Early Intensive Behavioral Intervention for Children with Autism Spectrum Disorders: What Families and Providers Need to Know

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Topics

1. Increase familiarity with recent studies on Early Intensive Behavioral Intervention

2. Identify implications of recent studies for best practices in implementing Early Intensive Behavioral Intervention

3. Become aware of issues in need of further research
Topic 1: Research on Early Intensive Behavioral Intervention
Intervention Research in ASD

Historically less of a priority for funding than basic research

Knowledge base in autism
- Less developed than in some other neurological disorders (e.g., Parkinson’s or Alzheimer’s)

Fragmented and confusing topic
- Many different interventions with devoted advocates
- Divergent views on whether and how to evaluate efficacy
- Little interaction with other autism researchers or with treatment researchers outside autism
ABA in ASD Intervention Research

Autism is a neurobiological disorder

However, primary interventions are currently behavioral and educational

Most research has focused on interventions based on applied behavior analysis (ABA)
What is Applied Behavior Analysis?

Definition: Application of scientifically-based principles of learning to improve socially important behavior.

Characteristics of ABA intervention programs:
- Designed to maximize success
- Systematic use of reinforcement ("rewards")
- Careful selection of instructional materials and procedures

Comprehensive, targeting skills in all areas of development.
What is ABA? (cont.)

• Intended to improve everyday functioning
  • Involvement of parents, peers, and others in environment
  • Intervention across multiple settings
• Use of multiple intervention techniques
ABA for autism

Intervention programs may be roughly divided into two types:

- Skills-focused
  - Examples: parent training, peer-mediated social skills training, PECS
- Comprehensive
  - Examples: early intensive behavioral intervention (EIBI), ABA classes
Early Intensive Behavioral Intervention

- 20-40 hours of individual ABA instruction
- Beginning at age 4 years or younger and lasting 2-3 years
ABA, EIBI, ASD

- ABA
- ASD Tx

ABA for ASD

EIBI
EIBI

- Many EIBI models, but UCLA/Lovaas approach most extensively studied
UCLA/Lovaas Treatment Model
Smith et al. (2001, in Handleman & Harris, Eds.)

- Integration of behavior analytic studies
- Comprehensive: treats all the behavior problems a child presents
- Proceeds in small, carefully-planned steps
- Mostly in-home first year, with increasing emphasis on school and community thereafter
- 40 hours per week of instruction
Overview of Treatment

- Phase 1: rapport (~2 weeks)
- Phase 2: foundational skills (~2-6 months)
- Phase 3: early communicative language (~6 months)
- Phase 4: grammatical language and early socialization (~12 months)
- Phase 5: socialization and school entry (~12 months)
Intensive Treatment for Children with Autism

(*Lovaas, 1987, JCCP; McEachin, Smith, & Lovaas, 1993, AJMR*)

Children with autism under age 4 and IQ>35

Assignment to groups based on therapist availability

*Experimental Group (n = 19):*

40 hrs/wk of treatment, 2+ years

*Control Groups:*

1. <10 hrs/wk of treatment, 2+ years (n = 19)
2. No treatment (n = 21)
Results

Large advantages for intensive group through age 13 years
  • IQ + 31
  • Vineland + 21
  • Significantly lower scores on PIC and clinical ratings

Best outcome (IQ > 85 + placement in regular ed.)
  • 9 of 19 intensive children at age 7, 8 of 19 at age 13
  • 1 of 40 children in other groups
Subsequent EIBI studies

Anderson et al. (1987)
Birnbrauer & Leach (1993)
Sheinkopf & Siegel (1998)
Handleman & Harris (2000)
Bibby et al. (2002)
Findings

Generally confirmed Lovaas’s finding that children make large gains in EIBI

However, effect sizes were about half what Lovaas reported
Children with Pervasive Developmental Disorder

Smith, Groen, & Wynn (2000, AJMR)

Participants: N = 28, 14 with autism, 14 with PDDNOS

- Chronological age ≤ 42 months
- Ratio IQ between 35 and 75
- Absence of other major medical problems (e.g., cerebral palsy)
Groups: Stratified random assignment

- Intensive Treatment \((n = 15)\):
  
  Intended: 30 hrs/wk of one-to-one-treatment for 2-3 years

  Actual: \(M = 24.52\) hrs/wk for 33.44 months

- Parent Training \((n = 13)\):

  5 hrs/wk of individualized, in-home training for 3 months
Measures

**Intake/Follow-up Assessments**
- Bayley/Stanford-Binet
- Merrill-Palmer
- Reynell
- Vineland

**Intake Only**
- Family Background

**Follow-up Only**
- Parent Satisfaction
- Wechsler Individualized Achievement Test
- Child Behavior Checklist
- Teacher Report Form
Smith et al. (2000)

![Graph showing IQ scores at different age ranges (2-3 and 7-8 years) for EIBI and Parent Tx treatments.](image)
Results of Smith et al. (2000)

- At follow-up, EIBI group outperformed comparison group in several important areas:
  - +16 IQ points
  - +27 points on test of academic achievement
  - +15 months in visual-spatial skills
  - 4 of 15 fully included in general education (compared to 0 of 13 in comparison group)
Additional Results

- Trend toward higher language scores in EIBI group
- High parent satisfaction in both groups
- *But* no significant difference between groups in adaptive behavior (Vineland) or problem behavior
Many more EIBI studies 2005-2009

**UCLA Model**
- Eikeseth, Smith et al. (2002, 2007, BMod)
- Sallows & Graupner (2005, AJMR)
- Eldevik, Smith et al. (2006, JADD)
- Cohen, Amerine-Dickens & Smith (2006, JDBP)
- Hayward et al. (2009)

**Other EIBI Programs**
- Howard et al. (2005, RIDD)
- Reed et al. (2007, JADD)
- Remington et al. (2007, AJMR)
- Zachor et al. (2007, RASD)
- Magiati et al. (2007, AJ MR)
- Perry et al. (2008, RASD)
Findings

Continued to confirm Lovaas’s finding that some children make large gains

In some cases equaled his effect sizes (e.g., Sallows & Graupner, 2005)
EIBI Studies

- 2 randomized clinical trials (both on the UCLA model)
- 10 quasi-experimental studies (3 on UCLA Model)
  - Studies with EIBI group and non-EIBI group
  - Children assigned to groups based on parent preference or availability of EIBI rather than at random
- 10 studies with only an EIBI group
  - No control for progress that might have occurred without treatment
Topic 2: Implications of Research
Many high-profile reviews of EIBI

Multiple recent reviews or meta-analyses

- Rogers & Vismara (2008, *JCCAP*)
- Howlin et al. (2009, *AJIDD*)
- Reichow & Wolery (2009, *JADD*)
- Spreckley & Boyd (2009, *J Peds*)
- Odom et al. (2010, *JADD*)
- What Works Clearinghouse (2010)—federal agency
- Warren et al. (2011, *Pediatrics*)—federal agency
Reviews

- Different methodologies
- Somewhat discrepant conclusions
- Confusing to families and providers
Perspectives on ABA research

One view (e.g., National Autism Center, 2009)

- ABA has support from many single-case studies and some group studies
- Almost all other psychoeducational approaches are under-researched
- Therefore, ABA is the first-line intervention for autism
Another view (e.g., Warren et al., 2011, Pediatrics)

- Randomized clinical trials (RCTs) are the “gold standard” for evaluating interventions
- There are few RCTs on ABA
- Therefore, recommendation of ABA over other approaches is premature
Does EIBI work?
Most reviewers say “yes” or “probably”

Spreckley & Boyd (2009) disagree, citing insufficient evidence

Most reviewers note serious methodological limitations such as:
- Unclear amounts of treatment
- Limited range of outcome measures
- Small sample sizes
Reviews of reviews

1. Reichow (2012, JADD): The large majority of reviews conclude that EIBI works

2. Kuppens & Onghena (2012, RASD): Data across studies are far more than is necessary to show that EIBI is at least moderately effective
If EIBI does work, how big are the effects?

- Estimates from meta-analysis (statistical synthesis of research findings):
  - Reichow & Wolery (2009)
    - Mean effect size for IQ = 0.69
    - Average child in EIBI has more favorable outcome than 75% of children not in EIBI
    - Considered fairly large effect
Effect size (cont.)

- Eldevik et al. (2009)
  - Average effect size of 1.10 for IQ
    - Average child in EIBI has higher IQ than 86% of comparison children
  - Average effect size of 0.66 for adaptive behavior
    - Average child in EIBI has more advanced adaptive behavior than 75% of comparison children
Eldevik et al. (2010):

- Individual children making reliable change:
  - IQ: 27.1% in EIBI vs. 9.9% in comparison groups
  - Adaptive behavior: 19.2% in EIBI, 7.0% in comparison groups
- Number Needed to Treat: 4.5 for IQ, 7.0 for adaptive behavior
Possible Active Ingredients (Kasari, 2002, JADD)

Amount of treatment
- How many hours per week for how long?

Intervention method
- Most studies on discrete trial training, but would other, more child-led ABA approaches be better?

Content
- What skills should be taught?
Amount of treatment

Some writers conclude that the most intensive programs (30+ hours) may be most effective (Eldevik et al., 2009; Reichow & Wolery, 2009)

- However, others say this conclusion is premature (Rogers & Vismara, 2008)

Most changes may occur in the first year (Howlin et al., 2009)
Method and Content

No studies currently available
Individual differences

All studies report wide individual differences in outcome
IQ of Individual EIBI Children in Lovaas (1987)
Figure 1. Changes in Full Scale IQ during 4 years of behavioral treatment.
Predictors of Response

Still not entirely clear

Some evidence that children who are higher-functioning initially may benefit more

Age not associated with outcome among preschoolers
Predicting outcome of EIBI
(Smith, Klorman, & Mruzek, 2009, in progress)

Case series of 71 children with autism in EIBI

• M(SD) age = 3.24 years (0.69)
Predicting outcome of EIBI (cont.)

Predictors:

- Age
- IQ
- Social communication (measured by observation and parent report)
  - Imitation
  - Joint attention
  - Requesting

Independently of IQ, social communication predicts 1 year outcome.
Topic 3: Future Directions
Conclusions

- Most evidence indicates that EIBI works
  - UCLA/Lovaas Model is the most extensively tested EIBI approach

- EIBI may be most effective for higher functioning children and when given intensively

- Little information on other active ingredients

- Still need well-designed clinical trials with large samples and an array of predictors and outcome measures
Suggestions on EIBI

- Offer trial of EIBI for most preschool children with ASD
  - As intensive as possible
  - Continuation based on progress monitoring every 6 months
  - Up to 2-3 years

- Other ABA models for EIBI graduates who still need services and for older children with ASD
Future Directions

- Larger scale studies
  - Still seeking funding for large study of EIBI
- Comparative effectiveness studies
Future Directions (cont.)

- Studies now underway in Rochester:
  - Comparison of discrete trials to developmental intervention for communication (with UCLA and KKI)
  - Comparison of parent training to parent education for preschoolers with autism (with Yale, Pittsburgh, OSU, Indiana)
  - Comparison of atomoxetine and parent training for school-age children with autism+ADHD (with Pittsburgh and OSU)
Future Directions (cont.): Community-based intervention
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Questions???

1. Research on EIBI
2. Implications
3. Future directions
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Medicine of the Highest Order