Distillation and Matching: Identifying Components of Evidence-Based Practice

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Acknowledgements


Meta Analysis

- Basic problem in all areas of science – how do we make large numbers of findings useful?
- We have already expended the costs, how do we maximize the benefits?
Meta Analysis of Child Treatments

- In general, findings show broad classes of child treatments are effective, as are specific manuals
  - Cognitive Behavior Therapy
    - Coping Cat (Kendall, 1990)
  - Parent Management Training
- Good effect sizes
Practitioner Concerns

- Fixed content
- Fixed intensity
- Fixed length
- Single target approach
- Replacement
- Empty cell problem
- Crowded cell problem
- Expiration problem

Aarons (2004); Addis & Krasnow (2000); Addis, Wade, & Hatgis (2004); Chorpita, Daleiden, & Weisz (2005); Kimhan & Chorpita (2006); Persons (1995)
Researcher Concerns

- Poor specification of IV
  - Lack of a formal aggregator
- Limited examination of context variables
  - Diagnosis-specific main effects, with two-way interactions (diagnosis x age) in some cases

Chorpita et al., (2002); Chorpita, Daleiden, & Weisz (2005)
How Can We Get More Out of Existing Data?

- **Distillation**: Reduce protocols to their elements to facilitate aggregation

- **Matching**: See how protocols match with context variables
Distillation

Families

Protocols

Practice Elements
Data Mining Procedures

- Coding of 322 RCTs involving 615 treatment protocols:
  - 25,435 youth participants
  - 41 years of research
  - > $400 million in today’s dollars
- Analysis of the resulting data set
- Expert review of resulting model
Coding Procedures

- Developed through pilot testing, expert feedback
- Used best available description of protocol
- Coded:
  - Sample characteristics
  - Protocol descriptions
  - Treatment outcomes
Coding Procedures: Sample Characteristics

- 29 study codes in 4 domains:
  - Problem
  - Age
  - Gender
  - Ethnicity
Problem Codes (n=16)

- Aggression
- Anger
- Anxiety
- Attention
- Autism
- Avoidance
- Depressed Mood
- Hyperactivity
- Justice Involved
- Oppositional/Non-compliant
- Phobia/Fears
- School Refusal/Truancy
- Shyness
- Substance Use
- Traumatic Stress
- Willful Misconduct, Delinquency
Coding Procedures: Protocol Descriptions

- 41 practice element codes
  - Cognitive
  - Commands
  - Exposure
  - Praise
  - Relaxation
  - Self-Verbalization
  - Time Out
Coding Procedures: Treatment Outcomes

- Baseline and post-treatment scores
- “Winning” treatments:
  - Significantly better than a control group on a primary measure of clinical symptoms of functioning
- Resulted in 279 “winning” treatment groups
Reliability

- Protocol Codes (Kappa)
  - Median = .75, Mean = .88
- Study Codes (Kappa)
  - Median = 1.0, Mean = .93
- Evidence-Based Classification
  - Spearman R = .95
Distillation

Parent Training

- Incredible Years
  - Commands
  - Time Out
  - Rewards

- PCIT
  - Attending
  - Time Out

- Defiant Children
  - Commands

Practice profiles based on frequencies inform Matching analysis
Matching: Analytical Approach

Are treatments organized differently based on contextual variables?

How do we know when treatments are “alike” or “different?”
Analytic Approach

- Examine all factors of interest
- Within each factor, determine whether categories can merge
- Intraclass correlation coefficient
  - High ICC between different categories of matching factor means that variance due to practices, not groups
- Iterative until no more merges
- Determine which factor maximizes differences
  - Based on alpha-to-split criterion
- Recursive within each node

Kass (1980)
Matching: Problem

Results
Problem
Final Tree

- Autism (7)
  - Anxiety (84)
    - Anxiety
    - Phobia
    - Shyness
  - Avoidance (4)
  - Traumatic Stress (11)
    - Depressed Mood (24)
    - School Refusal, Truancy (6)
    - ADHD (22)
      - Attention
      - Hyperactive
    - Oppositional, Aggressive (68)
      - Aggression
      - Anger
      - Oppositional
  - Delinquent (39)
    - Conduct
    - Justice Involved
  - Substance Use (6)

Problem .20
Ave. pairwise ICC
Externalizing

Oppositional
Aggressive

Praise .53
Time Out .51
Tangible Rewards .46
Commands .43
Problem Solving .41
Differential Reinforcement .40
Modeling .37
Cognitive .35
Psychoeducational-Parent .34
Monitoring .26
Communication Skills .26
Goal Setting .24
Response Cost .21
Behavioral Contracting .21
Attending .21
Therapist Praise/Rewards .19
Self-Monitoring .18
Social Skills Training .16
Stimulus Control or Antecedent Management .16
Natural and Logical Consequences .15
Relaxation .13
Psychoeducational-Child .13
Maintenance/Relapse Prevention .10
Parent Coping .09
Assertiveness Training .09
Insight Building .09
Self-Reward/Self-Praise .07
Exposure .06
Guided Imagery .04
Family Therapy .03
Talent or Skill Building .01
Physical Exercise .01
Educational Support .01
Marital Therapy .01
Family Engagement .01
Activity Scheduling .01
Self-Verbalization .01
Biofeedback/Neurofeedback .00

Delinquency

Praise .49
Time Out .21
Tangible Rewards .21
Commands .56
Problem Solving .23
Differential Reinforcement .21
Modeling .36
Cognitive .46
Psychoeducational-Parent .38
Monitoring .46
Communication Skills .41
Goal Setting .41
Response Cost .46
Behavioral Contracting .21
Attending .18
Therapist Praise/Rewards .41
Self-Monitoring .15
Social Skills Training .46
Stimulus Control or Antecedent Management .18
Natural and Logical Consequences .26
Relaxation .15
Psychoeducational-Child .08
Maintenance/Relapse Prevention .38
Parent Coping .23
Assertiveness Training .10
Insight Building .05
Self-Reward/Self-Praise .15
Exposure .05
Guided Imagery .08
Family Therapy .26
Talent or Skill Building .21
Physical Exercise .21
Educational Support .21
Marital Therapy .18
Family Engagement .18
Activity Scheduling .18
Self-Verbalization .18
Biofeedback/Neurofeedback .09

ADH

Praise .45
Time Out .32
Tangible Rewards .36
Commands .23
Problem Solving .32
Differential Reinforcement .18
Modeling .32
Cognitive .36
Psychoeducational-Parent .32
Monitoring .23
Communication Skills .09
Goal Setting .09
Response Cost .09
Behavioral Contracting .17
Attending .17
Therapist Praise/Rewards .32
Self-Monitoring .09
Social Skills Training .09
Stimulus Control or Antecedent Management .23
Natural and Logical Consequences .05
Relaxation .23
Psychoeducational-Child .33
Maintenance/Relapse Prevention .18
Parent Coping .09
Assertiveness Training .09
Insight Building .09
Self-Reward/Self-Praise .17
Exposure .17
Guided Imagery .17
Family Therapy .33
Talent or Skill Building .17
Physical Exercise .17
Educational Support .17
Marital Therapy .17
Family Engagement .17
Activity Scheduling .17
Self-Verbalization .17
Biofeedback/Neurofeedback .17

School Refusal

Praise .33
Time Out .33
Tangible Rewards .17
Commands .17
Problem Solving .17
Differential Reinforcement .33
Modeling .33
Cognitive .33
Psychoeducational-Parent .33
Monitoring .33
Communication Skills .33
Goal Setting .50
Response Cost .50
Behavioral Contracting .33
Attending .33
Therapist Praise/Rewards .33
Self-Monitoring .33
Social Skills Training .33
Stimulus Control or Antecedent Management .33
Natural and Logical Consequences .33
Relaxation .33
Psychoeducational-Child .33
Maintenance/Relapse Prevention .33
Parent Coping .33
Assertiveness Training .33
Insight Building .33
Self-Reward/Self-Praise .33
Exposure .33
Guided Imagery .33
Family Therapy .33
Talent or Skill Building .33
Physical Exercise .33
Educational Support .33
Marital Therapy .33
Family Engagement .33
Activity Scheduling .33
Self-Verbalization .33
Biofeedback/Neurofeedback .33
Final Tree

- **Autism (7)**
  - Ethnicity: .53
  - Age: .56

- **Anxiety (84)**
  - Anxiety
  - Phobia
  - Shyness
  - Ethnicity: .56
  - Age: .53

- **Avoidance (4)**
  - Age: .30

- **Traumatic Stress (11)**
  - Ethnicity: .70

- **Depressed Mood (24)**
  - Ethnicity: .30

- **School Refusal, Truancy (6)**

- **ADHD (22)**
  - Attention
  - Hyperactive
  - Ethnicity: .20

- **Oppositional, Aggressive (68)**
  - Aggression
  - Anger
  - Oppositional

- **Delinquent (39)**
  - Conduct
  - Justice Involved

- **Substance Use (6)**
  - Ethnicity: .61

- **All Autism (7)**
  - Ethnicity: ASIAN, HISPANIC, MULTIETHNIC (5)
  - Age: 12 to 15 (1)

- **All Anxiety (84)**
  - Ethnicity: ALL ANXIETY (84)
  - Age: O to 3 (1)

- **All Traumatic Stress (11)**
  - Ethnicity: ALL TRAUMATIC STRESS (11)
  - Age: 4 to 11 (2)

- **All Other (22)**
  - White
  - Not Reported
  - Ethnicity: ALL OTHER (22)
  - Age: 4 to 11 (2)

- **All Substance Use (6)**
  - Ethnicity: ALL SUBSTANCE USE (6)
Autism (Special Case)
What The Results Tell Us...

- DMM is a data analysis strategy ("common elements"), not a treatment design strategy.
- The features of successful interventions.
- That the features vary according to different variables of interest:
  - Problem
  - Age
  - Ethnicity
What This Means for Clinicians...

- Need not deconstruct promising interventions – can also point to them
  - Can point to a single, fully elaborated intervention or choice of multiple promising interventions
  - Manages the problem of no evidence: Averages across broad classes of targets to leave fewer areas for which there are no informed options
  - Enhance usual care by adding practices that appear in profile for a particular group
  - Special cases might provide more ideas
- More efficient assembly, avoids shotgun approach
What This Means for Researchers...

- Test combinations of practices (e.g., two-component intervention versus five-component intervention)
- Test “special case” intervention versus “parent node” intervention
- Highlights areas in which there are few studies (e.g., youths age 12+ with autism)
What The (Primarily Descriptive) Results Do Not Tell Us...

- Does not tell us what will work, only what has...
- Does not tell us what components are necessary (practice elements themselves are not necessarily “evidence-based”)
- Does not address many other aspects of therapy
  - Coordination of elements: selection, sequencing, pacing, etc.
  - Therapeutic process (e.g., alliance, homework)
Limitations

- Feasibility study, with small n and small code set
- The tree is a function of the completeness of the literature (confounds, holes lead to artifactual branches)

- To date, have coded more than 700 RCTs with a much larger codeset
- Continued coding increases the reliability of findings, particularly in the lower nodes where there have been fewer studies
Real Time Data and Improved Clinical Reasoning

- MAP: Managing and Adapting Practice (Chorpita & Daleiden, 2014)

- Integrating findings from organizational change, clinical feedback, and evidence based practice literatures (e.g., Daleiden & Chorpita, 2005) to create an evidence-based services framework to enhance clinical decision making:
  - What is the evidence base for interventions (DMM)
  - What are the steps involved in a practice element
  - Is the treatment plan working
Thank You!