Sources and Measures of Stress and Anxiety in Children with Chromosome 22q11.2 Deletion Syndrome.

Elliott A. Beaton, Ph.D.

University of California, Davis Medical Center
M.I.N.D. Institute, Sacramento, CA, USA
Cognitive Analysis and Brain Imaging Lab
http://cabil.mindinstitute.org/

Contact email: eabeaton@ucdavis.edu

Center for Excellence in Developmental Disorders
What is “Stress”?

- Stress = any shift from homeostasis  
  (Cannon, 1932)

- The psychophysiological consequence  
  of any event challenging the organisms  
  capacity to cope  
  (Selye, 1946)

- Stress can also be thought of as a  
  motivational state that arises from  
  emotional/cognitive processes and  
  bodily states
Coping

- Ability to cope effectively determines whether one adapts successfully in the stage of resistance or psychologically and physiologically breaks down to exhaustion.
Isn’t stress and anxiety the same thing?

- They are related and can share symptoms but they are not exactly the same.
- Anxiety can be specific but also more generalized and doesn’t always disappear with a reduction in obvious stressors.
- Anxiety can also elicit a physiological stress response.
What about depression?

- Anxiety and depression are not the same thing but they can share some similar symptoms (e.g. irritability, problems sleeping or concentrating)

- It is not uncommon for people with a mood disorder to be diagnosed with an anxiety disorder (and vice versa)

- Chronic stressors that seem uncontrollable and unchangeable combined with self-blame for a situation or your inability to deal with it may lead...
Allostatic Load

- Allostasis = actively maintaining homeostasis through change (Sterling & Eyer, 1988; McEwan, 2000)

- Allostatic load is the “wear and tear” on the body with repeated/chronic effort to maintain allostasis
Why study stress, anxiety, and depression in children with 22q11.2DS?

- Anxiety is common in this population of kids (and predicts adaptive function).
- Time anxiety and mood, lower verbal IQ, with low activity catechol-O-methyltransferase (COMT) genotype predicted onset and severity of psychosis in 22q11.2DS at T2 (Gothelf et al., 2007).
Risk and Protective Factors in Development?

- There is an elevated risk of psychosis and psychotic depression in young adulthood with **22q11.2DS** (Gothelf et al., 2005; Murphy et al., 1999)

- Who is at greater risk and why?
  - The genetic deletion is neither necessary nor sufficient to predict outcome
  - Could chronic stress and anxiety *contribute* to this risk?
Why study stress, anxiety, and depression in children with 22q11.2DS?

- Kids with 22q11.2DS (and their parents) can have extra things to cope with on top of the usual day-to-day challenges everyone has to deal with.

- Health issues notwithstanding, as the child ages and enters the school system, cognitive and social challenges become more apparent in the context of increasing social and academic expectations.
Why measure cortisol?

- Cortisol is a metabolic hormone
- Chronic elevated glucocorticoid secretion:
  - seen w/ depression and anxiety
  - Immunological impairments
  - Neuronal death, greater vulnerability to neurotoxicity, reduced neurogenesis, and decreased dendritic arborization in the hippocampus (McEwen 1999; Sapolsky et al., 1985; 1986).
- Passive drool saliva collection
- Pre and post mock scanner training procedure
- Novel experience + mild ‘restraint’ stress in should elicit a mild stress response
- Stress should dissipate quickly as the child acclimates to the environment

(Adapter from Corbett et al., 2006; 2008)
Total and Post-practice salivary cortisol was higher in children with 22q11.2DS vs. TD

Beaton et al. (In preparation)
Multi-day salivary hormone measures

- Demonstrated to increase patient compliance (Quittner et al., 2007)

Aardex MEMS 6 Smartcap compliance monitor
Salivary cortisol over 2 school days and one home day in children with and without 22q11.2DS

Day 1 - school

Day 2 - school

Day 3 - home
Implications

- We can treat anxiety and teach coping skills.
- Interventions could be tailored to potentially “bump” developmental trajectories in a positive direction.
- We may learn what factors are protective against stress and anxiety (and potentially schizophrenia) from children with 22q11.2DS as well.
An important *caveat*: Don’t forget that stress and anxiety (like pain) *can* be a good thing!

- Anxiety and stress motivate behaviour!
- These feelings can:
  - reduce risky behaviour
  - increase necessary, but not always pleasant behaviour
- In a nutshell:
  - Too little is not good and too much is not good.
The at-home saliva study is ongoing...

...and we need your help to continue this important work.

• Please contact Elliott Beaton to participate.
  Phone: 916-703-0408
  Email: eabeaton@ucdavis.edu
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