Provided By Public Comment on the Evaluation of Evidence: ABA for ASD

Given that the focus of most of the public comment pertained to requesting that ABA be recommended for coverage in individuals over age 12, detailed review of citations was limited to those studies. A random sample of 10% of SSRD study types (60 total) were reviewed in additional detail. In addition, all systematic reviews and meta-analyses of SSRDs were reviewed in more detail. Those findings are presented below:

Single Subject Research Design

  - Population: 3 “institutional retardates” ages 7-13
  - Outcome of interest: use of the “er” and “est” suffixes to describe superlative relationships (language training)
  - Intervention: Differential reinforcement
  - Setting: institution

  - Population: 2 13-year-olds with moderate to severe disability (1 with autism, 1 mentally retarded)
  - Outcome of interest: frequency and appropriateness of social interactions in the school setting
  - Intervention: social network intervention (peer-mediated)
  - Setting: school

  - Population: 7 developmentally delayed (severe or profound) subjects, ages 26-43 (no mention of autism)
  - Outcome of interest: identity matching (correctly matching one symbol to another)
  - Intervention: discrimination training (differential reinforcement, repetition, avoidance)
  - Setting: institution

  - Population: 1 individual diagnosed with Downs syndrome and autism, aged 13
  - Outcome of interest: vocal intraverbal responses
  - Intervention: echoic prompts compared to echoic prompts plus sign language
Detailed Review of Selected Single Subject Research Design Citations

- Setting: classroom
    - Population: 9 individuals diagnosed with ASD, ages 5 - 13
    - Outcome of interest: development of “complex” language
    - Intervention: 3 different language interventions utilizing a multiple baseline design:
      - Teaching to increase of language complexity (label, color and label, shape/size, color and label, verb + previous)
      - teaching answers to WH-concepts (who, what, why, where, how)
      - teaching answers to temporally remote events using “paragraphic speech”
    - Setting: special education classroom and the home

  - Population: 4 developmentally delayed individuals referred for self-injury, in an inpatient setting, with associated insomnia, ages 3 - 19
  - Outcome of interest: bedtimes, duration of sleep
  - Intervention: faded bedtime procedure with response cost
  - Setting: inpatient

Summary

Of the studies examined, 3 (50%) made no mention of autism. With regard to setting, 3 (50%) were in the school/educational setting and 3 (50%) were in an institutional or inpatient setting.

Meta-analyses or Systematic Reviews that include SSRD Studies


Funded by the US Department of Education, limited to evaluation of focused interventions, described as:

“practices ... designed to address a single skill or goal of a student with ASD (Odom et al., 2010). These practices are operationally defined, address specific learner outcomes, and tend to occur over a shorter time
period than comprehensive treatment models (i.e., until the individual goal is achieved). Examples include discrete trial teaching, pivotal response training, prompting, and video modeling. Focused intervention practices could be considered the building blocks of educational programs for children and youth with ASD.”

Population: Aged 0-22 years with ASD
Interventions: focused behavioral, developmental and educational interventions
Study design: experimental design, including SSRD (withdrawal of treatment, multiple baseline, multiple probe, alternating treatment, changing criterion designs)
Search dates: 1990-2011
Total evidence base: 456 articles
Criteria for designation of evidence-based:
(a) two high quality experimental or quasi-experimental design studies conducted by two different research groups, or (b) five high quality single case design studies conducted by three different research groups and involving a total of 20 participants across studies, or (c) there is a combination of research designs that must include at least one high quality experimental/quasi-experimental design, three high quality single case designs, and be conducted by more than one researcher or research group
Results: The 27 practices that met criteria for being evidence based are presented in the table below, along with the number and type of studies:

<table>
<thead>
<tr>
<th>Evidence-Based Practice</th>
<th>Definition</th>
<th>Empirical Support</th>
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<tbody>
<tr>
<td>Antecedent-based intervention (ABI)</td>
<td>Arrangement of events or circumstances that precede the occurrence of an interfering behavior and designed to lead to the reduction of the behavior.</td>
<td>Group (n)</td>
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<tr>
<td>Cognitive behavioral intervention (CBI)</td>
<td>Instruction on management or control of cognitive processes that lead to changes in overt behavior.</td>
<td>3</td>
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<tr>
<td>Differential reinforcement of Alternative, Incompatible, or Other Behavior (DRA/I/O)</td>
<td>Provision of positive/desirable consequences for behaviors or their absence that reduce the occurrence of an undesirable behavior. Reinforcement provided: a) when the learner is engaging in a specific desired behavior other than the inappropriate behavior (DRA), b) when the learner is engaging in a behavior that is physically impossible to do</td>
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<td>while exhibiting the inappropriate behavior (DRI), or c) when the learner is not engaging in the interfering behavior (DRO).</td>
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<tr>
<td>Discrete trial teaching (DTT)</td>
<td>Instructional process usually involving one teacher/service provider and one student/client and designed to teach appropriate behavior or skills. Instruction usually involves massed trials. Each trial consists of the teacher’s instruction/presentation, the child’s response, a carefully planned consequence, and a pause prior to presenting the next instruction.</td>
<td>0 13</td>
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<tr>
<td>Exercise (ECE)</td>
<td>Increase in physical exertion as a means of reducing problem behaviors or increasing appropriate behavior.</td>
<td>3 3</td>
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<tr>
<td>Extinction (EXT)</td>
<td>Withdrawal or removal of reinforcers of interfering behavior in order to reduce the occurrence of that behavior. Although sometimes used as a single intervention practice, extinction often occurs in combination with functional behavior assessment, functional communication training, and differential reinforcement.</td>
<td>0 11</td>
</tr>
<tr>
<td>Functional behavior assessment (FBA)</td>
<td>Systematic collection of information about an interfering behavior designed to identify functional contingencies that support the behavior. FBA consists of describing the interfering or problem behavior, identifying antecedent or consequent events that control the behavior, developing a hypothesis of the function of the behavior, and/or testing the hypothesis.</td>
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</tr>
<tr>
<td>Functional communication training (FCT)</td>
<td>Replacement of interfering behavior that has a communication function with more appropriate communication that accomplishes the same function. FCT usually includes FBA, DRA, and/ or EX.</td>
<td>0 12</td>
</tr>
<tr>
<td>Modeling (MD)</td>
<td>Demonstration of a desired target behavior that results in imitation of the behavior by the learner and that leads to the acquisition of the imitated behavior. This EBP is often combined with other strategies such as prompting and reinforcement.</td>
<td>1 4</td>
</tr>
<tr>
<td>Naturalistic intervention (NI)</td>
<td>Intervention strategies that occur within the typical setting/activities/routines in which the learner participates. Teachers/service providers establish the learner’s interest in a learning event through arrangement of the setting/activity/routine, provide necessary support for the learner to engage in the targeted behavior, elaborate on the behavior when it occurs, and/or arrange natural consequences for the targeted behavior or skills.</td>
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<tr>
<td>Parent-implemented intervention (PII)</td>
<td>Parents provide individualized intervention to their child to improve/increase a wide variety of skills and/or to reduce interfering behaviors. Parents learn to deliver interventions in their home and/or community through a structured parent training program.</td>
<td>Group (n)</td>
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<tr>
<td>Peer-mediated instruction and intervention (PMII)</td>
<td>Typically developing peers interact with and/or help children and youth with ASD to acquire new behavior, communication, and social skills by increasing social and learning opportunities within natural environments. Teachers/service providers systematically teach peers strategies for engaging children and youth with ASD in positive and extended social interactions in both teacher-directed and learner-initiated activities.</td>
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<tr>
<td>Picture Exchange Communication System (PECS)</td>
<td>Learners are initially taught to give a picture of a desired item to a communicative partner in exchange for the desired item. PECS consists of six phases which are: (1) “how” to communicate, (2) distance and persistence, (3) picture discrimination, (4) sentence structure, (5) responsive requesting, and (6) commenting.</td>
<td>2</td>
</tr>
<tr>
<td>Pivotal response training (PRT)</td>
<td>Pivotal learning variables (i.e., motivation, responding to multiple cues, self-management, and self-initiations) guide intervention practices that are implemented in settings that build on learner interests and initiative.</td>
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<tr>
<td>Prompting (PP)</td>
<td>Verbal, gestural, or physical assistance given to learners to assist them in acquiring or engaging in a targeted behavior or skill. Prompts are generally given by an adult or peer before or as a learner attempts to use a skill.</td>
<td>1</td>
</tr>
<tr>
<td>Reinforcement (R+)</td>
<td>An event, activity, or other circumstance occurring after a learner engages in a desired behavior that leads to the increased occurrence of the behavior in the future.</td>
<td>0</td>
</tr>
<tr>
<td>Response interruption/redirection (RIR)</td>
<td>Introduction of a prompt, comment, or other distracters when an interfering behavior is occurring that is designed to divert the learner’s attention away from the interfering behavior and results in its reduction.</td>
<td>0</td>
</tr>
<tr>
<td>Scripting (SC)</td>
<td>A verbal and/or written description about a specific skill or situation that serves as a model for the learner. Scripts are usually practiced repeatedly before the skill is used in the actual situation.</td>
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<tr>
<td>Self-management (SM)</td>
<td>Instruction focusing on learners discriminating between appropriate and inappropriate behaviors, accurately monitoring and recording their own behaviors, and rewarding themselves for behaving appropriately.</td>
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## Detailed Review of Selected Single Subject Research Design Citations

<table>
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<tr>
<td>Social narratives (SN)</td>
<td>Narratives that describe social situations in some detail by highlighting relevant cues and offering examples of appropriate responding. Social narratives are individualized according to learner needs and typically are quite short, perhaps including pictures or other visual aids.</td>
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<tr>
<td>Social skills training (SST)</td>
<td>Group or individual instruction designed to teach learners with autism spectrum disorders (ASD) ways to appropriately interact with peers, adults, and other individuals. Most social skill meetings include instruction on basic concepts, role-playing or practice, and feedback to help learners with ASD acquire and practice communication, play, or social skills to promote positive interactions with peers.</td>
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<tr>
<td>Structured play group (SPG)</td>
<td>Small group activities characterized by their occurrences in a defined area and with a defined activity, the specific selection of typically developing peers to be in the group, a clear delineation of theme and roles by adult leading, prompting, or scaffolding as needed to support students’ performance related to the goals of the activity.</td>
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<tr>
<td>Task analysis (TA)</td>
<td>A process in which an activity or behavior is divided into small, manageable steps in order to assess and teach the skill. Other practices, such as reinforcement, video modeling, or time delay, are often used to facilitate acquisition of the smaller steps.</td>
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</tr>
<tr>
<td>Technology-aided instruction and intervention (TAII)</td>
<td>Instruction or interventions in which technology is the central feature supporting the acquisition of a goal for the learner. Technology is defined as “any electronic item/equipment/application/or virtual network that is used intentionally to increase/maintain, and/or improve daily living, work/productivity, and recreation/leisure capabilities of adolescents with autism spectrum disorders”(Odom, Thompson, et al., 2013).</td>
<td>9</td>
</tr>
<tr>
<td>Time delay (TD)</td>
<td>In a setting or activity in which a learner should engage in a behavior or skill, a brief delay occurs between the opportunity to use the skill and any additional instructions or prompts. The purpose of the time delay is to allow the learner to respond without having to receive a prompt and thus focuses on fading the use of prompts during instructional activities.</td>
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</tr>
<tr>
<td>Video modeling (VM)</td>
<td>A visual model of the targeted behavior or skill (typically in the behavior, communication, play, or social domains), provided via video recording and display equipment to assist learning in or engaging in a desired behavior or skill.</td>
<td>1</td>
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</table>
### Visual support (VS)

<table>
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<td>Any visual display that supports the learner engaging in a desired behavior or skills independent of prompts. Examples of visual supports include pictures, written words, objects within the environment, arrangement of the environment or visual boundaries, schedules, maps, labels, organization systems, and timelines.</td>
<td>Group (n)</td>
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</table>

Those that were found to be evidence-based and included individuals aged 15-22 were the following:

- Antecedent-based Intervention
- Modeling
- Peer Mediated Instruction and Intervention
- Reinforcement
- Scripting
- Social Skills Training
- Technology-aided Instruction and Intervention
- Video Modeling
- Visual Support

No report or comment made pertaining to intensity, duration or persistence.


See public comment disposition document, comment #M4

Density reported for all included studies. For the 3 studies that included only adolescents and adults, frequency ranged from at least 15 minutes 4 times/week to 120 minutes/week to 15 minutes, 10 times/week. Duration ranged from 4 to 16 weeks.

These authors state that there are no methods for estimating publication bias for SSRD.

See public comment disposition document, comment #13

This review included the same two studies included in Warren evaluating treatment intensity (Smith 2000, Reed 2007). Both addressed EIBI in young children.


Population: Ages 3-47 years, developmentally disabled
Interventions: Any intervention targeted to prevention of elopement
Study design: 5 experimental design, including SSRD, 5 non-experimental
Search dates: not restricted - 2008
Total evidence base: 10 studies, total N = 53, 6 with ASD
Results: 80% of the studies reviewed reported positive results, however only two studies reported the complete elimination elopement

No comment in report pertaining to intensity, duration or persistence, however, a typical intervention is described as follows:

“Intervention initially contained 3 components. (1) No car rides following elopement and return to residential center with minimal attention. (2) During work times praise participant every 15 min and give breaks in which preferred items are available. (3) Reinforce with a car ride following periods without elopement. After implementation 2 modifications were made. (1) More regular car rides with staff and (2) Teaching participant to respond “Don’t run away” when asked how he can earn car rides.”


Population: Ages not specified, individuals with intellectual disabilities with any problem behavior
Interventions: Functional communication training “a function-based differential reinforcement procedure that involves teaching the individual to use an appropriate communication response to access the reinforcer responsible for maintaining problem behavior”
Study design: SSRD
Search dates: 1985 - 2009
Detailed Review of Selected Single Subject Research Design Citations

Total evidence base: 28 studies, total N = 80, 23 with ASD, 11 in adolescents, 9 in adults
Results: Not provided. A count of the number of studies was presented to demonstrate that FCT meets “well-established” standards (at least 10 studies) for children and adolescents, but not adults (meets “probably efficacious” standard)

No report or comment made pertaining to intensity, duration or persistence.


Does not pertain to ABA


Population: Ages 3 – 18 diagnosed with ASD or intellectual disability
Interventions: Any intervention used to reduce aggressive behavior (antecedent manipulations, reinforcement based strategies, consequential control)
Study design: SSRD
Search dates: 1980 - 2009
Total evidence base: 18 studies, total N = 31, 17 with ASD, 5 aged 13 - 18
Results: All of the studies reported decreases in challenging behavior attributed to the intervention. Of the studies included, seven reported total or near elimination of aggression of at least one individual during intervention in at least one condition. Antecedent manipulations, changes in instructional context, reinforcement-based strategies, and behavior reduction strategies each appear to be effective in reducing the occurrence of aggression. Limited conclusions may be drawn regarding the permanency of treatment gains as only four of the studies conducted follow-up assessments. However, each of these studies reported that treatment gains were maintained.

Of the 18 studies included, 4 reported on follow up (time elapsed not specified), and all 4 studies reported that aggressive behaviors were maintained at the same (low) level as at the end of the intervention. No report on intensity or duration.


Population: Not stated
Detailed Review of Selected Single Subject Research Design Citations

Interventions: Functional analysis – “empirical demonstrations of “cause-and-effect relations” between environment and behavior”
Study design: SSRD that included (a) a pretreatment assessment based on (b) direct observation and measurement of (c) problem behavior was conducted under (d) at least two conditions involving manipulation of some environmental variable in an attempt (e) to demonstrate a relation between the environmental event and behavior.
Search dates: Not restricted - 2000
Total evidence base: 277 studies, 58 included ASD, 30% adults, total N = 31, 17 with ASD, 5 aged 13 - 18
Results: Individual study results not reported. Description of the evidence base.

See public comment disposition comment #M8

One of the parameters reported was session duration for functional analysis, which ranged from 1 to 30 minutes (10 minutes is median duration), and the number of sessions conducted was most commonly 3 or more (83% of studies). The maximum number of sessions was not reported. No report on persistence.

Population: Age not specified
Interventions: any treatment of PICA.
Study design: SSRD
Search dates: 1980 - 2011
Total evidence base: 34 studies, 22% included ASD, 20% adolescents, 38% adults, total N = 50
Results: Behavioral treatments were effective at producing an 80% or greater reduction in PICA in 25 of 26 studies. Other 8 studies did not meet criteria for experimental control, treatment efficacy or sufficient description of intervention or patient characteristics and were not discussed further.

No report or comment made pertaining to intensity, duration or persistence.


Population: Age not specified, individuals with developmental disability
Interventions: any intervention to teach safety skills
Study design: not specified (included SSRD)
Search dates: 1970 - 2009
Total evidence base: 27 studies; ages and % ASD not specified.
Detailed Review of Selected Single Subject Research Design Citations

Results: Descriptive of included studies. No statistical analysis or synthesis. Authors conclude: “at least three components appear to often be successful: (1) prompting and prompt-fading, (2) reinforcement, and (3) role-playing”.

Each study is described, but no summary provided. Twenty studies reported on maintenance of behavior response, all of which found maintenance of response in those who achieved a response, with follow up ranging from 1-2 weeks to 16 months.


See public comment disposition, comment #I4

The review concluded that there was only one intervention that could be considered evidence-based for adolescents (antecedent package). For that intervention, duration ranged from 1 to 4 months and intensity ranged from 3 to 5 sessions/week, with each session ranging from 5 minutes to 3 hours. Skills were maintained over a follow up period of 1 to 6 months.


Population: Age not specified, individuals with intellectual disability with phobia avoidance
Interventions: any psychological treatment for the avoidance or fear of a specific phobia
Study design: group studies, SSRD and case reports
Search dates: 1970 - 2007
Total evidence base: 38 studies; 29% with ASD, 18% adolescent, 50% adults
Results: 12 of 13 SSRD studies “demonstrated efficacy through use of good experimental design”. Authors conclude “behavioral treatment as a well-established treatment for phobic avoidance displayed by individuals with intellectual disabilities.” and “All of the studies described that had good experimental designs and were shown to be efficacious included some form of live exposure to the feared stimulus plus reinforcement for appropriate behaviors (e.g., approach or absence of avoidance), suggesting that these are important components of treatment.”

No report or comment made pertaining to intensity, duration or persistence.
Meta-analyses of SSRD


Population: Ages 3-20 with ASD
Interventions: video modeling and video self-modeling
Study design: SSRD only
Search dates: 1987 - 2005
Total evidence base: 23 studies; Total N = 73
Results: Authors computed the percentage of non-overlapping data points (PND) for each study, which “provides a measure of intervention effectiveness”, measured by “calculating the percentage of intervention data points that do not overlap with the highest baseline data point”. The authors state that this statistic is preferable to effect size in synthesizing SSRD for 2 reasons: 1) the data derived from SSRD is not independent, thereby violating a primary assumption of inferential statistics, and 2) many SSRD include relatively few data points, which may inflate the effect size. Authors state that PND scores above 90 represent very effective interventions, scores between 70 and 90 represent effective interventions, scores between 50 and 70 represent questionable effectiveness and scores below 50 are ineffective interventions.

Interventions focused on functional skills resulted in the highest intervention effects (PND* = 89%) followed by social-communication functioning (PND = 77%), and behavioral functioning (PND = 76%). Interventions focused on functional skills resulted in the highest maintenance effects (PND = 100%) followed by behavioral functioning (PND = 82%) and social-communication functioning (PND = 78%). Generalization effects were high for functional skills interventions (PND = 97%) and were moderate for social-communication skills. Generalization of behavioral functioning skills was not measure in any studies.

Intervention effects for video modeling and video self-modeling (VSM) were both moderate (81% and 77% respectively). Maintenance effects for video modeling and VSM were also both moderate (88% and 71%). Generalization effects were moderate for video modeling (82%) and questionable for VSM (65%).

With regard to frequency and duration, the number of sessions ranged from 4 to 33 (timeframe not specified), and the duration of video clips was 30 seconds to 13.5 minutes.

Population: Age limited to children and adolescents with ASD
Interventions: any social skills intervention in the school setting
Study design: SSRD only
Search dates: 1980-2005
Total evidence base: 55 studies; Total N = 157
Results: Authors computed the percentage of non-overlapping data points (PND) for each study (see description above). Authors conclude “school-based social skills interventions are minimally effective for children with ASD. Specifically, social skills interventions produced low treatment effects and low generalization effects across participants, settings, and play stimuli. Moderate maintenance effects were observed, suggesting that gains made via social skills interventions are maintained after the intervention is withdrawn.”

Maintenance effects were reported in 25 studies and showed moderate results (PND = 80%). Frequency and duration were not reported.

Ma, H. (2009). The effectiveness of intervention on the behavior of individuals with autism: A meta-analysis using percentage of data points exceeding the percentage of data points exceeding the median of baseline phase (PEM). Behavior Modification (2009) 33 339-359

Population: Ages not specified, individuals with ASD
Interventions: any intervention addressing problem behaviors
Study design: SSRD only with sufficient graphical display to calculate PEM
Search dates: 1980-2005
Total evidence base: 163 studies; Total N = not stated
Results: Primarily a methods article to demonstrate the use of the statistic “percentage of data points exceeding the median of baseline phase” (PEM) for evaluating interventions for autism. The authors argue against the use of Improvement Risk Difference (IRD) for reasons similar to those stated above for effect size. Other methods are described and rejected:

Mean baseline reduction
Percentage of zero data
Use of the $q$ statistic

Authors conclude “five highly effective intervention strategies were priming, self-control, training, positive reinforcement and punishment, and presenting preferential activities. The least effective strategy was to teach perspective taking skills.”
With regard to duration, the authors state “The influence of length of treatment on the effectiveness of treatment. The average length of treatments was 12.78 sessions with a standard deviation of 14.68. The Pearson correlation between the length of treatment and the PEM score was .034, p = .19, depicting that the length of time a treatment lasted did not necessarily produce a larger effect.” Frequency and maintenance were not reported.


Population: Ages not limited, individuals with developmental disabilities (ASD not mentioned) who exhibited SIB, all institutionalized
Interventions: any intervention addressing SIB
Study design: SSRD
Search dates: 1980 - 2005
Total evidence base: 152 studies; Total N = 152, 75% over aged 10, 48% over aged 20
Results: Results of functional assessment reported, not treatment. Authors conclude “Social-negative reinforcement (escape from task demands or other sources of aversive stimulation) accounted for 58 cases, which was the largest proportion of the sample (38.1 %). Social positive reinforcement (either attention or access to food or materials) accounted for 40 (26.3%) of the cases, automatic (sensory) reinforcement accounted for 39 (25.7%), and multiple controlling variables accounted for 8 (5.3%). Overall results indicated that functional analysis methodologies are extremely effective in identifying the environmental determinants of SIB on an individual basis and, subsequently, in guiding the process of treatment selection.”

See public comment disposition comment #M9

The functional analyses were conducted in sessions occurring 2 to 8 times/day, usually 5 days/week. Each session was 15 minutes, and duration ranged from 8 to 66 sessions. Because outcomes of treatment were not the focus of this study, maintenance not reported.


Population: Ages not limited, individuals with intellectual disabilities and challenging behaviors
Interventions: any intervention addressing challenging behaviors  
Study design: SSRD and other “small-n” research  
Search dates: 2000 - 2011  
Total evidence base: 285 studies; Total N = 598, % with ASD not stated  
Results: Authors conclude “The average treatment effect was large and statistically significant. However, this effect varied significantly over the included studies and participants.” Sensitivity analysis found that interventions on average turn out to be less effective for persons with aggression as the challenging behavior; and that they are on average more effective when the intervention includes the component “manipulating antecedent factors”.

Authors detected evidence of publication bias using a regression test for funnel plot asymmetry.

Duration ranged from 1 to more than 20 weeks, although only 4 studies were in the latter category, and the majority were between 1 and 5 weeks. Frequency and maintenance not reported.


Population: Ages birth to 21 years, individuals with developmental disabilities with challenging behaviors  
Interventions: any intervention addressing challenging behavior  
Study design: SSRD  
Search dates: 1988 - 2006  
Total evidence base: 142 studies; Total N = 316, 27% between ages 11 and 15, 14% between ages 16 and 20; 33% with ASD  
Results: Authors calculated and reported effect sizes in 4 different ways (PND, percent zero data (PZD), standard mean difference (SMD) and “Allison mean plus trend”). They conclude “Skills replacement, consequence combined with systems change, and antecedent interventions generated selective positive results, large enough to be clinically meaningful. Behavioural interventions effectively reduce challenging behaviour, particularly when preceded by a functional analysis. Teaching replacement skills was most effective, especially if used in combination with systems change and/or traditional antecedent and consequence manipulation.”

In 20% of included studies duration was less than 20 weeks, and duration could not be determined in 75% of studies. Post-hoc analysis suggested that both very short (1-3 weeks) and very long (greater than 20 weeks) interventions were less effective than those lasting between 3 and 20 weeks. Authors report that the use of functional analysis was associated with more effective outcomes in
Detailed Review of Selected Single Subject Research Design Citations

maintaining a zero rate of behavior, but do not otherwise report on maintenance. Frequency was not reported.


Population: Ages not limited, individuals with ASD
Interventions: any intervention addressing SIB, stereotypy, aggression or property destruction
Study design: SSRD only
Search dates: 1966 - 1998
Total evidence base: 117 studies; Total N = 181, age range 2 - 31
Results: Authors calculated and reported effect sizes in 3 different ways (PND, PZD, and mean baseline reduction (MBLR)). They conclude “behavioral treatments were found to be significantly effective in reducing problem behavior in individuals with autism” and “treatment was equally effective regardless of problem behavior and type of technique used”. Also, “presence of a pretreatment functional assessment was found to be a significant variable in treatment, resulting in higher average PZD scores than those obtained in studies that did not include a functional assessment.”

Of included studies, 31% collected follow up data, and the mean follow up interval was 6 months. However, maintenance was not reported. The length of treatment per session was reported in 80% of studies, with the mean being 60 minutes. Frequency and total duration of intervention were not reported.


Population: Ages not limited, individuals with developmental disabilities (including ASD) who exhibited SIB
Interventions: any intervention addressing SIB
Study design: SSRD only
Search dates: 1964 - 2000
Total evidence base: 396 studies; Total N = 706, 25% aged 11 – 18, 40% over age 18
Results: Authors conclude “mean outcome of all reported treatments was an 83.7% reduction in SIB from baseline to treatment, and most treatments were successful in reducing SIB by at least 80%. Exceptions were found for the category of reinforcement-based interventions: When used alone and in conjunction with response blocking, reinforcement produced reductions in SIB of approximately 73% for both procedures.”
Follow up data was reported in 14% of included studies, and ranged from 2 weeks to 7 years. However, maintenance of effects was not reported, nor were frequency or duration.

Summary

A total of 12 systematic reviews and eight meta-analyses of SSRD included at least some individuals over age 12. Of these, one did not pertain to ABA, 4 did not specify that any of the included population had ASD and 7 were not limited exclusively to individuals with ASD. A variety of interventions were found to be effective using a variety of methods for calculating effect size. Only one study reported negative results (school-based social skills interventions are minimally effective).

Two articles were contradictory concerning publication bias, with one stating that there is no reliable way to test for publication bias in SSRD, and the other documenting the presence of publication bias by creating a funnel plot and testing significance using a regression statistic.

Five of the included reviews did not comment on frequency, duration or maintenance in any way. Six studies reported on frequency of intervention;

- session duration:
  - 15 minutes
  - 60 minutes
  - 30 seconds to 13.5 minutes
  - 5 minutes to 3 hours
  - 1 to 30 minutes
  - 120 minutes/week

- number of sessions:
  - 2-8 times/day, 5 days/week
  - 4-33 sessions
  - 3 to 5 sessions/week
  - 3 or more sessions
  - 4 times/week
  - 10 times/week

Duration of intervention was reported in six studies:

- 4 to 16 weeks
- 1 to 4 months
- Average length of treatment 13 sessions
- 8 to 66 sessions
- 1 to more than 20 weeks
- Less than 20 weeks
Follow up and maintenance were reported in six studies. Follow up times:
- 1 to 2 weeks to 16 months
- 1 to 6 months
- 2 weeks to 7 years

Of those reviews that reported on maintenance of effects, the following are the number of included studies reporting this outcome:
- 22%
- 74%
- 45%
- 14%

Of those that specifically reported on maintenance of effects of the intervention, findings were consistently positive, although the one meta-analysis that quantified maintenance effects (using PND) reported moderate results.