Childhood maltreatment, latent vulnerability and the shift to preventative help:

*Understanding the link between childhood maltreatment and long-term mental health risk*

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Coram Kent 23rd March 2018
Healthy development

Poor outcomes

Psychiatric disorders

Attainment

Economic productivity

Physical Health

Infancy ................. Childhood ................. Adolescence ................. Adulthood
Poor outcomes

Psychiatric disorders

Adversity

• May emerge many years later
• More likely to be less responsive to traditional treatments
• Problems more likely to be comorbid
• Problems show greater severity
Limitations of a psychiatric diagnostic model:

- Focus on trauma can obscure other mental health needs (Green et al., 2016; Woolgar et al., 2015)
- Focus on diagnostic categories can obscure causal factors and relevant situational factors.
- Mental health is viewed in terms of cut-offs rather than as a continuum. Problems often reach crisis point before they are addressed.
- Often an absence of a child-centered needs-orientated approach that seeks to understand the child’s presentation in a holistic way.
- As a result children often do not get the right help in a timely way as many CAMHS professionals feel ill-equipped to deal with the complexity that the child (and system around them) presents with.
1. **Early prevention** – how can we better help and support children who have experienced maltreatment to prevent the emergence of later problems?

2. **Pinpointing mechanisms** – how does adversity get under the skin and can an understanding of this help us think about preventative approaches?
The concept of Latent Vulnerability
McCrorry & Viding
Development and Psychopathology, 2015

The theory of latent vulnerability: Reconceptualizing the link between childhood maltreatment and psychiatric disorder
• Markers of latent vulnerability should be associated with maltreatment experience

• They are not necessarily symptoms

• They should be present even in the absence of psychiatric disorder

• They should be predictive of future psychiatric risk
Latent Vulnerability: Neurocognitive Phenotype

Altered:
- Threat processing
- Reward processing
- Emotion regulation
- Executive control

Normative Environment

Heightsened Risk of psychiatric disorder following stressor exposure

Developmental impact of environmental and genetic risk factors post maltreatment experience

Indirect effects of latent vulnerability: cumulative

Direct effects of latent vulnerability: immediate

Impact on socio-emotional functioning

Stressor Exposure

Lowered Risk of psychiatric disorder following stressor exposure

Adverse Environment

Genotype

Neurocognitive Adaptation
Latent Vulnerability

Adversity

Threat Processing

Reward Processing

Autobiographical Memory Processing

Latent Vulnerability
Annual Research Review: Childhood maltreatment, latent vulnerability and the shift to preventative psychiatry – the contribution of functional brain imaging

Eamon J. McCrory,¹,² Mattia I. Gerin,¹,² and Essi Viding¹

- Threat processing
  - i. Neural correlates
- Emotion Regulation
  - ii. Association with psychiatric disorder
- Reward Processing
  - iii. Association with maltreatment
- Executive Functioning
Neurocognitive changes are observable even in the absence of psychiatric disorder and in some cases, predict future symptomatology. They are thought, in part, to reflect adaptations to early adverse environments.

These changes are strikingly consistent with those seen in individuals presenting with psychiatric disorder suggesting such neurocognitive ‘adaptations’ embed latent vulnerability to future psychiatric disorder.
1. Altered threat processing

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 et al., 2001
Development of perceptual expertise in emotion recognition

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

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b University of Louisville, The Heuser Hearing Institute, 117 E. Kentucky Street, Louisville, KY 40203, USA
c University of Pittsburgh, 4327 Sennott Square, Pittsburgh, PA 15260, USA
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- 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

*Pollak & Sinha, 2002, Pollak et al., 2001, Kelly et al., 2015*
Heightened neural reactivity to threat in child victims of family violence Dec 2011

Eamon J. McCrory¹,²,*, Stéphane A. De Brito¹,²,*, Catherine L. Sebastian¹, Andrea Mechelli³, Geoffrey Bird⁴,⁵, Phillip A. Kelly¹,², and Essi Viding¹
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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.

This may be a latent neural marker of latent vulnerability – the same neural signature is common in anxiety disordered populations (Etkin & Wager, 2007).
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?*
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
The diagram illustrates the interaction between the thalamus, cortex, and amygdala in processing emotional stimuli and responses. The thalamus is connected to the cortex through two pathways: the "high road" and the "low road." 

- **Cortex**: "high road" pathway
- **Amygdala**: "low road" pathway
- **Thalamus**: Integrates inputs from sensory systems (e.g., SC) and sends information to the cortex and amygdala.

**Key Components**:
- **LGN**: Lateral Geniculate Nucleus
- **Pulv**: Pulvinar
- **SC**: Superior Colliculus

**Pathways**:
- **Emotional stimulus** (e.g., spider): Input into the thalamus.
- **Emotional response**: Output from the amygdala.
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<th>Duration (ms)</th>
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Is increased amygdala reactivity an adaptive response to environmental threat?
Prior amygdala reactivity to threat cues predicts anxiety and depression symptoms in a cohort of health adults (n=340) following future life stressors over a 1 – 4 year period.
Psychiatric Vulnerability

Adversity

• Increasing likelihood of interpersonal conflict with peers

Altered Threat Processing

• Reducing cognitive capacity available for more normative developmental tasks and social learning

Social Environment

Psychiatric Vulnerability
Autobiographical Memory (ABM)
Autobiographical memory

- Autobiographical memory (ABM) is concerned with the recollection of personally experienced events and plays a central role in scaffolding our sense of self and our ability to remain oriented in the present.

- A constructive, flexible ABM provides the ‘data’ that helps us simulate future events and negotiate them more effectively (The Constructive Episodic Simulation Hypothesis, Schacter & Addis, 2007).

- It is thought that episodic simulation has particular adaptive value because it allows us to simulate a variety of ways in which the future might unfold without having to engage in actual behaviour (cf., Ingvar, 1979; Schacter, 2012; Suddendorf & Corballis, 1997, 2007).

- If ABM is OVERGENERAL then memories are characterized by greater categorical recollection and a paucity of specific detail.
Autobiographical memory

• Over-general ABM is associated with current psychopathology:
  – Depression (Sumner et al., 2010)
  – PTSD (Ono et al., 2016)
  – Schizophrenia (e.g. McDougall et al., 2015)

• Overgeneral ABM predicts symptoms of Depression in at-risk adolescents (e.g. Rawal & Rice, 2015). It also predicts symptoms of PTSD in assault survivors 6 months later even taking into account assault severity and baseline symptoms (Kleim & Ehlers, 2008).

• These findings are consistent with the notion that OGM is implicated in the pathogenesis of psychiatric disorder.

• Maltreatment is reliably associated with OGM at the behavioural level (Valentino et al., 2009; see Hitchcock et al., 2014 for a review).
Autobiographical memory: a candidate latent vulnerability mechanism for psychiatric disorder following childhood maltreatment

Eamon J. McCrory, Vanessa B. Puetz, Eleanor A. Maguire, Andrea Mechelli, Amy Palmer, Mattia I. Gerin, Philip A. Kelly, Iakovina Koutoufa and Essi Viding
The Autobiographical Memory Test (AMT), a standard measure of OGM, was administered to all participants in a session 1-3 weeks before scanning. Participants generated specific memories in response to 10 positive (e.g. achieve, caring) and 10 negative cue words (e.g. mistake, lonely). OGMs were defined as ‘memories that did not contain at least one specific detail that identifies an event as a distinct episode’.

<table>
<thead>
<tr>
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<th>Maltreatment Group (N=34)</th>
<th>Non-Maltreatment Group (N=33)</th>
<th>p</th>
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<tbody>
<tr>
<td>AMT Total</td>
<td>17.4%</td>
<td>10.0%</td>
<td>.017</td>
</tr>
<tr>
<td>AMT Positive Memories</td>
<td>15.8%</td>
<td>9.6%</td>
<td>.066</td>
</tr>
<tr>
<td>AMT Negative Memories</td>
<td>19.0%</td>
<td>10.4%</td>
<td>.018</td>
</tr>
</tbody>
</table>
The maltreated vs. non-maltreated group showed DECREASED activation to positive memories in the hippocampus.

This was interpreted as possibly reflecting reduced memory specificity of positive memories in maltreated children.

SDQ Total Score correlated positively with hippocampal ($r=0.47, p=0.007$) activation during negative memory recall in the Maltreated group (greater specification of negative memories?)
The maltreated vs. non-maltreated group showed INCREASED activation to **negative** memories in the amygdala and increased connectivity between the amygdala and the mACC indicating heightened salience processing.

This was interpreted as possibly reflecting a privileging of negative memories in the maltreated children.

SDQ Total Score correlated positively with amygdala ($r=0.36$, $p=0.049$) activation during negative memory recall in the maltreated group.
In a study of depressed patients, remitted patients and individuals at high familial risk of depression, Young and colleagues (2016) reported increased amygdala activation, and functional connectivity with regions implicated in salience processing (including the dorsal anterior cingulate cortex) during negative ABM recall in all three groups relative to healthy controls.

This suggests that heightened amygdala activation and functional connectivity with the salience network during negative ABM recall may therefore represent a trait-like marker of depression.

Young et al., AJP, 2016
• Poorer social problem solving
  -> greater peer problems
• Development of negative self schema

• Greater ruminative processing
• Low mood
Psychiatric Vulnerability

Adversity

Over-general Autobiographical Memory

- Poorer social problem solving – greater peer problems
- Increased negative ruminative style
- Poorer ability to conceptualize the future self

Social Environment

Psychiatric Vulnerability
Relatively recent fMRI research has demonstrated that childhood maltreatment is associated with altered functioning in a range of neurocognitive systems including: threat processing and autobiographical memory processing. Reward processing is also implicated.

Such changes are observable even in the absence of psychiatric disorder and in some cases, predict future symptomatology. They are thought, in part, to reflect adaptations to early adverse environments.

These changes are strikingly consistent with those seen in individuals presenting with psychiatric disorder suggesting such neurocognitive ‘adaptations’ embed latent vulnerability to future psychiatric disorder.

These findings establish a compelling case to develop a more precise mechanistic understanding of the pathogenesis of psychiatric disorder following maltreatment and the need to invigorate efforts to build a preventative clinical approach.

Need to move on from meta-level clinical constructs such as ‘trauma-focussed’ and ‘attachment-focussed’. Both are important, but primarily signpost the direction of travel; more precision needed as to the targets and mechanisms of change.
Infancy .. Childhood .. Adolescence .. Adulthood

Healthy                      Unhealthy

Outcome

Latent Vulnerabilities

• Threat bias
• Autobiographical memory
• Reward Processing

Clinical Threshold

Maltreatment

Infancy ........... Childhood ........... Adolescence ........... Adulthood
Latent Vulnerabilities

- Threat bias
- Autobiographical memory
- Reward Processing

Clinical Threshold

Maltreatment

Life Stressors AND Developmental Challenge

Infancy ......... Childhood ......... Adolescence ......... Adulthood
Infancy \hspace{2cm} Childhood \hspace{2cm} Adolescence \hspace{2cm} Adulthood

Healthy \hspace{2cm} Unhealthy

Clinical Threshold

Maltreatment

Outcome

Healthy \hspace{2cm} Unhealthy

Infancy \hspace{2cm} Childhood \hspace{2cm} Adolescence \hspace{2cm} Adulthood
Thank-you!