Attention bias to threat:
What do we know so far and how is it relevant to therapeutics?

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Disclosure

- Nothing to disclose.
Talk outline

- Attention biases in anxious youth
- Attention biases as early markers of anxiety
- Manipulating attention biases
Biased threat processing in anxiety

- Fast engagement with threat-related stimuli
- Difficult to disengage attention from threat
- No threat bias in healthy non-anxious adults

Measuring
Measuring threat-related attention bias
Measuring attention bias

Threat congruent
RTc

Threat incongruent
RTi

Bias score = RTi - RTc

(+): bias towards threat
(0): no bias
(-): bias away from threat
Literature summary

- Attention biases to threat are associated with anxiety
- Most dot-probe studies show a bias to threat but:
  - Some studies show a bias away from threat
  - Longer stimuli presentation affect the bias

Bar Haim et al., (2007); Frewen et al., (2008)
The vigilance - avoidance cognitive model

Several levels of control involved in attention allocation:

- Initial rapid engagement to threat
- Subsequent avoidance of threat

Cisler & Koster, 2010; Waters, Kokkoris, et al., 2010
Dot probe shortcomings

- Attention is measured only at one time point
- Indirect measure of attention
- Motor responses are a potential confound
Eye tracking study
Study hypotheses

- Anxious children will attend to threat more than non-anxious children
- In line with the vigilance – avoidance cognitive model, anxious children will initially attend to threat and then avoid it
Where did they look first?

$t(30) = 2.35, p < .05$ for angry faces, n.s. for happy

Shechmer et al., (under review)
How fast did they look at each stimulus type?

Stimulus x Group interaction, $F(1, 29) = 4.33, p < .05$

Shechner et al., (under review)
How long did they look at each stimulus type (during first 500 ms)?

Time bin x Stimulus x Group, $F(19, 589) = 1.608, p < .05$

*Shechner et al., (under review)*
At risk populations

- Studying the developmental trajectory
- Studying at risk population - longitudinally
- Temperament
Temperament and Anxiety

- Children at risk for later anxiety can be identified early
- Behavioral inhibition:
  Infants react with distress to novelty and as toddlers show excessive fear in novel social situations
- Stable and predicts increase in risk for anxiety disorder in adolescents
Behaviorally inhibited children

Longitudinal study
Behaviorally inhibited children

Longitudinal study

- 4 months
- 1 year
- 2 years
- 4 years
- 6 years
- 9 years
- 15 years
Behavioral inhibition & attention bias

Absence of happy bias and large attention bias
Only in high BI and high anxiety adolescents

Shechner et al., (in press) – Depression and Anxiety
Direction of bias
Attention bias and diagnosis

Salum et al., (under review)
Direction of bias

- No threat related bias among non anxious adult
- Not the case in extreme and dangerous context
- Attention bias away from threat
SCR onset levels across the experimental blocks

\[ F(1, 15) = 32.26, p < 0.001 \]

Self reported anxiety levels across the experimental blocks

\[ F(1, 17) = 236.66, p < 0.001 \]
Attention bias scores across blocks

\[ F(2, 34) = 12.61, \ p < 0.01 \ | \ CS + \text{ compare to zero: } t(17) = -3.98, \ p < 0.01 \]
Manipulating attention biases
Study 2 design

- Dot probe baseline
  Stimulus set A

- Instructed fear
  conditioning

- Random assignment
  to either attention
  training or control
  dot probe

- Dot probe under
  acute stress
Training / Control Conditions

Training condition ABM
100% trials were congruent

Congruent

+++ 500 ms
Dead Data

Until Response

Control
50% trials were congruent & 50% incongruent

Congruent

+++ 500 ms
Dead Data

Incongruent

+++ 500 ms
Dead Data

Dead Data

Until Response
SCR onset levels across the experimental blocks

\[ F(1, 28) = 35.07, p < 0.01 \]

Self reported anxiety levels across the experimental blocks

\[ F(1, 35) = 562.26, p < 0.001 \]
Attention bias scores across blocks

F(2, 68) = 4.09, p < 0.02
Four-Week Treatment Outcomes in Pediatric Anxiety Disorders
Meta-analysis training studies

\[ d = 0.61 \]

Hakamata et al., 2010
Current clinical study

Anxious children

Random Assignment

Attention bias modification
Attention bias placebo
CBT alone
- Anxiety/risk for anxiety is associated with attentional biases
- Attention bias is a plastic phenomenon
- Attention bias could be manipulated/trained
- Attention training could have a therapeutic effect

Taken together
Collaborators

- Danny Pine
- Ellen Leibenluft
- Jennifer Britton
- Johanna Jarcho
- Eric Nelson
- Yair Bar Haim
- Nathan Fox