

# The Neuroscience of Trauma through a social transactional lens

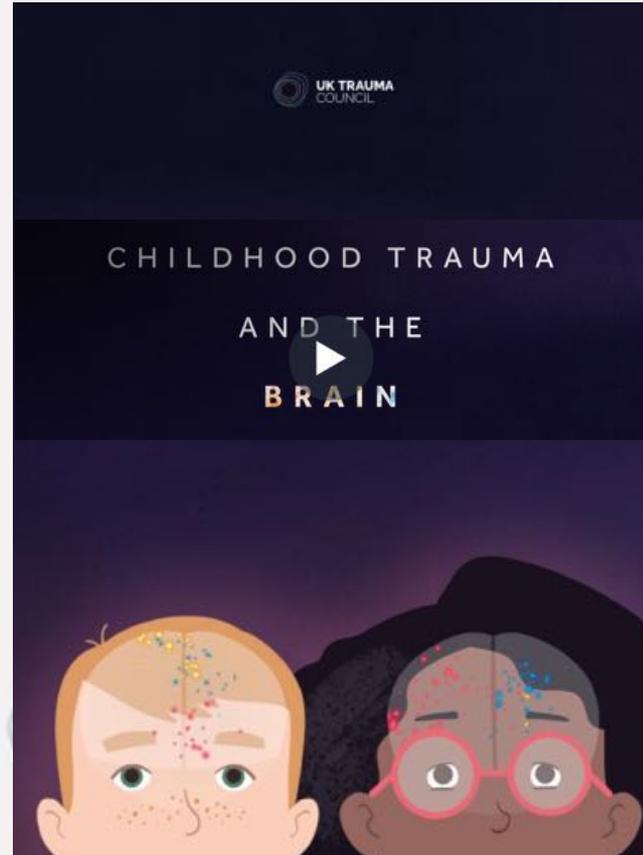




**UK TRAUMA  
COUNCIL**

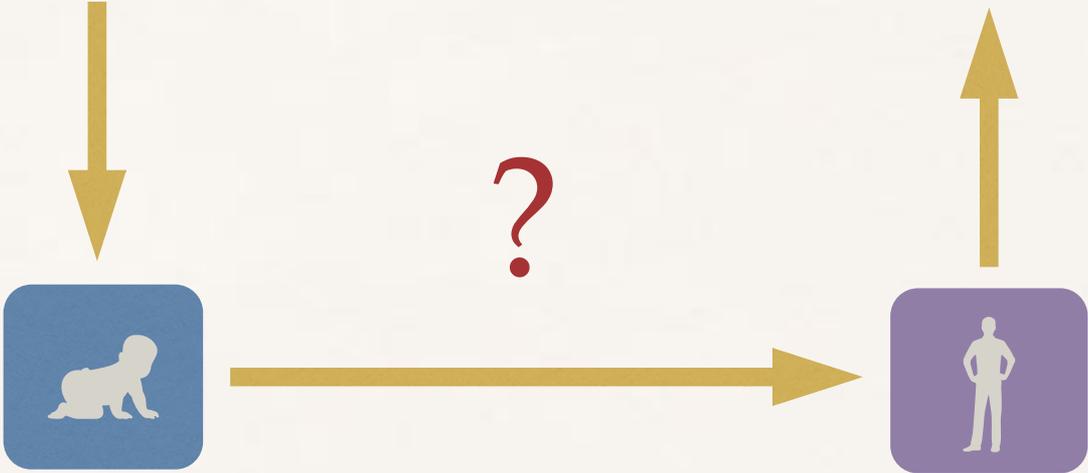
[UKTraumaCouncil.org](https://UKTraumaCouncil.org)

- Short animation
- Free PDF guidebook
- Explanatory videos
- Deep Dives
- Science -> Practice videos



Childhood Adversity ⚡

Outcome

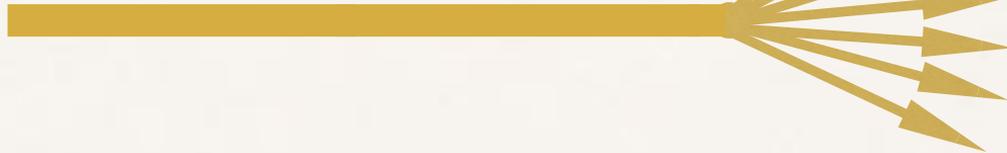


Childhood Adversity



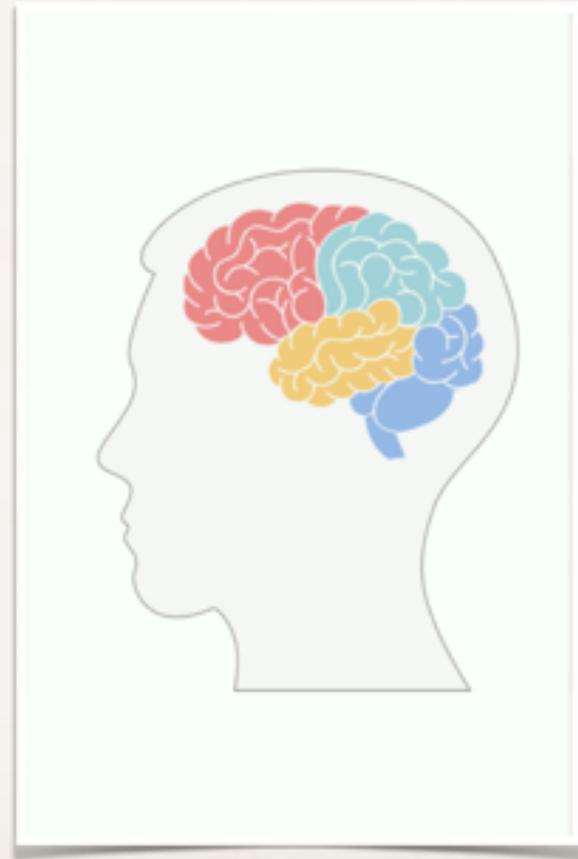
Genes

Protective / Risk Factors



# Latent vulnerability across brain systems

- ❖ Reward Processing
- ❖ Threat processing
- ❖ Memory processing
- ❖ Emotion regulation



# Theory of Latent Vulnerability

(McCrory & Viding, 2015)



**Dangerous /  
Unpredictable  
Environment** ⚡



**Neuro-cognitive  
adaptation**

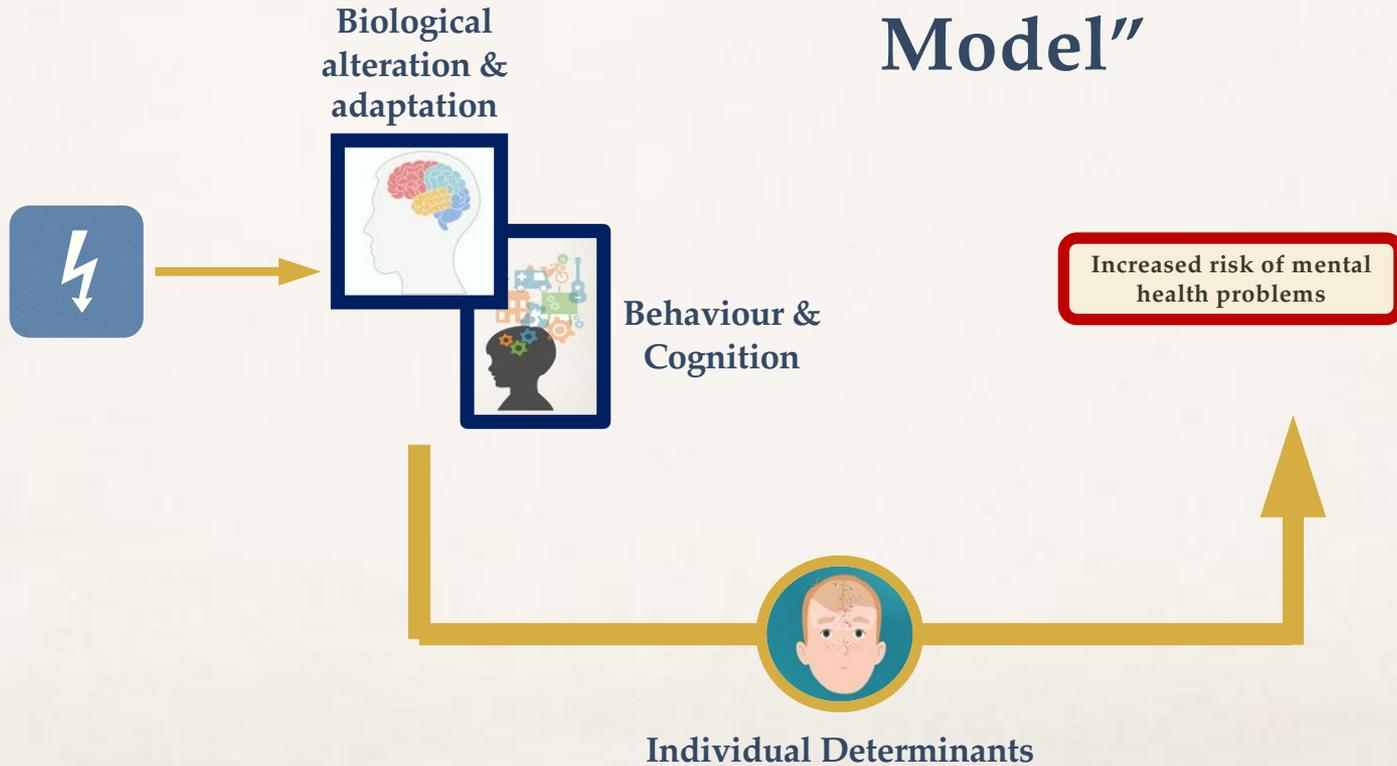


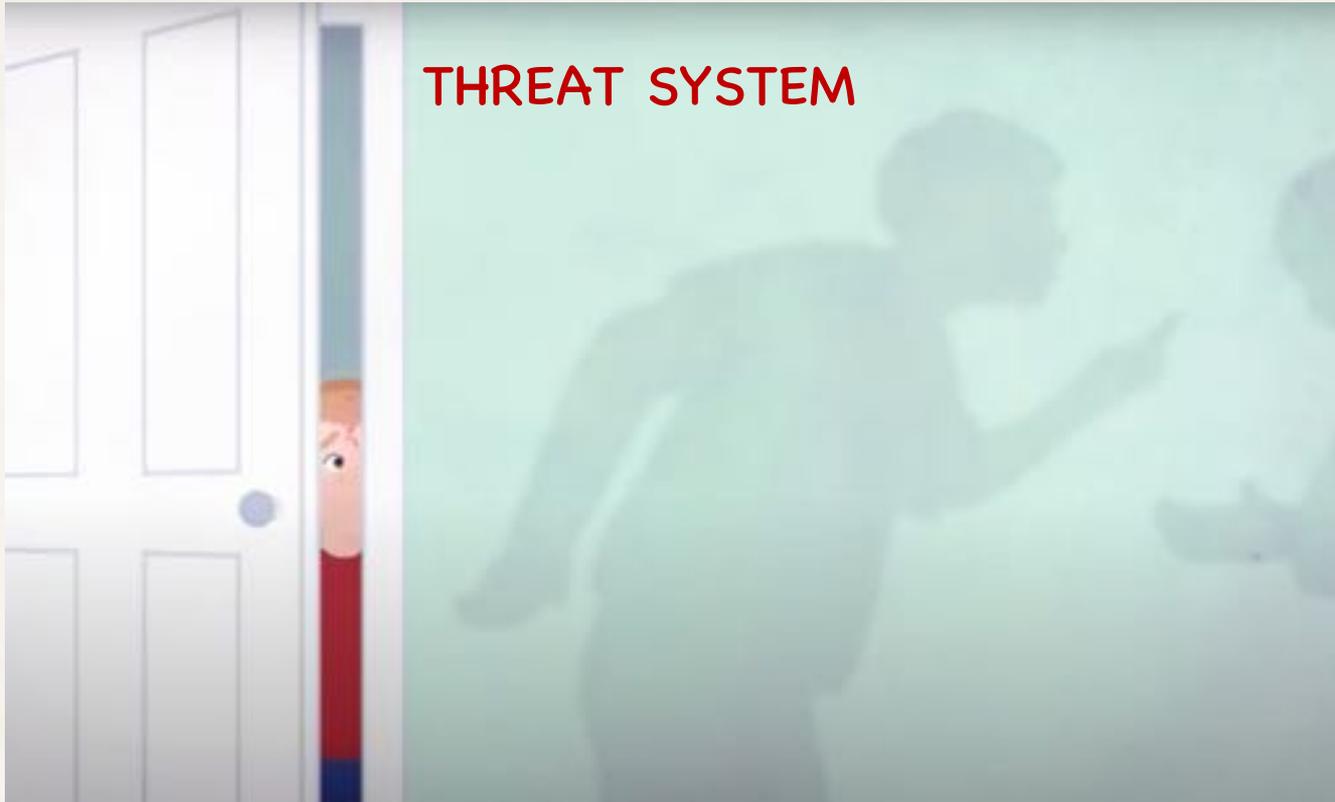
**Normative /  
Predictable  
Environment**



**Mismatch / Poor  
Optimization**

# “Stress Exposure Model”





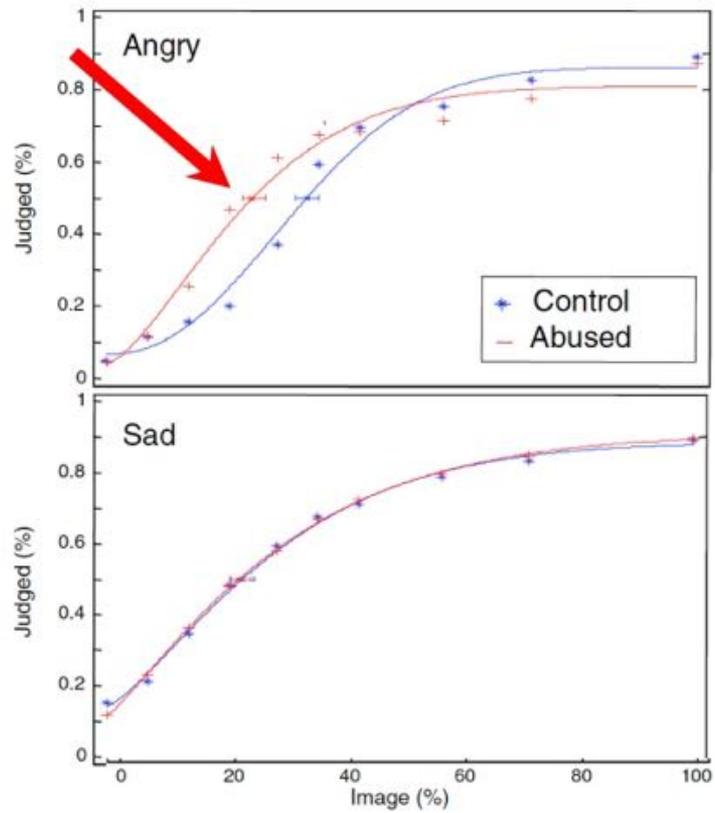
The **threat system** in the brain allows us to detect and respond to danger.

# Threat Processing & Childhood Maltreatment

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

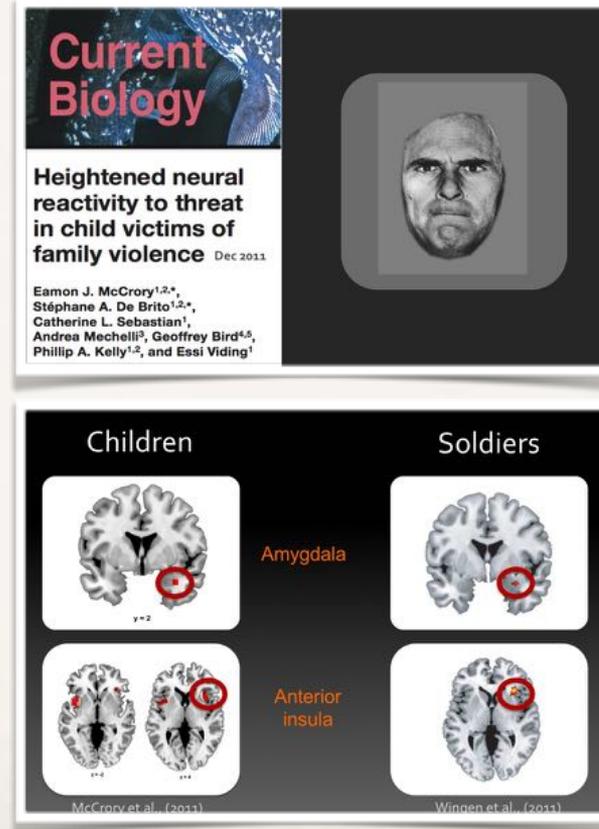
- able to more accurately identify angry facial expressions using sparse perceptual information than peers
- devote more attentional resources to the processing of angry faces - interpreted as increased hyper-vigilance to threat
- In some contexts they show **avoidance** of threat cues – diverting attention away from threat cues that may be processed as aversive

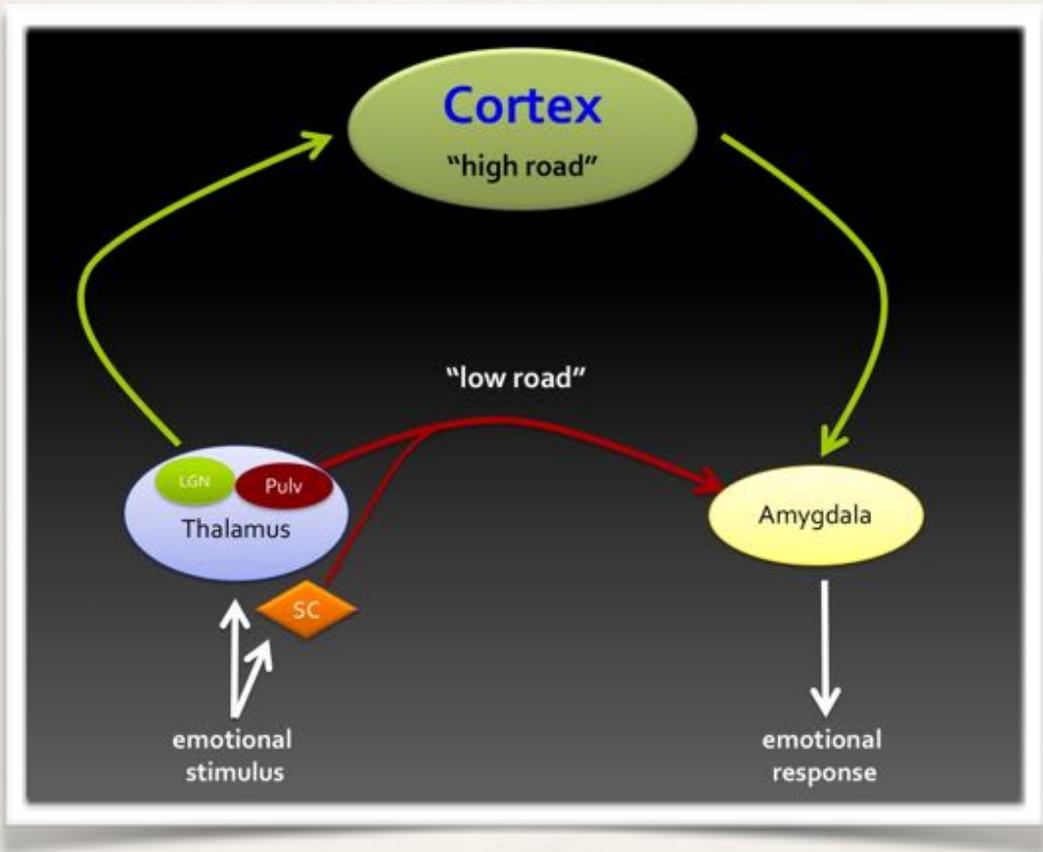




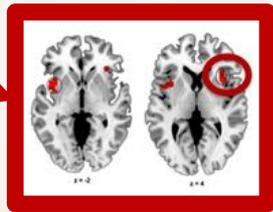
# Threat Processing

- ❖ In children exposed to physical abuse and domestic violence: amygdala and anterior insula activation - similar to what is observed in soldiers before and after combat (McCrorry et al., 2011; Van Wingen et al., 2011).





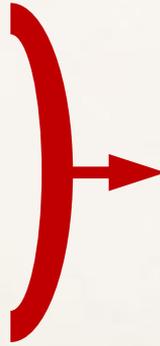
Maltreatment



↑ Reactivity of the salience network



Hypervigilance & avoidance of threat cues



Increased individual susceptibility to stress, increasing vulnerability to PTSD and internalising

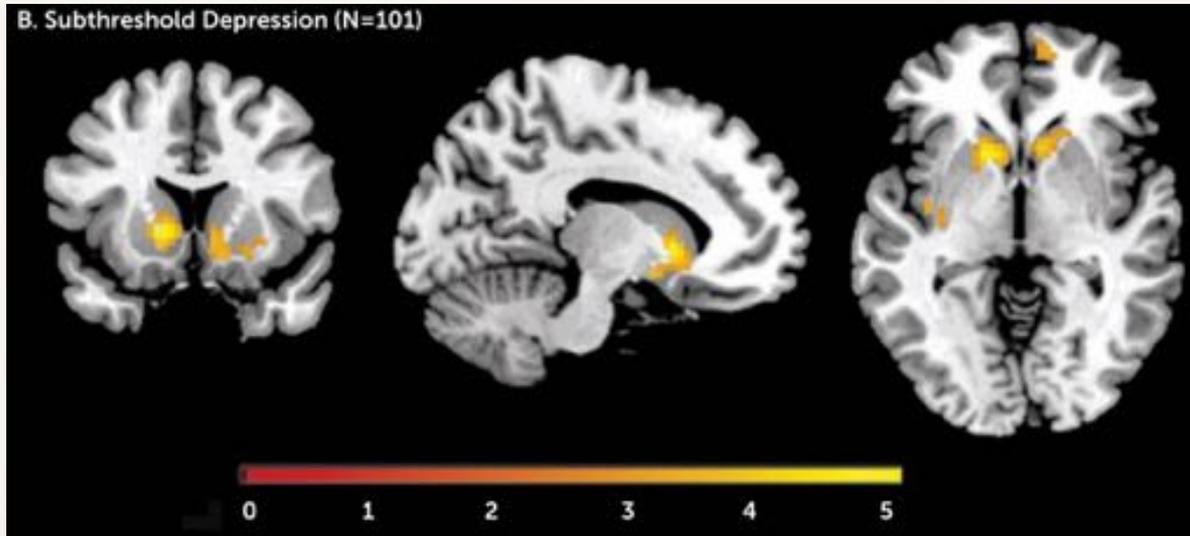


Threat processing



The **reward system** helps us learn about positive aspects of our environment, motivates behaviour, and guides decision-making.

Adolescents with sub-threshold depression show reduced reactivity of the striatum to monetary reward...



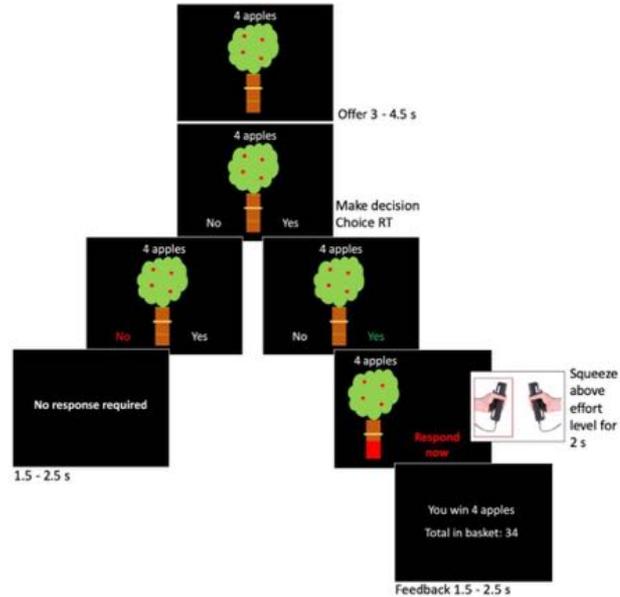
...levels of which predicted clinical depression 2 years later.

# Reward Processing & Childhood Maltreatment

Maltreatment experience has been associated with a 'blunting' of the reward system:

- Severity of emotional neglect is associated with reduced development of striatal neural response to the receipt of monetary rewards (Hanson et al., 2015)
- Higher response to social rewards predicts reduced depression symptoms 2 years later (Dennison et al., 2016)
- Altered reward learning in children with maltreatment experience (Gerin et al., 2017)

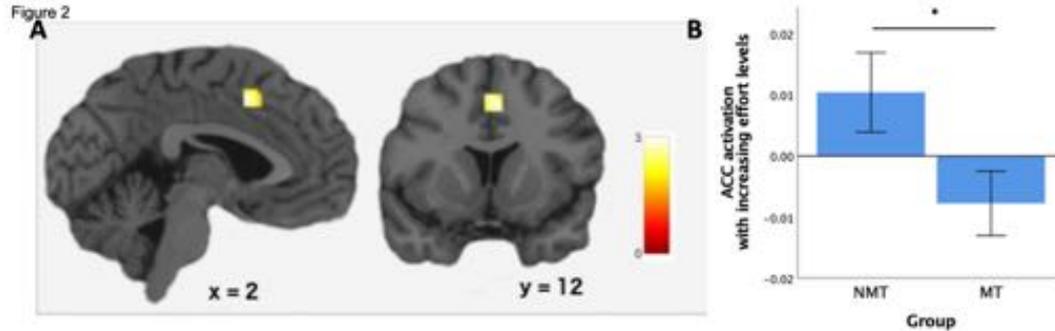
# Effort and Reward Processing



Armbruster-Genc, D. Valton, V. et al., 2022



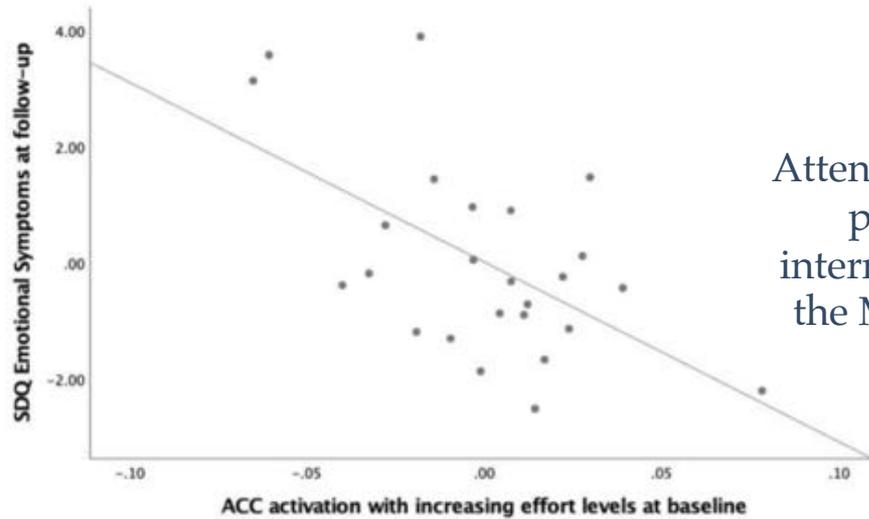
# Effort and Reward Processing



Lower activation in the anterior cingulate cortex (ACC) in the children with maltreatment experience relative to peers with increasing levels of effort.



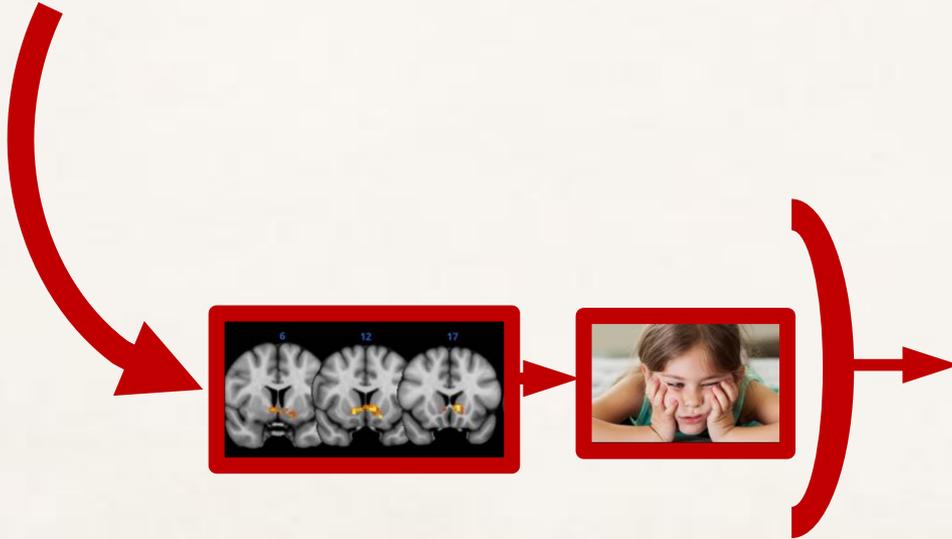
# Effort and Reward Processing



Attenuated ACC activation predicted elevated internalizing symptoms in the MT group 18 months later



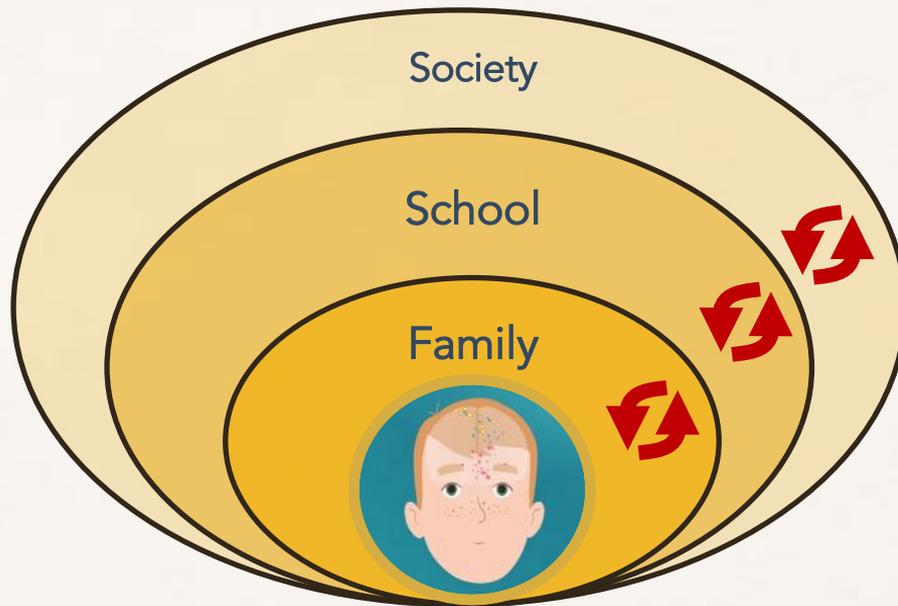
Maltreatment



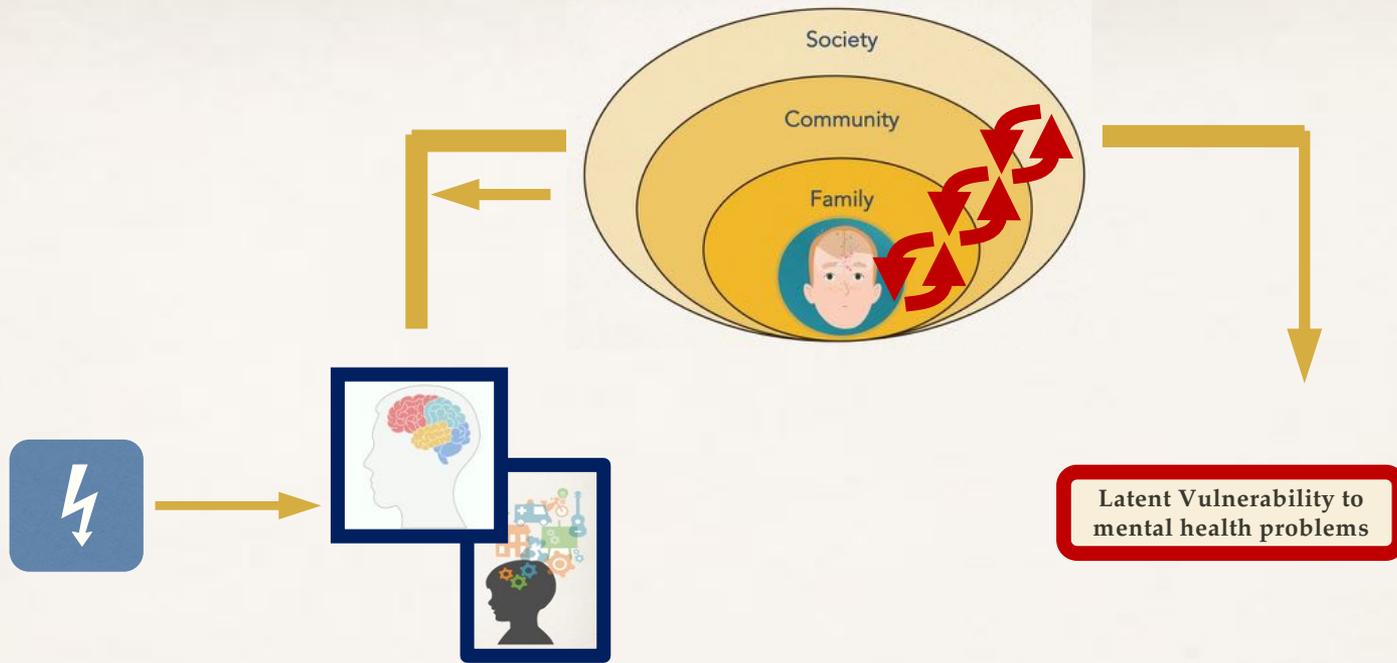
↓ reactivity of the ventral striatum and reward related regions

↑ Apathy  
↓ Motivation

Increased risk of  
Internalising  
symptoms

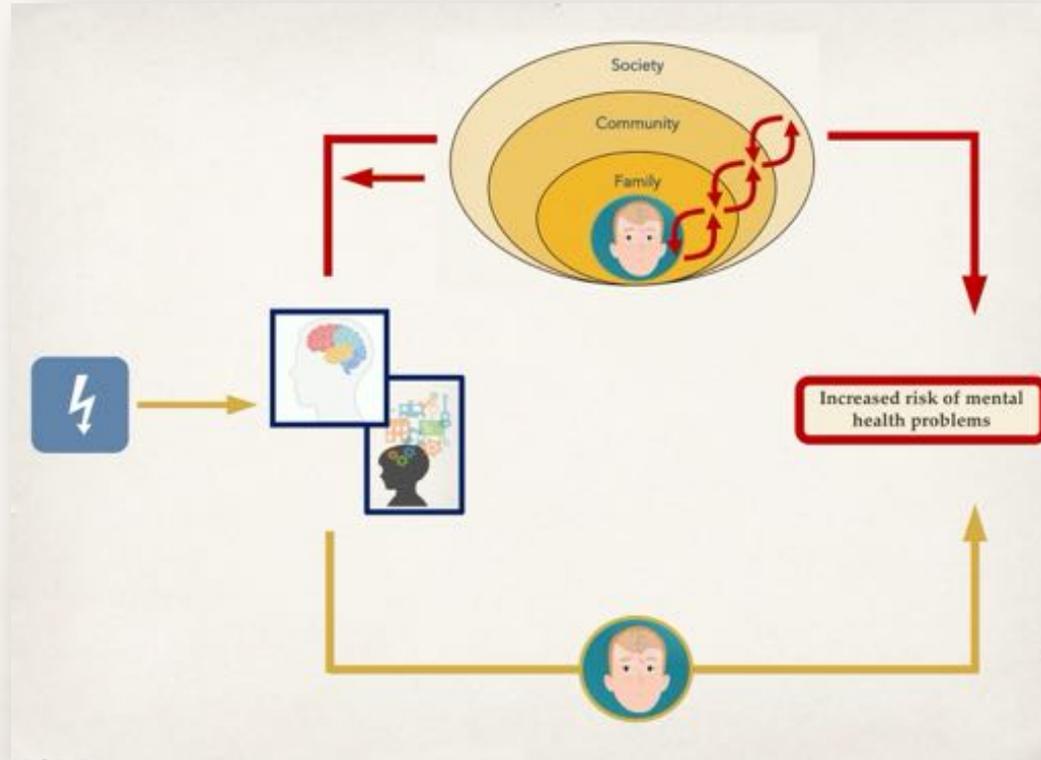


## Social Determinants



**“Social  
Transactional  
Model”**

# Two Pathways to Latent Vulnerability

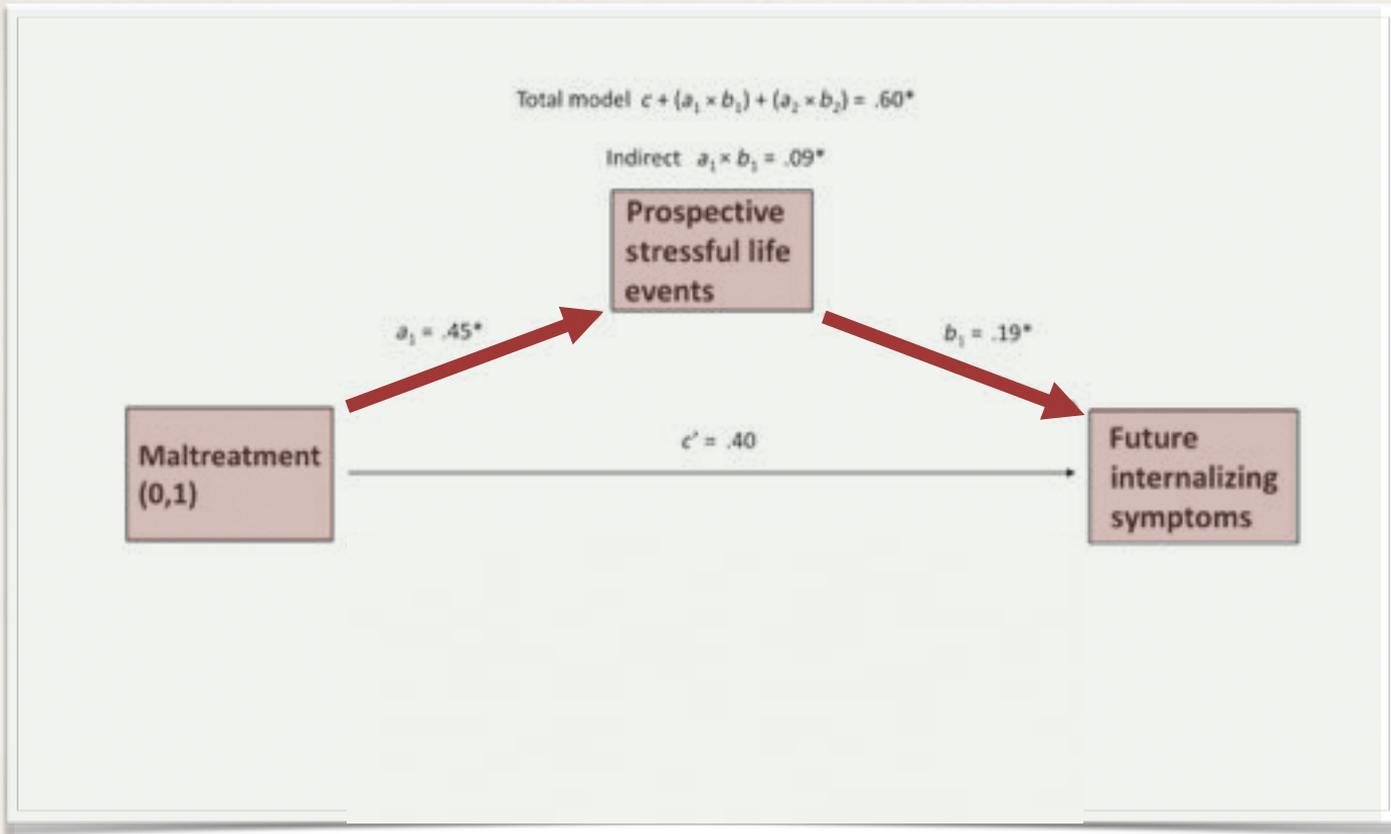


# I. Stress Generation

---

- Depression-prone individuals are more likely to experience interpersonal stressors (Hammen, 1991, 2006)
- Individuals who have experienced childhood maltreatment are also at increased risk of *future* stressful life events





## 2. Social Thinning

---

- ❖ Relative to their peers, children who experience maltreatment are more likely to grow up to be adults who:
  - have smaller **social networks**
  - are more likely to experience **loneliness**
  - have lower levels of **social support**



## 2. Social Thinning

---

*“A dynamic transactional process that - over time - leads to attenuated social capital relative to peers, including the extent and quality of social relationships.”*



## 2. Social Thinning

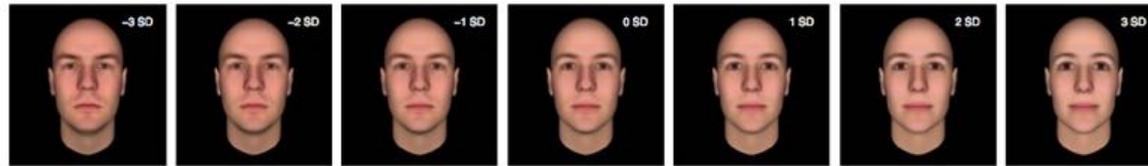
---

- i. Propensity to make new relationships
- ii. Capacity to establish these new relationships
- iii. Capacity to maintain relationships / repair rupture





A





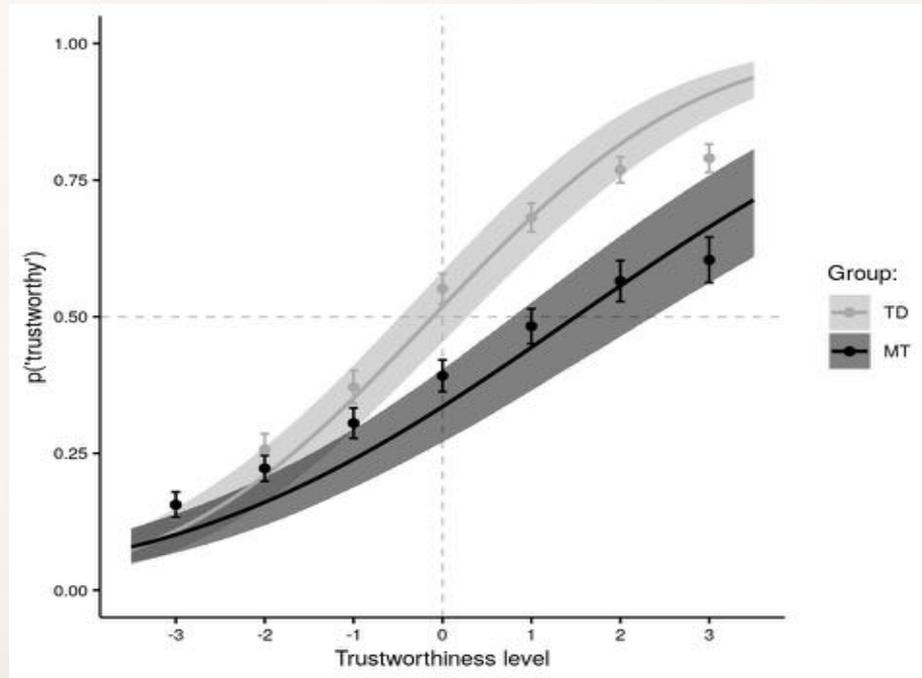
---

Is this person trustworthy?



Yes

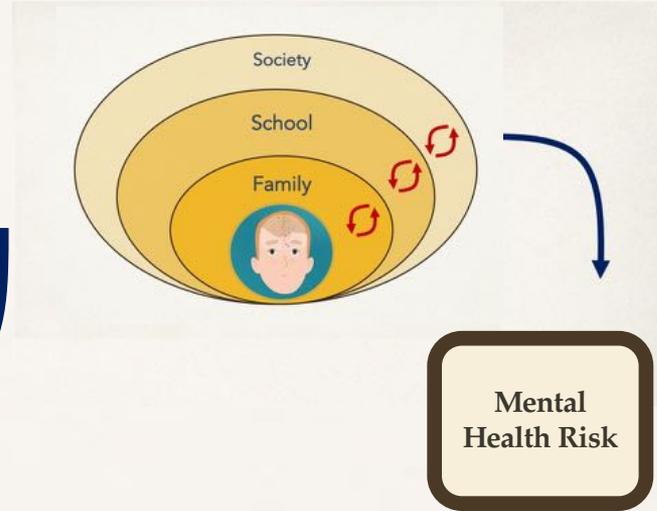
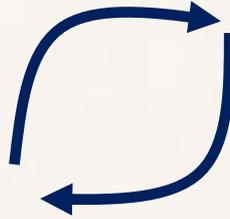
No



Adaptive re-calibration  
of neural systems



Protective Social  
Ecology



# Conclusions

---

1. Mental health problems following adversity do not emerge over night.

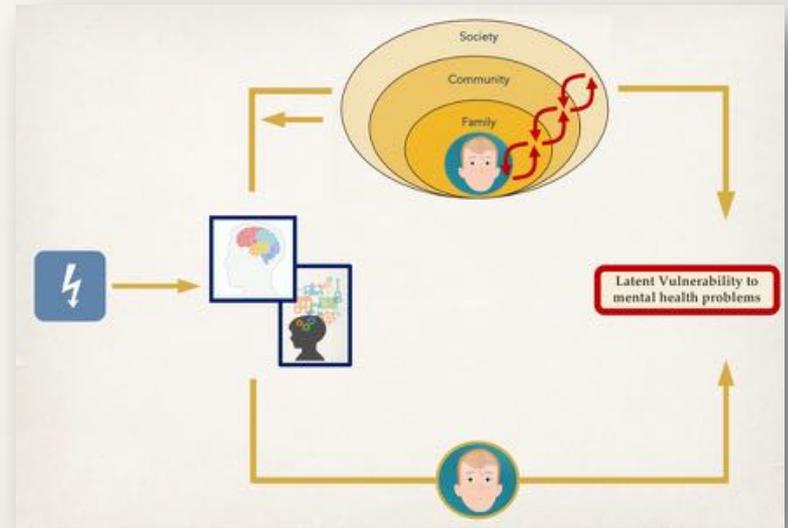
Neuroscience shows that vulnerability is measurable early on – and that specific neurocognitive mechanisms are implicated.

This has the potential to provide important clues for prevention.

# Conclusions

---

2. Vulnerability and resilience following maltreatment is not simply located in the child – it arises in the social ecology that is constructed across development in an iterative, transactional manner following changes in neurocognitive functioning.



# Promoting resilience and recovery

---

1. The brain is a plastic learning organ – and malleable in response to experience
2. The brain learns through trusting relationships
3. Stepping back to reflect can create new ways of thinking and responding to behaviour we find challenging
4. It is imperative that we focus on how we support and nurture the development of the social network and quality of relationships around a child who has experienced trauma

# Thank-you!



Developmental  
Risk and Resilience Unit



[UKTraumaCouncil.org](http://UKTraumaCouncil.org)



**Anna Freud**  
National Centre for  
Children and Families

**NSPCC**

**E·S·R·C**  
ECONOMIC  
& SOCIAL  
RESEARCH  
COUNCIL