# Best Practices for Autism Treatment in Kansas

## Best Practices Subcommittee of the Kansas Legislative Task Force on Autism


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## *EXECUTIVE SUMMARY*
### *Best Practices Subcommittee*

The purpose of this report is to (1) synthesize the evidence regarding effective evidence-based interventions that guide best practices for the treatment of individuals affected by ASD; and (2) based on the findings, make recommendations on best practices for children with autism. This report was generated from the ideology that our process and recommendations are based on the most current science.

***Synthesis of Evidence-based Practices***

The Best Practices subcommittee agreed to review: 1) other state documents; 2) other comprehensive reviews that have been completed; 3) discipline-specific comprehensive reviews that were submitted to the subcommittee by members of the committee or guest members, and 5) key reports or scientific documents that have been generated in the last 5 years. The subcommittee agreed with Horner and colleagues' (2005) definition of evidence-based practice:

> "[evidence-based] Practice refers to a curriculum, behavior intervention, systems change, or education approach designed for use by families, educators, or students with the express expectation that implementation will result in measurable educational, social, behavioral, or physical benefit (pg. 175)."

The Best Practices subcommittee also defined criteria for strong, moderate, emerging, minimal and no evidence of interventions, and these criteria were used to make recommendations. These criteria were developed based on published criteria for reviewing evidenced based practices by prominent researchers and national scientific reviews including the National Standards Project (National Autism Center – http://www.nationalautismcenter.org/), the National Research Council, the American Speech-Language-Hearing Association's National Center for Evidence-Based Practice, and the Council for Exceptional Children. The agreed upon criteria were:

- Strongest evidence: more than six studies with more than 20 participants, with beneficial effects and no conflicting results or harmful effects, using Randomized Control Trials or single subject designs, and conducted by 3 researchers in 3 geographic regions.
- Moderate evidence: more than nine studies and the same criteria as used for 'strongest evidence, however one study showing conflicting results.
- Emerging evidence: four to five studies with more than 10 participants, the same benefits and scientific design as for strongest evidence but no criteria for the number or location of research.
- Minimal evidence: one to two studies, with four participants and the same benefits and scientific design as for strongest evidence but no criteria for the number or location of research.
- No evidence: no methodological criterion and no experimental control

Once these sources were identified, the recommendations cited as evidence-based were then synthesized. Interventions and program recommendations that adhered to the committee's criteria for "evidence" were then included in this report. Due to time and resources constraints, the Best Practices subcommittee procedures DID NOT include: 1) a comprehensive, first hand

search and review of the scientific literature; 2) a review of all disciplines that could provide services for individuals with an ASD; and 3) a review of alternative medicines or techniques.

***Findings and Recommendations to the Autism Task Force***

Recommendations in this report are made with the understanding that each individual on the spectrum is unique. Given early diagnosis and intervention, outcomes will vary for individuals with an Autism Spectrum Disorder (ASD) just as outcomes for any child will vary based on individual characteristics. Individualized programs are recommended based on child needs and best available evidence of effective practices.

Recommendations are based on common elements of reported "best practices" and evidenced based programs: data collection and data-based decision making, structured and well-defined teaching procedures, use of procedures to increase desirable behaviors, function-based treatment of problem behaviors, and use of developmentally appropriate and well-rounded curriculum including peers when appropriate. Examples of evidence-based practices included: Applied Behavioral Analysis and Discrete Trial Teaching (e.g., University of California at Los Angeles, and replication sites); and 2 other intervention programs cited in a meta-analysis conducted by Simpson and colleagues (2005) Pivotal Response Training (PRT; University of California at Santa Barbara), and Learning Experiences: An Alternative for Preschoolers and Parents (LEAP). Examples of emerging or probably evidence-based (needing more research) included: Treatment and Education of Autistic and Communication Handicapped Children (TEACCH; University of North Carolina); and individual interventions such as assistive technology, augmentative alternative communication (AAC), incidental and naturalistic teaching, joint action routines, peer mediation intervention strategy, social stories intervention strategy, developmental play/assessment teaching, Picture Exchange Communication System (PECS), and video modeling.

Recommendations are also inclusive of general characteristics of quality programs based on syntheses provided of *Model Early Childhood Programs for Children with ASD* (see Boulware, et al. 2006; Dawson & Osterling, 1997; the National Research Council, 2001). Programs considered high quality by the reviewers (i.e., using evidenced-based practices, favorable reviews by multiple professional organizations) found a range of 15-40 hours per week of service, with average of 25 hours week. They found that the characteristics necessary for an effective program are: use of a comprehensive curriculum sensitive to developmental sequence, use of supportive, empirically validated teaching strategies, involvement of parents, gradual transition to more naturalistic environments, highly trained staff, and a systematic supervisory and review mechanism.

Finally, a large project sponsored by the National Autism Center, recently completed the National Standards Project, as an effort to use scientific merit to identify evidence-based guidelines for treatments of individuals with ASD younger than 22 years of age. The focus of the project was limited to "interventions that can reasonably be implemented with integrity in most school or behavioral treatment programs. A review of the biomedical literature for ASD will be left to another body of qualified individuals." (Wilczynski, et al., 2008, p. 39). A panel of multidisciplinary autism researchers applied a rigorous scoring system to evaluate the quality and usefulness of interventions for individuals with ASD described in nearly 1,000 studies. Results

of the project are expected before the end of 2008 (http://www. nationalautismcenter.org). A recent publication by those involved in the *National Standards Project* includes recommendations of the best practices listed above (e.g., discrete trial training). The report also recommends four key behavior support interventions including: antecedent (preventive) intervention, positive reinforcement to decrease challenging behavior, behavior-contingent (restrictive) intervention as a function-based approach, and family support.

The following recommendations are the results of the Best Practices subcommittee work for the Legislative Task Force on Autism.

Best Practice Recommendations based on a Synthesis of Sources

1. Use of a model based on the science of human behavior such as that found in an Applied Behavior Analysis model of intervention. Applied Behavior Analysis has been referenced throughout the literature as having the most scientific evidence to support the use of techniques found in intensive behavioral programs.
2. Entry into intervention as soon as an ASD diagnosis is seriously considered rather than deferring until a definitive diagnosis is made.
3. Intensive early intervention is recommended. Intensive intervention has been defined throughout the review as active engagement of the child at least 25 hours per week, 12 months per year, in systematically planned, developmentally appropriate community, home, and educational-based interventions designed to address identified objectives.
4. Instructional programs and curriculum address all areas of delay and specifically address core deficits of ASD (e.g., social, communication, and repetitive/stereotypic behaviors).
5. Ongoing measurement and documentation of the individual child's progress toward identified objectives are recommended.
6. Promotion of opportunities for interaction with typically developing peers.
7. Problem or interfering behaviors are targets for reduction and/or replacement by using empirically supported strategies to teach socially valid replacement behaviors.
8. The staff members delivering the intervention have received specialized training in ASD that includes an experiential component.
9. Inclusion of a family component (including parent training as indicated); must involve family participation in development of goals, priorities and treatment plans and provide on-going parent support, training and consultation.

This report offers a synthesis of evidence-based practices and program characteristics for young children with ASD. Examples of quality programs are referenced, and characteristics described. Single intervention strategies with evidence supporting their effectiveness are also described. Recommendations to the Autism Task Force are provided as guidelines for practitioners to improve outcomes for children with ASD, and support for their families across the state of Kansas. Guidelines are based on current research and our review process of the research as described (review of state documents, reports from professional organizations, literature syntheses, and meta-analyses reports). A final recommendation is to provide periodic updates and supplements to the report as new research and treatment are developed.

## *Overview of Procedures*

This report was generated from the ideology that our process and recommendations are based on the most current science. These recommendations are not discipline-specific; rather they are a compilation of evidence retrieved from reviews and reports from researchers in the field as well as those generated by Autism Task Forces in other states. Independent comprehensive literature reviews were not conducted by this Best Practices subcommittee, given the resources that have been available to us. Currently there is a large, national effort to examine the current literature in autism interventions (see pg. 49 ***National Autism Center National Standards Project***). It is our hope that the results of that report will further shed light on evidence-based practices.

Second, the recommendations in this report are made with the understanding that each individual on the spectrum is unique. Given early diagnosis and intervention, outcomes will vary for individuals with an Autism Spectrum Disorder (ASD) just as outcomes for any child will vary based on individual characteristics. However, overall best outcomes are associated with early diagnosis and structured interventions across the lifespan that include time with typically developing peers. The range of program characteristics will map to the individual's uniqueness, for example, 25-40 hours a week of intervention that includes a plan for an appropriate, individualized, program of services for an 18-month-old child with ASD looks incredibly different from the intervention for a child who is 4 years old or for a 15-year old adolescent with Asperger Syndrome. These programs in turn are different from a program developed for a 35-year-old in need of job skills. However, they all include the common elements of reported "best practices" and evidence-based programs: data collection and data-based decision making, structured and well-defined teaching procedures, use of procedures to increase desirable behaviors, function-based treatment of problem behaviors, family involvement, transition planning, and use of developmentally appropriate and well-rounded curriculum including peers when appropriate.

The findings in the Best Practices subcommittee report to the Autism Task Force are intended to state what we have found in our review. Thus, the purpose of this report is to synthesize the evidence regarding effective evidence-based interventions that guide best practices for the treatment of individuals affected by ASD.

Given the nature and scope of this task, that is, synthesizing evidence based practices for persons with ASD, a significant amount of resources would be necessary to conduct our own, first-hand comprehensive review of the literature. Given a lack of sufficient resources for a comprehensive review of each discipline (see "Literature Review Section" below), the subcommittee agreed to review: 1) other state documents; 2) other comprehensive reviews that have been completed; 3) discipline-specific comprehensive reviews that were submitted to the subcommittee by members of the committee or guest members, and 5) key reports or scientific documents that have been generated in the last 5 years For our review of these documents, we agreed that in order to have members' recommendations incorporated into our report, that these sources should include: 1) Who completed the review/who created the document (who developed the report), 2) the review process (e.g. assigned a score?, what was the criteria – peer reviewed?), 3) Which articles/disciplines were reviewed, 4) the years the reviews spanned, 5) the age ranges covered in the review (target population), and 6) the intervention settings the recommendations cover (e.g.

education, community, home, etc.). Once these sources were identified, the recommendations were then synthesized. Interventions and program recommendations that adhered to the committee's criteria for "evidence" were then included in this report. Due to time and resources constraints, the Best Practices subcommittee procedures DID NOT include: 1) a comprehensive, first hand search and review of the scientific literature; 2) a review of all disciplines that could provide services for individuals with an ASD; and 3) a review of alternative medicines or techniques.

Concurrent with the synthesis of the selected literature for the definition of "evidence-based" and the initial review and organization of submitted articles came the realization that key-players in the delivery of educational and intervention services to children with an Autism Spectrum Disorder were missing from our subcommittee roster. Consequently, the subcommittee members requested attendance at our meetings from the Kansas State Department of Education and the Kansas Department of Health and Environment. Both agencies generously provided the subcommittee with the names of two professionals from the field of early childhood special education and early intervention who, as guest members of the subcommittee, became active participants in the review and report-writing process.

***The Charge for the Best Practices subcommittee of the Legislative Task Force on Autism From the SB 138 Summary document presented by the Task Force Chair***

What are the "Best Practices" for early evidence-based intervention for children with autism? (9)

Reports Required by SB 138
Reports of the Task Force's activities and recommendations are to be given to the Legislative Educational Planning Committee (LEPC). A preliminary report is to be submitted to the LEPC by November 15, 2007. A final report is due by November 15, 2008. The Task Force expires on December 31, 2008.

***Review Process***

Our charge was to determine what would be considered "Best Practices" in Autism intervention for the State of Kansas. The subcommittee agreed that the arrival at what "best practices" encompasses required a review of what is considered "Evidence-Based." The committee reviewed several sources of information from the psychosocial, communication, educational, disability and behavioral research to obtain an understanding of the current scientific definition of "Evidence-Based" for low-incidence disorders.

***(1) Evidence-Based Practices—Standards for Single Subject Research***
A lingering criticism from the scientific and professional communities regarding "evidence-based" practices for individuals with ASD is the fact that the randomized-controlled trials, which in medical research, is held as the "gold standard" for scientific studies is not as frequent with individuals with ASD. While the "gold standard" (experimental-control, randomized design) (Shadish, Cook and Campbell, 2001) is recognized as exemplary for the field of experimental research, there are several reasons why this type of design is not the design of choice for this population. Single subject (*SS*) research is applicable to the vast heterogeneity within a low-

incidence population and is commonly found in clinical psychology, education psychology, neuropsychobiology, special education, and speech-language pathology (Schlosser, R.W., 2005; Horner, Carr, Halle, McGee, Odom, & Wolery, 2005).

Horner et al. (2005) present *SS* design components as: 1) The individual is the unit of analysis; 2) operational descriptions of the participants, setting, and process for selection are provided; 3) dependent variables are defined (operationally), measured (repeated) to allow for a within and between analysis of level, trend, and variability, assessed for consistency, and are selected for their social significance; 4) independent variables are operationally defined to allow valid interpretation of results and replication, fidelity of the independent variable is documented; 5) experimental control is established; and 6) internal and external validity are addressed. Horner and colleagues further recommend:

> "A practice may be considered evidence based when (a) a minimum of five single-subject studies that meet minimally acceptable methodological criteria and document experimental control have been published in peer-reviewed journals, (b) the studies are conducted by at least three different researchers across at least three different geographical locations, and (c) the five or more studies include a total of at least 20 participants." (pg. 176).

Thus, *SS* design studies have many important elements found in the traditional "gold standard" randomized trial research, and have become widely accepted as a reliable and valid experimental methodology for examining the effects of an intervention or defining practices (Chambless, & Hollon, 1998; Chambless, Sanderson, Shoham, Bennett Johnson, Pope, Crits-Cristoph, et al. 1996; Jenson, Clark, Kircher, & Kristjansson, 2007; Odom, Brown, Frey, Karasu, Smith-Canter, & Strain, 2003; Odom & Strain, 2002).

Odom and Strain (2002) suggest that *SS* meets scientific standards of research as outlined by the National Academy of Sciences (Shavelson, & Towne, 2002) as:

> "(a) conducting an empirical investigation, (b) linking findings to a theory of practice, (c) using methods that permit direct investigation, (d) providing a coherent chain of reasoning, and (e) replicating and generalizing across studies." (p. 151)

***(2) Evidenced Based Practices—Published Standards for Review of Individual Studies***

The American Speech-Language-Hearing Association's (ASHA) Ad Hoc Committee on ASD adopted the National Research Council (NRC) guidelines to evaluate scientific evidence for the guidelines and family of related documents. The NRC committee used a 4 point scale relative to internal validity, external validity, and generalization with 1 being the highest and 4 being insufficient design or no evidence (NRC, 1001, p.15). Because the NRC report reviewed journals to 2000 and only those affecting children birth to 8, the ASHA Ad Hoc Committee asked the ASHA National Center for Evidence Based Practice in Communication Disorders to identify treatment studies on speech, language, and /or communication in children with ASD published after 2000 and in adolescents or adults with ASD published over the last decade. Studies were included in the ASHA review only if they were published in English, in peer reviewed journals, and reached a Level 1, 2, or 3 based on the NRC 4-point scale.

The Guidelines for Speech-Language Pathologists in Diagnosis, Assessment and Treatment of Autism Spectrum Disorders Across the Life Span were also evaluated by staff at ASHA's

National Center for Evidence-Based Practice based on the Appraisal of Guidelines for Research and Evaluation (AGREE) criteria. AGREE is an international collaboration of researchers and policy makers who seek to improve the quality and effectiveness of clinical practice guidelines by establishing a shared framework for their development, reporting and assessment. The AGREE framework looks at 23 criteria across 6 domains and develops a score for the documents being reviewed. The Guidelines received an AGREE rating of Highly Recommended, which is the highest score available.

*(3) National Autism Center (http://www.nationalautismcenter.org/).*

The National Autism Center (NAC) was recently authorized and funded to conduct the National Standards Project. The National Standards project has conducted the most current and comprehensive of reviews to date. As a part of the process, the NAC adopted the Scientific Merit Rating Scale (SMRS) as a tool for evaluating the research and drawing conclusions. Each study was then coded according to the SMRS and assigned a level of scientific support. The NAC adopted four levels of evidence from Strongest Support to Emerging Treatment with 2 additional categories: Unestablished Treatment and Discredited Treatment. Following is the NAC's support rating scales:

"Strongest Support: Multiple* published, peer reviewed studies using experimental research designs with a score of 5 on the SMRS demonstrating strong beneficial treatment effects. These may be supplemented by studies with lower scores on the SMRS demonstrating beneficial treatment effects.

Strong Support: Multiple* published, peer-reviewed studies using experimental research designs with a score of 4 on the SMRS demonstrating moderate or strong beneficial treatment effects. These may be supplemented by studies with higher or lower scores on the SMRS demonstrating strong beneficial treatment effects when a higher classification criterion has not been met.

Modest Support: Limited*: published, peer-reviewed studies using experimental research designs with a score of 3 on the SMRS demonstrating moderate or strong beneficial treatment effects. These may be supplemented by studies with higher or lower scores on the SMRS demonstrating strong beneficial treatment effects when a higher classification criterion has not been met.

Emerging Treatment: Few* published, peer-reviewed studies using quasi-experimental research designs with a score of 2 on the SMRS demonstrating weak to strong beneficial treatment effects. These may be supplemented by studies with higher or lower scores on the SMRS demonstrating beneficial treatment effects when a higher classification criterion has not been met.

Unestablished Treatment: Claims of treatment efficacy based solely on very poorly controlled studies (scores of 0 or 1 on the SMRS), testimonials, narrative accounts, unverified clinical observations, opinions, speculations; or a treatment does not reach the criterion for any of the other classifications.

Discredited Treatment: Multiple published, peer-reviewed studies using experimental research designs with scores of 3 or higher on the SMRS demonstrating no beneficial

treatment effects and/or adverse treatment effects AND no studies with scores of 3 or higher on the SMRS demonstrating moderate or strong beneficial treatment effects.

**Multiple* is defined as 2-group design or 6 single-case design studies with no conflicting results OR at least 3-group designs or 9 single-case design studies with no more than 1 study with conflicting results, published, peer-reviewed. *Limited* is defined as 1-group design or 3 single-case design studies with no conflicting results OR at least 2-group design or 6 single-case design studies with no more than 1 study with conflicting results. *Few* is defined as 2 single-case design or group design studies with no conflicting results. *Conflicting results* are reported when a better or equally controlled study that is assigned a score of at least 3 reports either *a* no beneficial treatment effects or (*b*) adverse treatment effects." (Luiselli, Russo, Christian, Wilczynski, 2008, pg. 49).

Thus, based on the review of the scientific literature regarding the definition of "Evidence-Based", the committee came to a consensus regarding our definition of "Evidence-based". Table 1 presents this definition of Evidence-Based.

***Table 1. Levels of Evidence****

| Levels of Evidence | Number of Studies (minimum) | Scientific Methodology | Published | # of Researchers (minimum) | # of Geographic Regions (minimum) | # of Participants (minimum) |
|---|---|---|---|---|---|---|
| Strongest | ≥6 with beneficial effects and no conflicting results or harmful effects | Randomized Controlled Trials (RCT) OR Single Subject | Peer Reviewed Journal | ≥3 | ≥3 | ≥20 |
| Moderate | 9 with beneficial effects and 1 conflicting result and no harmful effects | Randomized Controlled Trials (RCT) OR Single Subject | Peer Reviewed Journal | 3 | 3 | 20 |
| Emerging | 4-5 with beneficial effects and no conflicting results and no harmful effects | Randomized Controlled Trials (RCT) OR Single Subject | Peer Reviewed Journal | Not Specified | Not Specified | 10 |
| Minimal | 1-2 with beneficial | Randomized Controlled | Peer Reviewed | Not Specified | Not Specified | 4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | effects and no conflicting results and no harmful effects | Trials (RCT) OR Single Subject | Journal | | | |
| No Evidence | ----- | No Methodological criterion and did not document experimental control | ----- | ----- | ----- | ----- |

*Note: Beneficial effects means effects in the expected direction; Harmful effects means increases in inappropriate behaviors (e.g. aggression) or physical harm.

***What is "Evidenced-Based Practice?"***

When looking at "evidence-based *practices*" within the framework of utilizing scientifically based approaches, practitioners also integrate other sources of information such as practitioner judgment, family values, the individual needs, as well as cultural factors affecting intervention. For example, Dunst, Trivette, and Cutspec, (2002) assert that evidence-based *practices* are:

> "Practices that are informed by research, in which the characteristics and consequences of environmental variables are empirically established and the relationship directly informs what a practitioner can do to produce a desired outcome." (pg. 3)

The American Speech-Language Hearing Association (ASHA) (2004, para. 3) refers to evidence based practice as "the integration of: (a) clinical expertise, (b) best current evidence, and (c) client values to provide high-quality services reflecting the interests, values, needs, and choices of the individuals we serve."

Speech-language pathologists play a critical role in screening, diagnosing, and enhancing the communication and quality of life of individuals with autism spectrum disorders (ASD). The core features of ASD include impairments in reciprocal social interaction and in verbal and nonverbal communication. All individuals with ASD are challenged in the area of social communication. Many individuals with ASD need support in acquiring the form and content of language and/or augmentative and alternative communication, and all have needs for support in the area of social communication. The ASHA Position Statement on ASD (2006a) refers to ASD as primarily a social communication disability.

The American Speech-Language-Hearing Association (ASHA) has produced a family of documents relative to ASD. The documents were developed by ASHA's AdHoc Committee on ASD. The documents were disseminated for select and widespread peer review to speech-language pathologists, speech-language-hearing scientists, and audiologists with expertise in ASD, high functioning adults with autism, family members of children and adults with autism, graduate students in communication sciences and disorders, and related professionals.

The documents are:

American Speech-Language-Hearing Association (2006). Roles *and Responsibilities of Speech-Language Pathologists in Diagnosis, Assessment, and Treatment of Autism Spectrum Disorders Across the Life Span* [Position Statement]. Available from www.asha.org/policity.

American Speech-Language-Hearing Association (2006). *Principles for Speech-Language Pathologists in Diagnosis, Assessment, and Treatment of Autism Spectrum Disorders Across the Life Span* [Technical Report]. Available from www.asha.org/policy.

American Speech-Language-Hearing Association (2006). *Guidelines for Speech-Language Pathologists in Diagnosis, Assessment, and Treatment of Autism Spectrum Disorders Across the Life Span* [Guidelines]. Available from www.asha.org/policy.

American Speech-Language-Hearing Association (2006). *Knowledge and Skills Needed by Speech-Language Pathologists for Diagnosis, Assessment, and Treatment of Autism Spectrum Disorders* [Knowledge and Skills]. Available from www.asha.org/policy.

To identify evidence-based practices, Horner et al. (2005) proposed the following:

"Practice refers to a curriculum, behavior intervention, systems change, or education approach designed for use by families, educators, or students with the expressed expectation that implementation will result in measurable educational, social, behavioral, or physical benefit. (pg. 175)", and;

"Single-subject research documents a practice as evidence based when (a) the practice is operationally defined; (b) the context in which the practice is to be used is defined; (c) the practice is implemented with fidelity; (d) results from single-subject research document the practice to be functionally related to change in dependent measures; and (e) the experimental effects are replicated across a sufficient number of studies, researchers, and participants to allow confidence in the findings." (pg. 175-176).

Further, Buysse and Winton of the Frank Porter Graham Child Development Institute, University of North Carolina at Chapel Hill assert that evidence-based practice is:

"...a decision-making process that integrates the best available research evidence with family and professional wisdom and values" (Buysse & Wesley, 2006, xiv).

A comprehensive paper that was published as part of a series of research articles on evidence based practices in the Council for Exceptional Children Professional Standards and Practice Committee proposed criteria for identification of evidence-based practices in making recommendations to special education researchers and practitioners. The papers are posted at the CEC website http://www.cec.sped.org and were published in *Exceptional Children Vol. 71-2* (Winter 2005). The CEC Professional Standards and Practice Committee published the organization's *Evidence Based Practices Proposal* in 2006. Through the work of the CEC

Division for Research the following criteria for identifying evidence-based studies were developed:

- A clear and complete description of the practice with its essential components,
- A brief description of each research study that the team has included,
- A brief description of the results of each included study, and
- A classification of the current research for the prospective practice within the criteria described in Attachment 1

***Table 2. Council for Exceptional Children Evidenced-Based Practice Standards***

**PSPC Evidence-Based Practice Proposal**

**Attachment 1 Proposed Evidence-Based Practices Identification Criteria**

| Evidence-base | Criteria | Practice Recommendation |
|---|---|---|
| Research-Based Practice | Experimental and quasi-experimental – At least four acceptable quality[1] studies or two high quality[2] studies that support the practice, and that indicate a significant effect of the practice at a .05 level.<br>OR<br>Single subject – a minimum of five single subject studies that meet acceptable criteria and document experimental control[3].; studies conducted by at least three different researchers across at least three different locations; studies include a total of at least 20 different participants. | Recommended for special educators' repertoire |
| Promising Practice | Experimental and quasi-experimental – At least four acceptable quality studies or two high quality studies that support the practice, and the data indicate a 20% confidence level for the effect size.<br>OR<br>Single subject – a minimum of five single subject studies meeting acceptable criteria by at least three different researchers across different geographical locations. | May be included in special educators' repertoire with clear caveats for following developing literature. |
| Emerging Practice | Correlational – Well designed studies with effects that are clearly significant; most informative when exemplary practices are followed regarding measurement, quantifying effects, avoiding common analysis errors, and using confidence intervals to portray the range of possible effects and the precision of the effect estimates.[4]<br>OR<br>Qualitative Studies – Provide evidence for specific contexts and particular individuals; quality studies must have clear descriptions of methods used and relate to the research questions and conceptual | Informative, but research base does not yet lead to generalization. |

| | | |
|---|---|---|
| | frameworks for the type of study.[5] | |

1 All but one of the Essential Quality Indicators and at least one of the Desirable Quality Indicators for Group Experimental and Quasi-experimental Research in Gersten, Fuchs, Compton, Coyne, Greenwood, & Innocenti. (2005, p. 152)

2 All but one of the Essential Quality Indicators and at least Four of the Desirable Quality Indicators for Group Experimental and Quasi-experimental Research in Gersten, et al, 2005

3 Quality Indicators for Singe-Subject Research in Horner, Carr, Halle, McGee, Odom, & Wolery. (2005, p. 174).

4 Suggested Quality Indicators for Correlational Research in Thompson, Diamond, McWilliam, Snyder & Snyder (2005, p. 191)

5 Quality Indicators Within Qualitative Research in Brantlinger, Jimenez, Klingner, Pugach & Richardson (2005, p. 202),
http://www.cec.sped.org/Content/NavigationMenu/ProfessionalDevelopment/ProfessionalStandards/EVP_revised_03_2006.pdf

Simpson, and colleagues (2005) conducted a scientific review to identify methodologies that adhered to a level of scientific evidence. The criteria that Simpson and colleagues used in their review were:

"(a) reported outcomes and effects;
(b) qualifications of persons implementing the intervention or treatment;
(c) how, where, and when the intervention or treatment is best administered;
(d) potential risks associated with the intervention or treatment;
(e) costs associated with using the intervention or treatment; and
(f) methods for evaluating the effectiveness of the method." (p. 145)

Following the review, methodologies were assigned to one of the following four categories of scientific merit:

1) Scientifically-based practice
2) Promising practice
3) Limited supporting information for practice
4) Not recommended (2005a, p. 146).

While acknowledging the difficulties of developing a objectively verifiable methodology evaluation process, and warning that "total consensus will likely never be achieved" (p. 145), Simpson, et al (2005) challenges the field to continue to use an evidence based approach to search for methods that have the "greatest probability of producing desired outcomes" (p. 145) for students with ASD.

Finally, among recent efforts by the Office of Special Education Programs (OSEP) to support improved practices for educating children with ASD, 2 federally funded projects stand out for the work they are doing to guide and assist professionals in identifying and implementing effective, research-based practices with children with ASD and their families. The National Professional Development Center on Autism Spectrum Disorders (NPDC-ASD) was funded in 2007 with the goal of " providing optimal development and learning of infants, children, and youth with ASD and providing support to their families through use of evidence based practices" http://www.fpg.unc.edu/~autismPDC/. The National Professional Development Center on ASD (http://www.opi.state.mt.us/pdf/SpecED/link/08AugNPDC_ASD.pdf) has adopted the following definition of evidence-based practices:

"To be considered an evidence-based practice for individuals with ASD, efficacy must be established through peer-reviewed research in scientific journals using:
• randomized or quasi-experimental design studies. Two high quality experimental or quasi-experimental group design studies,
• single-subject design studies. Three different investigators or research groups must have conducted five high quality single subject design studies, or
• combination of evidence. One high quality randomized or quasi-experimental group design study and three high quality single subject design studies conducted by at least three different investigators or research groups (across the group and single subject design studies)."

High quality randomized or quasi experimental design studies do not have critical design flaws that create confounds to the studies, and design features allow readers/consumers to rule out competing hypotheses for study findings. High quality in single subject design studies is reflected by a) the absence of critical design flaws that create confounds and b) the demonstration of experimental control at least three times in each study (Horner, Carr, Halle, McGee, Odom, & Wolery, 2005; Nathan, & Gorman, 2002; Odom, Brantlinger, Gersten, Horner, Thompson, & Harris, 2004; Rogers, & Vismara, 2008).

***Literature Review***

Overview

Initially the subcommittee began requesting information from the larger task force for experimental research intervention studies pertaining to each member's specific discipline.

Following an initial flurry of submissions, it was discovered that most of the submissions did not meet the criteria for evidence-based scientific intervention studies adopted by the subcommittee (see Table 1). Given the paucity of scientific intervention studies available to the subcommittee for review, we were then faced with the daunting task of conducting a comprehensive literature review for appropriate articles to include in our process.

The following documents reporting syntheses of literature were reviewed for inclusion in the Best Practices subcommittee report:

***State generated reports.*** Our first sources of data were the abundance of state-generated reports dating back to initial state reports by Maine (1992/revised 2000) and California (1997). Subsequently, 19 states have undertaken a process to review practices and interventions for individuals affected by an ASD, and almost 50% have generated documents designed to outline best practices for autism intervention. However, of all the states providing recommendations, only 3 presented a transparent review process combined with a rating of levels of evidence for their recommendation (Maine, New York, and Vermont). The subcommittee spent a good deal of time systematically reviewing these documents to determine which recommendations generated by these reports were deemed to apply to the citizens of Kansas (see recommendations below). However, the subcommittee is aware of the limitations of current state documents published almost a decade ago, for they "no longer reflect the most up-to-date empirical evidence on the treatment of ASD... and were not sufficiently comprehensive regarding educational and behavioral treatment options for all children and adolescents served in schools and behavioral treatment programs." (Wilczynski, Christian, and the NAC, 2008, p. 39).

The subcommittee is also aware that the Kansas State Department of Education is in the process of publishing educational program guidelines for working with students with autism spectrum disorders. Unfortunately the document was not available for review at the time of this report.

***Professional association reports.*** Other states' documents were not the only source of information or comprehensive reviews that were accessed for this report. Several disciplines have undertaken the task of defining "evidence-based" strategies and providing guidelines for implementation and evaluation. For example, the American Speech-Language-Hearing Association (ASHA) has an extensive body of literature specifically designed to address effective strategies and assessment practices for speech/language/and hearing professionals when working with individuals with an ASD (Guidelines referenced above; Technical Report, 2006 Available from www.asha.org/policy; Knowledge and Skill, 2006 Available from www.asha.org/policy; Position Statement, 2006 Available from www.asha.org/policy). Other professional associations, such as the American Association of Pediatricians (Myers & Johnson, 2007), were also considered and are presented below. Unfortunately, not all disciplines have undertaken this comprehensive review of evidence-based strategies.

***Literature reviews.*** In addition, several meta-analysis and/or comprehensive research reviews were examined. For example, Richard Simpson, Ed.D., Professor of Special Education, University of Kansas, and his colleagues, published a book summarizing evidence based practices according to their review process (2005). More recently, Reichow and Wolery (2008) published a synthesis of research findings from early intensive behavior intervention studies. These documents were also taken into consideration when generating this report.

***To summarize,*** while the subcommittee worked diligently to review a daunting amount of information, this report will necessarily contain gaps, in part due to a paucity of information targeting specific strategies for children and young adults with autism; and/or limited information addressing adults with ASD (e.g. job coaching/adults); and due to the lack of resources available to complete a more comprehensive review of original source data.

## *Results of the Best Practices Subcommittee Review Process*

The following sources of information are organized first by source (e.g. state, review, etc.), then by discipline, and finally, by recommendation. Findings and summaries are presented within the context of evidence-based practices following the procedures outlined in the first sections of this report.

### *Sources of Information from Other States*

As stated above, only 3 of the reviewed states included a review process and levels of evidence. Recommendations from those states, Maine, New York, and Vermont are summarized below. The information in the following tables comes directly from each state's report, and unless otherwise noted, is a direct quote from each report. The states' recommendations also include the levels of evidence used in each recommendation, in some cases, assigned by a particular subcommittee member. These ratings are indicated in the tables below.

Each of the reports from the three states identified as having a clear review process determined Applied Behavioral Analysis as an effective intervention model. As first defined by Baer and colleagues in 1968, Applied Behavior Analysis procedures are designed to be "effective" and "analytical". Effective means that the procedures should lead to a socially meaningful change in behavior; analytical means that procedures show why a behavior has changed (see discussion in Wacker, Berg, & Harding chapter in ***Effective Practices for Children with Autism: Educational and Behavioral Support Interventions That Work*** (Luiselli, Russo, Christian, & Wilczynski, 2008).

While all of the states used a "levels-of-evidence" approach and reported their identified levels, the reported levels did not match consistently across sources. Consequently, for ease of comparison, the following tables report each source's level of evidence as well as the level adopted for the Kansas report.

***Maine***

The Maine Administrators of Services for Children with Disabilities (MADSEC) convened a task force in 1997 made up of representatives from special education, CDS, autism society, parents, psychologists and 2 attorneys specializing in special education law. Report of the Maine Administrators of Services for Children with Disabilities (MADSEC) is available at: www.madsec.org. The task force reviewed "innumerable" sources and compiled their own list of "likely educational methodologies". They enlisted the services of a master's level student in special education to conduct a search for scientific information related to these methodologies and provide the task force with a preliminary analysis of scientific merit. This report targets early intervention which is viewed as ages birth through age 8 (MADSEC, 2000).

The task force established 4 categories for identifying scientific merit of targeted methodologies. A total of 8 interventions were assigned to the categories as follows: (Note: numbers were not included in the MADSEC report. Numbers were added here by the subcommittee chair to agree with other numbering systems, with a 4 indicating potential harm.*)

1) *The intervention is objectively substantiated as effective based upon the scope and quality of scientific research (Applied Behavior Analysis)*
2) *The intervention anecdotally shows promise, but is not yet objectively substantiated as effective using controlled studies and subject to the rigors of good science (auditory integration training, the Miller Method, TEACCH, sensory integration)*
3) *The intervention may be without scientific evaluation of any kind. (Greenspan's DIR/Floortime, Son Rise, p. 61)*
4) *The intervention has been repeatedly subjected to the rigors of science, which leads numerous researchers to conclude the intervention is not effective, may be harmful, or may lead to unintended consequences (Facilitated Communication)*

Recommendations of the Maine task force included:

- *Develop an aggressive plan to encourage screening of every child for autism as part of pediatric care*

- *Improve data collection systems to more accurately determine the number of Maine children who meet the diagnostic criteria for autism, independent of or in addition to other impairments*
- *Justify and seek additional funding from the Maine State Legislature for increased early autism identification and intervention*
- *Ensure services for children with autism are based on scientifically validated procedures*
- *Ensure that services for children with autism include systematic instruction procedures focusing on both the acquisition of skills and the decrease/elimination of interfering behaviors*
- *Require ongoing evaluation of autism interventions using controlled studies and subject to the rigors of good science. Ongoing evaluation should minimally include a credible method of evaluation, and criteria for determining whether to terminate or continue the intervention.*
- *Identify and recruit qualified behavior analysts from within and outside of Maine as required to meet current service needs*
- *Convene a Task Force charged with developing resources sufficient to meet and support the demand for applied behavior analysis. (p. 61)*

Findings and recommendations of the Maine report are limited by its date of publication (2000), date of research reviews (through 1998), and insufficient description of how intervention methodologies were selected and rated, and age ranges for which interventions were validated Further, ratings and recommendations are based on a review of the literature published a decade ago. Newer evidence would likely alter some ratings if they were made today. Following is a summary of the MADSEC report. The full report, with references, is available at www.madsec.org.

***Table 3. Maine Administrators of Services for Children with Disabilities and Kansas Levels of Evidence for Interventions for Children with an Autism Spectrum Disorder***

| **Recommendations (Maine)** | **Level of Evidence** | **Kansas Level** |
|---|---|---|
| Applied Behavioral Analysis (ABA) was determined to be an effective intervention for individuals with an Autism Spectrum Disorder. Applied behavior analysis includes many effective interventions, such as Discrete Trial Training (DTT). DTT is based on the principles of learning and has been demonstrated as an effective instructional method. DTT represents one of many teaching *methods* used within ABA-based programs. Others include the Picture Exchange Communication System (PECS), visual schedules, chaining and shaping. ABA also relies heavily upon incidental teaching as a generalization component.<br><br>According to the MADSEC, ABA is an objective discipline which focuses on the reliable measurement and objective evaluation of observable behavior.<br>ABA methods are used to support persons with Autism in at least 6 | 1 | **Strong** |

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| ways:<br>1. to *increase targeted behaviors* – using reinforcement procedures to increase on-task behavior or social interaction<br>2. to *teach new skills*- using systematic instruction & reinforcement procedures to teach functional life skills, communication and social skills<br>3. to *maintain behaviors*- teaching self-monitoring procedures to maintain and generalize vocationally related social skills<br>4. to *generalize or transfer behavior* from one situation to or response to another- completing assignments in the resource room to the mainstream classroom with typically developing peers<br>5. to *restrict or narrow conditions* under which interfering behaviors occur- structuring or modifying the learning environment<br>6. to *reduce interfering behavior*- self-injury or stereotopies<br><br>Reliable measurement means that behaviors must be defined objectively and operationally. ABA interventions also require a demonstration of the events that are responsible for the occurrence or the non-occurrence of behavior. The use of single case experimental design to evaluate the effectiveness of the individualized interventions is an essential component of programs based on ABA. This process should include:<br>1. selection of interfering behavior or behavioral skill defect<br>2. identification of goals and objectives<br>3. establishment of a method of measuring targeted behaviors<br>4. evaluation of current levels of performance (baseline)<br>5. continuous measurement of targeted behaviors<br>6. on going evaluation of effectiveness of the program<br><br>At the time of publication, the MADSEC reported two important emerging trends in ABA are 1) Positive Behavior Supports (PBS) and 2) Functional Assessment. The primary goal of PBS is to teach functional skills as a replacement for problem behaviors. PBS is:<br>1. based on the results of a functional assessment (FA),<br>2. consistent with fundamental principles of behavior (e.g. reinforcement increases behavior; punishment decreases behavior),<br>3. provides a good conceptual fit with values, resources and skills of all people in the setting, and<br>4. includes on-going evaluation to determine effectiveness.<br><br>Functional Assessment is the process of gathering information that can be used to maximize the effectiveness of behavioral support interventions. It includes:<br>1. a clear description of he problem behaviors, | | |

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| 2. identification of the events, times, and settings that predict problem behavior,<br>3. identification of the consequences that maintain behavior,<br>4. development of a hypotheses specifying the function of behavior,<br>5. collection of data that support the summary hypothesis or lead to an alternate hypothesis of behavioral function. | | |
| Treatment and Education of Autistic and Communication Handicapped Children (TEACCH).<br><br>The TEACCH approach includes a focus on the person with autism and development of a program around this person's skills, interests and needs. The major priorities include centering on the individual, understanding autism, adopting appropriate adaptations, and a broadly based intervention strategy building on existing skills and interest" (Mesibov, 1998).<br><br>This method makes use of visual cues for instruction and prediction for gaining independent (Trehin, 1998), keep detailed notes and data on each session (Lord & Schopler, 1994), document outcome of data, and utilize components of behavior approaches in teaching self-care skills and managing aberrant behaviors.<br><br>This approach also draws on concepts of sensory integration in determining causation of aberrant behaviors or lack of skill acquisition.<br><br>The goal of this program is to maximize autonomy through increased communication skills, social awareness, and independent decision-making by designing sheltered settings that help children make use of skills they posses rather than assisting children to enter normalized/typical settings (Lord & Schopler, 1994; Smith, 1996)<br><br>While there have been over 250 research studies since 1965, this body of research has included only a few peer-reviewed studies of outcome replications by researchers not affiliated with TEACCH. Professionals considering TEACCH methods should portray the program as lacking independent verification of its effectiveness and should disclose this status to key decision makers influencing the child's intervention. | 2 | **Minimal** |
| The Miller Method<br><br>The Miller Method is based on the theory that some children with autism have "system-forming disorders." Intervention methods include the use of adaptive equipment to expand the child's reality system and to increase the child's understanding of his/her relation to environment and space (Miller, 1998). | 2 | **Minimal** |

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| Only one study has been conducted to validate overall effectiveness of the Miller Method. This study was weakly controlled in that it did not evaluate the direct effects of the intervention, only the post-education placement of the students. | | |
| Sensory Integration<br><br>Sensory Integration based upon theories that sensory integration is an innate neurobiological process (Hatch-Rasmussen, 1995) and that children with autism and other developmental delays experience dysfunction in which sensory input is not integrated or organized appropriately by the brain.<br><br>Current research does not support Sensory Integration as an effective treatment for children with autism, developmental delays or mental retardation; nor has the limited research to date been able to identify Sensory Integration as an independent variable responsible for positive change in a child's behaviors or skills. In at least one study, Sensory Integration was shown to actually increase self-injurious behaviors. | 2 | **Minimal** |
| Auditory Integration<br><br>Auditory integration training is said to address the hearing distortions, hyperacute hearing, and sensory processing anomalies which cause discomfort and confusion in persons suffering from learning disabilities, including autism (Stehli, 1995). Auditory training seeks to retrain the auditory system by correcting hearing distortions. During 20 half-hour training sessions which take place over 10 to 14 days, participants listen with headphones to a musical program modified and filtered through an electron device called an AudoKinetron (Stehli, 1995)<br><br>There are few validated studies regarding the use of auditory integration training. According to the American Academy of Pediatrics Committee on Children with Disabilities, current information does not support the use of auditory integration training and, therefore, its use is not yet warranted other than in research protocols. | 2 | **Minimal** |
| Greenspan's DIR/Floor Time<br><br>Floor Time is based upon Greenspan's (1998) theories of six functional milestones necessary for a child to succeed in further learning and development. DIR/Floor Time includes interactive experiences ranging from two to five hours a day.<br><br>There have been no peer-reviewed, published studies of Greenspan's | 3 | **No Evidence** |

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| DIR/Floor Time's effectiveness for children with autism. Professionals considering Greenspan's Floor Time should portray the method as without peer-reviewed scientific evaluation, and should disclose this status to key decision makers influencing the child's intervention. | | |
| Son Rise<br><br>This technique is offered at the Options Institute and teaches the Option Process®. This intervention involves a loving and non-judgmental method for resolving unhappiness and discarding self-limiting beliefs (The Option Institute and Fellowship, 1997).<br><br>There have been no peer-reviewed, published studies of The Son-Rise Program's effectiveness or outcome statistics. Professionals considering Son-Rise should portray the method as without scientific evaluation of any kind, and should disclose this status to key decision makers influencing the child's intervention. | 3 | **No Evidence** |
| Facilitated Communication<br><br>Facilitated Communication is derived from the hypothesis that children and adults with autism or other developmental disabilities have a motor deficit that prevents them from expressing themselves even though they posses a sophisticated understanding of spoken and written language. At least five respected organizations have issued position papers discrediting the use of Facilitated Communication:<br>American Psychological Association<br>American Academy of Child and Adolescent Psychiatry<br>American Speech-Language-Hearing Association<br>American Association on Mental Retardation<br>Association for Behavior Analysis | 4 | **Potential harm** |

***New York***

In 1999 the New York State Department Of Health Division of Family Health Bureau of Early Intervention received federal funding (U.S. Department of Education) to develop best-practice guidelines for autism interventions and service delivery. Following an extensive review process outlined in the ***Guidelines Technical Report***, the best-practice guidelines were then developed and published.

The methods used by the New York reviewers were based on the methodology and guideline formats used by the Agency for Health Care Policy and Research (AHCPR), a part of the United States Public Health Service (The Guideline Technical Report, pg. I-7). Articles were selected based on a review of all potentially relevant literature and then screened to determine a sufficient level of scientific merit for inclusion in the review. They further established a "*Strength of evidence ratings*" which indicates the amount, general quality, and clinical applicability of scientific evidence. These ratings are as follows:

"[A] = Strong evidence is defined as evidence from two or more studies that met criteria for adequate evidence about efficacy and had at least moderate applicability to the topic, where the evidence consistently and strongly supports the recommendation.
[B] = Moderate evidence is defined as evidence from at least one study that met criteria for adequate evidence about efficacy and had at least moderate applicability to the topic, and where the evidence supports the recommendation.
[C] = Limited evidence is defined as evidence from at least one study that met criteria for adequate evidence about efficacy and had at least minimally acceptable applicability to the topic, and where the evidence supports the recommendation
[D] = Panel consensus opinion (either [D1] or [D2] below):
[D1] = Panel consensus opinion based on information not meeting criteria for adequate evidence about efficacy, on topics where a systematic review of the literature was done
[D2] = Panel consensus opinion on topics where a systematic literature review was not done." (from Table I-5; pg. I-21)

The New York guidelines are the most comprehensive to date, spanning several volumes of material. In fact, the ***Clinical Practice Guideline Report of the Recommendations for Autism/Pervasive Developmental Disorders: Assessment and Intervention for Young Children (Age 0-3)*** is a stand-alone publication of 182 pages of recommendations and corresponding appendices and references. These guidelines were established by a rigorous review of the literature pertinent to primarily children birth through age six. However, of the 232 research papers identified in their literature review, only 5 met the state's own criteria for sufficient evidence, and the 5 articles represented only 4 studies (Gernsbacher, 2003). New York's guidelines and recommendations are therefore limited by the number of studies upon which they are based, as well as the fact that nearly a decade of research has since been published.

Following is a summary of these recommendations taken from the ***Clinical Practice Guideline Report of the Recommendations Autism/Pervasive Developmental Disorder Assessment and Intervention for Young Children (age 0-3 years)*** pages 119-182.

***Table 4. New York State Department of Health Division of Family Health Bureau of Early Intervention and Kansas Levels of Evidence for Interventions for Children with an Autism Spectrum Disorder***

| **Recommendations (New York)** | **Level of Evidence** | **Kansas Level** |
|---|---|---|
| The New York report on effective intervention for children with ASD provided 6 general principles based on a comprehensive review of the literature. They site common elements as described by Dawson and Osterling (1997).<br>These effective intervention components are:<br>1. Curriculum content: An effective curriculum emphasizes five basic skill domains, designed to teach the child to successfully demonstrate the following abilities: 1. To attend to elements of the | | |

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| environment that are essential for learning, especially to social stimuli. 2. To imitate others. 3. To comprehend and use language. 4. To play appropriately with toys. 5. To interact socially with others.<br>2. Highly supportive teaching environments and generalization strategies: Establish core skills in highly structured environments and then work to generalize these skills to more complex natural environments.<br>3. Predictability and routine: Assist the child with strategies that help with transitions from one activity to another.<br>4. Functional approach to problem behaviors: Initially the teacher, care giver arranges the environment and instruction to prevent the development of problem behaviors. If problem behaviors persist, use a functional approach that involves these steps: recording behavior, developing a hypothesis about the function of the behavior, changing the environment to support appropriate behavior which allows child to cope effectively with the situation, and teaching appropriate behavior to replace problem behavior.<br>5. Plans for transition from preschool classroom: Teach "survival" skills that children will need later on in order to function independently in preschool or school classrooms.<br>6. Family involvement: Parents can provide unique insight into creating an intervention plan and can provide additional hours of intervention. Including parents in the intervention can also help children achieve greater maintenance and generalization skills and can help reduce parents stress level. | | |
| **Behavioral and Educational Approaches** | | |
| *Linking Interventions to Assessment of the Child* | | |
| Linking Early Identification and Diagnosis with Early Intervention<br><br>All sub-recommendations were opinion recommendations only. | Level 4<br>D1-D2 | **No Evidence** |
| Individualized interventions based on information from the assessment<br><br>All sub-recommendations were opinion recommendations only, except for:<br>(8) It is recommended that target behaviors for each individual child be clearly identified and defined with developmentally appropriate measurable criteria for master. | Level 4<br>D1-D2<br><br>Level 1<br>A | **No Evidence**<br><br>**Strong** |
| Ongoing monitoring of child performance and modifications of interventions<br><br>All sub-recommendations were assigned a value of A. | Level 1<br>A | **Strong** |

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| (9) It is recommended that any intervention be tied to ongoing monitoring of the child's progress by parents and professionals.<br><br>(10). If ongoing assessment of the child's progress shows an intervention has not been effective after an adequate trial period, it is recommended that the intervention or specific aspects of its application be changed. | | |
| Periodic in-depth reassessment<br><br>All sub-recommendations were opinion recommendations only | Level 4<br>D1 - 2 | **No Evidence** |
| *General Considerations in Implementing Interventions* | | |
| Need for scientific validation of efficacy and safety of interventions<br><br>All sub-recommendations were opinion recommendations only | Level 4<br>D1 - 2 | **No Evidence** |
| Collaboration and coordination<br><br>All sub-recommendations were opinion recommendations only except:<br>(6) It is important that there be appropriate supervision of paraprofessional staff and coordination of efforts to accomplish agreed-upon intervention goals. | Level 4<br>D1 – 2<br><br>Level 1<br>A | **No Evidence**<br><br>**Strong** |
| Planning a comprehensive intervention<br><br>(this recommendation relates to complementary strategies, NOT the inclusion of multiple domains) | Level 4<br>D1 – 2 | **No Evidence** |
| Addressing co-existing developmental and health problems | Level 4<br>D1 – 2 | **No Evidence** |
| Use of physically intrusive approaches and physical aversives<br><br>All sub-recommendations were opinion recommendations only except:<br><br>(9) The use of physical aversives (such as hitting, spanking, slapping, or pinching) is not recommended as a part of any intervention program There is evidence that interventions for children with autism can be successful without the use of physical aversives | Level 1<br>A | **Strong** |
| *Role of the Parents and Family in Interventions* | | |
| Role of family in assessment and intervention process<br><br>All sub-recommendations were opinion recommendations | Level 4<br>D1 – 2 | **No Evidence** |
| Considering the cultural context of the family<br><br>All sub-recommendations were opinion recommendations | Level 4<br>D1 – 2 | **No Evidence** |
| Selecting an intervention program | | |

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| (1) When selecting a comprehensive intervention program for a young child with autism, it is recommended that parents and professionals consider the following aspects of the program:<br>• Content and emphasis of the program's curriculum<br>• Strategies for using a functional approach for problem behaviors<br>• Strategies for providing a highly structured and supportive teaching environment with a high degree of predictability and routine<br>• Strategies for taking skills learned in more structured settings and generalizing them to more complex natural environments<br>• Strategies for transitions from one activity to another during the day<br>• Long-term strategies for transition between intervention settings opportunities for family involvement | Level 1<br>A | **Strong** |
| <u>Recommendations about program curriculum</u><br><br>(2) It is recommended that comprehensive intervention programs have a curriculum content specifically designed for children with autism. It is important that the program curriculum focus on developing increased attention to social stimuli, imitation skills, communication and language, symbolic play, and social relationships.<br><br>(3) It is recommended that the curriculum of an intervention program for a child with autism be individualized based on the child's specific strengths and needs. | All<br>Level 1<br>A | **Strong** |
| <u>Recommended elements for programs</u><br><br>(4) It is recommended that comprehensive intervention programs for young children with autism include the following elements:<br>• A functional approach to dealing with problem behavior<br>• A highly structured and supportive teaching environment<br>• A high degree of predictability and routine<br>• Strategies for generalization of skills to less restrictive settings<br>• Strategies for transition between daily activities<br>• Long-term strategies for transitions between intervention settings<br><br>(5) Because children with autism have a need for predictability and routine, it is recommended that comprehensive intervention programs provide strategies for children to deal with transitions such as changes in schedule, activity, or routine during the day. To facilitate transitioning activities, cue cards or other visual aids may be used. | All<br>Level 1<br>A | **Strong** |
| <u>Need for a continuum of intervention strategies</u> | | |

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| (6) A continuum of intervention strategies is important as the child progresses in independence from one-to-one to group settings; move from highly structured to more natural environments such as preschools with typical peers<br><br>(7) Use a functional approach to problem behaviors.<br><br>(8) …prepare children for transition to more general settings by teaching them to function as independently as possible<br><br>(9) …provides opportunities for parent involvement including intervention planning, parent training to assist in the intervention and regular consultation regarding the progress of their child. | All Level 1 A | **Strong** |
| *Intensive Behavioral and Education Intervention Programs* | | |
| Using principles of applied behavioral analysis for interventions | Level 1 A | **Strong** |
| Frequency, intensity and duration of intervention<br><br>(2) … that intensive behavioral programs include as a minimum approximately 20 hours per week of individuals behavioral intervention using applied behavioral analysis techniques (not including time spent by parents).<br><br>(3) …that the precise number of hours…vary. Considerations in the frequency and intensity of intervention include age, severity of autistic symptoms, rate of progress, other health considerations, tolerance of the child for the intervention and family participation<br><br>(4) (summary) the literature suggests 18-40 hours per week by a trained therapist. Number of hours per week is based on individual child characteristics and needs.<br><br>(5) …frequent monitoring to determine if intervention hours should be increased or decreased<br><br>(6) revise intervention plan when the child shows either significant improvement or a lack of improvement | All Level 1 A | **Strong** |
| Supervision of therapist<br><br>(7) (summary) therapist receive regular supervision from a professional with expertise in applied behavioral approaches | Level 4 D2 | **No Evidence** |
| Parent involvement and training<br><br>(8) …Parental involvement is important to ensure that the …outcomes, goals, and strategies most important to the family are incorporated in the intervention | All Level 1 A | **Strong** |

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| (9) …that parents be trained in behavior techniques and encouraged to provide additional hours o instruction to the child.<br><br>(10) ….parent training should be extensive and ongoing | | |
| Use of physical aversives<br><br>See above | Level 1<br>A | **Strong** |
| *Basic Principles of Specific Behavioral Intervention Techniques* | | |
| Selecting behavioral and education intervention techniques<br><br>(1) …use appropriate behavioral techniques such as those of applied behavioral analysis<br><br>(2) Specific behavior strategies…include:<br>• Prompting<br>• Modeling<br>• Fading<br>• Reinforcement | All<br>Level 1<br>A | **Strong** |
| Individualizing interventions for each child<br><br>(3) It is important to identify each child's individual strengths and learning styles<br><br>(4) …interventions be …tailored to the child's learning style<br><br>(5) …target behaviors…be clearly identified and defined with measureable criteria for mastery<br><br>(6)…use of a task analysis may be useful | Level 2<br>B<br>Level 4<br>D<br>Level 1<br>A<br>Level 3<br>C | **Emerging**<br><br>**No Evidence**<br>**Strong**<br><br>**Minimal** |
| Selecting Reinforcers<br><br>All sub-recommendations (type and assessment) are level 2 except:<br><br>(9) It may be useful to vary the reinforcers used. | Level 2<br>B<br>Level 3<br>C | **Emerging**<br><br>**Minimal** |
| Techniques and strategies to promote generalization of skills<br><br>The following strategies were identified:<br>❖ Use of behavioral techniques facilitating generalization<br>❖ Assessment of generalization<br>❖ Continuum of intervention strategies are used<br>❖ Fade from higher levels of support (e.g. prompts and reinforcers)<br><br>(13) Using multiple cues may be useful to move the child beyond | Level 1<br>A<br><br>Level 3<br>C | **Strong**<br><br>**Minimal** |

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| reliance on point prompts and to help the child generalize responses to different stimuli. | | |
| Assessing progress and modifying the intervention<br><br>(15) ….ongoing assessment be included as a part of every intervention session and that intervention techniques be modified as appropriate based on the child's progress | Level 1<br>A | **Strong** |
| *Behavioral and Educational Intervention Techniques for Maladaptive Behaviors* | | |
| Behavioral/educational interventions for reducing maladaptive behaviors<br><br>(1) (summary) it is important to consider age, developmental level, skills, and abilities, environmental changes, parent's needs, desires, and priorities, family members appropriate to be involved in the program<br><br>(2) (summary) functional approaches be used when behaviors interfere with learning or could be hazardous to child | Level 4<br>D1<br><br>Level 1<br>A | **No Evidence**<br><br>**Strong** |
| Using Functional Analysis to evaluate maladaptive behaviors<br><br>(3) (summary) the use of a functional assessment is useful<br><br>(4) (summary) using differential adult attention is sometimes useful in decreasing problem behaviors | Level 1<br>A<br>Level 3<br>C | **Strong**<br><br>**Minimal** |
| Using reinforcers and punishers to reduce problem behaviors*<br><br>(5) (summary) use of a reinforcer assessment is an important intervention to reduce maladaptive behaviors<br><br>(6) (summary) using empirically defined reinforcers and punishers can be useful for reducing many types of maladaptive behavior including pica<br><br>(7) (summary) differential reinforcement is helpful to frequency inappropriate and increase substitute appropriate behavior<br><br>(8) (summary) differential reinforcement of verbal behavior is useful in reducing the frequency of inappropriate behavior<br><br>(9) (summary) using a variety of punisher is more effective at reducing problem behavior | All<br>Level 3<br>C | **Minimal** |
| Using physically intrusive procedures or physical aversives<br><br>Summary:<br>Physical measures (e.g. redirection, holding or restraints) should only | All | |

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| be used after other methods have failed<br><br>Physical aversives (spanking, etc.) is not recommended | Level 4<br>D1 | **No Evidence** |
| Including parents in the intervention<br>See above | Level 4<br>D1 | **No Evidence** |
| *Behavioral and Educational Intervention Techniques to Improve Communication* | | |
| Behavioral and educational interventions for improving communication<br><br>(1) (summary) it is important to consider age, developmental level, skills, and abilities, environmental changes, parent's needs, desires, and priorities, family members appropriate to be involved in the program | Level 4<br>D1 | **No Evidence** |
| Using specific behavior or education techniques<br><br>(5) (summary) a variety of behavioral techniques are useful<br><br>(6) (summary) prompting and/or modeling followed by reinforcement may be useful<br><br>(7) use of time-delay strategies prior to prompting | Level 1<br>A<br>Level 3<br>C<br><br>Level 3<br>C | **Strong**<br><br>**Minimal**<br><br>**Minimal** |
| Including parents and peers in intervention<br><br>(8) (summary) parental involvement in communication interventions is critical<br><br>(9) (summary) parent training in prompting strategies is beneficial<br><br>(10) (summary) training peers to model correct verbal responses may be useful | Level 1<br>A<br>Level 3<br>C<br>Level 3<br>C | **Strong**<br><br>**Minimal**<br><br>**Minimal** |
| Using sign language and augmentative communication systems<br><br>Summary: use of sign may be useful in facilitating language; augmentative communications systems may be useful for aiding communication; parent perception is important | Range:<br>Level 3-4<br>C-D | **Minimal - No Evidence** |
| *Behavioral and Educational Intervention Techniques to Improve Social Interactions* | | |
| Behavioral/educational interventions for improving social interactions<br><br>(1-2) (summary) it is important to consider age, developmental level, skills, and abilities, environmental changes, parent's needs, desires, and priorities, family members appropriate to be involved in the program | Level 4<br>D1<br><br>Level 1 | **No Evidence**<br><br>**Strong** |

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| (3) (summary) specific behavioral techniques may be useful<br><br>(4) (summary) prompting or modeling followed by reinforcement may be useful | A<br>Level 3<br>C | **Minimal** |
| Training peers to assist in intervention | Level 1<br>A | **Strong** |
| Training parents in the intervention | Level 4<br>D1 | **No Evidence** |
| *Parent Training as a Part of Behavioral and Educational Programs* | | |
| (1) (summary) parents should be included<br><br>(2) (summary) consideration should be given to siblings and other family members | Level 4<br>D<br>Level 3<br>C | **No Evidence**<br>**Minimal** |
| **The *Developmental*, Individual Difference, Relationship Model (*aka, DIR/Floor Time*)** | | |
| This approach (Greenspan & Wieder, 1997) does not have any research to support the effectiveness of these intervention approaches. Different intervention components rated in the New York Report were based on opinion only | Level 4<br>D1 | **No Evidence** |
| **Sensory Integration** | | |
| Sensory Integration therapy is based on an evaluation targeting sensory (hearing, smell, taste, touch, sense of position, and others) disturbances.<br>Different intervention components rated in the New York Report were based on opinion only | Level 4<br>D1 | **No Evidence** |
| **Auditory Integration Training** | | |
| According to the New York report:<br>(1) Because of the lack of demonstrated efficacy and the expense of the intervention, it is recommended that auditory integration training not be used as an intervention for young children with autism. | Level 3<br>C | **Minimal** |
| **Facilitated Communication** | | |
| (1) ….due to the lack of evidence and possible harm….it is strongly recommended that facilitated communication not be used | Level 4<br>D1 | **No Evidence** |
| **Music Therapy** | | |
| (1) Music therapy is not recommended | Level 4<br>D1 | **No Evidence** |
| **Touch Therapy** | | |
| (1) Touch therapy is not recommended | Level 4 | **No** |

| | D1 | Evidence |
|---|---|---|
| **Medication and Diet Therapy** | | |
| *General Approach for Using Medication or Diet Therapies as Interventions for Autism* | | |
| Evaluating potential benefits and risks of using medication or special diets<br><br>(1) (summary) careful consideration should be give to potential risks<br><br>(2) (summary) use should be based in scientific evidence for effectiveness<br><br>(3) (summary) in general should not be used<br><br>(4) (summary) – the professional is responsible for providing information to the family. | Level 1 A<br><br>Remaining Level 4 D1 | **Strong**<br><br>**No Evidence** |
| *Psychotropic Medications* | | |
| Evaluating potential benefits and risks of psychoactive medication to treat autism<br><br>(1-2) (summary) careful consideration should be give to potential risks<br><br>(3) (summary) physicians prescribing psychoactive medication should discuss potential risks and benefits with parents | Level 1 A<br><br>Level 4 D1 | **Strong**<br><br>**No Evidence** |
| Using a trial of psychotropic medications to treat autism in young children<br><br>(4) (summary) some medications can be useful for sever behavioral problems that have not responded to behavioral techniques (mood stabilizers, neuroleptics, opiate antagonists, sedatives, selective serotonin re-uptake inhibitors, stimulants)<br><br>(5) (summary) use should be based in scientific evidence for effectiveness | Level 1 A<br><br>Level 4 D1 | **Strong**<br><br>**No Evidence** |
| Using psychoactive medications to treat health problems associated with autisms<br><br>(6-7) (summary), medication trials for sleep or associated medical conditions suspected of precipitating regression may be useful | Level 4 D1; D2 | **No Evidence** |
| Monitoring children taking psychoactive medication for autism<br><br>(8-9) (summary) requires parental education for side effects and close monitoring. | Level 1 A | **Strong** |

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| (10) (summary) after a trial period, the data should be reviewed to determine whether or not to keep the child on the medication | Level 4 D1 | **No Evidence** |
| Experience and expertise of physician<br><br>(11-12) (summary) the physician should be knowledgeable and have expertise in autism and medications and that the early intervention team should facilitate consultation with a physician experienced with medication use in young children with autism | Level 4 D2 | **No Evidence** |
| *Hormone Therapies* | | |
| The use of hormone therapies is not recommended | Level 4 D1 | **No Evidence** |
| *Immunologic Therapies* | | |
| Summary:<br>These therapies are not recommended; it is strongly recommended that the use of intravenous immune globulin therapy not be used; immunological testing is not useful for guiding interventions for young children with autism | Level 4 D1 | **No Evidence** |
| *Anti-Yeast Therapies* | | |
| Summary:<br>These therapies are not recommended; testing is not useful for guiding interventions for young children with autism | Level 4 D1 | **No Evidence** |
| *Vitamin Therapies* | | |
| (1) Administering high does of vitamin B6 (pyridoxine) and magnesium is not recommended as an intervention for autism in young children | Level 3 C | **Minimal** |
| (2) (summary) administration of high doses of any vitamin or trace mineral is not recommended | Level 4 D1 | **No Evidence** |
| (3) (summary) if there is a documented vitamin deficiency – follow and treat as appropriate | Level 4 D2 | **No Evidence** |
| *Diet Therapies* | | |
| (1, 3) (summary) use of diet that eliminates milk, gluten, or other specific foods in not recommended; allergy testing provides no information for determining appropriate treatment. | Level 4 D1 | **No Evidence** |
| (2) (summary) for documented food allergies, use standard allergy testing and then appropriate dietary changes: this would be unrelated to the child's autism | Level 4 D1 | **No Evidence** |

*note the use of the terms reinforcer and punisher are used in their strict scientific terms (reinforcers increase or strengthen; punishers decrease or weaken behavior).

Information about the New York report can be obtained at http://www.health.state.ny.us/community/infants_children/early_intervention/autism/index.htm

Copies of the full report, review process, and references can be ordered at:
Publications
New York State Department of Health
P.O. Box 2000
Albany, New York 12220

*Vermont*
In 2005 the Vermont State Interagency Team was charged to answer critical questions about autism in Vermont. In response to this charge, the Department of Education and the Department of Disabilities, Aging and Independent Living hired professionals (autism specialists) to assess a variety of questions, one of which was, ***"What is evidence-based practice in working with these children and their families?"*** (McFadden, & Bruno, 2006).

In reviewing the educational literature, treatments are given a Level 1 through a Level 4 Efficacy Rating, with Level 1 being an indication that there is a significant level of research that supports the treatment and a Level 4 Efficacy Rating indicating that there is not a significant level of research supporting the treatment at this time. Findings and recommendations of the Vermont report are limited by the lack of information available regarding the research review and assignment of efficacy ratings. In addition, there insufficient description of how intervention methodologies were selected and rated, and age ranges for which interventions were validated, although the authors report that the interventions were have been reviewed using the framework outlined by Chorpita, et al. (2002). Following is a summary of the review framework and the findings of the work of the Vermont Task Force. The full report, with references, and the ***Efficacy Ratings*** table are available at for download at http://www.autismtaskforce.com/about.html. This report targets early intervention which is viewed as ages birth through age 8 (pg. 46).

**Framework for Examining Interventions**
**(adapted from Chorpita et al, 2002)**

Level I: Well established interventions meeting four criteria:

1. Two or more examples exist in the literature where groups of individuals who received one treatment performed better than either those who did not receive the treatment or those who received treatment with a different intervention; and/or where the experimenter has statistically demonstrated that the intervention in question can produce the same level of effects or improvement as a more established intervention (group design)

OR

A large series of case studies have been done with strong experimental designs comparing one intervention with another.

2. Treatment manuals exist for the experimental procedures.
3. Participant samples are clearly defined.
4. Two or more researchers have reported significant effects.

Level II: Probably efficacious (promising) treatments meeting one of the following three criteria:

1. Intervention is found to be superior to a control group in at least two studies reported in the literature.
2. Evidence of one example in the literature where groups of individuals who received one treatment performed better than either those who did not receive the treatment or those who received treatment with a different intervention; and/or where the experimenter has statistically demonstrated that the intervention in question can produce the same level of effects or improvement as a more established intervention (group design)
3. A small series of case studies with clear participant description, strong experimental designs, and use of procedural manuals compared to a group that did not receive treatment or received another intervention.

Level III: Possibly efficacious treatments requiring only one of the following criteria:

1. Evidence of one example in the literature where groups of individuals who received one treatment performed better than either those who did not receive the treatment or those who received treatment with a different intervention; and/or where the experimenter has statistically demonstrated that the intervention in question can produce the same level of effects or improvement as a more established intervention (group design)

OR

2. A small series of case studies with clear participant and treatment description, strong experimental designs with two or more researchers reporting similar effects and comparison to a group that did not receive treatment or received another intervention.

Level IV: Untested and unsupported treatments

Level V: Possibly harmful treatments

***Table 4. Vermont State Interagency Team, the Vermont Department of Education and the Department of Disabilities, Aging and Independent Living and Kansas Levels of Evidence for Interventions for Children with an Autism Spectrum Disorder***

| **Recommendations (Vermont)**<br>*Note: the order has been changed to reflect categories of levels. | **Level of Evidence** | **Kansas Level** |
|---|---|---|
| Applied Behavioral Analysis<br><br>ABA continues to offer the broadest amount of supporting peer reviewed research as a method to both improve symptomology associated with ASD and to support individual's successful development of adaptive skills (individually defined). ABA is a method through which many other approaches can be applied, including such methods as DIR, peer mediation, PECS, and RDI. | Level 1 | **Strong** |
| Discrete Trial Teaching | Level 1 | **Strong** |

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| There are currently 2 or more examples in the literature which document research conducted using between group designs which demonstrate that children with ASD who received DTT performed better on a variety of measures in comparison to those who receive no intervention, those who received different interventions and those who received less intensive interventions. There are also a series of single subject studies that demonstrate the efficacy of DTT for children with ASD. A recent replication of the UCLA early intensive behavioral treatment program resulted in 48% of the children showing rapid learning, achieving average scores on measures of cognitive, language, adaptive and social skills and succeeding in regular education classrooms. | | |
| Pivotal Response Training (PRT)<br><br>The review of the research demonstrated that there are both a number of single subject studies and case studies, which document and demonstrate the effectiveness of PRT over no treatment. There is also a research example of a between group study which demonstrates that children with ASD who receive PRT have better outcomes than those who did not have PRT. There is an Intervention Manual to support the intervention. However, this intervention does not receive a Level 1 rating because the existing literature does not contain a large number of studies that compare PRT to other interventions, nor are there two or more examples of between group designs. | Level 2 | **Moderate** |
| Peer Mediation Intervention Strategy<br><br>While this approach does not have a variety of controlled group studies, it is very well described, has a number of strong case studies, and uses a clear procedure that appears to have a direct effect. | Level 2 | **Moderate** |
| Social Stories Intervention Strategy<br><br>While there are no examples of group design research studies which support the efficacy of social stories and no single subject design studies which compare the effectiveness of social stories with other interventions, there are a large series (5+) of case study and single subject design studies which demonstrate the effectiveness of Social Stories in reducing problematic behaviors and frustration and increasing communication among children with ASD.<br>Three studies, Kuoch, Kuttler and Ivey, had strong experimental designs, clearly described participants and assessed social stories as | Level 2 | **Moderate** |

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| the sole intervention. Two demonstrated reduction in problem behaviors using social stories. One showed an increase in independent behavior in novel situations. Two other studies, Thieman & Goldstein and Barry & Burlew, had strong experimental designs, clearly described participants, but used social stories together with other interventions. There is a manual describing this intervention. | | |
| Picture Exchange Communication System<br><br>When it is applied appropriately as a technique to increase mands, it works well and this is well documented. Three studies using single subject designs (Charlop-Christy, Ganz & Simpson, and Kravits) had good experimental designs and clear participant descriptions showed increases in communication skills using PECS. All use the PECS procedure manual. | Level 2 | **Moderate** |
| Video Modeling<br><br>At least five case studies with strong experimental designs and clear participant descriptions demonstrating positive effects of video modeling to increase social or functional life skills. No procedural manual. | Level 2 | **Moderate** |
| Floor Time Intervention Strategy (aka, Develomental, Individual Difference, Relationship Modell/DIR)<br><br>Recently, Floor Time has been tested in a single subject design study, which will require replication but it is showing some initial promise. There is also some evidence in the form of chart reviews, which suggest the potential for Floor Time to be effective. There are no group design studies or more than one single subject design that document the effectiveness of Floor Time or compare the effectiveness of Floor Time with other intervention approaches. In order to receive a higher rating, further research is needed to demonstrate the effectiveness of Floor Time either in comparison to no intervention or different interventions. Further, research by multiple investigators is needed. | Level 3 | **Minimal** |
| Nutritional Supplements & Vitamin Therapy - B6 & Magnesium<br><br>A placebo controlled study reported that low dose pyridoxine (B6) and magnesium failed to benefit 15 patients (Tolbert et al., 1993). Study by Findling et al., (1997) reported an inability of HDPM (high dose pyridoxime and magnesium) to provide therapeutic response for children with ASD and, according to the authors, "adds to a body of evidence that has questioned the efficacy of this intervention." | Level 3 | **Minimal** |

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| Pfeiffer et al., (1995) analyzed the results of 12 published studies of B6 and magnesium treatment. They reported, "overall, results of the current research suggest that B6-Mg may be a promising adjunct in the treatment of autism." The authors suggested further research to explore the long-term effects of treatment. | | |
| Relationship Development Intervention (RDI)<br><br>While this approach intuitively makes sense it is not, at this point, tested. The author makes reference on his web page to an article "in press" in the Journal of Autism and Developmental Disabilities, but a review of this journal did not reveal his article. This study was said to compare 17 children receiving RDI with 14 children receiving other interventions. The RDI group demonstrated significantly greater improvement in their scores on the Autism Diagnostic Observation Schedule, diagnostic classification and classroom placement (Gutstein, 2005). This was based upon a retrospective study of a small sample of children with methodological limitations. | Level 4 | **No Evidence** |
| Nutritional Supplements & Vitamin Therapy - DMG<br>(Added – Definition not in Vermont report: DMG is an abbreviation for Dimethyl Glycine. DMG typically is used as an antioxidant, anti-aging and anti-cancer agent, and to reduce cholesterol. Most studies, however, have not reported any beneficial effect. Other names for DMG include: Calcium Pangamate, Pangamic Acid, N,N-Dimethyl Glycine, and Vitamin B15.)<br>Anecdotally, parents have reported beneficial results of vitamin therapies. Only one study with small sample size and possibly too low a dosage to support or refute efficacy of DMG. | Level 4 | **No Evidence** |
| Sensory Integration Therapy<br><br>Therapy is currently an unsupported intervention technique. While there is a body of literature that has been used to support SI, much of it is characterized by poor research design. Anecdotal reports do suggest SI may show promise, but as an intervention for children with ASD, SI is not yet objectively substantiated through the rigors of good science. | Level 4 | **No Evidence** |
| Wilbarger Protocol<br><br>There are currently no research studies (either single subject or group design) that measure the efficacy of the Wilbarger Protocol. Anecdotal evidence from parents and therapists suggest that children have responded positively to this technique, but scientific research is needed to further evaluate and determine the appropriateness of this | Level 4 | **No Evidence** |

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| intervention strategy. | | |
| Auditory Integration Training (AIT)<br><br>While it can receive broad testimonial support, this approach lacks any systematic or methodologically sound review of its efficacy at this time. A couple of studies and review chapters have been conducted, essentially indicating that AIT makes no difference. One author suggested that the only proponents of AIT are those who stand to benefit economically from it. There are also questions of validity and appropriate controls in the studies that have been done. | Level 4 | **No Evidence** |
| Alert Program<br><br>This is an untested intervention. | Level 4 | **No Evidence** |
| Visual Therapies (VT)<br><br>Visual therapies are untested and unsupported at this time beyond testimonials.<br>There was more evidence that VT had no effect than that it had any effect at all. | Level 4 | **No Evidence** |

**Sources of Information from Professional Organizations and Specific Disciplines**

*Note: The following are ordered alphabetically only. These are not ordered by deemed importance.

***(1) American Speech-Language-Hearing Association (ASHA)***
Given the significant impairment in socialization and communication skills, interventions for children with an ASD typically target social and communication goals. The Guidelines for Speech-Language Pathologists in Diagnosis, Assessment, and Treatment of Autism Spectrum Disorders Across the Life Span (2006a Available from http://www.asatonline.org/resources/articles/ evidencebasedpractice.htm) recommend the following:

SLPs should establish partnerships with families in assessment and intervention

- SLPs who acquire and maintain the necessary knowledge and skills can diagnose ASD, typically as part of a diagnostic team.
- All individuals with ASD have core challenges in the area of social communication, therefore, SLPs should conduct assessments and prioritize intervention goals and objectives to enhance:
    - The initiation of spontaneous communication in functional activities across social partners and settings

- The comprehension of verbal and nonverbal discourse in social, academic, and community settings
- Communication for a range of social functions that are reciprocal and promote the development of friendships and social networks
- Verbal and nonverbal means of communication including natural gestures, speech, signs, pictures, written words, as well as other AAC systems
- Access to literacy and academic instruction, as well as curricular, extracurricular, and vocational activities.

- SLPs should provide services in natural learning environments that are connected with functional and meaningful outcomes and only provide pull-out services when repeated opportunities do not occur in the natural environment or to work on functional skills in more focused environments.
- SLPs have an important role as advocates for individuals with ASD.

***(2) Applied Behavior Analysis and Behavioral Interventions***

Behavior analysis is the scientific approach to understanding behavior and how it is affected by the environment. "Applied" behavior analysis (ABA) is the use of those techniques and principles to address socially important problems in community settings, and to bring about meaningful differences (Baer, Wolf, & Risley, 1968). According to Baer and colleagues, ABA includes the following seven elements: 1) the program must be applied, that is, the behaviors should be socially significant, 2) the program must focus on the environment and observable behaviors recorded and described with precision, 3) the program must be analytic, with systematic data collection that clearly indicates that the intervention is responsible for a change in a behavior, 4) the program must be technological, with procedures described fully enough that others can replicate/duplicate the intervention with the same results, 5) the program must be conceptually systematic, that there is relevance to the field, 6) the program must be effective, with meaningful changes in behavior, and; 7) the program should display some generality, that is, the change in behavior should be seen across settings, people, environments, stimulus materials, etc.

Research over the past 25 years has consistently demonstrated that behavioral techniques, such as those found in the applied behavior analysis or 'ABA' approach, allow most children with an ASD to make significant gains (Smith, Groen, & Wynn, 2000). Evidence suggests that intensive behavior analytic intervention (e.g., a minimum of 15-20 hours per week) is most effective at producing long term improvements in functional capacity for young children (Anderson et al., 1987; Howard et al., 2005; Lovaas, 1987; Sallows & Graupner, 2005; Smith, et al., 2000; Clark, Tuesday-Heathfield,, Olympia, & Jenson, 2006; Lovaas & Smith, 2003).

The following presents common elements found in the behavioral literature (National Research Council, 2001; Herbert, et al., 2002; Simpson, 2005; Dawson & Osterling, 1997):

- Caregivers must receive training.
- Individuals receive between 25 & 40 hours of intervention every week. At least half of the intervention must be delivered one-on-one OR in small groups that have been determined to be more appropriate than one-on-one (e.g., if a child's primary goals are social interaction, one-on-one intervention may be contraindicated).

- The staff members delivering the intervention have received specialized training in ASD that includes an experiential component.
- Individualized instructional targets have been selected based on an age appropriate curriculum based assessment. Instructional targets address all areas of delay and specifically address core deficits of ASD (e.g., imitation, communication, play, social interaction, attention [Dawson & Osterling, 1997]).
- Instructional programs exist for every instructional target skill. Instructional programs include mastery criteria and strategies for programming for generalization.
- Data are collected during instructional sessions on all target skills that are addressed.
- Instructional decisions are data-based.
- Written instructions, programs, data charts, student progress (or not), and changes in programming are based on data and graphic displays.
- Behavioral intervention and instructional strategies are implemented with high fidelity and the intervention strategy is outlined and explained by staff.
- Behavioral strategies are used to facilitate appropriate behavior and to decrease challenging behavior. Data are collected on the challenging behavior and decisions regarding changes in the treatment are data-based.

***(2a)Discrete Trial Training (DTT)/Task Analysis and Language Acquisition.***

In DTT, skills are taught through discrete teaching trials that consist of a trainer-provided antecedent, a behaviorally defined response from the child, and a consequence that rewards a correct response or marks an incorrect response. Complex behaviors are broken down into individual, teachable skills through a process called task analysis. Techniques such as shaping, prompting, chaining and fading are the used to develop the new behavior. DTT is highly directive, where the adult chooses which skill to be taught, provides an instruction, requires the child to give a desired response, provides consequences, and repeats the sequence until the child has mastered the skill. DTT can be used for language acquisition, relying on the child's imitation of adult speech. This method uses prompting, shaping, chaining and fading to build understanding and use of single words and then various word combinations. For children who do not yet imitate speech, verbal imitation itself is taught (Lovaas, Ackerman, Alexander, Firestone, Perkins, & Young, 1981)

While DTT has been demonstrated to be effective and has been cited across multiple sources as an evidence-based practice, a review in 2001 (Delprato, 2001) examined a series of 10 controlled studies in which traditional operant behavioral procedures were compared with more recently developed normalized interventions for teaching language to young children with autism. Main characteristics of the older treatments include highly structured direct teaching sessions of discrete trials, teacher initiation, artificial reinforcers, and response shaping. Normalized interventions consist of loosely structured sessions of indirect teaching with everyday situations, child initiation, natural reinforcers, and liberal criteria for presentation of reinforcers. The main conclusion was that in all eight studies with language criterion responses, normalized language training was more effective than discrete-trial training. Furthermore, in both studies that assessed parental affect, normalized treatment yielded more positive affect than discrete-trial training alone (Delprato, 2001 retrieved from www.pubmed.org). This method of teaching is consistent with the recommendations found in the literature to promote generalization of skills (Stokes and Baer, 1977).

*(2b) The UCLA Young Autism Project*

The UCLA Young Autism Project is one behavioral intervention based on Applied Behavioral Analysis methodology that has been used with preschool children. Two replication studies that used randomized group assignment demonstrated significant change in intelligence quotient (IQ) and behavior in children receiving one-on-one home-based Lovaas ABA at least 27 hours a week for 2 years (Sallows and Graupner, 2005; Cohen, Amerine-Kickens, & Smith, 2006).
Essential elements of early intervention practices:

- must begin early: as soon as identified at being for risk of autism
- must be intensive- 25 or more hours per week, 52 week per year, with a low ratio of teachers to students
- must involve family participation in development of goals, priorities and treatment plans and provide on-going parent support, training and consultation
- must be individualized to student
- must be designed and delivered by experienced, professional interdisciplinary team
- must target development of social attention, peer interaction, functional spontaneous language appropriate toy play, and decrease in problem behavior using positive behavior approaches
- progress must be evaluated frequently and modified as need (Mastergeorge, Rogers, Corbett, & Solomon, 2003, pg. 150-151)

*(2c) Early Intensive Behavioral Interventions*

Often, these intensive intervention programs are referred to as "Early Intensive Behavioral Interventions," or EIBI. Recently, Reichow and Wolery (2008) conducted a comprehensive synthesis of research on EIBI. The authors described their methods, and provided effect sizes and a meta-analysis of findings. The authors presented results on participant characteristics (e.g. diagnosis, age, IQ scores, adaptive behavior, language, and other treatments received) as well as intervention characteristics. Intervention characteristics included a) intervention density (number of hours per week); b) duration (number of months in intervention); c) total hours of intervention (density x duration x 4.3 which is the number of weeks in a month); d) type of intervention (UCLA model or other); e) service coordination type (clinic, community, or parent-coordinated); f) qualification of therapist; and g) use of aversive procedures (yes or no). Reichow and Wolery (2008) found that overall most of the samples were of children less than 42 months old, with IQ scores ranging from 28-83, adaptive behavior between 2 and 3 standard deviations below the mean, and expressive language scores between 3 and 4 standard deviations below the mean. Thus, the authors found that the EIBI studies represented a large range of participant characteristics, not exclusively children with mild impairments. Further, the authors found that the overall effect size was statistically significant suggesting that EIBI is an effective intervention for increasing IQ scores for this population. This analysis also found that the data suggests that density and duration of intervention has a positive impact, although this finding was close to, but did not reach, significance. Overall the authors note that the findings suggest that "*children with autism receiving EIBI made large gains on multiple domains of behavior and made better progress than children with autism who received less intensive behavior intervention or other treatments*" (pg. 123). The authors caution, however, that these results need to be interpreted with caution since individual data typically were not presented, outcomes were narrowly measured, and no controls existed for maturation, thus, the effects cannot be attributed

to EIBI only. The authors conclude with, "*In sum, the findings of the current synthesis were mixed. Although the data and findings of this synthesis can be used to make claims about the effectiveness of EIBI (particularly in relation to IQ scores), the synthesis also exposed many knowledge gaps*" (pg. 123).

***(2d) Early Intensive Behavioral Intervention – (0-3 years)***

A number of studies investigating the effects of Early Intensive Behavioral Intervention (EIBI) on very young children with autism have been conducted over the years. Not all of these studies have been conducted with substantial methodological rigor. Understandably, group experimental designs that require a "no treatment" or "delayed treatment" control group, and single subject designs that delay treatment, may not be ethical for young children who require immediate intervention. Currently, however, a number of studies assessing the efficacy of EIBI can be found that utilize methodologies that are rigorous or at least acceptable when paired with numerous participants and robust child outcomes (large number of participants if pooled across multiple studies).

The following paragraphs briefly summarize a number of studies with positive outcomes for young children with Autism Spectrum Disorders (ASD) using EIBI. These studies do not exhaust the literature in this area but rather represent a sample. Most of the studies do not clearly indicate the number of participants younger than three years of age however, every study includes a number of participants that are younger than three years of age. It is mathematically likely, based on the mean ages and standard deviations reported in the studies, that numerous child participants began intervention at an age of 3 or younger.

Intervention in the reviewed studies include some but not necessarily all common features of "early intensive behavioral intervention" (EIBI), including: a) an age appropriate, comprehensive curriculum focusing on imitation, language, communication, toy play, social interaction, motor skills, and adaptive behavior, b) empirically validated teaching strategies derived from the science of applied behavior analysis, c) behavioral strategies for reducing problem behaviors, d) involvement of parents, e) gradual transition to naturalistic environments, f) highly trained and monitored staff g), supervisory and review procedures, (g) intensive treatment delivery (at least 25 hours per week, for at least 2 years), and g) initiation of treatment by 2 to 4 years.

Three of the reviewed studies: Jocelyn, Casiro, Beattie, Bow, and Kneisz (1998); Smith, Groen, and Wynn (2000); and Sallows and Graupner (2005) feature experimental multiple group comparison designs where children were randomly assigned to groups. Results from Jocelyn et al. (1998) included significantly increased language performance, but no difference in autism severity, compared with controls. Smith et al. (2000) found that after 2 years, children increased significantly in IQ, language outcomes, and social/adaptive behavior outcomes. Sallows and Graupner (2005) randomized 24 children to "clinic-directed" and parent-directed group. After 4 years of treatment, both experimental groups showed significant similar gains in cognitive, language, social, and academic skills.

A number of studies using quasi-experimental designs to assess some or all features of EIBI resulted in positive outcomes for young child participants. For instance, Lovaas (1987),

Birnbrauer and Leach (1993), and Cohen, Amerine-Dickens, Sheinkopf and Siegel (1998), Smith et al., (1997), and Smith (2006) implemented EIBI, based on the Lovaas model, using multiple group designs (including control groups) with very positive results, including higher IQ scores, higher adaptive behavior scores, and many children who were fully included in regular education classrooms after intervention. Anderson et al. (1987) also assessed the Lovaas model using 14 children in a multiple baseline design. Anderson and colleagues showed very positive results including positive improvements across numerous domains, especially in the areas of social skills and self-help.

A final study that focused only on communication skills (Yoder & Stone, 2006), included a group design with two randomized treatment groups to provide Picture Exchange Communication (PECS) (Bondy & Frost, 2001) training to children under 3 years old. As a result of the PECS training, all of the children made substantial gains in communication using pictures. A side effect of the intervention was increased socialization.

A notable multi-study analysis included a 3-part comprehensive synthesis of the EIBI for young children with autism based on the UCLA Young Autism Project method (see Lovaas in the *Journal of Consulting and Clinical Psychology, 55*, 3-9, 1987; See also critique of Lovaas in Gresham & MacMillan, 1997, for example). The three components of the synthesis were: (a) descriptive analyses, (b) effect size analyses, and (c) a meta-analysis. The findings suggest that EIBI is an effective treatment on average, for children with autism. The conditions under which this finding applies and the limitations and cautions that must be taken when interpreting the results are discussed. Five of the reviewed studies had participants with a mean pre-treatment age of less than 36 months. These studies were Lovaas (1987), Sheinkopf and Siegel (1998), Boyd and Corley (2001), Sallows and Graupner (2005), and Cohen et al. (2006).

Given that these five studies used acceptable methodology and showed positive meaningful gains for 40 children, then early intensive intervention has a sufficient evidence-base. These findings are important to consider when mapping a route to help children with autism under the age of three. In summary, a sample of 12 studies assessing components of EIBI was reviewed. All 12 resulted in positive gains for children under the age of three. Especially notable were three methodologically rigorous studies (Jocelyn, Casiro, Beattie, bow, and Kneisz (1998); Smith, Groen, & Wynn (2000); and Sallows and Graupner (2005)) that resulted in significant gains in IQ, adaptive behavior and integration into regular classrooms.

***(2e) School-age Behavioral Interventions***

For school-aged children, Mastergeorge, Rogers, Corbett, and Solomon, (2003) found that effective interventions rely on the same practices as early intervention such as discrete trial teaching, peer mediation, visual support, and careful structuring of the learning environment. Children of any functioning level (not just those who are verbal or of average intelligence) should be educated in inclusive setting with access to typically developing peers. Most children with ASD benefit from a variety of accommodations in the school setting. Effective school-age programs may include:

- consistent rules and routines
- visual schedules
- written directions

- access to a keyboard for writing
- reduced workload
- alternative formats for assignments and tests. (pg. 151-153)

***(2f) Pivotal Response Treatment (PRT)***

Another behavioral approach is Pivotal Response Treatment (PRT), which focuses on increasing social relationships (Koegel, Koegel, & Brookman, 2003). While some of the strategies differ from a behavior analytic approach (e.g. the child chooses the stimulus materials vs. clinician chosen materials), practitioners of PRT employ many of the same techniques such as reinforcement, prompting, parent education, interaction, and shaping. The Pivotal Response Model has its early origins as a behavioral intervention training program evolving over time to a more naturalistic approach. The model was developed in 1979 by Koegel & Koegel, researchers at the University of California, Santa Barbara, and originally validated with children who were nonverbal. In the beginning it was primarily a parent training program. Over the years the approach has been extended to a broader range of providers working with individuals of various ages who have various disabilities including autism spectrum disorders (ASD). In fact, PRT is one of 10 module programs for comprehensive autism interventions selected for inclusion in the National Research Council Report on *Educating Children with Autism* (Lord & McGee, 2001). The focus of intervention, as the name implies, is on identifying and changing pivotal skills that can lead to improvements in a number of areas simultaneously, particularly communication, social skills, and disruptive behavior. Categorized as a skill-based intervention, PRT met the criteria for "scientifically based practice" in a recent review of interventions and treatments for children and youth with ASD (Simpson, et al., 2005). Guidelines for implementing the approach can be found in a training manual available online www.users.qwest.net/~tbharris/prt.htm. The 2 pivotal skills addressed in the training manual are lack of motivation and responding to multiple cues, or "stimulus overselectivity", core difficulties associated with ASD. The manual provides specific procedures for adults to follow in delivering effective instructions and using natural consequences as reinforcers. Emphasis is on recognizing and responding to child/student preferences and initiations in natural contexts across a variety of inclusive settings, making this an intervention that can be implemented by early intervention and special education teams.

***(3) The Council for Exceptional Children (CEC)***

While professionals providing service to children and families eligible under IDEA 2004 are guided by many sources in provision of services, the Council for Exceptional Children (CEC) is a primary influence in the field of early intervention/early childhood special education.

> "The Council for Exceptional Children (CEC) is the largest international professional organization dedicated to improving educational outcomes for individuals with exceptionalities, students with disabilities, and/or the gifted. CEC advocates for appropriate government policies, sets professional standards, provides continual professional development, advocates for newly and historically underserved individuals with exceptionalities, and helps professionals obtain conditions and resources necessary for effective practice." (www.cec.sped.org)

CEC has taken a leadership role in defining evidence-based practices for the field of special education in a 2006 proposal from the CEC Professional Standards & Practice Committee,

described above. For a comprehensive overview of the conceptualization of scientific research in education and the use of different methodologies, see the paper by Odom, et al. (2005).

***(3a) Division for Early Childhood (birth through age 8)***

The Division for Early Childhood (DEC) is a division of the Council for Exceptional Children (CEC). The DEC is for professionals who work "with or on behalf of children with special needs, birth through age eight, and their families." The mission of the organization is to promote policies and advance "evidence-based practices that support families and enhance the optimal development of young children who have or are at risk for developmental delays and disabilities." (www.dec-sped.org)

The first *Division for Early Childhood (DEC) Recommended Practices in Early Intervention/Early Childhood Special Education (EI/ECSE)* published in 1993 was based on input from various stakeholders, including researchers. Five years later, DEC undertook a review of EI/ECSE research (Smith, Strain, Snyder, Sandall, McLean, Ramsey, & Sumi, 2002) published in peer-reviewed journals between 1990-1998, including single-subject design research (Odom & Strain, 2002), to develop a revised set of recommended practices (Sandall, Hemmeter, Smith, & McLean, 2005) for the field, based on more rigorous scientific methods than the original. According to the website, the *DEC Recommended Practices* "form the foundation of the knowledge/research base that guides the work of early intervention and early childhood special education practitioners", and provides "a definitive set of personnel standards that are linked to multiple disciplines' standards and recommended practices." DEC also works with CEC to develop and promote core competencies needed for personnel in early childhood special education across disciplines that work with young children and their families and to obtain endorsement of personnel competencies by other key organizations. Promoting the use of data-based decision-making and evidence-based practices are additional goals of the organization.

While a great number of references have been provided by DEC Recommended Practices in Early Intervention/Early Childhood Education and recommendations are provided and implemented, no comprehensive review of the scientific intervention literature has been conducted that uses a "levels-of-evidence" approach consistent with the approach/standard adopted by this committee. While children with an ASD are included in the studies upon which this literature is based, these children may not have been separated by diagnosis. Consequently recommendations by the DEC are made for all children, however, currently are not provided as autism-specific recommendations. Providers use early intervention/early childhood research that provides intervention guidance that targets core deficit areas found in children with a diagnosis of autism.

***(3b) Early Intervention 0-3 and Early Childhood Special Education 3-5:***

A comprehensive review of evidence-based practices for young children with ASD in early intervention and early childhood special education programs would include research from fields representing all of the disability services identified in the Individuals with Disabilities Education Act of 2004. It would of necessity include professional research literature on early childhood education, special education, communication disorders, parent-child interaction, family systems, child development, applied behavior analysis, positive behavior support, developmental and

behavioral psychology, physical therapy, occupational therapy, audiology, vision, health and nutrition. All of these professions are contributing to the emerging evidence base for effective interventions for young children with ASD and their families. It was beyond the scope of the resources of the subcommittee to undertake such a review.

While the research base on interventions for preschoolers with ASD is growing, there is relatively little agreement regarding autism-specific intervention models for very young children (NRC, 2001; Stahmer & Ingersoll, 2004; Wetherby & Woods, 2006). Models that Kansas could look to include the Denver Model (Rogers, Hayden, Hepburn, Charlifue-Smith, Hall, Hayes, 2006), Project DATA (Boulware, et al., 2006), Responsive Teaching (Mahoney, 2007), and the Early Social Interaction Project (Wetherby & Woods, 2006). These models integrate behavioral and developmental interventions for infants and toddlers often delivered in natural environments within the context of family. The field acknowledges the importance of research guiding intervention in this age group specific to children with ASD, especially as new research emerges as to interventions that might begin at birth and which, for the first time begins the discussion of prevention of ASD as plausible. There are a number of projects working currently to fill this gap in the research, and the field anxiously awaits this research and its dissemination.

Birth to Three: While there has been some research that has included children as young as 21 months, there is a significant gap in the research for ages 0-3. There will need to be more investigation as to the effects of specific practices for this age group. Currently, intervention services are guided by the DEC Recommended Practices and the Mission and Key Principles for Providing Early Intervention Services in natural environments as well as the NECTAC Elements of Effective Programs for children with ASD developed by the field of early intervention for EI/ECSE, The key principles are outlined below. A summary of the DEC Recommended Practices and the NECTAC elements of Effective Programs are outlined in the 3-5 section that follows.

- Infants and toddlers learn best through everyday experiences and interactions with familiar people in familiar contexts.
- All families, with the necessary supports and resources, can enhance their children's learning and development.
- The primary role of a service provider in early intervention is to work with and support family members and caregivers in children's lives.
- The early intervention process, from initial contacts through transition, must be dynamic and individualized to reflect the child's and family members' preferences, learning styles and cultural beliefs.
- IFSP outcomes must be functional and based on children's and families' needs and family-identified priorities.
- The family's priorities, needs and interests are addressed most appropriately by a primary provider who represents and receives team and community support.
- Interventions with young children and family members must be based on explicit principles, validated practices, best available research, and relevant laws and regulations.

Three to Five: Based on early childhood special education research outlined in the DEC Recommended Practices (Sandall, Hemmeter, Smith, & McLean, 2005), the following presents common elements found in the literature:

- Professionals and families collaborate in planning and implementing assessment.
- Assessment is individualized and appropriate for the child and family.
- Assessment provides useful information for intervention.
- Professionals meet legal and procedural requirements and meet Recommended Practices guidelines.
- Adults design environments to promote children's safety, active engagement, learning, participation, and membership.
- Adults use ongoing data to individualize and adapt practices to meet each child's changing needs.
- Adults use systematic procedures within and across environments, activities, and routines to promote children's learning and participation.
- Families and professionals share responsibility and work collaboratively.
- Practices strengthen family functioning.
- Practices are individualized and flexible.
- Practices are strengths- and assets- based.
- Teams including family make decisions and work together.
- Professionals cross disciplinary boundaries.
- Intervention is focused on function, not services.
- Regular caregivers and regular routines provide the most appropriate opportunities for children's learning and receiving most other interventions.

The National Early Childhood Technical Assistance Center (NECTAC)- (not autism specific). NECTAC is the national early childhood technical assistance center supported by the U.S. Department of Education's Office of Special Education Programs. NECTAC serves all 50 states and 10 jurisdictions with an array of services and supports to improve service systems and outcomes for infants, toddlers, and preschool aged children with special needs and their families. Between 1997 and 2001 NECTAC sponsored a Forum on Autism Spectrum Disorders with experts from 7 model programs for young children with ASD. The following table represents areas of agreement regarding elements of effective programs for young children with ASD.

***Table 5. NECTAC Table: Elements of Effective Programs***

| Program Element | Brief Definition |
|---|---|
| Areas of Agreement | |
| Earliest Possible Start to Intervention | Children receive services appropriate to their needs as soon as they are identified as having ASD. |
| Individualization of Services for Children and Families | Adjustments in goals, intervention strategies, and evaluation criteria are made for each child and family receiving services, determined by the child's needs, strengths, and interests and the family's concerns, priorities, and resources; as well as the program's overall theoretical and conceptual framework. |

| | |
|---|---|
| Systematic, Planful Teaching | Instruction or intervention that is carefully thought out, logical, and consistent with a conceptual or theoretical basis and involves planning, implementing, and assessing intervention steps; each step is intentional, coordinated with an overall approach, and builds toward meaningful goals. |
| Specialized Curriculum | A core curriculum to address specific needs of children with ASD, includes these key areas: attending to elements of the environment, imitating others, language comprehension, use of language, playing appropriately with toys and interacting socially with others. |
| Intensity of Engagement | Engagement refers to the amount of time that a child is attending to and actively participating in the social and nonsocial environment. Intensity of engagement is sometimes expressed as the percent of enrolled time that is spent in teaching interactions, or in activities in which the child is actively learning. The time that a child is engaged in learning opportunities may occur during program time and in home or community settings. |
| Family Involvement | Includes family involvement in their own child's program; services provided to families primarily because their child has ASD; services provided to families that are not directly related to ASD but may impact on overall family functioning; family support and networking; and family involvement in the overall program. |
| Program Areas That Are Part Of Some, But Not All Programs | |
| Structured Environment | Arranging the environment, instructional materials, and teaching interactions to elicit, facilitate, or support specific skill attainment or development, including the use of environmental arrangements or visual cues to organize or schedule activities, to facilitate choices, and to define work, play, or rest spaces. |
| Developmentally-Appropriate Practices | Practices that have been designed for all young children; programs are guided by information about child development and learning, each individual child's strengths, needs, and preferences and knowledge of the social and cultural contexts in which children live. |
| Intervention in Settings with Typical Children or in Natural Environments | Some or all interventions occur in settings with typical children. This may include fully integrated toddler or preschool settings, community childcare, community recreation activities and other supports in home and community settings. |

Retrieved from: http://www.nectac.org/topics/autism/effecprog.asp, 7/14/08

***(4) Comprehensive Early Childhood Program Models***

*(4a) National Research Council.* The National Research Council (2001) presents a brief overview of comprehensive early childhood programs for children with autism. Criteria for selection of programs relied on "availability of recently published program descriptions" and "existing reviews of model programs for children with autistic spectrum disorders" reviews of special issues in professional journals and programs that had received federal funding from the National Institutes of Health and the U.S. Department of Education (p. 141). A frequency count of the number of times each program was cited was recorded, and the NRC contacted all programs cited between three and nine times in these designated resources. Ten programs submitted program description information of their model, but did not include a comprehensive review of the research for each model project. Of the ten programs identified by the NRC report, three of them appeared in multiple sources reviewed by this subcommittee and accepted as efficacious. These three programs are: (1) University of California at Los Angeles Young Autism Project, (2) Pivotal Response Model at the University of California at Santa Barbara Model at the University of California at Santa Barbara, and (3) Learning Experiences, an Alternative Program for Preschoolers and their Parents (LEAP) Preschool at the University of Colorado School of Education, meet the criteria of the sub-committee for evidence-based practice. Five other programs use specific techniques that have been evaluated in research studies and shown to be evidence-based, thus these models would be considered "promising" in that program components are based on evidence (discrete trial, naturalistic teaching, peer-mediated interventions, structured teaching, incidental teaching, and positive behavior support). However, there have been no replications of the programs. These include (1) Children's Unit at the State University of New York at Binghamton, (2) Douglass Developmental Center at Rutgers University, (3) Individualized Support Program at the University of South Florida at Tampa (4) Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH) at the University of North Carolina School of Medicine at Chapel Hill, and (5) Walden Early Childhood Programs at the Emory University School of Medicine. (See program descriptions p. 140-172).

*(4b) National Standards Project.* The National Standards Project (2008) was established to conduct a comprehensive review of interventions that were deemed to be reasonably implemented in most school or behavioral treatment programs. This project was committed to establishing a transparent review process for treatment based approaches for individuals under the age of 22. This effort specifically excluded medication or nutritional supplements, complementary/alternative medication interventions (with the exception of curative diets), individuals with psychosis or diagnosis other than ASD, and predictors of outcomes.

As a part of the review process, the National Standards Project also reviewed literature regarding intervention program type. Specifically they categorized treatments into 1) comprehensive programs and 2) focal interventions. To be included as a comprehensive program, the program must address the core impairments characteristic of an individual with an ASD (e.g. communication, social interaction, and restricted, repetitive, nonfunctional patterns of behavior, interest, or activity). In addition, the program must provide procedural guidelines, manuals, or curricula and must be published in a refereed journal, book chapter, or book. Finally, to be included as a comprehensive program, there must be a clear theoretical or conceptual framework and treatment must occur at least 25 hours per week for at least 9 months. The authors cite the Young Autism Project and replications sites, the LEAP project, the Walden Early Childhood

Program, the TEACCH program, and the Developmental, Individual-Difference, Relationship-Based (DIR/Floor Time)) model as comprehensive programs (Wilczynski & Christian, 2008).

***(4c) Model Early Childhood Programs for Children with ASD***

Dawson and Osterling (1997) conducted a survey of 8 model programs for preschoolers found range of 15-40 hours per week, with average of 27 hours week (school-based services). They found that the characteristics necessary for an effective program are:

"• Use of a comprehensive curriculum focusing on imitation, language, toy play, social interaction, motor and adaptive behavior
- Sensitivity to developmental sequence
- Supportive, empirically validated teaching strategies (applied behavior analysis)
- Behavior strategies for reducing interfering behaviors
- Involvement of parents
- Gradual transition to more naturalistic environments
- Highly trained staff
- Supervisory and review mechanism
- Intensive delivery of treatment (25 hr/week for at least 2 years);
- Initiation by 2-4 years" (pg. 789-790)

***(5) Medical***

***(5a) The American Academy of Pediatrics (AAP)*** conducted a review of the empirical intervention literature for children with an ASD. They produced a report entitled, "*American Academy of Pediatrics Management of Children With Autism Spectrum Disorders Report.*" This report found that while each approach is based on differing philosophical foundations, there is converging evidence that the following elements are key components of effective intervention practices for young children with an ASD, such as:

" • entry into intervention as soon as an ASD diagnosis is seriously considered rather than deferring until a definitive diagnosis is made;
- provision of intensive intervention, with active engagement of the child at least 25 hours per week, 12 months per year, in systematically planned, developmentally appropriate educational activities designed to address identified objectives;
- low student-to-teacher ratio to allow sufficient amounts of 1-on-1 time and small-group instruction to meet specific individualized goals;
- inclusion of a family component (including parent training as indicated);
- promotion of opportunities for interaction with typically developing peers to the extent that these opportunities are helpful in addressing specified educational goals;
- ongoing measurement and documentation of the individual child's progress toward educational objectives, resulting in adjustments in programming when indicated;
- incorporation of a high degree of structure through elements such as predictable routine, visual activity schedules, and clear physical boundaries to minimize distractions;
- implementation of strategies to apply learned skills to new environments and situations (generalization) and to maintain functional use of these skills; and
- use of assessment-based curricula that address:
    *functional, spontaneous communication;

- social skills, including joint attention, imitation, reciprocal interaction, initiation, and self-management;
- functional adaptive skills that prepare the child for increased responsibility and independence;
- reduction of disruptive or maladaptive behavior by using empirically supported strategies, including:
    *functional assessment;
    *cognitive skills, such as symbolic play and perspective taking; and
    *traditional readiness skills and academic skills as developmentally indicated."

(*PEDIATRICS* Volume 120, Number 5, November 2007, taken from report, pgs. 1163-1164).

This report further reviewed the literature that compared intensive ABA programs (25–40 hours/week) to equally intensive eclectic approaches. The AAP report found that ABA programs were significantly more effective in producing desirable gains (Cohen, Amerine-Dickens, & Smith, 2006); Eikeseth, Smith, Jahr, & Eldevik, 2002; and Howard, Sparkman, Cohen, Green, & Stanislaw, 2005).

***(5b) Biobehavioral and Environmental***

Even more recently, Dawson (2008) conducted a study reviewing the genetic literature on the phenotypes of autism, environmental risk factors, behavioral risk factors, atypical brain growth, and brain imaging. Dawson (2008) found that there are several behavioral risk indices associated with the development of an ASD including a) failure to respond to name, b) abnormal visual attention, and; c) temperamental difficulties. The authors note that ASD is not a static brain disorder, but presents with dynamic *post*natal changes in both the brain and behavior of an individual indicating that brain-environment interactions are additional risks associated to the eventual presentation of ASD characteristics. Dawson further describes how one of the core characteristics of an ASD, impairment in social behavior, can negatively impact the amount of time an infant spends engaged in his/her social community. This lack of interaction could negatively impact brain development (e.g. specialization functions in the brain with less function devoted to mediating social cognition). Dawson hypothesizes that social impairment may be related to a primary neural system (dopamine system) involved in processing reward information, and the amygdale (attention to emotionally relevant stimuli and emotional memories) reporting that recent studies targeting the dopamine system have had a positive impact with reductions in repetitive behavior and increases in comprehension of affective meaning. Given the overall impact of early brain-environmental interactions, Dawson reports that the Early Start Denver Model (based on the Denver Model) is a comprehensive intensive early behavioral intervention for preschool children designed to address the needs of infant and toddlers with ASD as young as 12 months. This model incorporates applied behavior analytic techniques delivered in a relationship-based context. In previous work, Dawson and colleagues (Dawson & Osterling, 1997) identified several characteristics of effective interventions (see below). Dawson is currently incorporating biological measures in research in an effort to further the research into brain-environment interactions with regards to young children with or at risk for the development of an ASD, and working to identify strategies and techniques that work to prevent and treat the core characteristics of an ASD by ameliorating the detrimental effects of genetic and environmental risk factors.

*(6) Occupational Therapy*

Occupational therapy is often a prescribed intervention used for working with children with an ASD. One systematic review document in the area of occupational therapy containing the review process and levels-of-evidence were submitted to the Best Practices subcommittee (Case-Smith, & Arbesman, 2008). This review identified six categories of research topics, summarized the literature according to levels of evidence and relationship to occupational therapy. The six categories of research that were identified were: 1) sensory integration and sensory-based interventions, 2) relationship-based, interactive interventions, 3) developmental skill-based programs, 4) social/cognitive skill training, 5) parent-direct or mediated interventions, and 6) intensive behavioral interventions (Case-Smith, & Arbesman, 2008). Of these, the authors noted that intensive behavioral interventions have the strongest base of research. However, across theoretical disciplines, the authors noted the following common themes:

- the development of individualized interventions through the analysis of performance and behavior is essential to successful outcomes,
- children's social behavior increases when adults engage in systematic and planful activities (e.g. reinforce communication, prompt eye contact, allow adequate time for the child to respond to a request, modify the environment to evoke behavior),
- effective programs provided structured access to typical peers, and the use of functional analysis techniques is recommended to develop function-based interventions for aberrant behaviors.

***Sources of Information from Literature Reviews***

***(1) National Research Council Report (2001)***

At the request of The Office of Special Education Programs (OSEP) the National Research Council (NRC) formed a committee in 1999 to examine the scientific evidence for educational interventions for children with autism. While understanding that children with autism spectrum disorders share common features with other children with disabilities, OSEP and the NRC committee recognized that these children offer unique challenges to family members, providers, researchers, and policy makers. Consequently the committee included experts from special education, psychiatry, psychology, speech and language pathology, and pediatric neurology. The committee also called on program directors, researchers, and policy analysts to participate in gathering and analyzing the current evidence of effective interventions and synthesizing it into recommendations to guide policy and practice.

Guidelines were developed for evaluating the research literature identified by committee members and by researchers solicited to provide papers on specific topics of intervention. Research reports were rated on a scale of I-IV in 3 categories: internal validity, external validity/selection bias, and generalization. The process of summarizing and analyzing the research is well described in the report. Common components of 10 model comprehensive programs for young children with ASD also were identified and analyzed.

Once effective programs, interventions, and components were identified for young children, the committee developed recommendations in the areas of diagnosis/assessment/prevalence, role of family, education services, characteristics of effective interventions, public policy, personnel preparation, and future research. For the purposes of the Best Practices subcommittee report,

only recommendations in the area of "characteristics of effective interventions" will be included. A copy of the full report is available on the internet http://nap.edu/books/0309072697/html.

Critical Features of Effective Interventions

- Entry into intervention programs as soon as an autism spectrum diagnosis is seriously considered;
- Active engagement in intensive instructional programming for a minimum of the equivalent of a full school day, 5 days (at least 25 hours) a week, with full year programming varied according to the child's chronological age and developmental level;
- Repeated, planned teaching opportunities generally organized around relatively brief periods of time for the youngest children (e.g., 15-20 minute intervals), including sufficient amounts of adult attention in one-to-one and very small group instruction to meet individualized goals;
- Inclusion of a family component, including parent training;
- Low student/teacher ratios (no more than two young children with autistic spectrum disorders per adult in the classroom); and
- Mechanisms for ongoing program evaluation and assessment of individual children's progress, with results translated into adjustments in programming. (NRC, 2001, p. 219)

***(2) National Autism Center National Standards Project***

The National Autism Center is a nonprofit organization that sponsored the recently completed National Standards Project, an effort to use scientific merit to identify evidence-based guidelines for treatments of individuals with ASD younger than 22 years of age. The focus of the project was limited to "interventions that can reasonably be implemented with integrity in most school or behavioral treatment programs. A review of the biomedical literature for ASD will be left to another body of qualified individuals." (Wilczynski, et al., 2008, p. 39). A panel of multidisciplinary autism researchers applied a rigorous scoring system to evaluate the quality and usefulness of interventions for individuals with ASD described in nearly 1,000 studies. Results of the project are expected before the end of February 2009. Copies of the report will be disseminated to departments of education across the country and available at the website: http://www.nationalautismcenter.org.

A recent publication by those involved in the *National Standards Project* includes recommendations of seven evidence-based procedures for increasing skills to include: discrete trial training (Tarbox & Najdowski, 2008), direct instruction (Weiss, 2008), naturalistic teaching Allen & Cowan, 2008), video-based instruction (Darden-Brunson, Green, & Goldstein, 2008), social skills instruction (Machalicek et al., 2008), developmental play assessment/teaching Lifter, 2008), and augmentative and alternative communication intervention (Schlosser & Wendt, 2008). Authors also recommends four key behavior support interventions including: antecedent (preventive) intervention (Luiselli, 2008), positive reinforcement to decrease challenging behavior (Kern & Kokina, 2008), behavior-contingent (restrictive) intervention as a function-based approach (Lerman, 2008), and family support (Symon & Boettcher, 2008). Although the NAC has not completed the review and publication of all the individual interventions they have released, Frea and McNemy (2008) conclude that, the use of intensive early interventions and ABA methodology are used interchangeably "...because this is the only evidence-based approach to intensive early intervention for children with autism at this time" (pg. 84).

*****Acknowledging that our committee has limited resources as compared to the National Autism Center (NAC), the committee has agreed to review the NAC report when released and reserve the right to amend our recommendations based on the NAC report recognizing that the NAC will represent the most comprehensive current review of the highest levels of evidence to date. The report is now complete and is currently under review by expert advisors. If the current report is acceptable to the experts, it should be published by February 2009.**

*(3) National Professional Development Center on Autism Spectrum Disorders*

Based on their published criteria of efficacy established through peer-reviewed research, the National Professional Development Center has to date confirmed the evidence base for 24 interventions for individuals with ASD. Online instructional modules will be developed for each of the following strategies (in alphabetical order): Computer-aided instruction; Differential reinforcement; Discrete trial training; Extinction; Functional behavior assessment; Functional communication training; Naturalistic interventions; Parent-implemented interventions; Peer-mediated instruction/intervention; Picture Exchange; Communication System; Pivotal response training; Positive behavioral supports; Prompting; Reinforcement; Response interruption/redirection; Self-management; Social skills training groups; Stimulus control/Environmental modification; Structured work systems; Task analysis; Time delay; Video modeling; Visual supports; VOCA/Speech generating devices

*(4)* **Simpson, de Boer-Ott, Griswold, Myles, Byrd, Ganz, Cook, Otten, Ben-Arieh, Kline, & Adams (2005)**

Simpson and colleagues (2005) developed an evaluation process for reviewing the scientific merit of 33 commonly used methodologies for treating children and youth with autism spectrum disorders (see ***What is "Evidence Based Practice?"*** section above). Based on the results of this comprehensive review, Only 4 interventions were judged to meet the standard of scientifically based practice: Applied behavior analysis, discrete trial training, pivotal response training, and Learning Experiences: An Alternative for Preschoolers and Parents (LEAP). Six programs were rated as promising practices: assistive technology, augmentative alternative communication (AAC), incidental teaching, joint action routines (JARS), Picture Exchange Communication System (PECS), and structured teaching (TEACCH). Two interventions were "not recommended" based on criteria: Holding therapy and facilitated communication. For a complete summary of the interventions and their ratings see Simpson (2005a, p. 146). While acknowledging the difficulties of developing a objectively verifiable methodology evaluation process, and warning that "total consensus will likely never be achieved" (p. 145), Simpson challenges the field to continue to use an evidence based approach to search for methods that have the "greatest probability of producing desired outcomes" (p. 145) for students with autism spectrum disorders. (Simpson, 2005a; Simpson, de Boer-Ott, Griswold, Myles, Byrd, Ganz, Cook, Otten, Ben-Arieh, Kline, & Adams, 2005).

*(5) Intensity of Early Intervention in Comprehensive Early Childhood Program Models*

The significant functional gains found by some investigators - specifically in response to intense behavioral interventions such as applied behavioral analysis (Lovaas, 1987; Anderson, et al.,

1987) – has generated a great deal of interest from researchers, providers and families. Several key characteristics of intensive early intervention have been identified, intensity, duration of services, and timing of services. The earliest report of intensity of services for this population came with the publication of intervention results from the Early Intervention Project for young children with autism describing improved outcomes for children who received at least 40 hours of intensive behavioral treatment in comparison with children who received 10 hours treatment or less (Lovaas, 1987). The original study and follow-up report have been criticized for methodological problems (Gresham & MacMillan, 1997, p. 188). More recent studies have demonstrated good outcomes with between 20-30 hours per week (Smith, Groen & Wynn, 2000; Bibby, et al., 2002). In regard to duration of services, time in treatment has ranged from one to more than four years of intense treatment (Ramey & Ramey, 1998). Most studies indicate that at least 2 years of intervention are needed to obtain optimal results (for a review, see Green, 1996). In regard to timing, studies generally indicate that intervention should begin as early as possible and preferably before four years of age for the greatest potential impact (Bibby et al., 2002; Harris & Handleman, 2000).

Recent comparison studies of intensive behavioral intervention to other types of intensive treatment have found that children receiving behavioral treatment showed substantially better gains in cognitive, language, and adaptive functioning after approximately one year than children in more eclectic programs (Eikeseth, Smith, Jahr & Eldevik, 2002; Howard et al. 2005). According to Simpson, Smith-Myles, & Ganz, (2008), applied behavior analysis has been proven effective in producing significant changes in multiple domains (e.g. language, cognition, social skills, and adaptive behaviors). Simpson et. al recommend implementation of more than 20 hours a week for over a year of intervention services.

Researchers have suggested that two factors associated with better outcomes: earlier and more 'intensive' interventions (Green, 1996; Greenspan & Wieder, 1997). In 1999 however, Prizant & Rubin, reported that "There is no consensus on how 'intensity of treatment' is to be defined" (p. 200). Regarding efficacy of treatment, researchers have questioned whether 'intensity' of services (typically defined in terms of numbers of hours of intervention per week) is the crucial variable related to more positive outcomes regardless of the types of intervention provided (Dawson & Osterling, 1997; Greenspan & Wieder, 1997). As noted, it may very well be that other variables such as family structure, resources, and supports are most critical because they allow some families to engage in more demanding and "intensive" interventions. Landa (2007) again notes that, the concept of intensity remains undefined in the empirical literature and that the "degree to which the child's attention and engagement are secured and sustained during therapeutic activities, number and nature of response opportunities and other related factors are likely to contribute to the "intensity" (or dosage) of intervention, and to intervention response."

Further, Hurth, et al., (1999) conducted another survey of 19 model programs for children with autism and found 15-80 hours of intervention time was provided each week for infants and toddlers; with an average of 38 hours per week, of which 17 hours per week on average were provided by the family.

In a more recent project, researchers reported preliminary outcomes for inclusive early intervention program for 8 children under age 3 enrolled in Project DATA for Toddlers at

University of Washington (Boulware, et al. 2006). Children participated in integrated playgroup twice a week for 1.5 hours, received intensive individualized instruction 3 times a week for 2 hours, and support in home or community by project staff for 2 hours per week. Family members delivered 5 hours of additional structured support each week, for a total of 16 hours of intervention per week. All children made gains in every developmental domain and family members and school district personnel expressed pleasure with results of the intervention over time. Follow-up data in first or second grade is presented for 7/8 students, 4 of whom were in full-time general education placements, 1 was home-schooled, and 2 were in full-time segregated special education classrooms designed for students with ASD.

In 2001, the National Academy of Sciences reported an exhaustive undertaking in which they reviewed the literature to date regarding elements of effective intervention services for children with an ASD. In this report, the authors state that, "The committee recommends that educational services begin as soon as a child is suspected of having an autism spectrum disorder. Those services should include a minimum of 25 hours per week, 12 months a year, in which the child is engaged in systematically planned, and developmentally appropriate educational activity toward identified objectives. What constitutes these hours, however, will vary according to a child's chronological age, developmental level, specific strengths and weaknesses, and family needs."

While there is still some debate around the concept of "intensity", most research to date and recommendations from model programs indicate that this concept does include an element of "time" with most reporting between 20 and 40 hours a week of engagement in intervention services.

***"Best Practices" Revisited***

There is a significant body of literature across disciplines that point to the need for intensive, early, systematic interventions for children with an ASD to maximize the impact of intervention services (Clark, Tuesday, Heathfield, Olympia, & Jenson, 2006; Koegel, Koegel, & Brookman, 2003; Lovaas & Smith, 2003). While this is the case, the need is still present for the use of evidence-based interventions as "Best Practice" for individuals with an ASD across the life-span.

Our review of recommendations from state guidelines and professional associations and sampling of the research literature makes it clear that families and practitioners everywhere are struggling with the same challenges as our state when it comes to meeting the needs of children with ASD and their families. Social, medical, educational, and behavioral health services are stretched beyond their limits in an attempt to identify, refer, treat, educate, and support the increasing incidence of individuals with ASD in communities across the country.

A positive finding of the subcommittee was the concomitant increase in research with this population, especially targeting children at younger ages, and the emergence of standards of evidence by which research can be evaluated. Applying the most stringent criteria we found, the NAC review identified nearly 1,000 studies of autism interventions that met their criteria for inclusion in their report. It is becoming increasingly clear that each of us—from policy-maker to teacher, therapist to parent—will need to become educated consumers of evidence based practices. Even high quality studies may target only a narrow population or limited environmental context, making generalization difficult. Toward that end, we need ongoing

training and support to become evidence-based practitioners and consumers, for this type of research may be the "hardest of the hardest-to-do science." (Odom, et al, 2005, page 139).

According to Strain and Dunlap (www.challengingbehavior.org; retrieved 9-16-08):

> *"Evidence-based practitioners engage in the following ongoing activities that are consistent with and necessary for the use of evidence-based practice:*
>
> - *To maintain awareness of evidence-based practices through ongoing education, including reading current professional journals, books, and other materials; accessing web sites devoted to evidence-based practice (such as www.challengingbehavior.org); and participating in workshops on evidence-based practices.*
> - *To select overall curricula that has peer-reviewed data to support use with a particular population of children.*
> - *To employ daily data collection systems that track children's progress and use this information to plan and refine instruction.*
> - *To provide families with support, information, and training sufficient to meet their desires for participation in their child's educational program*
> - *To remain open to changes in service delivery based on new ideas, new data, and trends in the field that are evidence-based.*
> - *To access learning opportunities to enhance instructional, administrative, and interpersonal skills that are evidence-based.*
> - *To promote the use of evidence-based practices by the staff you supervise.*
> - *Supervisors should encourage staff to learn about evidence-based practices, try new evidence-based approaches, and engage in an array of continuous professional development activities."*

Recognizing that the empirical base of support is still emerging for many of our current practices, Buysse (2008) proposed a 5-step team process adapted from the field of medicine for evaluating the effects of an intervention on a particular child. More recently, Spencer, Petersen, & Gillam (2008) described a 7-step process to guide intervention decisions illustrated using case studies of children with ASD (p. 41).

***Table 6. Spencer, Petersen, and Gilliam's Table 1 for Evaluating Unproven Interventions (2008)***

| Table 1. A Seven Step Evidence-Based Practice Decision-Making Process | |
|---|---|
| Step | Action |
| 1 | Develop parameters to guide the search for evidence. |
| 2 | Search for evidence. |
| 3 | Evaluate each study for quality and summarize findings. |
| 4 | Consider student and family factors. |
| 5 | Consider teacher and school factors. |
| 6 | Integrate the evidence. |

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|---|---|
| 7 | Monitor the outcome. |

*Note.* Steps adapted from Gillam & Gillam (2006). Reprinted with permission from Making evidence-based decisions about child language interventions in schools by S.L. Gilliam and R.B. Gilliam. *Language, Speech, and Hearing Services in Schools*, 37, 304-315. Copyright 2006 by American Speech-Language-Hearing Association. All rights reserved.

The *Iowa Best Practice Guide for Interventions* (downloaded 11-7-08 from the internet http://www.medicine.uiowa.edu/autismservices/bestpractices/plan_guidelines.htm) includes a grid to guide teams in using data to monitor procedures and evaluate progress, define problem areas, and guide decision making. The Iowa report argues that although the process is critical for any intervention, it is especially important when a team is implementing an unproven or promising practice not yet validated by research.

A number of reputable websites are providing increasingly easy access to current information about evidence-based practices for children with disabilities, including ASD:

- American Speech-Language Hearing Association http://www.asha.org/members/ebp
- The Campbell Corporation (C2) http://www.campbellcollaboration.org
- Institute for Education Sciences/ National Center for Special Education Research http://www.ed.gov/about/offices/list/ies/ncer/index.html
- National Dissemination Center for Children with Disabilities (NICHCY) Research to Practice Database http://research.nichcy.org/search.asp
- Promising Practices Network (PPN) http://ww.promisingpractices.net
- Research and Training Center on Early Childhood Development
- http://www.researchtopractice.info
- Technical Assistance Center for Social Emotional Interventions (TACSEI) http://www.challengingbehavior.org/
- What Works Clearinghouse http://ies.ed.gov/ncee/wwc

***Table 7. Best Practice Recommendations based on a Synthesis of Sources***

| Recommendation | Level of Evidence |
|---|---|
| 1. Use of a model based on the science of human behavior such as that found in an Applied Behavior Analysis model of intervention. Applied Behavior Analysis has been referenced throughout the literature as having the most scientific evidence to support the use of techniques found in intensive behavioral programs such as those designed to:<br>• *Increase targeted behaviors* using reinforcement procedures to increase on-task behavior or social interaction.<br>• *Teach new skills*- using systematic instruction and reinforcement procedures to teach functional life skills, communication and social skills.<br>• *Maintain behaviors*- teaching self-monitoring procedures to maintain and generalize vocationally related social skills. | **Strong** |

| | |
|---|---|
| • *Restrict or narrow conditions* under which interfering behaviors occur-structuring or modifying the learning environment.<br>• *Reduce interfering behavior* such as self-injury or stereotypic behaviors. | |
| 2. Entry into intervention as soon as an ASD diagnosis is seriously considered rather than deferring until a definitive diagnosis is made. | **Emerging** |
| 3. Intensive early intervention is recommended. Intensive intervention has been defined throughout the review as active engagement of the child at least 25 hours per week, 12 months per year, in systematically planned, developmentally appropriate community, home and educational-based interventions designed to address identified objectives. | **Strong** |
| 4. Instructional programs and curriculum address all areas of delay and specifically address core deficits of ASD (e.g., social, communication, and repetitive/stereotypic behaviors).<br>• The use of physically aversive interventions is not recommended.<br>• Instructional programs exist for every instructional target skill based on the use of assessment-based curricula that address functional, spontaneous communication; social skills, including joint attention, imitation, reciprocal interaction, initiation, and self-management; cognitive skills, such as symbolic play and perspective taking are included, and; functional adaptive skills that prepare the child for increased responsibility and independence.<br>• The instructional curriculum prepares the child for transitions to other environments.<br>• Intervention outcomes include targets to teach children to become as independent and self-determined as possible<br>• The child's strengths and interests should be included when developing programming<br>• Instructional programs include mastery criteria and strategies for programming for generalization to new environments and situations, to maintain functional use of skills.<br>• Target behaviors should be clearly identified and defined, with measurable criteria for mastery, including the use of a task analysis for complex behavioral skills<br>• Items or activities that are motivating or reinforcing for the child should be identified and used appropriately.<br>• Low student-to-teacher ratio is recommended to allow sufficient amounts of 1-on-1 time and small-group instruction to meet specific individualized goals, including the use of:<br>➢ clear organization of tasks<br>➢ visual supports<br>➢ physical arrangements<br>➢ strategies designed to move toward less structure and more naturalistic teaching environments, such as small groups if it has been determined to be more appropriate than one-on-one (e.g., if a child's primary goals are | **Strong** |

| | |
|---|---|
| social interaction, exclusive one-on-one intervention may be contraindicated)<br>➢ generalization strategies to apply learned skills in new environments and situations and to maintain functional use of these skills<br>➢ prompting, modeling, and fading | |
| 5. Ongoing measurement and documentation of the individual child's progress toward identified objectives are recommended.<br>• Data are collected during instructional sessions on all target skills that are addressed.<br>• Instructional decisions are data-based.<br>• Written instructions, programs, data charts, student progress (or not), and changes in programming based data.<br>• Adjustments made in programming by the professional when the data indicate no progress is being made<br>• Reliable measurement means that behaviors must be defined objectively and operationally. This process should include:<br>➢ identification of goals and objectives<br>➢ establishment of a method of measuring targeted behaviors<br>➢ evaluation of current levels of performance (baseline)<br>➢ continuous measurement of targeted behaviors<br>➢ ongoing evaluation of effectiveness of the program.<br>➢ modify program if needed, based on the data | **Strong** |
| 6. Promotion of opportunities for interaction with typically developing peers. | **Moderate** |
| 7. Problem or interfering behaviors are targets for reduction and/or replacement by using empirically supported strategies, including:<br>• Functional assessment strategies possibly including a functional analysis; functional assessment is the process of gathering information that can be used to maximize the effectiveness of behavioral support interventions. It includes:<br>➢ a clear description of the problem behaviors<br>➢ identification of the events, times, and settings that predict problem behavior<br>➢ identification of the consequences that maintain behavior<br>➢ development of a hypotheses specifying the function of behavior<br>➢ collection of data that support the summary hypothesis or identification of an alternate hypothesis<br>• Strategies are used to facilitate appropriate behavior and to decrease challenging behavior. Data are collected on the challenging behavior and decisions regarding changes in the treatment are data-based. | **Strong** |
| 8. The staff members delivering the intervention have received specialized training in ASD that includes an experiential component.<br>• Intervention must be designed and delivered by experienced, professional | **Minimal** |

| | |
|---|---|
| transdisciplinary team which may include:<br>➢ special educator<br>➢ social worker or family service coordinator<br>➢ speech language pathologist<br>➢ occupation therapist<br>➢ physical therapist<br>➢ psychologist<br>➢ behavior analyst, or<br>➢ others as indicated by the child's unique characteristics and needs.<br>• Intervention and instructional strategies are implemented with high fidelity and the intervention strategy is outlined and explained by staff. | |
| 9. Inclusion of a family component (including parent training as indicated); must involve family participation in development of goals, priorities and treatment plans and provide on-going parent support, training and consultation. | **Strong** |

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