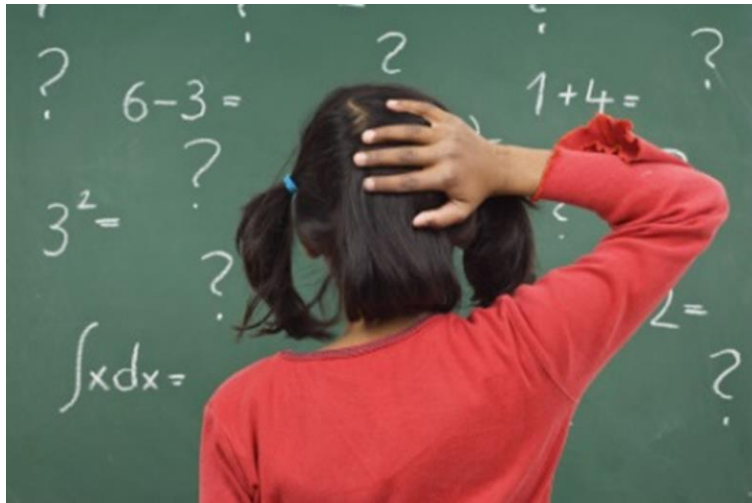


Mathematics Anxiety: What it is and how we can reduce it!



Dr Tom Hunt

Senior Lecturer in
Psychology

University of Derby

t.hunt@derby.ac.uk



@dr_tom_hunt

Defining maths anxiety

- “The panic, helplessness, paralysis, and mental disorganization that arises among some people when they are required to solve a mathematical problem” (Tobias and Weissbrod, 1980)
- “Feelings of tension, apprehension, or even dread that interferes with the ordinary manipulation of number and the solving of mathematical problems” (Ashcraft & Faust, 1994)



Maths anxiety and the brain

Young et al (2012) [7-9 year olds]

In those with high maths anxiety:

- greater deactivation of the ventromedial prefrontal cortex (which regulates emotion)

- reduced response of cortical and sub cortical areas that are implicated in mathematics and numerical reasoning.

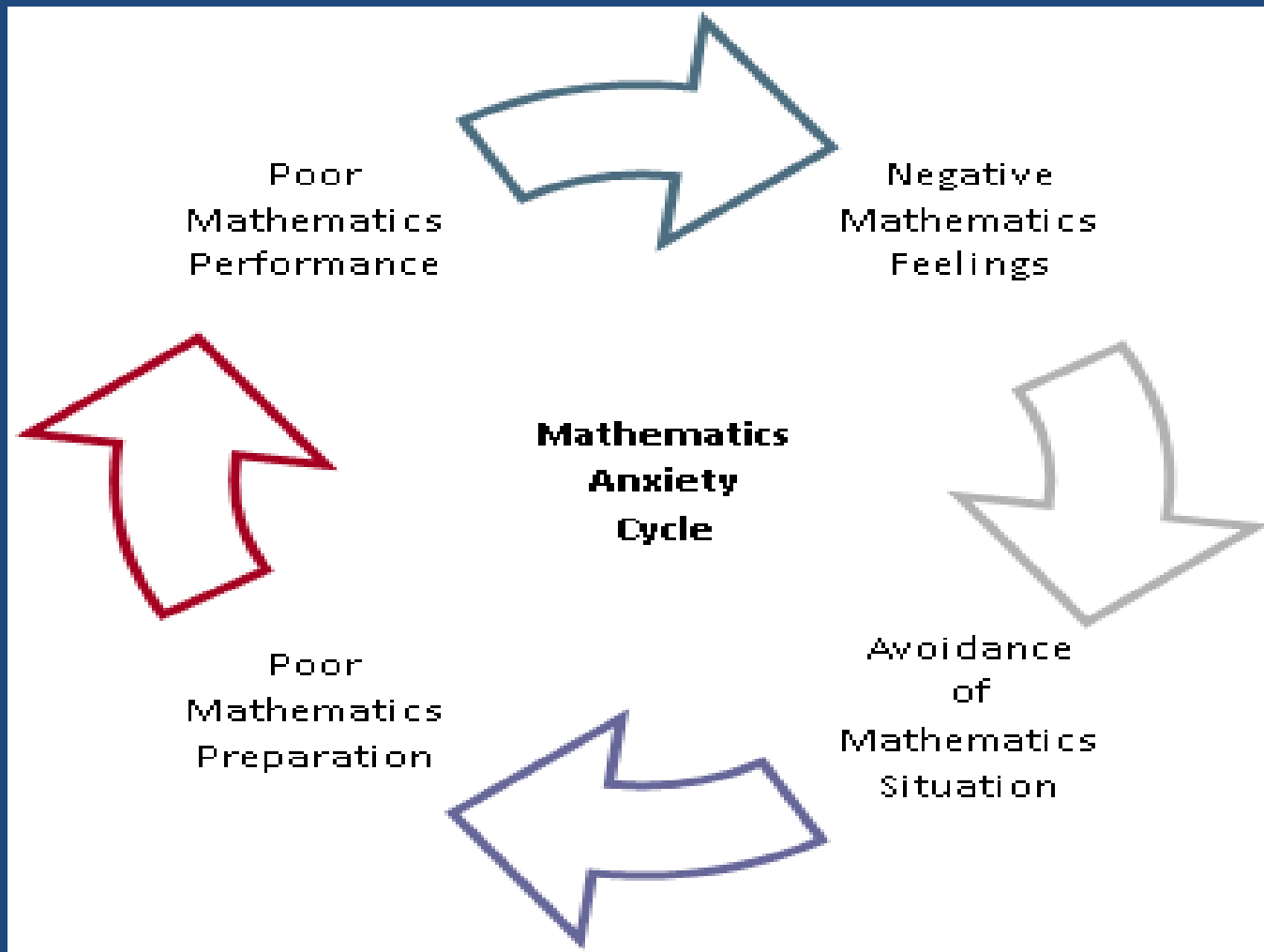


Correlates of maths anxiety

- Parents' maths anxiety
 - Related to child's maths anxiety (if they help with homework!)
(Maloney et al., 2015)



A vicious cycle



Strategies to reduce maths anxiety

Expressive writing

- Based on emotion regulation theory.
- Writing down worries and fears helps control anxiety (Klein & Boals, 2001).
- Park, Beilock and Ramirez (2014) – writing just before a maths test helps those with high maths anxiety.
- More anxiety related words = better performance.



Strategies to reduce maths anxiety

Reappraisal

- Jamieson et al., (2016) looked at the effects of reinterpreted reappraisal on performance.
- Participants were faced with an anxiety evoking task, some were told anxious feelings were beneficial to their performance, others were told nothing at all.
- Individuals who had been reappraised to see anxiety as beneficial i) performed better (exam grade) than controls and ii) had lower maths evaluation anxiety.

A challenge or a threat?

.....instructional framing?



Strategies to reduce maths anxiety

Focused breathing

(Brunye et al., 2013)

- Based on mindfulness
- Posture
- Attention
- Refocusing

- Performance of high maths anxious individuals approached that of low maths anxious individuals



Strategies to reduce maths anxiety

Systematic desensitisation (Hembree, 1990)

- Gradual exposure to maths, usually accompanying relaxation
 - Reduced maths anxiety
 - Improved performance



Strategies to reduce maths anxiety

Cognitive restructuring (Hembree, 1990)

- Modifying cognitions
- Addressing self-beliefs (also see Jansen et al, 2013)
- Increasing confidence

Eliminating myths

- Boys are better than girls
- High creativity = poor at maths
- Some people are just bad at maths
- Maths has no relevance to real life



Strategies to reduce maths anxiety

Encourage a growth mindset

(Johnston-Wilder & Lee, 2010)



Strategies to reduce maths anxiety

General tips

- Reinforce positive messages (e.g. usefulness)
- Avoid reinforcing negative messages (e.g. “I was never any good at maths at school” or using maths as a form of punishment)
- Reward engagement and genuine attempts
- Celebrate mistakes as a learning opportunity
- Only use time pressure when confidence is high
- Free up working memory (e.g. don't keep Qs in your head)
- Focus on understanding the problem/question