Behavioral Treatment Outcomes for Self-Injury in Autism Spectrum Disorders

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ASD Roadmaps

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Disclosures of Potential Conflicts

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Source	Advisor/ Consultant	Employee	Books, Intellectual Property	Honorarium or expenses for this presentation or meeting
AACAP				X
Elwyn	X			
Drexel U.		X		
Brookes			X	
Springer			X	

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Learning Objectives

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- 1. Describe examples of intense self-injurious behavior (SIB) observed in children and adolescents with ASD and related ID
- 2. List the behavioral interventions most frequently used to address SIB in published outcome research involving 1. above
- Describe some opportunities and challenges involved in implementing the behavior interventions referenced in 2. in day-to-day practice.

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My background

- As a father
- As a clinician
- As a teacher
- As a researcher
- As a program leader

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Child and Adolescent Psychiatric Clinics of North America

Article in Press

Behavioral Approaches to Managing Severe Problem Behaviors in Children with Autism Spectrum and Related Developmental Disorders:

A Descriptive Analysis

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Abstract | Full Text | PDF | References

Severe problem behaviors such as aggression, self-injury, and property destruction can result in injury, and require specialized and expensive treatment. This article reviews outcome research published since 1995 that used behavioral techniques to decrease severe problem behaviors among children and adolescents with autism spectrum disorder and/or intellectual disability. Many relatively simple interventions were reported to significantly reduce severe problem behavior, which offers hope for practitioners. Nonetheless, these studies also reveal a risk for injury and a need for specialized assessment and placement, careful tracking, and high-quality treatment that few agencies could likely replicate without increases in training and support.

Keywords: Autism, Intellectual disability, Aggression, Self-injury, Behavioral intervention, Applied behavior analysis, Outcome research, Children

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BACKGROUND
SIB in ASD & DD

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- Self-injury is relatively common among persons with ASD or related ID
- Potential impact of all SIB
  - Can severely limit the integration of the person into the community
  - Place tremendous stress on the family

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BACKGROUND

Impact of Intense SIB

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- Intense SIB can have a very significant impact, and can lead to
  - Serious injury
  - Use of seclusion, physical restraint, protective equipment, etc.
  - Residential placement and/or hospitalization
- Many programs are simply not prepared to manage or treat intense SIB effectively

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BACKGROUND

Using outcome research to identify practices

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- Informal reviews of outcome research are limited by the breadth of the review & experience of reviewer
- Formal, systematic ratings help to objectively identify specific, evidence-based practices (EBP)
  - National Autism Center (2009)
  - National Professional Development Center for Autism (2010)
  - Reichow et al (2011)
  - All value single subject experimental designs (SSED)
- Some formal EBP reviews for specific behavioral methods have already been done
  - Functional communication training (Kurtz et al, 2011)

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BACKGROUND

Evaluating the outcome research

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- Are there enough SSED to suggest at least emerging EBPs for specifically addressing intense SIB?
- How many SSED are needed to establish a practice as at least an emerging EBP?
  - NAC: 2 SSED with N>5 participants
  - NPDC: 5 high quality SSED across 3 different groups (Established EBP)
  - Reichow: 5 SSED of adequate strength, N>16, 2 teams in 2 different locations

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PRESENT STUDY

Objectives

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- What outcome research has been conducted using behavioral interventions for intense SIB?
  - What kinds of behavioral interventions have been studied?
  - Is there evidence that children with ASD and related ID respond to behavioral interventions?
  - Does the research offer potential insights into the function of SIB, new research trends, or resources needed to extend interventions into the community?
- Is there enough outcome to suggest at least emerging EBPs for specifically addressing intense SIB?

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METHODS

Selection Criteria for all studies

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- Involved children ages 6-18 years of age with ID and/or ASD
  - Individual cases meeting the criteria were included if individual results were presented.
- Used a group or single subject experimental design
- Involved behavioral intervention to decrease intense aggression, self-injury, or destruction
  - Studies involving SIB analyzed separately
- Published in an English, peer-reviewed journal between 1995 and 2012
  - Listed in online databases by October 2012.

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METHODS

Targeted search: Process

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- Targeted search of MEDLINE & PSYCHINFO between 1995-2012 yielded 2572 unique, relevant abstracts.
- Abstract Screening: 199 involving outcome research on pertinent targets and populations
- Article Screening: 101 of the 199 met all inclusion criteria for Descriptive Analysis.
- Inter-rater reliability for coding at each stage resulted in 80-95% agreement.

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METHODS
Study variables

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- Periodical
- Experimental design
  - Group vs. single subject experimental design
  - All studies reviewed here used SSED
- Assessment strategies
  - Behavior: Observations vs. Interviews vs. Formal checklists vs. Analogue functional analysis (FA)
  - Cognitive and diagnostic assessment
- Procedures for establishing fidelity
  - Use of treatment manuals vs. Detailed descriptions of training vs. Actual measurement of treatment fidelity

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METHODS
General participant variables

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- Gender
- Age group (children 6-12 years of age versus adolescents 13-18 years of age)
- Presence of ASD
- Presence and level of ID
  - Borderline / Mild vs. Moderate vs. Severe

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METHODS
Participant variables: Behavior

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- Target
  - Aggression, Destruction, SIB, & combinations
  - Only results for SIB reported here
- Evidence of intensity: explicitly labeled or
  - Occurrence of staff / patient injury
  - Use of restrictive interventions
  - Reliance on specialized placement
- Identified function
  - Attention vs. Automatic (including Sensory) vs. Escape vs. Tangible vs. Multiple functions

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METHODS
Interventions: Antecedent

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- Change task or environmental conditions associated with behaviors
  - Proactive: Preventative, but does not build specific skills
  - Increase interest using highly preferred activities/items or competing stimuli
  - Schedule/routines: Changing them, using visuals
  - Providing a warning, Offering choices
  - Changing how instruction is provided (prompting strategies, behavioral momentum, etc.)
  - Enriching the environment (e.g., increased access to sensory stimuli

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METHODS
Interventions: DRO

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- Differential Reinforcement of Other Behavior: Functionally linked to SIB
  - Positive and Proactive: Prevents problem behavior by building skills
  - Equivalent alternative: Initiating a game
  - Incompatible alternative: Playing with toys
  - Absence / low rates of SIB

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METHODS
Interventions: Other Reinforcement

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- Other reinforcement though not a specific functional alternative
  - Proactive: Preventative, but does not build specific skills
  - Non-contingent reinforcement (access to desired items): Maintain a base level with minimal conditions

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METHODS

Interventions: Functional Communication

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- Positive and Proactive: Prevents problem behavior by building skills
- A specific variant of DRO, focused on communication alternatives to SIB
  - Many problem behaviors are communicative surrogates
  - Requesting desired items
  - Gaining attention
  - Requesting to end a non-desired activity
  - Requesting a sensory item

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METHODS

Interventions: Extinction

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- Reactive: Occurs after the behavior has occurred
- Withholding the response identified as maintaining the behavior
  - Ignoring attention-maintained behavior
  - Blocking escape of a task
  - Blocking access to desired tangible
  - Blocking access to sensory experience(?)

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METHODS

Interventions: Response Interruption

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- Reactive: Occurs after the behavior has occurred
- Potentially useful when no attention, escape, or tangible function is identified
  - Redirecting child to another activity
  - Interrupting a behavior chain
  - Using protective equipment

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METHODS

Interventions: Punishment

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- Reactive: Occurs after SIB has occurred
- Withdrawing a desired consequence
  - Removing a reinforcer or token when SIB occurs
- Adding a non-desired consequence
  - Contingent work
  - Brief restraints identified as aversive

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METHODS

Intervention: Response to treatment

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- 4 levels subsequently collapsed into 2
  - Strong Responder (80% or greater reduction in treatment across conditions)
  - Mixed Responders (Less than 80% reduction in treatment across conditions)

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RESULTS: Study Variables

Number and type of studies

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- 43 studies involving intense SIB were identified and evaluated.
  - All employed SSED
  - Number published decreased from 1995 - 2003 (26) to 2004-2012 (17)
- As interest in ASD is increasing, interest in treatment of intense SIB is decreasing?
  - With increased diagnosis of ASD, why not increased recognition of SIB as a problem?

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RESULTS: Study Variables
Setting

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- Setting
  - More restrictive settings: In-Patient Programs - 49%; Residential programs - 19%
  - Less restrictive settings (e.g., home or school) - 33%
- Role of in-patient programs in driving research
  - But very few (less than 20?) in-patient treatment programs specializing in ASD in US
  - Not all of these are university-affiliated

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RESULTS: Study Variables
Changes over time in setting

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Number of studies by setting & period

Period	Restrictive	Non-Restrictive	Total
1995-2003	21	5	26
2004-2012	8	9^{+}	17
Total	29	14	43

Chi-Square $p<.05$; Z-score greater than expected : $^{+}p<.10$

- Increasing interest in addressing intense SIB in less restrictive settings

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RESULTS: Study Variables
Behavioral assessment

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- Assessment methods used
  - Analogue functional analysis (FA): 74%
  - Less structured observations: 26%
  - Interviews 12%
  - Checklists 9%
- To conduct research using SSED, capacity for FA is important
  - And is likely to be critical for many challenging cases

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RESULTS: Study Variables
Cognitive & diagnostic assessment

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- Fewer than 5% of studies provided any additional information regarding cognitive or diagnostic assessment, such as
  - Actual IQ scores or tests used
  - ASD diagnostic procedures (ADOS, ADI-R)
- Is such precision critical when planning specific treatment of intense SIB?
  - May be untestable at moment of intervention
  - May not help in selection of treatment

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RESULTS: Study Variables
Other study variables

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- Periodical:
  - 35% in Journal of Applied Behavior Analysis,
  - 21% in Behavioral Intervention
  - Rest scattered across a dozen journals
- Fidelity: In addition to detailed descriptions of intervention,
  - Few (21%) included measures of fidelity
  - None employed a manual
  - Makes it more difficult to replicate intervention

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RESULTS: Participant Variables
General variables

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- 53 eligible participants identified across 43 studies
  - Analyses here conducted at the level of the participants and not the study
- Majority of the participants were school-aged children (57%)
  - Even more important to promptly address Intense SIB among children
- Almost 2/3's (65%) were males.

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RESULTS: Participant Variables
ID & ASD

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- Most participants (94%) had ID
  - Majority (84%) had severe to profound ID
  - One-third (36%) with ID also had ASD
- Severe ID as a risk factor for intense SIB
  - Suggests need to target SIB more vigorously in those with severe ID
  - Association with increased prevalence of other neurological factors in those with severe ID?

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RESULTS: Participant Variables
ID & ASD: Interaction with Time Period

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Number of participants by ASD & period

Period	ID Only	ID & ASD	Total
1995-2003	27	8	35
2004-2012	5	12*	18
Total	32	20	52

Chi-Square p<.001 Z-score greater than expected: $^{+}$p<.01

- Reflects increasing interest in ASD
  - Or likelihood that ASD is reported as a secondary diagnosis?

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RESULTS: Participant Variables
Behavior variables

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- Evidence of intensity
  - Hospital/residential placement: 74%
  - Behavior explicitly labeled as severe: 74%
  - Resulted in injuries (57%), use of protective equipment (28%), use of restraint (13%)
  - Multiple factors; 80%
- Patients are among the most dangerous and treatment-resistant of any psychiatric population

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RESULTS: Participant Variables
Behavior variables

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- Behavioral Function
  - Automatic: 34%
  - Escape: 25%
  - Attention: 19%
  - Tangibles: 13%
  - Multiple functions: 15%
  - Unspecified function: 26%

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RESULTS: Participant Variables
Treatment variables

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- Response to Treatment
  - Strong: (80+ decrease from baseline): 60%
  - Mixed: (Less than 80% decrease): 40%
  - Response to treatment unrelated to the ability to specify a behavioral function
- Majority respond significantly to treatment
  - Is response to behavioral intervention stronger that response to medication?

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RESULTS: Intervention Variables
Proactive vs Reactive

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- Proactive vs Reactive
  - Proactive interventions: 79%
  - Reactive interventions: 47%
  - Reactive interventions only: 17%
  - Use of proactive vs reactive interventions unrelated to response to treatment or Time period
- Reactive interventions rarely used in isolation
  - 1 out of 6 cases
  - 2/3s of time, are used in combination with proactive interventions

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RESULTS: Intervention Variables
Treatment type

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- 84 treatments used across 53 participants
  - Antecedent Interventions: 51%
  - Response Interruption: 30%
  - Differential Reinforcement: 23%
  - Extinction: 21%
  - Other Reinforcement: 13%
  - Functional Communication Training: 9%
  - Punishment: 8%
  - Combinations: 43%, or 1.5 interventions/case

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RESULTS: Intervention Variables
Treatment: Interactions

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- Too infrequent to calculate significance of use alone or interaction with response… but patterns are interesting
  - Antecedent interventions used alone more than 50% of the time
  - Extinction never used alone
  - Strong response to Differential Reinforcement, but not Functional Communication

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RESULTS: Intervention Variables
Treatment Combinations

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	Alone	Combination
Antecedent Intervention	15	12
Differential Reinforcement	4	8
Funct. Communication Training	1	4
Other Reinforcement	2	5
Extinction	0	11
Punishment	2	2
Response Interruption	4	12

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RESULTS: Intervention Variables
Response to Treatment

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	Strong	Mixed
Antecedent Intervention	16	11
Differential Reinforcement	12	0
Functional Communication Training	0	5
Other Reinforcement	5	2
Extinction	7	4
Punishment	3	1
Response Interruption	11	5

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RESULTS: Intervention Variables
Treatment: Interactions with Function

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- Too infrequent… but patterns are interesting
- Antecedent Intervention, Response Interruption used more often for Automatic & Unspecified Functions
  - Matched/competing stimuli, addressing hunger, environmental enrichment
  - Blocking more useful when no other function reflecting external factors can be identified
- Punishment not used when an external function clearly identified
- ¾ of cases addressing Escape used Antecedent Interventions or Differential Reinforcement

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RESULTS: Intervention Variables
Behavioral Function

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	Atten-tion	Auto-matic	Es-cape	Tang-ible	Unspec-ified
Antecedent Inter.	2	9	8	4	7
Differential Reinf.	3	3	7	3	0
Func. Comm. Tr.	3	0	2	1	0
Other Reinforcemt	2	4	0	1	0
Extinction	3	2	3	2	3
Punishment	0	3	0	0	1
Response Inter.	2	4	2	2	7

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RESULTS: Intervention Variables
Potential as emerging EBP

- Depending on how many studies meet standards of adequate/high quality
  - Antecedent Interventions could exceed thresholds for all groups
  - All interventions except Punishment could meet NAC and NPDC standards
  - Even soon linked to specific functions
- Questions
  - How to address combinations of interventions
  - Do you need to distinguish between different Antecedent Interventions?
  - Expand search to include less intense SIB?

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RESULTS: Intervention Variables
Potential as emerging EBP

Intervention Studies with Strong Responders	Studies	Groups	Total N	Reichow	NAC	NPDC
Antecedent Intervention	15	11-13	16	✓	✓	✓
Response Interruption	10	7-10	12	X	✓	✓
Differential Reinforcement	5	4	7	X	✓	✓
Extinction	8	6	8	X	✓	✓
Other Reinforcement	7	3-6	7	X	✓	✓
Punishment	3	2	3	X	X	X

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CONCLUSIONS
Implications for Research

- Formal evaluation of quality of outcome research may confirm practices as EBP
  - Consider broadening search criteria
  - May motivate other researchers to contribute to body of knowledge
- Factors not addressed in outcome research
  - Inter-play of behavioral and pharmacological intervention
  - Role of other health conditions in precipitating crises

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CONCLUSIONS
Implications for Treatment

- Results reflect patterns in the published research not day to day practice, but
  - Points to reliance on preventative & positive treatments driven by behavioral function
  - Punishment rarely used, even in these more intense and complex cases
  - May lead to evidence-based practice standards, perhaps linking target, treatment, and function

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CONCLUSIONS
Implications for Program Development

- What kinds of programs are needed to translate these findings into practice?
  - Increased expertise in behavioral assessment
  - Cognitive/diagnostic assessment less critical?
  - Integration of behavioral & pharmacological interventions
  - Careful data collection and analysis
  - Training & supervision to assure fidelity
- Successful outcomes in less restrictive settings: Early intervention?
  - Can we identify triggers to target emerging SIB?

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