Interventions Matter: Supporting Academic Achievements While Minimizing Stress

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Outline of Talk

- What is the problem?
  - Mismatches between abilities and demands - Poor calibration

- What are the solutions?
  - bringing the child’s abilities closer to the world’s demands
  - bringing the world’s demands closer to the child’s abilities

- How well does it work?
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Our Working Hypothesis

Cognitive impairments limit competence

*IQ of 75 means operating as a 9-year-old in a 12-year-old’s world*

- mental representation impairments limit development in domains like space, time, number

- Executive Function impairments limit behavior/emotional regulation

  Impaired cognition (borderline IQ) creates/interacts with increased stress/anxiety to further modulate/challenge development

- stress/anxiety increase inattention and decrease cognitive control

Family/School/Community supports further modulate above interaction & influence “coper/struggler” trajectory

- strugglers might experience higher “allostatic load” & psychosis risk

If so, we can target cognitive, emotional and environmental factors for intervention to improve academics, mental health, family dynamics
Adaptive function NOT related to overall IQ. Unlike TD/most other NDDs

Adaptive function IS related to anxiety levels
*Angkustsiri et al., submitted*

Anxiety levels related to stress hormone level, maybe psychosis risk
*Beaton et al., submitted; Beaton & Simon, 2011*
Anxiety and Attention

Prelim data from “Hot Cognition” tasks

- Dot Probe Threat Bias (Perez-Edgar, ’11; Roy, Pine, Lissek..)
- Emotional Attentional Blink (Lim/Pessoah, ’09)

Dot probe RTs suggest 22q group drawn to angry faces (threat bias)

- positive scores indicate “vigilance” for angry faces
- some evidence of relation to the one fear anxiety index checked so far
Anxiety and Attention

What does this actually look like? How “distracting” is threat?
- Movie #1 a typical child with no emotion bias
- Movie #2 a child with 22q11 with a strong threat (i.e. angry face bias)

Arousal, Anxiety & Inattention

Michelle Y Deng, Ph.D.
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What is working memory?

The ability to keep information in your mind for a short period of time (seconds) and be able to use the information in your thinking.

A system for temporary storage and manipulation of information, necessary for wide range of cognitive tasks.

Working memory is the search engine of the brain

Cogmed America 2011 ©
Center for Excellence in Developmental Disabilities
UCDAVIS MIND Institute
Prospects for Intervention

One program might help with issues related to Executive Function/ADHD:
- Cogmed: http://cogmed.com
  - limited to key Exec. Function domain
  - costly & not unlimited access
  - well validated, not yet with 22q11.2DS

BUT, buyer beware. Now purchased by Pearson Testing Inc.
- starting to morph into wider product range
- possibly beyond evidence base
- this was what happened with Fast ForWord

How on earth can you know what works, and for whom?
- Sharp Brains: http://sharpbrains.com
  - neuroscience based community
  - likely to prioritize evidence base
  - BUT, buyer beware. This IS a PRO brain training group

NB: I have no affiliation with either of these
Stress/Anxiety Intervention

Evidence Based Behavioral Approaches

- Cognitive Behavioral Therapy (CBT)
  - high linguistic/conceptual demands
- Biofeedback, Meditation, Exercise …

Work with (any) good clinician

Pharmacological Approaches

- SSRI - Selective Serotonin Reuptake Inhibitors
- Stimulants - ADHD medications
  - reasonable concerns but safe & effective

Work with pediatrician/psychiatrist
Computer Assisted Cognitive Behavior Therapy for Anxiety

- Developed from Coping Cat; Individual Cognitive Behavior Therapy (Kendall & Hedtke, 2006)
- Camp Cope-A-Lot
  - 12 sessions, Interactive CD ROM
  - 7-13 year old youths with anxiety
  - First 6-sessions self-guided
  - Last 6-sessions therapist coached
  - http://www.cope-a-lot.com/

Stress/Anxiety Intervention

Less Evidence Based but research supported anxiety program

- Turnaround Anxiety Therapy
- http://www.myanxiouschild.com/

Work with family member

NB: we don’t have experience with this AND adult/parental involvement will modulate success. BUT does seem to be based on sound CBT principles
Social Skills Training

Strong evidence based for Social Skills Training as effective with:

- children & adults
- a range of disorders
  - ASD, Schizophrenia, others

Michelle Garcia-Winner is a leader in this work

http://socialthinking.com

Many medical centers, universities, other organizations offer evidence-based social skills group training

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Effect sizes ($d$) for Cogmed studies with Control Groups: *Nontrained Behaviors*

<table>
<thead>
<tr>
<th>STUDY</th>
<th>CONTROL GROUP</th>
<th>SAMPLE</th>
<th>$d$ After Cogmed</th>
<th>$d$ Four to 6-months f/u</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klingberg et al (2005)</td>
<td>Nonadaptive Training</td>
<td>7-12 years, ADHD</td>
<td>Parent report Inatt= 1.21, Hyp/Imp= 0.42</td>
<td>Parent report Inatt= 0.67, Hyp/Imp= 0.42</td>
</tr>
<tr>
<td>Swedish</td>
<td></td>
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</tr>
<tr>
<td>Holmes et al (2009)</td>
<td>Nonadaptive Training</td>
<td>8-11 years, WM&lt; 15th percentile</td>
<td>Classroom Inst. Task= 0.83, Math Rsng= 0.11</td>
<td>Classroom Inst. Task= 0.52, Math Rsng= 0.49</td>
</tr>
<tr>
<td>English</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dahlin (2010)</td>
<td>SpEd as usual</td>
<td>9-12 years, ADHD &amp; LD</td>
<td>Reading Comp= 0.88</td>
<td>Reading Comp= 0.91</td>
</tr>
<tr>
<td>Swedish</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Beck et al (2010)</td>
<td>Wait List</td>
<td>7-17 years, ADHD + (ODD, Anx., Mood Dis. &amp; on meds.)</td>
<td>Parent report DSM-IV Inatt= 1.49, BRIEF MetaCog= 0.91 Plan/Org= 0.92</td>
<td>Parent report DSM-IV Inatt= 1.03 BRIEF MetaCog= 0.83 Plan/Org= 0.72</td>
</tr>
<tr>
<td>American</td>
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How Well Does WM Training Work?

Is Working Memory Training Effective? A Meta-Analytic Review

Twenty-three studies with 30 group comparisons met the criteria for inclusion. The studies included involved clinical samples and samples of typically developing children and adults. Meta-analyses indicated that the programs produced reliable short-term improvements in working memory skills. For verbal working memory, these near-transfer effects were not sustained at follow-up, whereas for visuospatial working memory, limited evidence suggested that such effects might be maintained. More importantly, there was no convincing evidence of the generalization of working memory training to other skills (nonverbal and verbal ability, inhibitory processes in attention, word decoding, and arithmetic). The authors conclude that memory training programs appear to produce short-term, specific training effects that do not generalize. Possible limitations of the review (including age differences in the samples and the variety of different clinical conditions included) are noted. However, current findings cast doubt on the continuing relevance of current working memory training programs.

Keywords: working memory training, ADHD, attention, learning disabilities

Review of 23 working memory training studies with control groups

- no sustained verbal WM effects, some lasting visuospatial effects
- “no convincing evidence of generalization ... to other skills

How Well Does EF Training Work?

Review of 6 different approaches to executive function training.

“Diverse activities have been shown to improve children’s executive functions: computerized training, noncomputerized games, aerobics, martial arts, yoga, mindfulness, and school curricula. All successful programs involve repeated practice and progressively increase the challenge to executive functions. Children with worse executive functions benefit most from these activities; thus, early executive-function training may avert widening achievement gaps later. To improve executive functions, focusing narrowly on them may not be as effective as also addressing emotional and social development and physical development.

Fig. 4. A fun exercise at a Canadian gym. [Photo: courtesy of Calgary]

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Randomized, controlled comparison (Khanna & Kendall, 2010)

- 49 children with anxiety disorders ages 7 to 13-years
- Random assignment
  - Evaluators blind to treatment condition
- Computer-assisted CBT vs Individual CBT vs Computer-linked education, support and attention condition (CESA)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Anxiety Diag.</th>
<th>Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA-CBT (Camp Cope-A-Lot)</td>
<td>81%</td>
<td>Child and parent more satisfied than with CESA; CA-CBT = I-CBT</td>
</tr>
<tr>
<td>I-CBT (Coping Cat)</td>
<td>70%</td>
<td>Child and parent more satisfied than with CESA; I-CBT = CA-CBT</td>
</tr>
<tr>
<td>CESA (attention/education control)</td>
<td>19%</td>
<td>Child and parent satisfaction CESA &lt; CA-CBT and I-CBT</td>
</tr>
</tbody>
</table>

CBT & medication yields substantial improvement (Walkup, Albano, Piacentini et al. 2008)

- 488 Children 7 to 17-years with anxiety disorders
- Random assignment
  - Evaluators blind to all treatment assignments
- 12-weeks, multi-site trials

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Improvement</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sertraline only (N=133)</td>
<td>55% very much to much improved</td>
<td>0.45 effect size</td>
</tr>
<tr>
<td>Cognitive Behavioral Therapy (CBT) only (N=139)</td>
<td>60% very much to much improved</td>
<td>0.31 effect size</td>
</tr>
<tr>
<td>Sertraline &amp; CBT combined (N=140)</td>
<td>81% very much to much improved</td>
<td>0.86 effect size</td>
</tr>
<tr>
<td>Placebo drug (N=76)</td>
<td>24% very much to much improved</td>
<td>-</td>
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</table>
Conclusions

We do now understand a lot about what needs to be fixed

- huge amount can be done without stem cells/brain surgery
- instead, well validated methods, with skilled providers are widely available and don’t require 22q11.2DS expertise

Much energy is going into novel, technological interventions

- these are “works in progress” trying to translate basic neuroscience into effective treatments
- any of these might work for your child, but no evidence yet for wide ranging, long-lasting effects
- few Random Controlled Trials - the “gold standard”

Decades of training studies show above pattern so the big Q:

Will “Brain Training” be different? More studies and time will tell