SUMMARY

Autism Spectrum Disorders: Guide to Evidence-based Interventions

A 2012 CONSENSUS PUBLICATION

Missouri Autism Guidelines *Initiative*

Sponsored by the Thompson Foundation for Autism; the Division of Developmental Disabilities, Missouri Department of Mental Health; the Office of Special Education, Missouri Department of Elementary and Secondary Education; and Mercy Children's Hospital – St. Louis and Springfield

This publication is available at no charge at www.autismguidelines.dmh.mo.gov.

Funding for the printing and dissemination of this *Guide* was provided in whole by the Missouri Foundation for Health. The Missouri Foundation for Health is a philanthropic organization whose vision is to improve the health of the people in the communities it serves.

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Introduction

This is a summary of *Autism Spectrum Disorders: Guide to Evidence-based Interventions*, produced by the Missouri Autism Guidelines Initiative. It provides an overview of evidence-based interventions for individuals with autism spectrum disorders (ASDs) based on six recent nationally recognized systematic research reviews. The full *Guide* provides information and tools to support individuals with ASDs and their families and to assist healthcare professionals, educators, and other community-based service providers in making informed decisions about selection, implementation, and monitoring of ASD interventions.

This summary includes key components of the *Guide* and provides references to specific pages of the *Guide* to help the reader find more information. The *Guide's* Table of Contents also is a clear navigation tool. The full *Guide* can be accessed at no cost at www.autismguidelines.dmh.mo.us.

Throughout the *Guide* several key concepts emerge regarding evidence-based interventions.

Emphasis on evidence-based practice. Evidence-based practice has become the current benchmark for professionals in education, medicine, psychology, and other healthcare fields. Evidence-based practice includes a combination of the best available scientific evidence, professional expertise, and understanding of client characteristics.

Scientific research informs evidence-based practice. Review of evidence from scientific research is the foundation of evidence-based practice and decision making regarding interventions to consider and those to avoid. Current research evidence provides important information about effective ASD interventions, but more research is needed. (For example, research on interventions for adults with ASDs is extremely limited.) Lack of the highest quality research data about an intervention does not in itself preclude consideration of that intervention.

Evidence-based practice is informed by professional expertise. Although scientific research is critical to evidence-based practice, professional expertise and judgment guide the interpretation and application of available research evidence.

Evidence-based practice includes consideration of individual characteristics. Intervention decisions for individuals with ASDs are not based solely on scientific evidence and professional expertise, but are made in the context of the strengths, concerns, values, and preferences of the person with an ASD and his or her support network. This network includes the family, the professional team, and available community resources.

Importance of systematic research reviews. The rapid growth of the scientific literature on ASDs makes it challenging for families and practitioners to stay up-to-date with research findings. Systematic reviews play an important role in summarizing and synthesizing the knowledge base on ASD interventions. To provide individuals with ASDs, their families, and professionals with the most current evidence to guide intervention planning and implementation, this project presents findings from six nationally recognized systematic research reviews on evidence-based ASD interventions.

Effective ASD interventions can lead to improved outcomes. The systematic reviews presented in the *Guide* describe effective evidence-based interventions that have produced positive outcomes for individuals with ASDs. Outcomes are maximized when interventions are matched to individual characteristics and begun as early as possible.

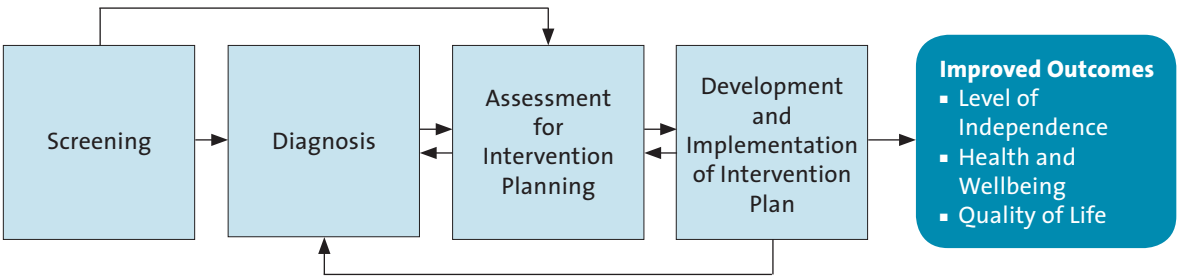
For an overview of evidence-based practice, see pages 5 to 7 in the full *Guide*.

The Need for the *Guide*

Autism spectrum disorders (ASDs) now affect approximately 1 in 88 American children (11.3 per 1000) (CDC, 2012). ASDs have lifelong effects on individual functioning in areas such as learning, relationships, and independence in daily life. The initial publication of the Missouri Autism Guidelines Initiative, *Autism Spectrum Disorders: Missouri Best Practice Guidelines for Screening, Diagnosis, and Assessment* (www.autismguidelines.dmh.mo.gov), presents current best practice in screening, diagnostic evaluation, and assessment for intervention planning for individuals with ASDs. The *Guide* is a companion publication that begins where the initial document left off—with the importance of comprehensive assessment for intervention planning—and describes the next steps in the intervention process including development and implementation of an intervention plan.

PATHWAY TO IMPROVED OUTCOMES

FIGURE 1.1



Research Reviews that Inform the *Guide*

Six *nationally recognized* systematic reviews of ASD interventions have been selected by the Missouri Autism Guidelines Initiative as the focus of the *Guide*. These reviews were sponsored by federal government agencies, nationally recognized nonprofit organizations with expertise in developmental disabilities, or nationally recognized academic institutions. Together, they provide up-to-date information on the effectiveness of a broad array of ASD interventions that include behavioral, educational, medical, allied health, and complementary and alternative interventions. The research reviews are listed in the table below.

THE SIX SYSTEMATIC REVIEWS TABLE 3.1

NAME OF REVIEW	AUTHOR/SPONSORING ORGANIZATION	ABBREVIATION USED IN GUIDE
Evidence-based Practices in Interventions for Children and Youth with ASD	National Professional Development Center	**NPDC**
ASD Services, Final Report on Environmental Scan	IMPAQ on behalf of the Centers for Medicare and Medicaid Services	**CMS**
National Standards Report	National Standards Project sponsored by the National Autism Center	**NSP**
Therapies for Children with ASD	Vanderbilt Evidence-based Practice Center on behalf of Agency for Healthcare Research and Quality	**AHRQ**
Management of Symptoms in Children with ASD: A Comprehensive Review of Pharmacological and Complementary-Alternative Medicine Treatments	Stanford Autism Research Team	**StART**
Evaluation of Comprehensive Treatment Models for Individuals with ASD	Odom et al. in Journal of Autism and Developmental Disorders	**CTM**

For full citations of the published reviews, see pages 8 to 9 in the full *Guide*.

For a side-by-side comparison of the reviews in terms of focus, age range, number of studies reviewed, dates of research reviewed, and classification systems to rank effectiveness, see pages 60 to 61 in the full *Guide*.

Core Values of the Missouri Autism Guidelines Initiative

In addition to emphasizing evidence-based practice, the *Guide* continues to reflect several core values initially introduced in the Initiative's companion publication, *Autism Spectrum Disorders: Missouri Best Practices for Screening, Diagnosis, and Assessment.*

- Family-centered Care
- Early Intervention and Ongoing Supports
- Informed Professional Judgment
- The Interdisciplinary Team
- Community Collaboration

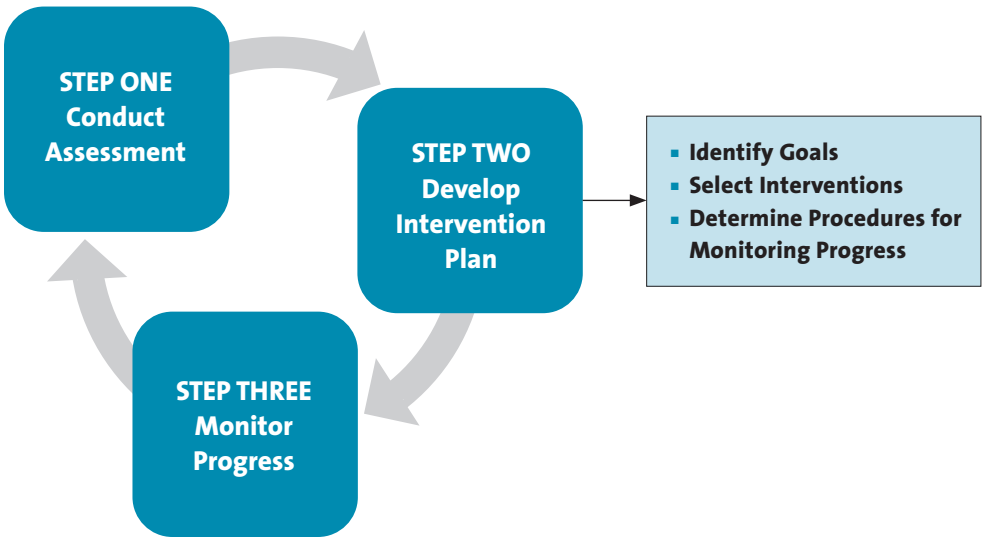
For more detail on core values, see pages 9 to 11 in the full *Guide*.

The Intervention Process

Evidence-based interventions can reduce ASD symptoms and increase independence, health and well-being, and quality of life for individuals with ASDs. ASD intervention is a continuous and ongoing process that begins with assessment for intervention planning (Step One). Assessment results are used to develop an individualized intervention plan (Step Two) which requires identifying goals, selecting interventions, and determining procedures for monitoring the individual's progress. As the intervention plan is implemented, progress monitoring data are used to adjust intervention strategies and update individual goals (Step Three). Over time, additional assessment and revisions to the intervention plan are completed, as needed.

THE INTERVENTION PROCESS

FIGURE 2.2



STEP ONE. CONDUCT ASSESSMENT

Assessment is the first step in the intervention process. Assessment for intervention planning identifies the unique intervention needs of each individual with an ASD. Because assessment involves professionals representing multiple disciplines, in healthcare settings a member of the multi-disciplinary team or an individual provider often is identified to collaborate with the family to integrate the findings into a descriptive profile of the individual with an ASD. In public education settings, findings are integrated by a member of the educational team such as a special education teacher or process coordinator.

STEP TWO. DEVELOP INTERVENTION PLAN

Families and individuals with ASDs (as developmentally appropriate) collaborate with professionals to develop an individualized intervention plan based on assessment data. Although the specific format and components of the intervention plan vary across providers and settings, intervention planning requires identification of intervention goals, selection of interventions, and determination of procedures to be used for progress monitoring.

STEP THREE. MONITOR PROGRESS

Interventions are implemented as detailed in the intervention plan. Progress monitoring procedures are followed to collect data to determine if the individual is progressing toward the intended goal. Data are used to determine if the target area is getting better, staying the same, or getting worse. Families and professionals use the data to make decisions about continuing, modifying, or discontinuing interventions, or introducing new interventions. Reasons for continuing an intervention or making changes are clearly discussed. Discussions include questions such as: If progress is noted, does the amount or degree of progress justify continuation of the intervention? Alternatively, if there is no progress or only minimal improvement, are there components of the intervention that need adjustment or is selection of a new intervention most appropriate?

For more detail on the intervention process that is similar across service delivery systems, see pages 19 to 27 of the full *Guide*.

The Intervention Process Across Service Delivery Systems

The intervention process involves professionals representing multiple disciplines and multiple service delivery systems. Often these professionals are part of a network of services that includes healthcare, educational, and other service providers. Although all of these systems provide direct services to the person with an ASD and his or her family, the *purposes* of these systems differ. For example, medical services may be provided to address problems associated with ASDs such as mood disorders (anxiety or depression) or seizure disorders, and other

COMPARISON OF SERVICE DELIVERY SYSTEMS INVOLVED IN ASD INTERVENTION TABLE 2.3

	HEALTHCARE SERVICES	
	MEDICAL	OTHER HEALTH PROFESSIONS
Focus of Intervention	Primary care providers may coordinate services to promote health and prevent disease. Individually or as part of a team, physicians and medical specialists (e.g., developmental-behavioral pediatricians, psychiatrists, and neurologists) may serve as the lead diagnostic clinician and assist families in coordinating services. Specialists may be consulted to treat associated medical conditions (e.g., seizure disorders, sleep disorders) and mood disorders (e.g., anxiety).	Individually or as part of a team, psychologists may serve as the lead diagnostic clinician and assist in coordination of intervention services. Psychologists, behavior analysts, and other health professionals such as speech-language, occupational, and physical therapists provide individual or group therapies to address a range of individual and family goals in areas such as health and wellness, problem behaviors, or skill development.

healthcare services may address goals related to functioning across all types of environments. In contrast, public school services are focused on ensuring access to a free and an appropriate public education (FAPE). Table 2.3 provides a brief overview of how the intervention processes differ across these systems. As discussed earlier, community collaboration is a core value of the Missouri Autism Guidelines Initiative; interagency and interdisciplinary collaboration with individuals with ASDs and their families promotes access to a range of high-quality interventions.

For more detail on the intervention process as it occurs in different service systems, see pages 27 to 54 of the full *Guide*.

	PUBLIC EDUCATION SERVICES			OTHER SERVICES
	MO FIRST STEPS (IDEA PART C) (Birth to 36 months)	SPECIAL EDUCATION (IDEA PART B) (Age 3 to 21 years or until high school graduation)	SECTION 504 OF THE REHABILITATION ACT OF 1973	COMMUNITY-BASED
	A family training and education system that provides coordinated services for children with developmental disabilities and their families. Services and supports focus on the child's routines, activities, and interests to increase the child's participation in family and community life.	To enable IDEA-eligible students to be involved in and progress in the general education curriculum in the least restrictive environment in academic and non-academic activities, participating with children who are non-disabled to the maximum extent appropriate, and to progress on the goals of the IEP	For any qualified person who has a physical or mental impairment that substantially limits one or more major life activities, the focus is to provide accommodations, modifications, services and/or related services to prohibit discrimination on the basis of the disability in academic and non-academic activities.	Multiple types of other service systems may be involved in providing interventions for individuals with ASDs including state-based agencies and programs, non-profit groups, or other community-based providers. Interventions focus on individual and family goals within the scope of the program or service. Services may or may not have age-related limitations.

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COMPARISON OF SERVICE DELIVERY SYSTEMS INVOLVED IN ASD INTERVENTION TABLE 2.3

	HEALTHCARE SERVICES	
	MEDICAL	OTHER HEALTH PROFESSIONS
Funding	Public and private health insurance, self-pay, other public funding	Public and private health insurance, self-pay, other public funding At times, providers of behavioral and developmental services contract with the educational system to provide services.
Special Considerations (General)	Medications do not cure autism, but can be effective for treating associated conditions, including aggression and irritability, ADHD symptoms, and psychiatric symptoms (e.g., mood, anxiety, or psychotic disorders). Medications may be considered after behavioral therapies are tried given that medications may have side effects. In some cases, medications may be needed so that the individual can engage in and benefit from behavioral interventions. Medications combined with behavioral and developmental therapies may promote optimal outcomes.	Therapies may be provided through community-based agencies, individual providers, or healthcare systems. Therapies are provided across the lifespan; there are no age restrictions such as with the educational system. Individuals of all ages receive a wide variety of interventions.

	PUBLIC EDUCATION SERVICES			OTHER SERVICES
	MO FIRST STEPS (IDEA PART C) (Birth to 36 months)	SPECIAL EDUCATION (IDEA PART B) (Age 3 to 21 years or until high school graduation)	SECTION 504 OF THE REHABILITATION ACT OF 1973	COMMUNITY-BASED
	State and federal funds, family cost participation based on ability to pay, public and/or private health insurance coverage for certain therapy services	Local tax base, state and federal funds, and public insurance (limited to Medicaid-approved services under Missouri state plan for Medicaid)	There is no funding source. State and local jurisdictions must provide accommodations under Section 504 if they receive federal financial assistance.	Public funding, self-pay, or other private funding sources. Some not-for-profit organizations have scholarships or grant funding available for services. Insurance reimbursement typically is limited to clinical providers, but may cover some other specific types of services particularly in the case of public insurance or waiver programs.
	Infants and toddlers are eligible for services after confirmation of medical condition or developmental delay. To the maximum extent possible, services must be provided in the child's natural environment, such as the family's home.	A medical diagnosis does not automatically qualify a student under the IDEA. Parents are an important member of the IEP team, but the IDEA ultimately requires public schools to design and implement an IEP that offers some educational benefit (free appropriate public education–FAPE) to the student. Selection of appropriate interventions to enable the student to benefit from his education is made by teachers and therapists who serve the child with input from the parents.	FAPE is the standard that must be met. An "appropriate" education means an education comparable to that provided to students without disabilities.	Other service providers may be affiliated with many different types of organizations or agencies.

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COMPARISON OF SERVICE DELIVERY SYSTEMS INVOLVED IN ASD INTERVENTION TABLE 2.3

	HEALTHCARE SERVICES	
	MEDICAL	OTHER HEALTH PROFESSIONS
Legal Considerations	Physicians, nurse practitioners, and physician assistants should be licensed and practice within the scope of their training and experience.	Providers should be licensed or supervised by licensed providers (e.g., psychologists, behavior analysts, speech/language therapists, occupational therapists, etc.) and practice within the scope of their training and experience. Recent legislation (§337.315,RSMo) specifies the legal requirements for BCBAs to receive insurance reimbursement for services.
Intervention Plan	Medical Treatment Plan	Treatment or Intervention Plan

	PUBLIC EDUCATION SERVICES			OTHER SERVICES
	MO FIRST STEPS (IDEA PART C) (Birth to 36 months)	SPECIAL EDUCATION (IDEA PART B) (Age 3 to 21 years or until high school graduation)	SECTION 504 OF THE REHABILITATION ACT OF 1973	COMMUNITY-BASED
	Governed by Part C of the Individuals with Disabilities Education Act (IDEA). State requirements for licensure and certification apply to therapists and other providers as provided for in state regulations implementing First Steps (see State Plan for Part C of IDEA).	Governed by Part B of the Individuals with Disabilities Education Act (IDEA). State requirements for licensure and certification apply to teachers, therapists, and other providers of services and therapies. See state regulations implementing Part B of IDEA (see State Plan for Part B of IDEA).	Governed by Section 504 of the Rehabilitation Act of 1973; oversight by the U.S. Department of Education, Office for Civil Rights (OCR).	Agencies have their own unique standards and regulations regarding eligibility for services in terms or age, diagnosis, symptom severity, or other individual factors.
	Individualized Family Service Plan (IFSP)	Individualized Education Program (IEP)	Section 504 Plan or if the student is also identified under IDEA, the IEP under IDEA.	Treatment Plan, Person-centered Plan, or Individualized Service Plans

Overview: Six Systematic Reviews 2009-2011

A search of available research resulted in identification of six recent nationally recognized systematic reviews that were selected by the Initiative as the focus of the *Guide* to provide up-to-date information on the effectiveness of a broad array of ASD interventions.

Although the terminology differs, the types of interventions summarized in the reviews can be described using two broad categories: (a) medical and complementary alternative medicine (CAM) interventions and (b) behavioral interventions.

For the specific definitions of these terms within the context of the research reviews, see Chapter 4 of the full *Guide*.

Focused interventions are individual strategies, used alone or in combination, to address specific skills or behaviors (e.g., the use of positive reinforcement to increase vocalizations), whereas comprehensive interventions are a set of procedures or programs designed to address a broad array of skills or behaviors (e.g., structured teaching to enhance learning).

For additional information on the types of interventions considered by each review, please refer to the review summaries in Chapter Four and the Glossary in Appendix B of the full *Guide*.

EFFECTIVE ASD INTERVENTIONS

The list of effective interventions presented in Table 3.3 synthesizes the findings across the six systematic reviews. The effective interventions include those described as Evidence-based (NPDC); Level One: Evidence-based (CMS); Established (NSP); having evidence of effectiveness (AHRQ); and/or as Effective Medications (StART).

For individual findings from each review, see pages 115 to 180 of the full *Guide*.

The term effective indicates a high level of research support for a particular ASD intervention based on the findings of one or more of the six systematic reviews. However, the specific characteristics and needs of individuals with ASDs vary significantly; there is no one size fits all intervention for ASD. Therefore, a review of effective interventions must consider the characteristics of individuals who benefited from the intervention and the skills or behaviors targeted by the intervention.

For information from the systematic reviews about the characteristics of individuals who benefited from each intervention, see pages 76 to 114 of the full *Guide*.

For general information about the goal areas addressed by each intervention, see page 72 and 204 to 213 of the full *Guide*.

For more detailed information about the specific goal areas for which interventions were reported to be effective, see pages 115 to 180 of the full *Guide*.

It is not the intention of this document to suggest what interventions should or should not be used for a specific individual with an ASD. Instead, the document emphasizes a process for intervention selection in which professional expertise and individual characteristics set the context for reviewing research findings.

Table 3.3 provides a list of effective ASD interventions identified in the systematic reviews. Interventions are presented alphabetically by category; the order does not reflect ranking, merit, or preference. Effective interventions are grouped into two broad categories: (a) behavioral interventions and (b) medical and complementary-alternative medicine (CAM) interventions.

For the specific definitions of these terms within the context of the research reviews, see Chapter 4 of the full *Guide*.

The broad category of behavioral interventions includes interventions that may be described as educational, academic,social, psychosocial, and psychological. Behavioral interventions are described as either comprehensive (i.e., a program of set of procedures that addresses a broad array of skills or behaviors) or focused (i.e., an individual strategy used address specific skills or behaviors).

EFFECTIVE ASD INTERVENTIONS

TABLE 3.3

BEHAVIORAL INTERVENTIONS

Comprehensive Interventions*

PROGRAMS OR SETS OF PROCEDURES THAT ADDRESS A BROAD ARRAY OF SKILLS OR BEHAVIORS.

Comprehensive Behavioral Intervention Programs for Young Children

Structured Teaching

Focused Interventions

INDIVIDUAL STRATEGIES USED ALONE OR IN COMBINATION TO ADDRESS A SPECIFIC SKILL OR BEHAVIOR.

Antecedent Package
- Prompting
- Stimulus Control/Environmental Modification
- Time Delay

Behavioral Package
- Differential Reinforcement
- Discrete Trial Training
- Extinction
- Functional Behavioral Assessment
- Functional Communication Training
- Reinforcement
- Response Interruption/Redirection
- Task Analysis and Chaining

Cognitive Behavioral Interventions

Joint Attention Intervention

Modeling
- Video Modeling

Multi-component Package

Naturalistic Interventions

Parent Implemented Interventions

Peer Mediated Interventions

Picture Exchange Communication System™

Pivotal Response Training

Schedules

Self-management

Social Communication Intervention

Social Narratives

Social Skills Intervention

Speech Generating Devices

Structured Work Systems

Supported Employment

Technology-based Treatment
- Computer-aided Instruction

Visual Supports

MEDICAL AND COMPLEMENTARY AND ALTERNATIVE MEDICINE (CAM) INTERVENTIONS

Medications

Aripiprazole

Methylphenidate**

Risperidone

** A summary of the Comprehensive Treatment Models (CTM) evaluation is provided in Chapter Four for individuals interested in information about comprehensive intervention programs. Because the CTM review evaluated intervention programs across multiple categories without offering overall conclusions about program effectiveness, the CTM results are not included in the list of effective interventions or other tables in this chapter.*

*** StART found that methylphenidate was effective for reducing hyperactivity in children with ASDs; however, it was not found to be effective for treating restricted or repetitive behavior or irritability.*

INEFFECTIVE ASD INTERVENTIONS

Research evidence also has provided important information about interventions that have not been shown to be effective. Although interventions with insufficient evidence require more research to determine whether they are effective, an intervention is described as ineffective when there is sufficient evidence to conclude that the intervention did not result in the intended outcomes. Information about ineffective interventions may be limited by the fact that researchers often discontinue studies if preliminary data collection does not show positive results. In addition, if an intervention already was shown to be ineffective with the general population or another clinical population, researchers are less likely to study that intervention with individuals on the autism spectrum.

For a list of ineffective interventions, including the areas for which they failed to produce positive results, see page 73 of the full *Guide*.

HARMFUL ASD INTERVENTIONS

When there is sufficient evidence to show that an intervention produces negative outcomes, it is described as harmful. Although the six systematic reviews included in the *Guide* did not identify harmful ASD interventions, this does not mean that all interventions used with individuals with ASD are safe. When preliminary research findings suggest that an intervention is harmful, ethical guidelines require researchers to take steps to minimize harm and to discontinue a study if results suggest continuing or serious harm. Therefore, studies of potentially harmful interventions often are not completed and thus are not published in the research literature. In addition, if research shows that an intervention is harmful for the general population or another specific population (e.g., individuals with developmental disabilities), ethical researchers do not apply these harmful treatments to individuals on the autism spectrum just to show that they also are harmful to individuals with ASDs. It is important to be familiar with all available information about a potential intervention, including research or public health guidelines that are not specific to ASDs. Intervention selection always should include open discussion about any potential harmful effects of the intervention under discussion, which is a key aspect of informed consent.

OTHER ASD INTERVENTIONS

The *Guide* focuses on effective ASD interventions and provides information about ineffective and harmful interventions. For many ASD interventions, more research is needed before conclusions can be drawn about whether the intervention is effective. The systematic reviews included in the *Guide* use a variety of terms to describe interventions for which more research is needed, including Level 2: Emerging and Level 3: Unestablished (CMS); Emerging or Unestablished (NSP); Insufficient Evidence (AHRQ); and Marginal Evidence (StART). When an intervention is identified as having limited evidence or lacking research support, it does not necessarily mean that the intervention produces no beneficial outcomes. For example, in the NSP classification system, all interventions described as emerging showed some beneficial outcomes, but lacked sufficient evidence to describe them as established.

Although effective interventions provide a starting point for intervention selection, information about other interventions may be needed to answer questions, provide a basis for comparison, or provide alternatives when effective interventions are not sufficient to address a specific concern for a particular individual.

For information about other ASD interventions, see pages 115 to 180 of the full *Guide*.

For information about specific interventions of interest, see the Index of Intervention Names on pages 225 to 232 of the full *Guide*.

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