Technology-based "Behavioral Vaccines" to Prevent Child and Adolescent Mental Disorders in Health Systems: Are We There Yet?

University of Chicago School of Social Work Administration

Davis Lecture, October 28, 2014

Benjamin Van Voorhees, MD, MPH
Heather Risser, PhD
Jennifer Nidetz, LCSW
Stephanie Cordel, BS
Many thanks to my SSA teachers and colleagues

- William Borden, Ph.D.
- Mathew Epperson, Ph.D.
- Susan McCracken, Ph.D.
- Harold Pollack, Ph.D.
- Dexter Voisin, Ph.D.
Caring for people - whatever the circumstance
People and the challenge of living-the role for the physician
<table>
<thead>
<tr>
<th></th>
<th>Grant Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Centers for Disease Control, Prevention Research Centers, Grant #U48/CCU309674 (2002)</td>
</tr>
<tr>
<td>2</td>
<td>National Association for Research on Schizophrenia and Affective Disorders Young Investigator Award (2004)</td>
</tr>
<tr>
<td>3</td>
<td>Robert Wood Johnson Foundation Depression in Primary Care Value Grant (2005)</td>
</tr>
<tr>
<td>4</td>
<td>National Institute of Mental Health Physician Scientist Career Development Award (2006)</td>
</tr>
<tr>
<td>5</td>
<td>RWJ Foundation Finding Answers Grant (2010)</td>
</tr>
<tr>
<td>6</td>
<td>1 R01 MH090035-01A1 Primary Care Internet-Based Depression Prevention for Adolescents (CATCH-IT) (2011)</td>
</tr>
<tr>
<td>7</td>
<td>CMMI Healthcare Innovations Grant, 2015</td>
</tr>
</tbody>
</table>
- Mevident, Inc
  - Received $4,000 to assist in revising version of CATCH-IT for schools
- Prevail Health Solutions, Inc.
- Social Kinetics, Inc
- Chinese International School, Hong Kong
- University of Hong Kong
- Alberta Medical Association
- Dalhousie University
- Hong Kong Government, SA, PRC

Disclosures: Rise Consulting, LLC
Infant Mental Health
A Staten Island teenager fell into a manhole while texting

Last of Teen Sex Ring Suspects Arrested

Teen Locked Up In Closet For Years

Frequent Family Meals Might Reduce Teen Substance Use

Russia considers ban on emos and goths

When Flirting Becomes Pornography – Sexting

TV, other factors lead to early teen sex: Study

Study reveals teen self-harm rate
Core concepts

• Modern people dwarfed and alienated by urbanization and overwhelmed complexity
• Mental and developmental disorders in childhood arise in this context
  ▫ Potential solutions undermined by the same precipitating factors and reluctance to fund these services
• Behavioral intervention technologies offer novel solutions
  ▫ Simplified distribution and low cost
  ▫ Build self-determination (connection, autonomy and competency)
• Can we build these models into health systems?
Alienation and Complexity of Modernity...

“Life, as we find it, is too hard for us; it brings us too many pains, disappointments, and impossible tasks”

*Civilization and its Discontents*

Sigmund Freud, MD, 1930
Trends in Depression by Birth Cohort

- Cumulative lifetime rates of MDD by birth cohort and age of onset from ECA (Epidemiologic Catchment Area Study)
- Burden of depression in adolescence is rising across the last century

Burden of Child and Adolescent Mental Disorders

- Increase in recent years in morbidity of behavioral and mental disorders
- 75% of cases have initial onset before the age of 24
- 20% (US) of children have disorders
- 294 billions dollars in direct and indirect costs

## Prevalence of the Disorder-Similar Across Cultures

<table>
<thead>
<tr>
<th>Problem/Disorder</th>
<th>Point Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>China</td>
</tr>
<tr>
<td>Any disorder</td>
<td>16.9%</td>
</tr>
<tr>
<td>ADHD</td>
<td>3.9%</td>
</tr>
<tr>
<td>Oppositional Defiant Disorder</td>
<td>6.8%</td>
</tr>
<tr>
<td>Depressive Disorder</td>
<td>1.3%</td>
</tr>
<tr>
<td>Anxiety disorders</td>
<td>6.9%</td>
</tr>
<tr>
<td>Substance Abuse</td>
<td>1.7%</td>
</tr>
</tbody>
</table>

And the Promise

“Resilience arises from ordinary magic of ... human adaptation and capability”

Resilience and Vulnerability
Suniya Luthar, Ph.D, 2002
Overcoming resistance and raising funds is a major part of this challenge

- **Phase 1 Clinical Trial**
  - 2002-2004
  - Analysis of pilot study results
  - Need narratives and Pictures to engage

- **Phase 2 Clinical Trial**
  - 2005-2007
  - Stories and self-diary value

- **Phase 2 Clinical Trial Analysis**
  - 2007-2010
  - Quality of experience drives potential efficacy

- **Phase 3 clinical trial plan and intervention development**
  - 2011-2012
  - Complexity of integrating multiple design elements

- **Phase 3 Clinical Trial - PATH Study and CURB Study**
  - 2012-2016
  - Digital ennui – need for strong relational component

---

**Funding Sources**

- **John Hopkins Fellowship and CDC/Foundation**
  - $7,000

- **University of Chicago/K-Award and R-34**
  - $1,000,000

- **University of Illinois/RO-1 and RWJ Foundation**
  - $4,000,000
Core concepts

• Modern people dwarfed and alienated by urbanization and overwhelmed system complexity
• Mental and developmental disorders in childhood arise in this context
  ▫ Potential solutions undermined by the same precipitating factors and reluctance to fund these services
• Behavioral intervention technologies offer novel solutions
  ▫ Simplified distribution and low cost
  ▫ Build self-determination (connection, autonomy and competency)
• Can we build these models into health systems?
Why *Prevent* Adolescent Depression?

- Treatments for adolescent depression work, but only about half the time.
- Relapse is quite common, with 40% of teens relapsing within 2 years, and 75% relapsing within 5 years.
- Prevention is less expensive, and less disruptive, than waiting for an episode to emerge and trying to treat it.
- Prevention research suggests that there is evidence for long-term benefits from depression prevention efforts (e.g., Beardslee et al., 2013).
Layered Vulnerability Factors for Child Mental Disorder

- **Child characteristics:**
  - gender, age, ethnicity, physical health, cognitive and psychological function, pre- and peri-natal exposures to illness, physical stress, alcohol, drugs, nutrition, infections and other environmental agents, and lifetime history of environmental exposures to toxins, stress, infections

- **Life events:**
  - stress, social environment and stressful life events

- **Family and parent characteristics:**
  - parental education, age, social class, employment, psychiatric and medical history, and family function, structure

- **Neighborhood and broader contextual influences:**
  - violence, educational system

---

Complex Causation in Space and Time

Space
Multiple community, school, individual and family factors

COMMUNITY
Engagement/Delinquency

SCHOOL/PEER
Performance/Failure
Acceptance/Rejection

FAMILY
Connection/Conflict

INDIVIDUAL
Active/Passive Coping

Time
Factors interacting across time from vulnerability to disorder to outcome

Vulnerability and Protective Factors

Depressive Disorder (DD)

Health outcome

Adapted from Van Voorhees, et al, JAH, 2008
And Across Inter-locking Developmental Domains

Human Brain Development
Experience-Dependent Synapse Formation

Conception | Birth | (Months) | (Years)

Sensory Pathways (Vision, Hearing)
Language
Higher Cognitive Function

Age


http://www.developingchild.harvard.edu
Physical Development

Children’s Hospital University of Illinois/TIKES Center

Risser & Issa, 2014
With Substantial Neuro-developmental Impact

Perry, 1997
Intervening Effectively Requires Choreographing Multiple Interventions Across Time and Space at Optimal Early Time Points and Settings

Risser & Issa, 2014
Core concepts

• Modern people dwarfed and alienated by urbanization and overwhelmed system complexity
• Mental and developmental disorders in childhood arise in this context
  ▫ Potential solutions undermined by the same precipitating factors and reluctance to fund these services
• Technology Based Behavioral Vaccines offer novel solutions
  ▫ Simplified distribution and low cost
  ▫ Build self-determination (connection, autonomy and competency)
• Can we build these models into health systems?
Cost and Feasibility of Conventional Treatment

- Conventional Prevention can be Effective, but Costly and unfeasible
- The hazard of depression onset was significantly lower in CB than UC ($\chi^2=4.90$, $p=0.03$; Hazard Ratio (HR)=0.63, 95% CI: 0.40–0.98)
- 32.7% of adolescents in the UC control condition were diagnosed with a probable or definite MDE
- 21.4% of youth in the CB program had a MDE

Gladstone, Beardslee, Clark, Brent, Garber, JAMA, 2009
Technology Interventions As Alternatives

- Technology interventions are inexpensive and close to modifiable vulnerability factors
- Conceptualized as integrated components of the ecological development process that leads to social capital formation
- Health promotion, prevention, and treatment interventions
- Provides for possible mental health screening

Cost of Primary Care Internet-based Approach and Face-to-Face Models

- **Cost of implementation:** $597.50 per patient (higher than hypothesized $100 and higher than willingness-to-pay)

- **Cost of implementing a 15-session group therapy intervention:** $1632 (Lynch, 2007)
  - Therefore, CATCH-IT still over $1000 cheaper

![Costs of Implementation (%)](image)
Behavioral Vaccine Model - 4 Key Components

<table>
<thead>
<tr>
<th>Life Course Schedule (A)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Infancy</td>
<td>Childhood</td>
</tr>
<tr>
<td>Mothers and Baby’s</td>
<td>Infancy</td>
</tr>
<tr>
<td>Penn Optimism and Legend of the Snow Orchid</td>
<td>MOODGYM CATCH-IT</td>
</tr>
<tr>
<td>MOODGYM CATCH-IT ODIN</td>
<td>Middle Adulthood</td>
</tr>
<tr>
<td>Beating Blues Blue Pages Color Your Life</td>
<td>Older Adults</td>
</tr>
<tr>
<td>Trimbos Institute Intervention</td>
<td></td>
</tr>
</tbody>
</table>

**Effective Components (B)**

**Framework for Motivation (C)**

**Implementation Structure (D)**

Effective Intervention Components

- Combine interventions with other evidence-based components
- Adapt inexpensive standard interventions to specific cultural settings - socio-cultural relevance
  - Determine what can be shared across large cultural areas vs. local areas
- Is it as effective as face to face - comparative effectiveness?
- How long will it work - duration of benefits?
- What components contribute to efficacy mediators and moderators?

CATCH-IT

- Primary care based interventional Web site
- Principles based in CBT, IPT, and BA
- Substantial engagement with the site
- Moderate pre/post effect sizes for depressed mood


How the Behavioral Vaccine Model Works

“I’m feeling down”

Nurse visit followed by enrollment of teen

Doctor visit

Online intervention

Phone follow up

Online intervention - Patient has reduced risk of disorder

Implementation Structure

Motivational Framework

Effective Components
Project CATCH-IT is made up of 6 sections that we recommend you read in sequence. They are:

1. Intro
2. How You Act
3. How You Think
4. How Do You Form Relationships
5. How Do You Socialize
6. Wrap Up

Each section has at least 2 chapters that cover different topics. These topics include:

- **WHAT YOU WILL LEARN**: Section basics and Chapters
- **REVIEW**: Recap what you learned in the last module
- **LESSON**: Questions, examples, and discussion
- **STORIES**: Read how people like you apply the skills in each module to their lives
- **SKILL BUILDERS**: Apply what you learned to your own life
- **FEEDBACK**: Tell us what you think about the program or what you learned
- **WRAP UP**: See the big picture of each module
- **DOING GOALS**: New things you can learn or ways of training yourself
- **REWARD**: Something fun you can do on the web

---

This study was made possible by a NARSAD Young Investigators' Award and the Robert Wood Johnson Depression in Primary Care Value Grant.

©2006 Department of Medicine® The University of Chicago
5812 S. Ellis Street, Chicago, IL 60637 Contact Us
Cognitive Behavioral Therapy -

Freedom from Negative Thoughts
How can I train my thoughts?

The methods used in this module to help you train your mind are part of Cognitive Behavioral Therapy (CBT). The idea behind CBT is pretty basic: by changing your beliefs/thoughts, you can change the way you feel and act. No matter the situation, you have the power to decide how you will think about that situation and react to it. Getting stuck in negative thinking is just a bad habit; it might be hard to break, but it can be done.

Now that you've learned how your emotions and patterns of behavior are affected by the world around you (thinking "outside-in"), it's time to learn how to change and control your thoughts to improve your mood. CBT can teach you how to better understand the way you think, including how to identify thoughts that are negative or unhelpful. Using CBT, you can learn how to change and control your emotional responses to unpleasant situations in the moment, helping you to avoid sadness or negative emotions and improve your mood. You will feel better about yourself, other people, and the world around you.
Duration of Benefits – CATCH-IT Long Term Follow-up

Center for Epidemiologic Studies Depression Scale (CES-D) comparison for both groups baseline to 120 weeks, P-value > 0.001

CATCH-IT Intervention

Children’s Hospital University of Illinois/ TIKES Center
Sally N Merry associate professor1, et.al, The effectiveness of SPARX, a computerised self help intervention for adolescents seeking help for depression: randomised controlled non-inferiority trial
Depression

- **MoodGym & Blue Pages**
  - Unguided self-help program based on principles of CBT, interpersonal therapy and relaxation techniques combined with evidenced-based information about depression (Blue Pages)
  - Significant improvements in 2-month follow up
- **Depis.net**
  - Recent development of Internet-based support system for adolescents with depression tailored to improve self-management skills
  - Consists of elements identifying adolescents’ needs, and offering self-monitoring, access to health information and self-reflective written exercises


Eating Disorders

- **My Body...My Life...**
  - Body image program for adolescent girls
  - Demonstrated moderate effect sizes between bulimia and depression

- **The Student Bodies Program**
  - Showed small to medium effect sizes for both adolescent and parent outcomes


Combination Programs

- DEAL Project
  - Development phase of Internet-based program for young people (aged 18–25 years) with co-occurring depression and alcohol use problems
  - Based on CBT & Motivational Enhancement

- COPE Healthy Lifestyles TEEN
  - Educational and cognitive–behavioral skills building (CBSB) intervention that includes 20 min of physical activity in each session
  - Current RCT targets teens 14-16 years enrolled in health class


### Effect-sizes Comparable to Other Internet-Based Interventions

<table>
<thead>
<tr>
<th>Category</th>
<th>Mean Btw Group ES</th>
<th>Mean Pre/Post ES</th>
<th>Mean NNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression (Treatment)</td>
<td>0.20</td>
<td>0.26</td>
<td>9.88</td>
</tr>
<tr>
<td>Depression (Prevention)</td>
<td>0.32</td>
<td>0.65</td>
<td>NA</td>
</tr>
<tr>
<td>Anxiety</td>
<td>0.24</td>
<td>0.64</td>
<td>NA</td>
</tr>
<tr>
<td>Eating Disorder</td>
<td>0.29</td>
<td>0.29</td>
<td>NA</td>
</tr>
<tr>
<td>Substance Abuse</td>
<td>0.25</td>
<td>0.05</td>
<td>NA</td>
</tr>
<tr>
<td>CATCH-IT</td>
<td>0.18</td>
<td>0.54</td>
<td>5.6</td>
</tr>
</tbody>
</table>

Behavioral Vaccine Model-4 Key Components

Implementation Structure

• Primary care setting as an effective way to reach youth at-risk for depression
• Combination of self-directed internet intervention and some amount of face-to-face contact with PCP and study staff
• Intentional website design using Instructional Design Theory and Synchronization of the Senses


Delivery Mechanisms & Context

- **Goal**: Maintain high participation rates
  - More interactive exercises
  - Less textual information
  - Use range of media
- **Restrictions**: developing countries may not have technical infrastructure available
- **Two assessment strategies with best participation** were Internet and primary care
- **Recruitment via search of medical records**

Increasing Interaction and Work: Self-Efficacy Exercises

**Warm-Up Exercise**

We hope you enjoyed meeting with your physician and discussing your life goals. When you met with her/him, you talked about how building up your resiliency using CATCH-IT could be helpful in achieving your goals. Now we want to check how you feel like you are progressing. Your physician's hope is to provide the chance for you to "train up" for life's challenges using CATCH-IT. Building up resiliency comes down to learning and practicing your coping skills. Your physician wants to quickly "check-up" on how you think you are doing.

What was one of the goals you enjoyed talking about most with your physician?

Think about the last module you did. What was the coping skill you learned, and why do you think it might be helpful?

How do you think that coping skill might work in real life to keep you focused on your goals and help you feel better?

What motivated you to want to use that coping skill since that last visit to the Internet site?

When you used the coping skill, how did using it change or affect your life?
Increasing Interaction and Pleasant Experience: Narrative Learning Model - Self-Diaries
Increasing Interaction and Work: Skill Builder

Module 11: Skill Builder

Think of a recent relationship conflict that put you in a bad mood, then print and fill out the diagram on this page. We added a circle to ask you to consider what belief about yourself perhaps makes you feel this way. An example is not speaking up because you think people will laugh at you.

1. What stage was your conflict in - “talking it out”, “stuck” or “breaking up”?

2. Which problem-solving or communication tools could you have used to make things better?

3. Imagine how acting differently in the situation that you described might have helped you feel better. Write down some ways in which things might have improved.

Submit
Increasing Interaction and Reciprocity: Feedback
Using Implementation Structure to Increase interactivity and participation

<table>
<thead>
<tr>
<th>Variable</th>
<th>CATCH-IT 2 Mean(SD)</th>
<th>CATCH-IT 3 Mean(SD)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modules Completed</td>
<td>6.75(5.88)</td>
<td>3.73(4.30)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Characters typed</td>
<td>2778.04(2788.94)</td>
<td>3927.17(4043.94)</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>(411/module;22/min)</td>
<td>(1,052/module;42/min)</td>
<td></td>
</tr>
<tr>
<td>Time on site</td>
<td>122.22(117.82)</td>
<td>93.35(107.40)</td>
<td>0.09</td>
</tr>
</tbody>
</table>
Delivery Mechanism: from Sparx-Fantasy Game
Substance Abuse-Animation

- **ClimateSchools** is a program for the prevention of substance abuse through an interactive website
  - Small-to-moderate effect sizes were observed between groups for knowledge of alcohol and cannabis and their use
  - Small effect sizes were seen for weekly alcohol consumption and frequency of cannabis use
- **Computer-facilitated screening and brief advice (cSBA)**
  - Computerized screening and educational component before the visit, and provider advice during the visit
  - Compared with treatment as usual, cSBA patients reported less alcohol use at follow-up (3 & 12 months)


Safety

- Majorly depressed participants risks:
  - Not being observed frequently
  - Not having meaningful reaction with care provider
- Increase monitoring of patients via email, phone, or direct contact
- Standard approach to safety management needs to be developed

Drama video example (time permitting)
Behavioral Vaccine Model-4 Key Components

---

Who is Using Internet-based models?

![Graph showing the number of participants completing different steps and the proportion of population with Goldberg depression scores.]

- General population (n = 7439)
- MoodGYM users (n = 41695)
- e-couch users (n = 4270)
- BlueBoard users (n = 131)
- BluePages visitors (n = 17230)
Increase Participation Predicts Improved Outcomes

**Fig. 2.** Estimated marginal means for CES-D scores estimated in Group × Occasion × Gender model for male participants. Error bars depict standard errors of the mean.
Professional Guidance Increases Participation on Internet Programs

- Higher completion rates for guided study vs. unguided study participants
- Drop rates larger for participants in self-directed psychotherapy groups
- Drop out rates in Catch-It after 3 months**:  
  - With phone follow-ups: 7%
  - Without phone follow-ups: 43%
  - Physician motivational interview increased Internet participation >25%


Motivational Framework-CATCH-IT

• Model based upon the Theory of Planned Behavior and depression help-seeking
• Participants completed a behavior change contract
• Three PCP motivational interviews at 0, 2 and 12 months and a 1-month safety/motivational call from study staff for teens
• Parents receive a parallel structure of 3 motivational interviews and one phone call only by study staff


PATH Study Design and Randomization

**Study Design**

- Screening in Primary Care
  - Eligibility Assessment
  - Consent and Randomization
  - Baseline Assessment (Time=0)

**CATCHIT**
- \( N = 200 \)
  - Self-Assessment via Internet at 2, 6, 12, 18 and 24 months
  - Structured Psychiatric Interview at 2, 6, 12 and 24 months

**Attention Monitoring**
- Psycho-Education (Health Education)
  - \( N = 200 \)
Motivational Interview Video (time permitting)
Results

- N = 234 adolescents enrolled (186 randomized)
- Mean Age = 14.94 (SD = 1.49)
- 73.75% Female
- 46.89% Racial Minority
- 17.95% Latino
- Mean Adolescent Baseline CES-D = 17.86 (SD = 9.28)
Internet Participation: Average Number of Modules Completed by Teens

Across Sites

<p>| | | | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>14</td>
<td>13</td>
<td>12</td>
<td>11</td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.73*</td>
<td>6.76*</td>
</tr>
</tbody>
</table>

By Site

<table>
<thead>
<tr>
<th></th>
<th>Boston</th>
<th>Health Ed</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>5.05</td>
<td>7.89</td>
</tr>
<tr>
<td>14</td>
<td>2.84**</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>5.96**</td>
</tr>
</tbody>
</table>

* Statistically significant difference between Total Teen CATCH-IT use and Total Teen Health Ed use
**Statistically significant difference between Chicago Teen CATCH-IT use and Chicago Teen Health Ed use
Internet Participation: Average Number of Modules Completed by Parents

Across Both Sites

- CATCH-IT Parents: 2.37
- Health Ed Parents: 2.18

By Site

- Boston CATCH-IT Parents: 2.40
- Chicago CATCH-IT Parents: 2.48
- Boston Health Ed Parents: 2.34
- Chicago Health Ed Parents: 1.85
Internet Participation: Average Number of Minutes Teens Spent on Modules

Across Sites

By Site

* Teens spent statistically more time on CATCH-IT than on Health Ed.
School Based Teacher Lead- Anxiety

- **BRAVE Online**
  - Studies include 1 pre/post design and 3 randomized clinical trials
  - Effect sizes without direct face-to-face contact were small, but those done in a clinic setting reported as moderate

- **Cool Teens**
  - 12-week computerized cognitive-behavioral therapy program for anxiety management
  - Small RCT (43 teens) with significant reductions in anxiety presence and severity


Core concepts

• Modern people dwarfed and alienated by urbanization and overwhelmed system complexity
• Mental and developmental disorders in childhood arise in this context
  ▫ Potential solutions undermined by the same precipitating factors and reluctance to fund these services
• Behavioral intervention technologies offer novel solutions
  ▫ Simplified distribution and low cost
  ▫ Build self-determination (connection, autonomy and competency)
• Can we build these models into health systems?
Health System Level Changes

- Providers to address on their own
- Training of physicians
- Training of para-professionals
- Training of general practice and Pediatricians must play major role
- Use of technology based interventions
  - Early preventive intervention may be most effective in reducing life time burden


Importance of Early Intervention

• Early childhood adversity can lead to lifelong impairments in learning, behavior, and both physical and mental health
• Nurturing environments during early childhood minimize problem behaviors and promote pro-social and self-regulatory skills
• A key formation of social-emotional development in children is presence of positive caregiver-child relationship


Intervention Model

FROM HEAD TO TOOTH Intervention Model

Screening and Medical Record

- Level 1 Prevention
- Level 2 Early Intervention
- Level 3 Augmented Primary Care
- Level 4 Complex Treatment

Information/Communication Technology Portal

Community Health Worker N=10 CHW

Patient Intervention

- Medical and Dental Home Population
- Risk Factors for disease
- Early Symptoms of disease
- Full disorder diagnosis: mild/moderate
- Full disorder at high severity

Outcome and Cost
Intervention Aims

Aims and Outcomes


2. Improve access, care coordination, and quality of care for those already diagnosed with mental disorders, oral disease, developmental delay, asthma, epilepsy, and diabetes.

Primary Drivers

- Community Health Workers (CHW)
- Information and Communication Technology (ICT)
- Primary care provider (PCP) education

Secondary Drivers

- Patient empowerment/behavior change
- Trust/cultural adaptation
- Tracking and secure, low cost and efficient communication between CHW and patients
- Bright Futures program, communication skills training, Clinical Guideline training in Collaborative Care
- Bright Smiles program

From Head to Tooth Goals
Ameliorating factors

- Parent child relationships prompt medical care effective medical management

Exacerbating factors

- Problematic parent child relationships
  - Mental illness
  - Family Chaos

Inflammation

Well managed condition

Moderately managed condition

Poorly managed condition

Promotion

1. Support and reinforce family strengths
2. Prepare for next developmental stage.

Prevention

1. Step 1 repeated
2. Step 2 repeated
3. Health literacy
4. Support activation and motivation

Intervention

1. Step 1
2. Step 2
3. Step 3
4. Developmentally appropriate solution-focused self-discovery
5. Improve activation and motivation
Intervention by Developmental Phase

<table>
<thead>
<tr>
<th>Infancy</th>
<th>Early Childhood</th>
<th>Childhood</th>
<th>Early Adolescence</th>
<th>Adolescence</th>
<th>Young Adulthood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Happiest Baby</td>
<td>Family Check Up</td>
<td>Family Matters</td>
<td>Strengthening Families</td>
<td>Universal</td>
<td>Primary Prevention</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Secondary Prevention</td>
</tr>
<tr>
<td>Happiest Toddler</td>
<td></td>
<td>Strong African American</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incredible Years (Primary Care Model)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triple P- Level 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Healthy Steps/Bright Futures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Effectiveness of Early Childhood Programs

- **Incredible Years**
  - RCTs showed significant improvement in parenting skills, reduced behavior problems and reduction in externalizing problems related to parent mental health risk factors

- **Triple P**
  - More than 150 studies over 33 years with significant effects for parenting practices along with children’s social, emotional & behavioral outcomes

- **Healthy Steps**
  - Recent findings show Healthy Steps may serve as moderator of caregiver childhood trauma and child social-emotional development


Preventable oral, mental and developmental disorders increase cost and block development

Developmental Outcomes of Children in Urban Settings

50% of ethnic minority urban children do not graduate from high school
CMMI Innovation Grant Model Seeks to Close the Gap and Reduce Costs

Developmental Outcomes of Children in Urban Settings

From Head to Tooth will boost developmental outcomes through early identification, prevention and treatment.
Conclusions

- Evidence that Internet interventions can play important role in the prevention of mental disorders continues to develop
- However, they are unlikely to fulfill this potential if they are not carefully developed with regard to effective components, motivational framework and implementation structure
- Future directions will include combining trial data from across the world and evaluation of interventions in defined populations
The Importance of Relationships
Project CURB is a community and internet based project designed to teach coping skills to teenagers and young adults.

Coping skills like those taught by project CURB have been successfully taught to the youth through face to face counseling. The purpose of this internet intervention is to help teach you resiliency so you can achieve your life goals and reduce risk of becoming depressed in the future.

This website is recommended to youth by their families or primary care doctors and is intended to help you teach yourself how to beat the blues on your own time.
For Personal, Private and Down Moments

“Because you probably just don’t want anybody to know about it, or you don’t want people to see what you are doing, because you could feel embarrassed…”

“Well we’d use it at home because we have nothing to do or we’re sad…When you are out you don’t feel (sad) so much…”

“It may be weird when I say this, but I talk to my phone. I’ve got an IPhone and I’ll be talking to Siri”

“If it was going to come as an app I would like it to be a competition with somebody else. That would be fun”

“It should have games on one side; there’d be a whole thing full of games”

“I would download that app…”

“But I definitely dig...what you guys are trying to accomplish with the website. I like the theme...and lessons and stuff like that. But just more interactive stuff, because reading sometimes makes you tired.”
Low utilization and interactivity for most youth-external factors

Coping Continuum and Deciding to Tell Feelings of Sadness – Identifying Trust, Judgment, and Reaction as Links or Barriers to Clinical Help in African American and Latino Teens
Premie Protocol

- All families receive training in 5Ss, THB DVD, white noise, swaddling blanket, pacifier, UR parent mobile app
- All families receive a follow-up call 48 hours after discharge
- All families receive a Family Assessment – follow up PCP appt.
- Families receive additional services and referrals as needed

Referrals: HV,MV,T, SS MH, etc.
Resources

Mother

Not Depressed

THB, P_24/7
Text4Baby, HV,
Parenting.org

Depressed

THB, P_24/7
Text4Baby, HV,
Parenting.org

Maternal
Referral to CP

Other Needs

Coordinate with
CHW; resource
binder
Can behavioral intervention technologies provide a “partial” response – attenuate the links – between mental disorder and/or poverty in childhood and worse health outcomes in adulthood?
Overview

• Burden of Mental and Developmental Disorders
  ▫ Depression as a model disease
• Technology and Potential Cost Reduction
• Behavioral Vaccine Model and Technology
  ▫ CATCH-IT/Promoting Adolescent Health
• Health system reorganization model
  • Infant Mental Health
• Conclusions
Ability to Address Parent and Child Factors Simultaneously

- Potential for online interactive exercises between parent and child
- Opportunity to strengthen communication and discussion between child and parent
- Self-assessments for both parent and child
- MI to help strengthen the family
Impact Begins in Adolescence

- 50% of all lifetime mental disorders by mid-adolescence
- 75% of all lifetime mental disorder have onset by mid-20s
  - Importance of early intervention: most are not diagnosed in adolescence and severity increases over time
  - Remaining 25% develop mental disorder secondary to other conditions or following major precipitants
- Leading cause of death (suicide) and disability for 15-45 year olds

Adolescent Depression

• Point prevalence rates of 3-8% (Horowitz et al. 2011)
  • Average age of first onset = 15 years (IOM Report, 2009)
  • Lifetime prevalence rate of depression by end of adolescence = 25%
  • Relapse rate of 40% within 2 years; 75% within 5 years (Lewinsohn et al. 1994; Kovacs et al. 1984a,b)

• Symptoms of depression in adolescence are associated with risk for full-blown disorder (Rhode et al. 2009)
  • Most cases of recurrent adult depression have initial onsets during adolescence (Costello et al. 2002)
  • Long-term impact of functional status, education, employment, self-harm risk and other disorders such as cardiovascular disease
Treatment of Adolescent Depression

- Some support for three types of treatment:
  - Pharmacotherapy
  - Cognitive-behavioral psychotherapy
  - Interpersonal psychotherapy
- 50-60% of youth treated in controlled research studies show improvement (Brent et al., 1997; Emslie et al., 1997; Mufson et al., 1999; TADS, 2004)
- Evidence-based treatments are less helpful the longer the duration of the depressive episode (Curry et al., 2006)
Sensitive Periods in Early Brain Development

Graph developed by Council for Early Child Development (ref. Nash, 1997; Early Years Study, 1999; Shonkoff, 2000.)
Proposed Care Model

Solution 1: Improving Care Transitions

Solution 2: Increasing Access by Increasing Touches
- PCP
- Clinical pharmacists
- APN
- Patient Navigators
- Specialty providers
- Behavioral Health providers
- Dental providers

Solution 3: Meaningfully Engaging the Community

Solution 4: Disease Specific Interventions

Infant mental health

Pre-disease - Disease onset - Diagnosis - Treatment - Care oversight - ER/Hospitalization/High cost/Poor outcome
Perry, 1997