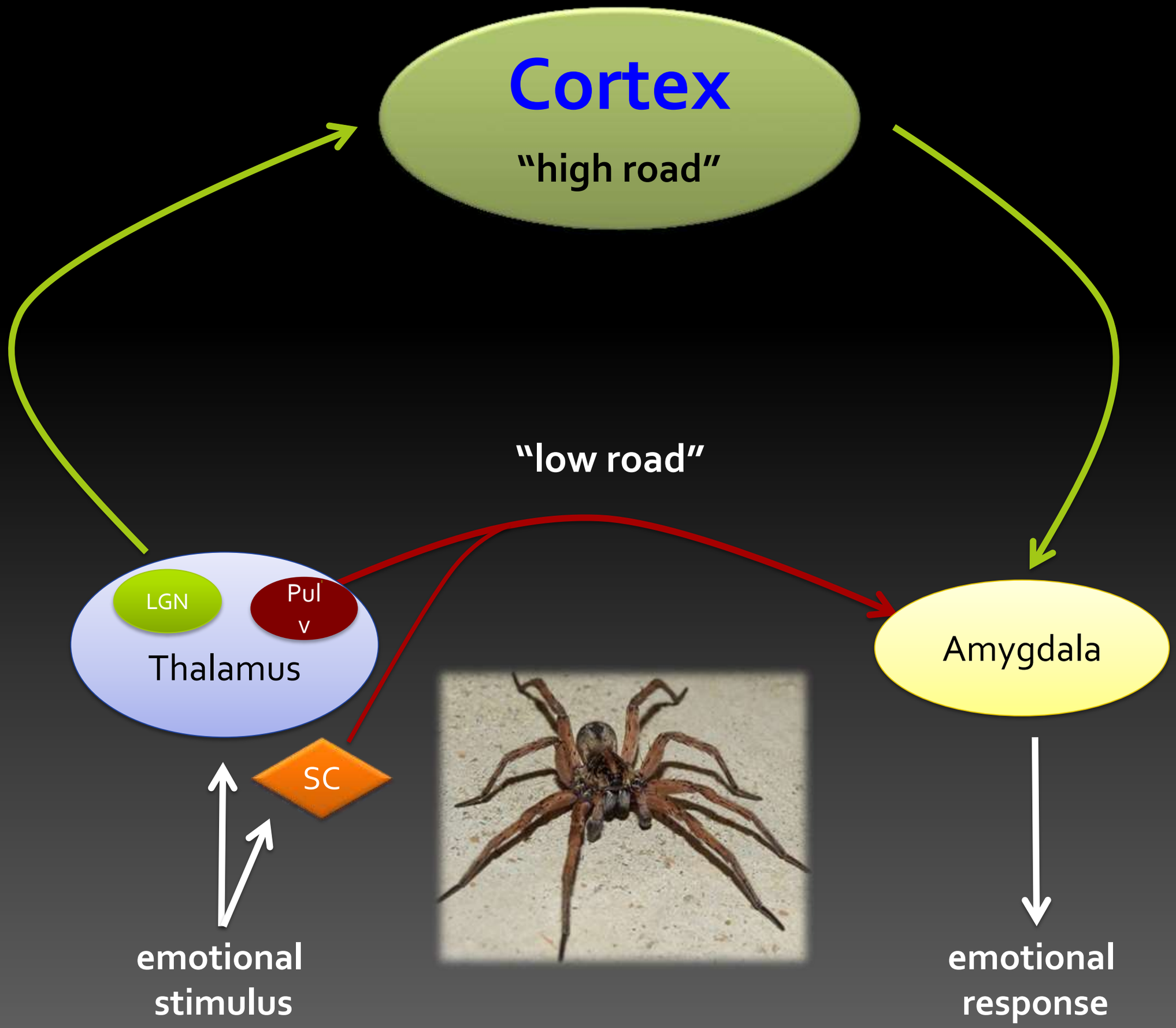
But is this a conscious process? In other words, is this hypervigilance to threat under higher order regulatory influence?

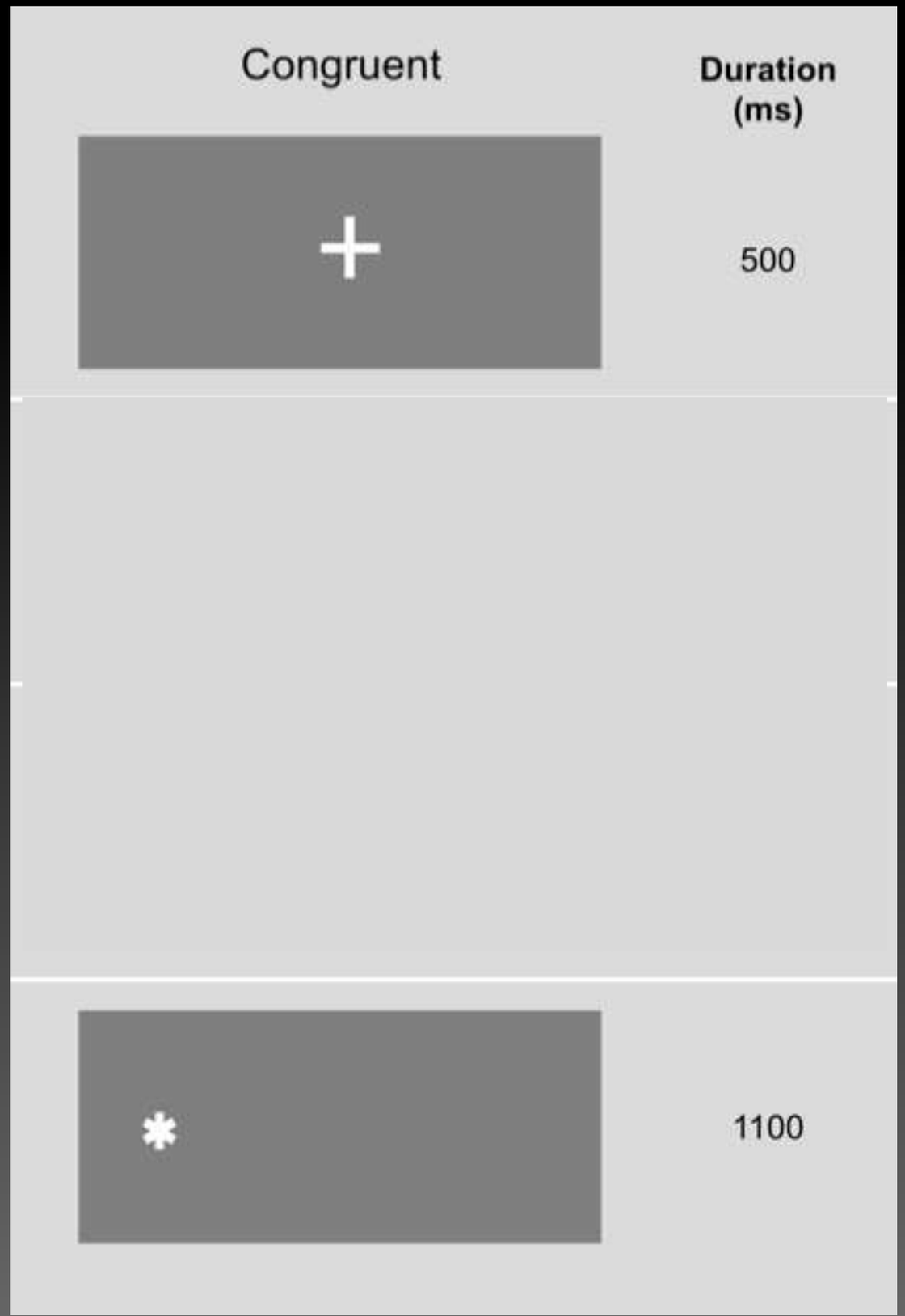
BJPsych | The British Journal of Psychiatry (2013)
202, 1–8. doi: 10.1192/bjp.bp.112.116624

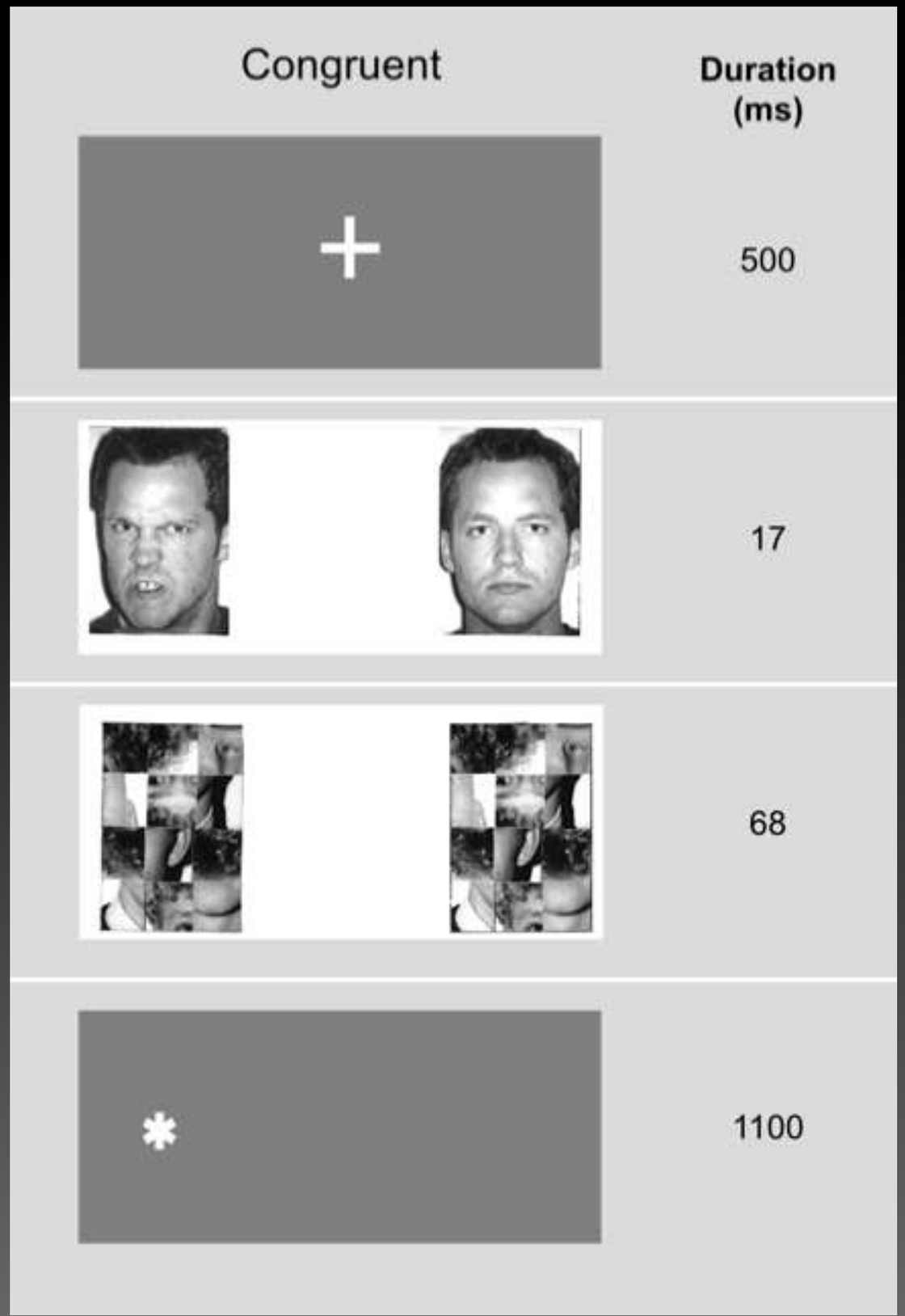
Amygdala activation in maltreated children during pre-attentive emotional processing

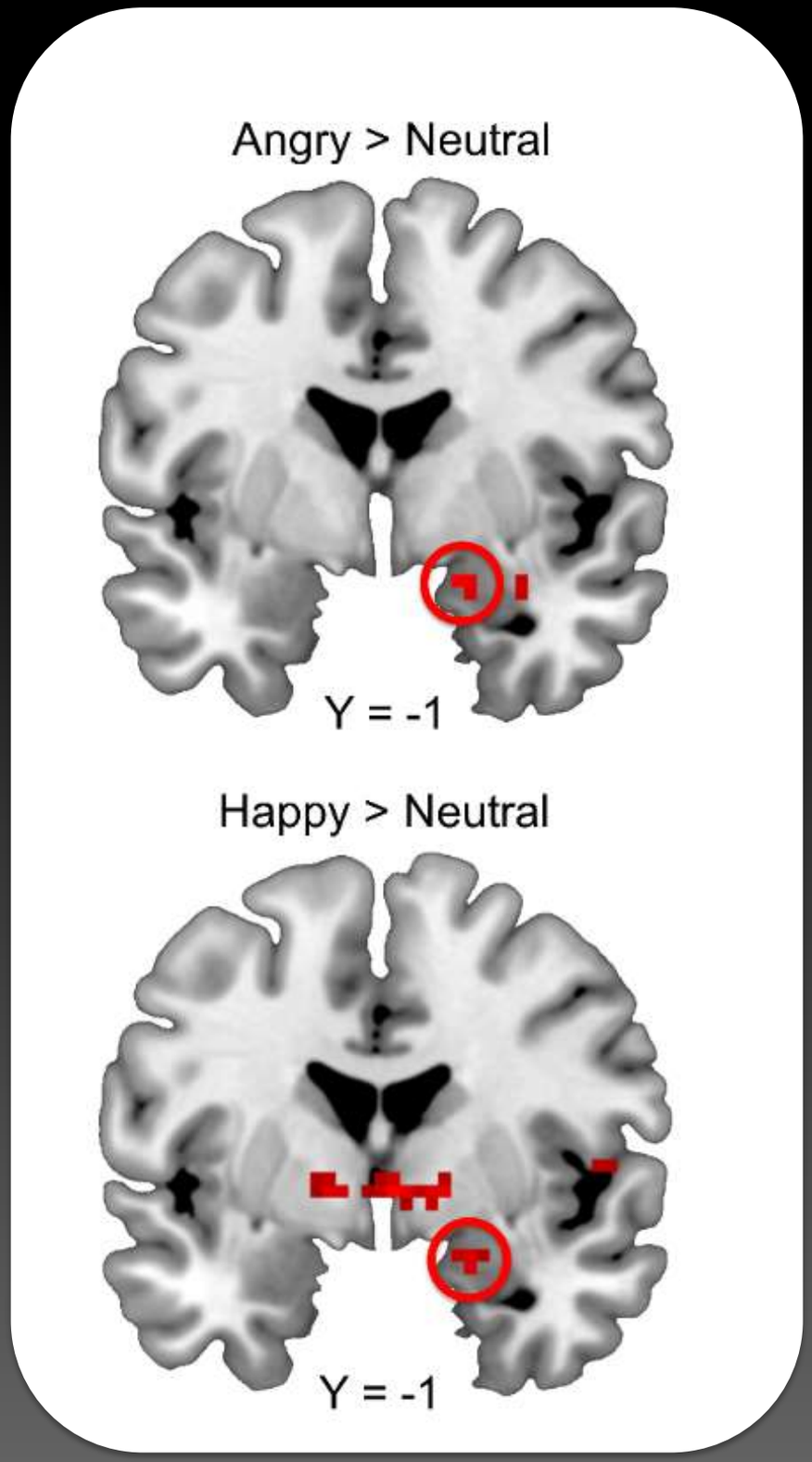
Eamon J. McCrory, Stéphane A. De Brito, Philip A. Kelly, Geoffrey Bird, Catherine L. Sebastian, Andrea Mechelli, Sophie Samuel and Essi Viding

McCrory et al., (2013) *British Journal of Psychiatry*, 202: 1-8


Cortex
"high road"
"low road"
LGN
Pul
v
Thalamus
SC
Amygdala
emotional
stimulus
emotional
response


Congruent
Duration (ms)
500
1100

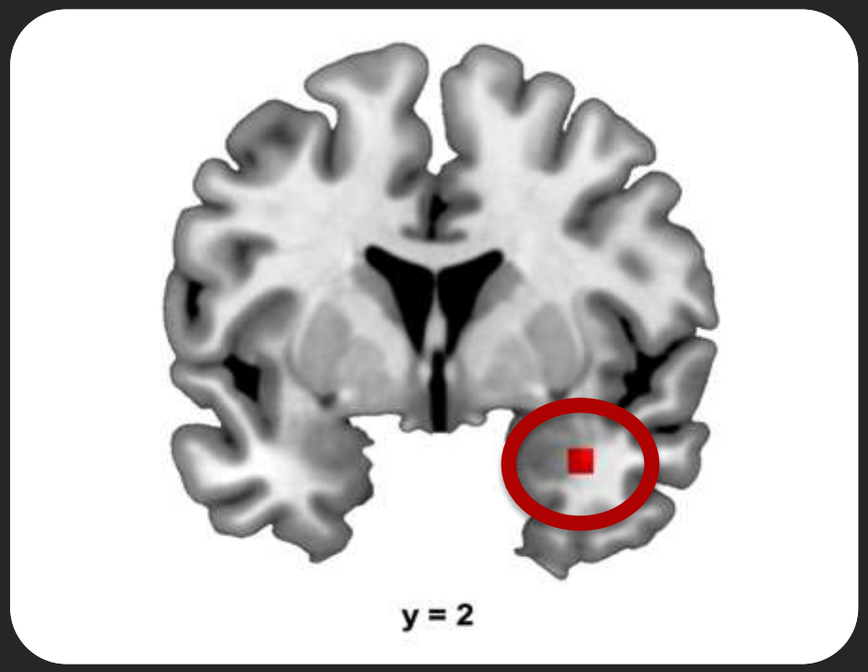

Congruent
Duration (ms)
500
17
68
1100


Angry > Neutral
Y = -1
Happy > Neutral
Y = -1

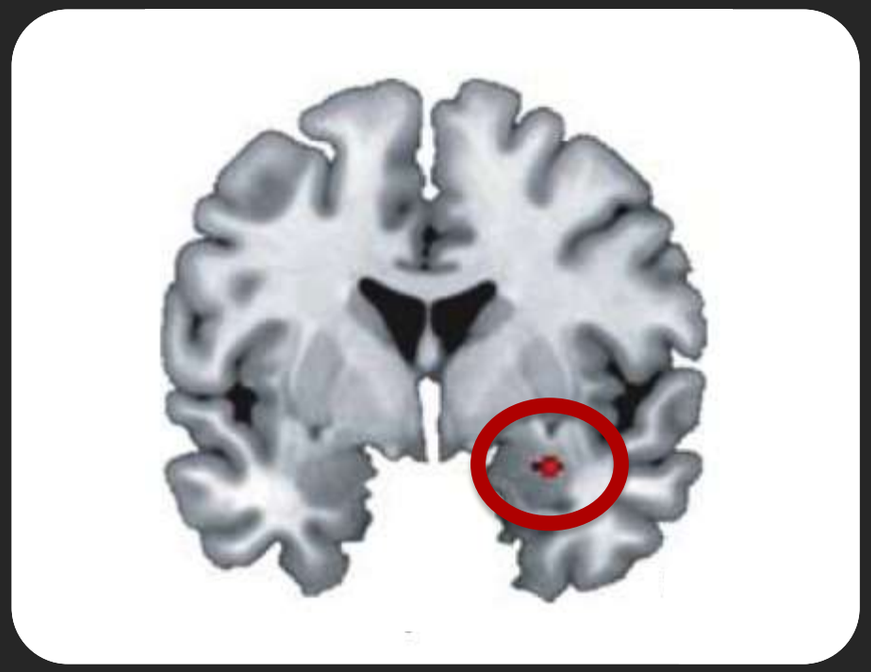
1. Is amgydala reactivity calibrated in response to environmental adversity?

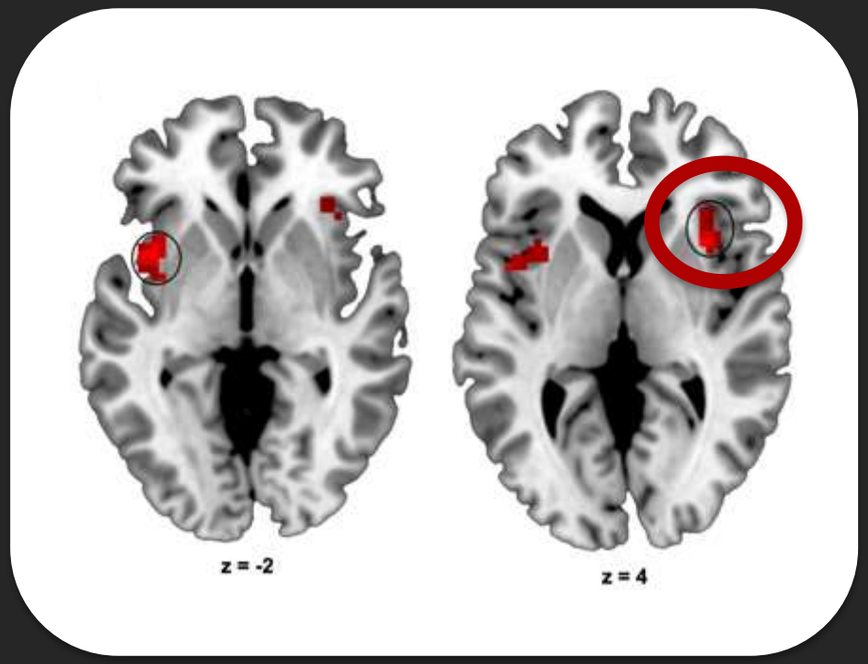
Children

Soldiers

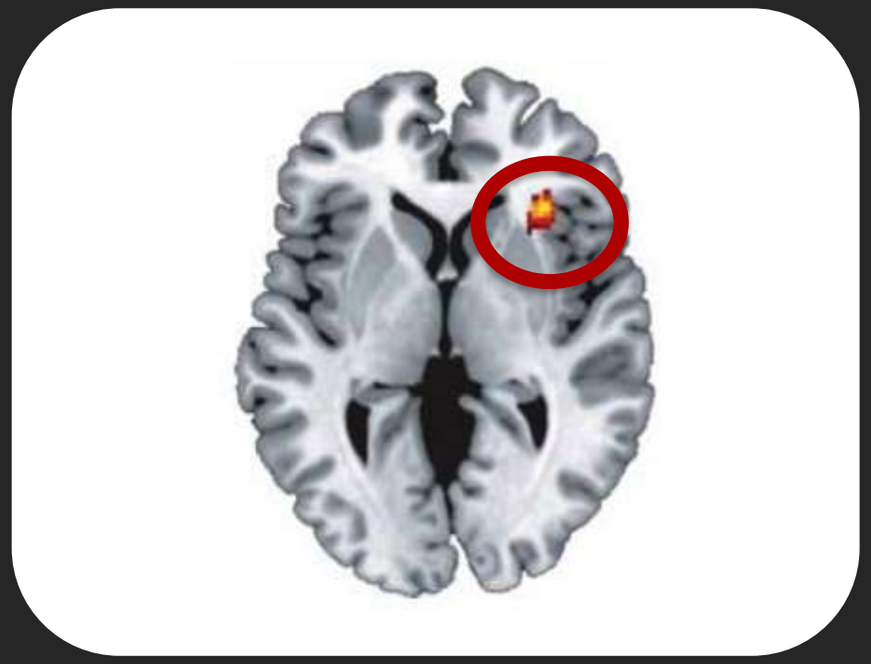


Amygdala





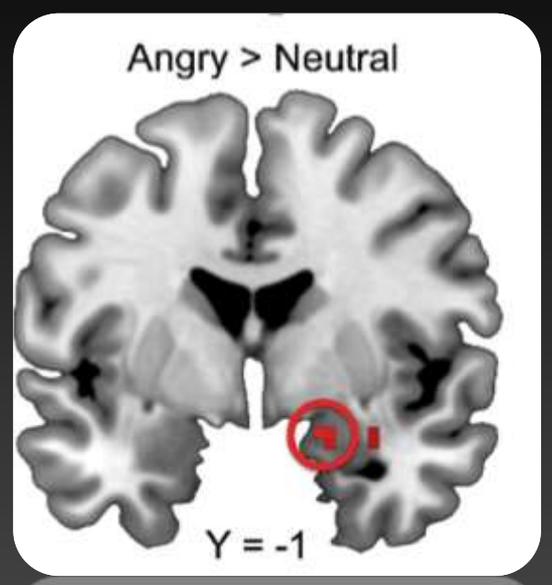
Anterior insula



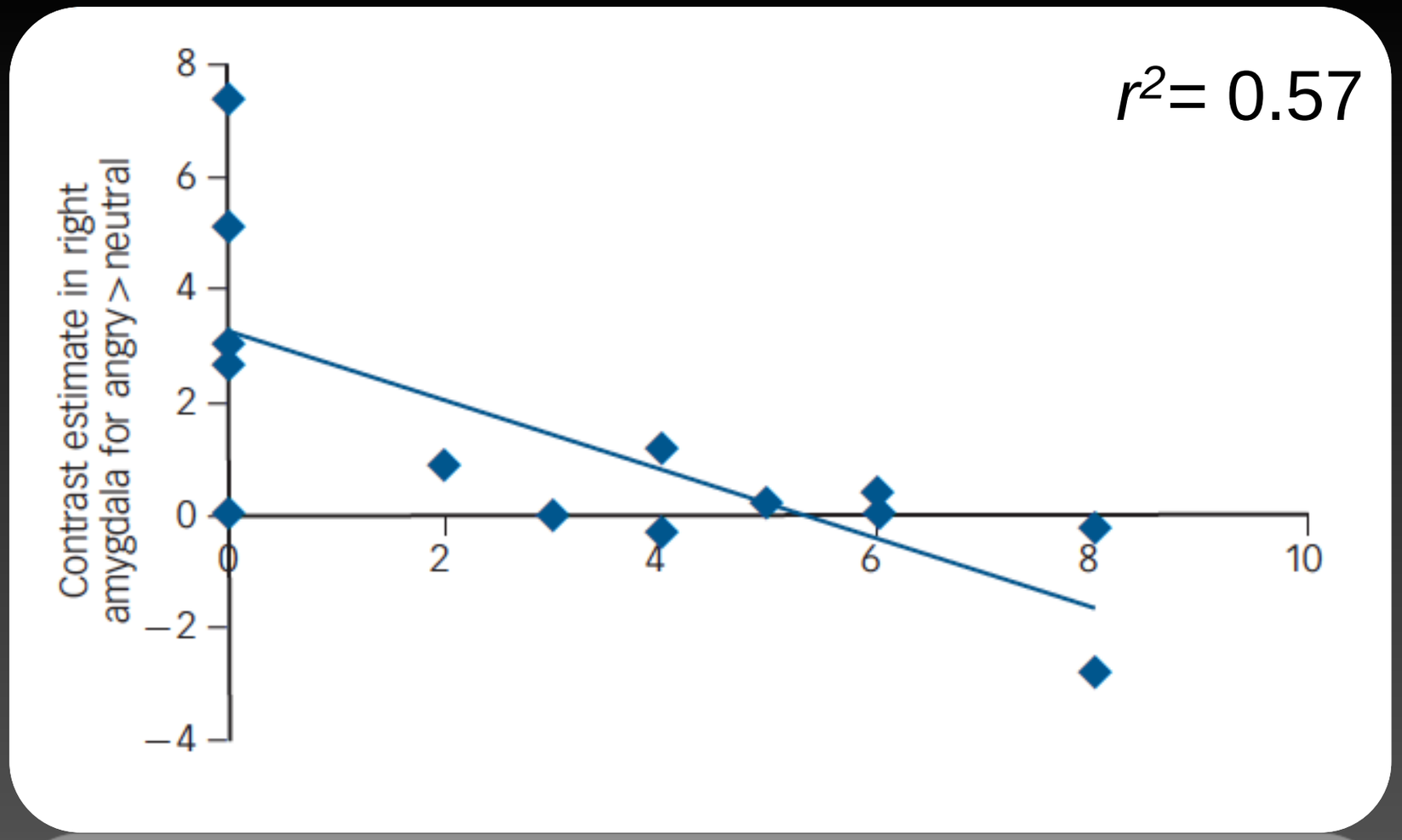
McCrory et al., (2011)

Wingen et al., (2011)

Duration of abuse associated with amygdala response in children



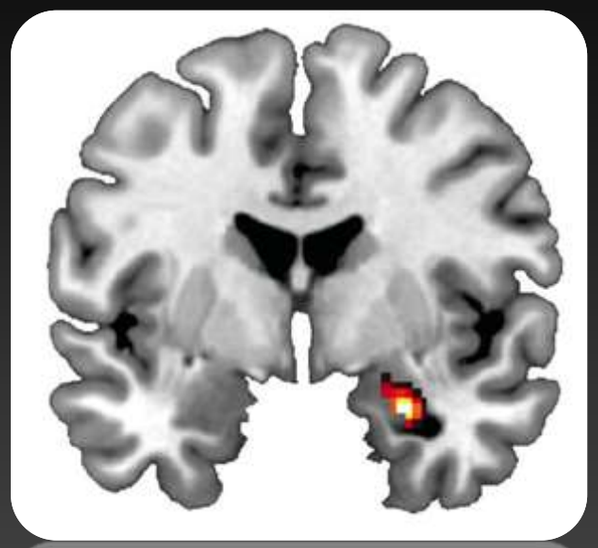
Amygdala activation

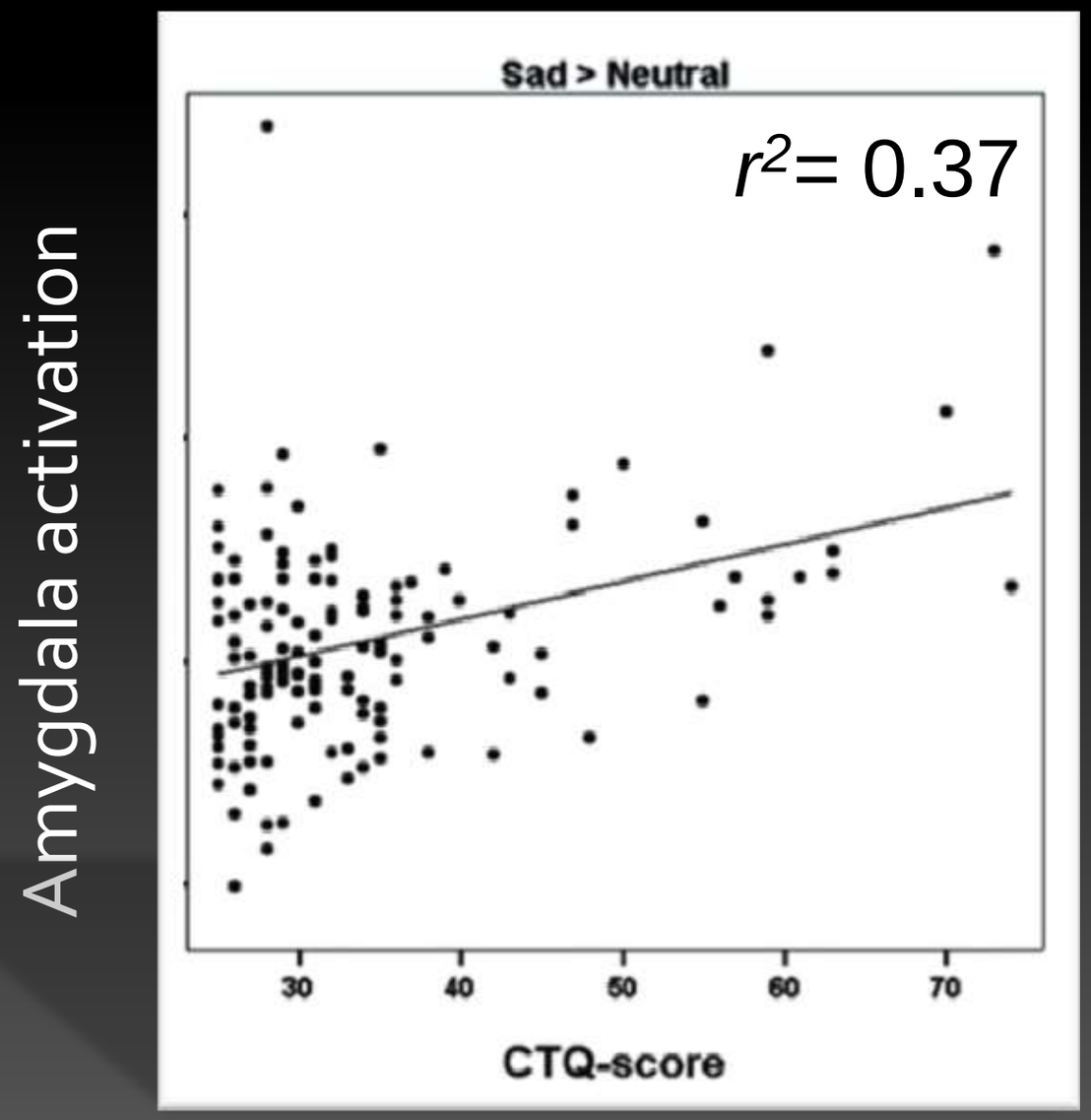


Age of onset of neglect (years)

McCrory et al., 2013

Severity of abuse associated with amygdala response in adults





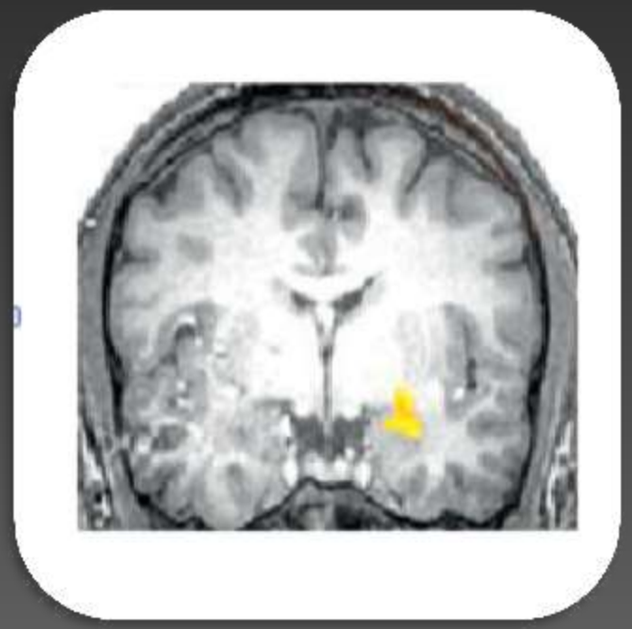
Severity of abuse (CTQ score)

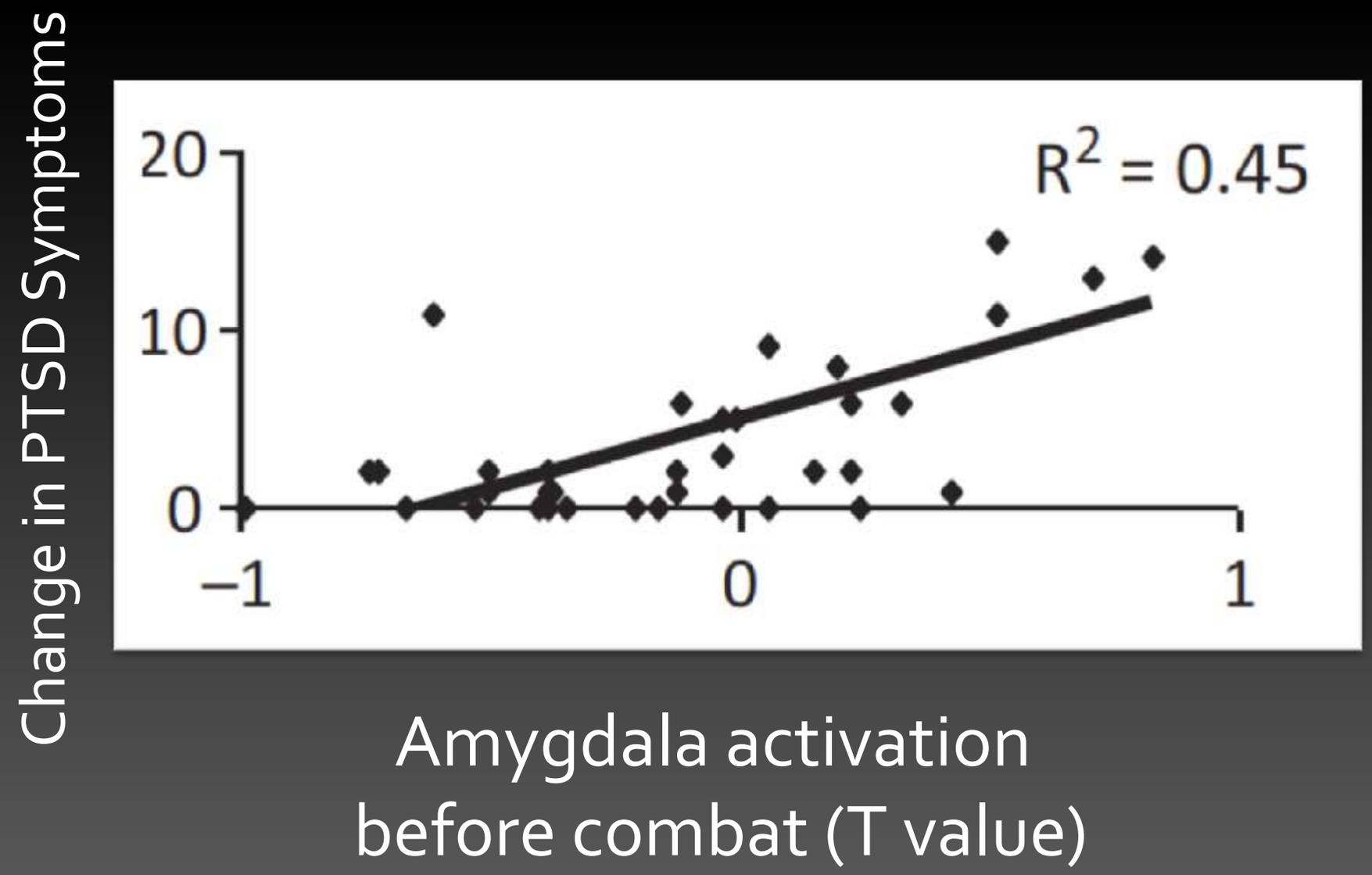
Dannlowski et al., 2013

Collectively, these findings suggests that the responsiveness of the amygdala is calibrated and adapts to the degree of environmental threat

2. Do higher levels of amygdala reactivity to threat predict future psychopathology?

Amygdala reactivity BEFORE stress predicts future symptoms





Admon et al., 2009

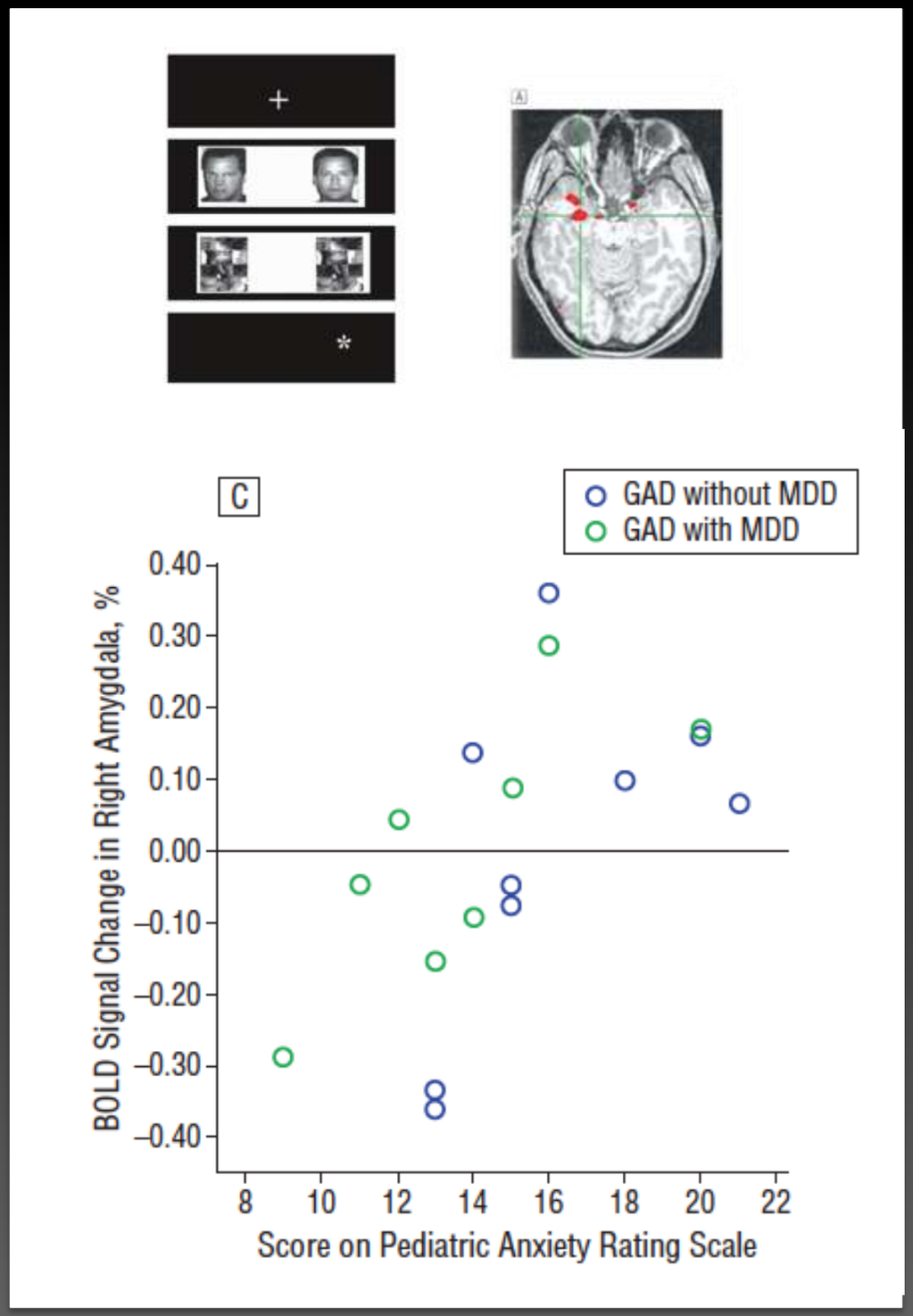
3. Is altered amygdala reactivity to threat implicated in disorders associated with maltreatment?

YES: Heightened amygdala reactivity is associated with anxiety /depression in adolescents and adults

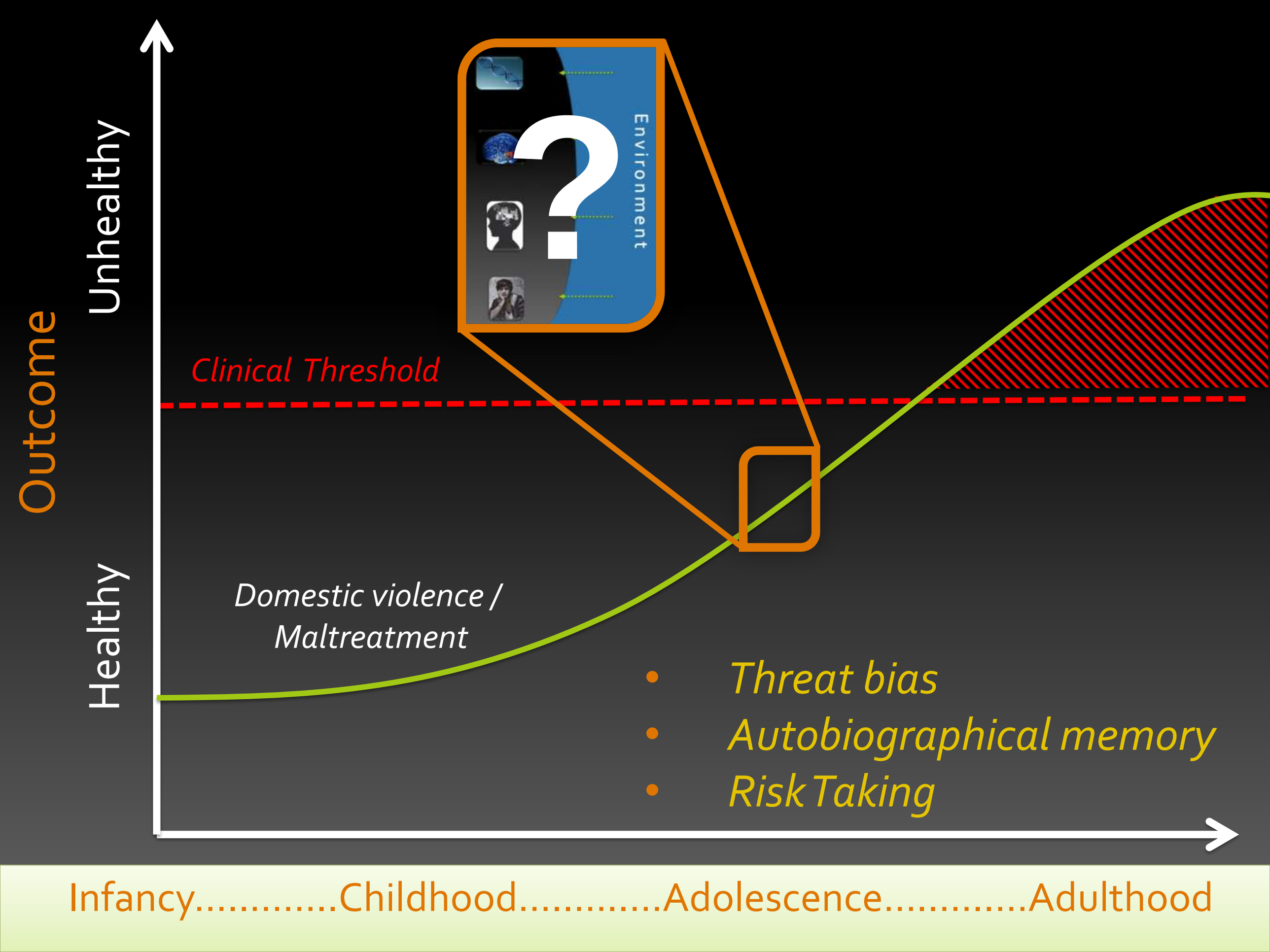
- Altered threat bias to consciously perceived threat cues is associated with PTSD and anxiety disorders (Bar-Haim et al., 2007)

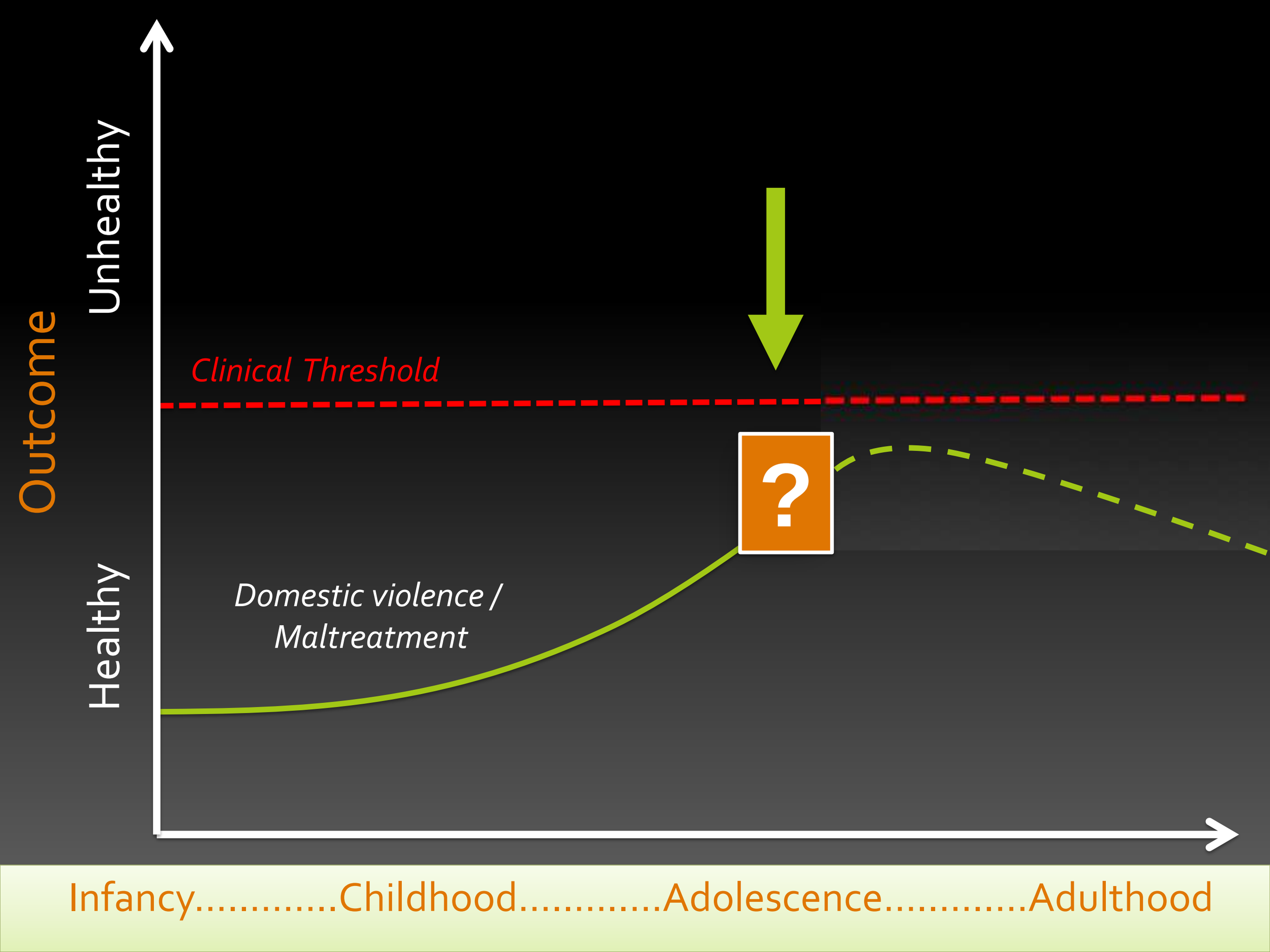
- Amygdala hyper-activation is observed during conscious and pre-attentive threat processing (Etkin & Wager, 2007; Fales et al., 2008; Liberzon et al., 1999)

- in adults with anxiety disorder and depression
- In soldiers with PTSD
- in children and adolescents with generalised anxiety disorder



Monk et al., 2008


Outcome
Unhealthy
Healthy
Environment
?
Clinical Threshold
Domestic violence /
Maltreatment
Threat bias
Autobiographical memory
Risk Taking
Infancy.....Childhood.....Adolescence.....Adulthood


Outcome
Unhealthy
Healthy
Clinical Threshold
?
Domestic violence /
Maltreatment
Infancy.....Childhood.....Adolescence.....Adulthood

Summary

- Functional correlates of domestic violence and maltreatment imply that children have adapted to the demands of their early environment.
- Such apparent adaptations may confer short-term functional advantages in enhancing a child's vigilance to threat.
- However, there may be 'real-time' costs in limiting attentional capacity for mastering age-appropriate skills in social /academic domains (chains of risk), but also ongoing costs in *predisposing to an increased risk of internalising or externalising psychopathology*. This emphasises the importance or primary prevention.
- The concept of Latent Vulnerability provides a framework for a mechanistic understanding of psychiatric risk following exposure to domestic violence and maltreatment. Identifying those neurocognitive systems which most sensitively index latent vulnerability could provide opportunities to develop a preventative psychiatry approach.

Developmental Risk and Resilience Unit 2014

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