Families Coping with Illness: Implications for Huntington Disease

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Families Coping with Illness

• Childhood Cancer
• Childhood Brain Tumor
• Childhood Sickle Cell Disease
• Childhood Congenital Heart Disease
• Childhood Hemophilia
• Parental Cancer
• Parental Depression
• Adverse Childhood Experiences (ACEs)
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This research has been carried out in Silos
Understanding Threats to Mental and Physical Health

• Life is not a level playing field…..
  • Some children and families are faced with greater stress and adversity than others
  • Some children and families maintain health and even thrive in spite of significant stress and adversity----they are resilient
  • Some children and families experience mental and physical health problems when faced with stress and adversity----they are vulnerable
• How can we build resilience in those who are vulnerable?
Research Program

• Steps in studying families faced with chronic illness:
  1. Identify sources of stress for children and parents
  2. Identify psychological, neurocognitive, and communication processes in children and parents (and families) who are resilient in the face of significant stress
  3. Identify psychological, neurocognitive, and communication processes in children and parents (and families) who are vulnerable to significant stress
  4. Develop interventions to support vulnerable children and parents (and families) and build resilience
  5. What is similar and what is different about HD?
Resilience and HD

• “It has changed the way we have to do things but it has brought us closer as a family.”

• “We still struggle deeply as a family and I don't think I'll ever be able to say I had a happy childhood. Despite this, we are coming through together as my mom's sickness begins to come to a close. I am grateful for the healing I am beginning to find.”
Vulnerability and HD

• “Currently one of my biggest challenges is my mental health. I honestly don't know what to do about it. I cannot afford a therapist and I don't have anyone to talk to about all my stress and anxiety. My family is not someone I can openly share my feelings with.”

• “The biggest challenge I face with HD is thinking about my future. I find myself going weeks in denial and blacking it out and then weeks where it consumes me to where I cannot get out of bed. I envy just about anything and everyone that does not have this illness consuming their life.”

• “I am nothing but terrified of HD…. I live in fear that HD made me less than human to the rest of the world… I didn't want to have dreams or continue with the things I'm passionate about. I was so hopeless that by the time I was 15, I wanted to commit suicide.”
Overview

1. **Stress** has direct effects on mental health
2. Stress has effects on neurocognitive development and function; specifically **executive function**
3. Executive function skills are needed to effectively **cope** with stress
4. **Support and communication** with others are important parts of effective coping
5. **Caring** for and supporting others has both benefits and costs
6. All of these processes can be improved with psychological and behavioral **interventions**
Stress

• Stress includes environmental events and conditions AND individuals’ psychological interpretation of these events and conditions (i.e., it’s both what happens to you and how you think about it)
Sources of Stress

• Traumatic Events
  • Sudden, beyond normal limits

• Major Life Events
  • Significant life disruption

• Minor Events
  • Small in magnitude, high frequency

• Chronic Adversity
  • Recurrent, pervasive

• Example:
  • Diagnosis of cancer (or HD?)

• Example:
  • Parental divorce

• Example:
  • Arguments, medical appointments

• Example:
  • Poverty, living with a chronic illness, living with a chronic mental health problem
Sources of Stress

- Childhood Cancer:
  - Daily Role Functioning
    - Missing school, disruptions in daily activities, medical treatments (chemotherapy)
  - Physical Effects
    - Nausea, pain, loss of hair
  - Uncertainty
    - Not understanding information about cancer, uncertainty about recurrence or effects of treatment

- Parental Depression:
  - Parental Withdrawal
    - Sad, unavailable, non-responsive
  - Parental Intrusiveness/Irritability
    - Upset, angry, worried, easily frustrated
  - Marital Discord
    - Parents arguing or fighting

* Both of these sources of stress are chronic, unpredictable, and uncontrollable
• Ripple effects of traumatic and major events:
  • It’s all about chronic stress
Effects of Stress

• Effects on Physical Health
  • Stress does not make you sick
  • Stress makes it more likely that other things will make you sick

• Effects on Mental Health
  • Stress is the single most potent risk factor for mental health problems
  • Stress increases risk for depression, anxiety, post traumatic stress disorder, eating disorders, and substance use disorders

• Individual differences in response to the same sources of stress
• Physical Responses to Stress
  • Central role of cortisol
  • Activated in response to stress
  • Predictable rhythm over the course of the day
Adaptive and Maladaptive Patterns of Stress Response

- Normal response:
  - Stress → Activity → Recovery

- Allotastic load:
  - Repeated "hits"
  - Lack of adaptation

- Prolonged response:
  - No recovery

- Inadequate response:
  - No recovery
Stress and the Brain

• From basic science:
  • Amygdala: activated by threat and novelty
  • Hypothalamus: activates cascade of stress hormones
  • Hippocampus: important for learning but is taken offline by prolonged stress
  • Prefrontal cortex (PFC): plays a role in inhibitory control over the amygdala

• For individuals exposed to stressful or trauma-related stimuli---the amygdala and hypothalamus are activated, and PFC and hippocampal activity are reduced.
"Thinking about Thinking"
Higher Reasoning
Executive Function

Prefrontal Cortex
- 9 Functions of the Prefrontal Cortex
  1. Empathy
  2. Insight
  3. Response Flexibility
  4. Emotion Regulation
  5. Body Regulation
  6. Morality
  7. Intuition
  8. Attuned Communication
  9. Fear Modulation

Limbic Brain
- 1. Fight, flight, freeze stress response
- 2. Thinks, "Am I safe? Do people want me?"
- 3. Emotions live here
Biological Basis of Memory: What SHOULD Be Happening in Your Brain

Biological Basis of Learning (Kandel)

**Short-term memory**
- Single pulse of serotonin
- Functional change: Synapse strengthened via enhanced release of glutamate. The nucleus is not involved.

**Long-term memory**
- Five pulses of serotonin
- Anatomical change: Synthesis of proteins in the nucleus and growth of new synaptic connections, as well as enhanced release of glutamate.

*In Search of Memory: The Emergence of a New Science of Mind* by Eric R. Kandel
Effects of Stress: Reduction in length of dendrites and number of dendritic spines (Davidson & McEwen, 2012)

**Figure 1** Chronic stress causes neurons to shrink or grow, but not necessarily to die. Representation of the chronic stress effects detected in animal models on growth or retraction of dendrites in the basolateral amygdala and orbitofrontal cortex (growth) and in the CA3 hippocampus, dentate gyrus and medial prefrontal cortex (shrinkage). These effects are largely reversible in young adult animals, although aging appears to compromise resilience and medial prefrontal cortex recovery²¹.
Executive Function Problems in Children

• Significant problems in executive function in:
  • Children with brain tumors
  • Children with leukemia
  • Children with sickle cell disease
  • Children with depression

• Problems in executive function are related to:
  • Problems in the ability to cope with stress
  • Example:
    • Working memory is a foundation for the ability to think about a problem in a more positive or less stressful way

• These children take a double hit
  • Faced with significant stress due to disease and its treatment
  • Ability to cope is compromised by the disease and its treatment
Children at Risk: Pediatric Brain Tumor Survivors

Group by N-back Level Interaction in the Left DACC (BA32)
Coping With Stress

• Guideline For Effective Coping:

  Grant me serenity to accept
  the things that I cannot change,
  courage to change the things I can,
  and wisdom to know the difference.

• Implication:
  • Certain coping skills may be most effective
    for managing uncontrollable stressors
  • But different coping skills may be most effective
    for managing controllable stressors
Control Model of Coping

- Subtypes of Coping-Emotion Regulation
  - Primary Control Coping
    - Efforts to directly act on source of stress or one’s emotions
  - Secondary Control Coping
    - Efforts to adapt to source of stress
  - Disengagement Coping
    - Efforts to orient away from source of stress
Empirical Support for Three-Factor Model of Coping

- Confirmatory Factor Analyses:
  - Connor-Smith et al. (2000)
    - Euro-American adolescents coping with social stress
  - Wadsworth et al. (2004)
    - Native-American (Navajo) adolescents coping with social stress
    - Spanish (Catalan) adolescents coping with social stress
  - Compas et al. (2006a, 2006b)
    - Euro-American adolescents coping with chronic pain
    - Latent variable analysis with adolescent and parent reports
    - Women coping with breast cancer
  - Xiao et al. (2010)
    - Chinese adolescents coping with social stress
  - Benson et al. (2011)
    - Bosnian adolescents coping with war-related trauma
Control Model of Coping

Subtypes of Coping-Emotion Regulation

- **Primary Control Coping**
  - Best suited for controllable stress
  - Example: *Problem solving*

- **Secondary Control Coping**
  - Best suited for uncontrollable stress
  - Examples: *Acceptance, Cognitive Reappraisal*

- **Disengagement Coping**
  - Poorly suited for all types of stress
  - Examples: *Avoidance, Denial*
Longitudinal Effects for Children Coping with Cancer

Time 1: Near Diagnosis

Children’s Secondary Control Coping

Path C

β = -.13 to -.21

Time 2: 12-Month Follow-up

Children’s Anxiety/Depression Symptoms

Path A

β = .50 to .56

Children’s Anxiety/Depression Symptoms

Compas et al. (2019)
Cognitive/Executive Function and Coping

A

\[ ab = -0.02 \text{ (SE = 0.02; 95\% CI = -0.09 to 0.01)} \]

\[ a = 0.00 \text{ (0.00)} \]

Working Memory

Secondary Control Coping

\[ b = -39.64^* \text{ (18.54)} \]

Depressive Symptoms

\[ c = -0.21^* \text{ (0.08)} \]

\[ c' = -0.18^* \text{ (0.08)} \]

B

\[ ab = -0.10 \text{ (SE = 0.05; 95\% CI = -0.24 to 0.02)} \]

\[ a = 0.002^{**} \text{ (0.00)} \]

Verbal Comprehension

Secondary Control Coping

\[ b = -46.93^* \text{ (21.65)} \]

Depressive Symptoms

\[ c = -0.09 \text{ (0.10)} \]

\[ c' = -0.01 \text{ (0.11)} \]
Communication and Support: Connectedness

No man is an island,
Entire of itself,
Every man is a piece of the continent,
A part of the main.
If a clod be washed away by the sea,
Europe is the less.
As well as if a promontory were.
As well as if a manor of they friend’s
Or of thine now were.
Any man’s death diminishes me,
Because I am involved in mankind.
And therefore never send to know for whom the bell tolls;
It tolls for thee.

John Donne, 1624
Communication and Support

• Communication between parents and children
• Gold standard: Direct observations of behavior
  • 10-15 minute samples of discussion about pleasant and stressful topics
• Coding for verbal and non-verbal behavior
• Macro-Coding:
  • Rate behaviors and emotions as not characteristic (1) to highly characteristic (9)
  • Coded by two independent raters
• Micro-Coding:
  • Transcribe interactions word-for-word
  • Code moment-to-moment exchanges
Communication and Support

• Effective parenting characterized by:
  • Warmth
  • Structure

• Parenting is impaired by:
  • Stress
  • Depression
  • Lack of resources
  • Lack of effective role models
Communication

Figure 1. Unstandardized path coefficients for the mediation model of the total, direct, and indirect effects of maternal PTSS at T1 on adolescent PTSS at T3 through maternal validations at T2. Standard errors are in parentheses.
Benefits and Costs of Caregiving

• Caring for others is strong motivation reflecting altruism and compassion
• Parents care for their children
• Children care for their parents
• But there can be challenges when children take care of their parents
  • Children of parents with cancer—more distress
  • Children of parents with depression—more distress
  • Children with cancer—more distress
Increasing Resilience

• Improving Cognitive Function
  • Computer-based programs involving repeated adaptive practice
  • Aerobic Exercise

• Enhancing Parenting and Coping Skills
  • Teaching parents better parenting skills
  • Teaching children how to cope
Cognitive Training

Fig. 1. A teen working at a CogMed game. [Photo courtesy of CogMed]
Cognitive Remediation for Survivors of Pediatric Brain Tumors and Congenital Heart Disease

Two pilot studies by our team using a more patient-friendly imaging method

- Near infrared spectroscopy
Teaching Parenting and Coping Skills

• Parental history of depression as major risk factor for depression and other mental health problems in children
  • Levels of depression 4 to 5 times higher than general population
• Parental depression leads to stressful family environment
  • Parental sadness, withdrawal, irritability and intrusiveness
• Stressors are recurrent, unpredictable and uncontrollable
• Requires use of secondary control coping skills to manage these stressors
  • Acceptance, cognitive reappraisal, distraction
Teaching Parenting Skills

• Teach effective parenting and communication skills
  • Praise
    • Drive-by praise
  • Spending quality time together
  • Attentive listening
  • Validation
  • Clear expectations and consequences
  • Manage your own emotions first, then respond to others
Parental Depression and Child Mental Health Problems

- Parent’s Depression
- Parenting Skills
- Stress in Family Context
- Children’s Coping/Emotion Regulation Skills
- Child Psychopathology (Internalizing and Externalizing Symptoms/Disorders)
Targets for Intervention with Depressed Parents and Their Children

Target of FGCB Intervention

Stress in Family Context

Parent’s Depression

Parenting Skills

Target of FGCB Intervention

Child Psychopathology (Internalizing and Externalizing Symptoms/Disorders)

Children’s Coping/Emotion Regulation Skills
Study Design

Initial Randomization

- 8-weekly Family CB Intervention
- 4-monthly Booster Sessions

Follow-up

2-months  6-months  12-months  18-months  24-months

**Intervention Effects:**

**Child Diagnoses of Over 2 years**

<table>
<thead>
<tr>
<th>Odds Ratio</th>
<th>2.96</th>
</tr>
</thead>
<tbody>
<tr>
<td>95% CI Odds Ratio</td>
<td>1.12 - 7.82, p = .028</td>
</tr>
<tr>
<td>Chi-Square</td>
<td>5.07, p = .038</td>
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</tbody>
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Compas, Forehand et al. (2015)
How Did the Program Work? Mediation Analyses

- Intervention vs. Control
  - Changes in Children’s Coping
    - Changes in Parenting
      - Child Depression at 12-months
        - Child Depression at Baseline

Compas, Thigpen, Forehand et al., 2010
Translation to HD

• Exposure to Stress and Chronic Adversity
  • Understand key sources of stress for HD patients and families

• Characteristics of Resilience
  • Identify deficits in executive function skills
  • Identify types of coping skills to cope with wide range of stressors related to HD

• Ways to Enhance Resilience
  • Cognitive training?
  • Learning and practicing single coping skill?
  • Learning and practicing multiple coping skills?
  • Enhancing communication and support?