Supporting Students with Autism Spectrum Disorder in Rural Schools

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Autism spectrum disorder (ASD) is a neurodevelopmental disorder that is characterized by restricted or repetitive patterns behavior of behavior, interests, or activities, and impaired social interaction and communication. The number of students with ASD has increased dramatically in recent years (CDC, 2016) and with this has come a pressing need for educators to develop skills in accurately identifying autism and in meeting the needs of this very diverse population. This is challenging in any school; however rural schools often face additional challenges when attempting to support students with ASD due to factors such as a relatively small number of students with ASD in a given school, and geographic barriers limiting access to resources (Ashburner, Vickerstaff, Beetge, & Copley, 2016).

In this chapter we describe a model of supports for students with ASD, building off our experiences helping schools develop and sustain effective academic, social, and behavioral practices for students with ASD and other disabilities, as well as for typically developing students. We begin with an overview of ASD and then describe a systems framework schools might adopt to enhance supports for this population. We provide suggestions for how school-based mental health professionals might play a role in this effort and suggest options that rural schools with varying levels of resources might adopt. We then define key features of effective supports for students with ASD, describing methods of identifying students with ASD in schools and reviewing evidence-based interventions. We conclude by describing directions for future research.

Autism Spectrum Disorder: An Overview

Individuals with ASD exhibit behavioral excesses and deficits in social communication and interaction and in restricted and repetitive behaviors, interests, and activities. Autism is heterogeneous in presentation, with some individuals appearing to be only mildly impacted whereas others have significant behavioral deficits and excesses that dramatically affect their ability to function. For example, a student who is mildly impacted by ASD may communicate well using spoken words but might have difficulty recognizing and using social cues such as body language or facial expressions. Another student might give long monologues on a preferred topic, such as types of

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vacuum cleaners, failing to notice that others might not share the same intense fascination. Other students might struggle with back-and-forth dialogue when talking with others, or tend to speak using very precise language and frequently draw upon an extensive vocabulary, not recognizing that few peers talk to one another in this way. Other individuals may not communicate at all, or must be taught to use pictures or other symbolic communication, and even then may be only able to express rudimentary wants and needs.

The range in deficits and excesses also is apparent with regard to restricted and repetitive patterns of behaviors, interests, and activities. Some students with ASD appear insensitive to environmental changes that others respond to almost automatically, such as an alarm going off or extreme kinesthetic stimulation such as stepping outside into freezing weather or touching a hot surface. Many students with ASD engage in repetitive behavior that can interfere with their ability to function or that is stigmatizing, such as jumping and twirling, or repeating words or sentences over and over again. Other individuals might develop obsessions; intense interests, for example in military equipment or in numbers; or compulsions, such as the need to tap doorframes three times upon entering or exiting a room.

At one time, ASD was considered rare; however prevalence estimates are increasing. The Centers for Disease Control and Prevention (CDC) (2016) estimates that approximately 1 in 68 children in the United States meet the criteria for ASD, which equates to roughly 1.5% of the population. Although ASD occurs among all racial, ethnic, and socioeconomic groups, prevalence rates are somewhat uneven. For example, using data from the 2009–2010 National Survey of Children with Special Health Care Needs, Jo et al. (2015) found that ASD was more prevalent among non-Hispanic-white children than both non-Hispanic-black children and Hispanic children, especially those born from foreign-born and non-English-speaking parents. Jo et al. speculated that the differing prevalence rates were not due to genetic or hereditary factors but rather were attributable to lower rates of identification in non-white populations, reflecting cultural, language, and socioeconomic barriers to seeking and accessing mental healthcare.

Gender differences in the prevalence of ASD are evident; boys are roughly four times more likely to receive a diagnosis of ASD than girls, with prevalence rates of 1 in 42 and 1 in 189, respectively (CDC, 2016). It is unclear whether the gender discrepancy in prevalence rates is due to a greater risk of developing ASD among boys, challenges associated with accurately identifying girls with ASD due to idiosyncratic symptom profiles, or some combination (Dworzynski, Ronald, Bolton, & Happé, 2012).

There is a high co-occurrence of ASD and intellectual disability with comorbidity estimated between 50 and 70% (Goldin, Matson, & Cervantes, 2014; Matson & Shoemaker, 2009). Recent prevalence studies also have shown a high comorbidity between ASD and anxiety disorders, attention-deficit hyperactivity disorder, depressive disorders, and oppositional defiant disorder (Simonoff et al., 2008). Specifically, approximately 70% of individuals with ASD meet the criteria for one additional diagnosis and about 40% meet the criteria for two or more comorbid diagnoses. Comorbid medical conditions such as constipation, sleep problems, or epilepsy are also common (American Psychiatric Association, 2013).

Supporting students with ASD in schools can be challenging, given the diverse needs of this population and the varying level of resources necessary to meet these needs. In the next section we describe a framework that may help schools develop and maintain the ability to meet the needs of all students with ASD.

A Framework for Capacity Building in Schools

Research has shown that educators are most able to meet the academic and social behavioral needs of students when schools invest in a comprehensive and long-term plan that includes emphasizing data-based decision making and use of evidence-based interventions matched to student need. Two widely used examples of such approaches are response to intervention (RTI;

Fletcher & Vaughn, 2009) and school-wide positive behavior interventions and supports (SWPBIS; Horner, Sugai, & Anderson, 2010). Both frameworks emphasize the use of (1) systems to train and support educators, (2) benchmarking and other assessment to identify students who might benefit from intervention, (3) evidence-based interventions matched to individual student needs, and (4) a mechanism for monitoring student progress within and across the student body. This same logic could be applied to supporting students with ASD in schools.

Systems to Train and Support Educators

Because students with ASD present with a diverse assortment of strengths and deficits, a great deal of expertise is required to design, implement, and sustain effective systems to support students with ASD in school. Large schools may build "in-house" capacity, hiring individuals with expertise in evidence-based assessment and intervention, but smaller schools with fewer students with ASD in a given school or rural schools that may have trouble attracting and retaining staff with such specific expertise may be more successful if they combine resources across schools or districts or utilize outside consultants. A good resource for identifying outside consultants is the Behavior Analysis Certification Board's website: bacb.com. The Board maintains a list of certified behavior analysts organized by country and state (province within Canada). Schools and districts can use this website as a starting point for identifying local providers who may have expertise in evidence-based assessment and intervention for individuals with ASD. Once potential providers have been identified, it will be important to interview them to ascertain their experience working in schools and providing consultation services similar to those that are desired. There are also a growing number of organizations that provide consultative services to support individuals with ASD. Before entering into a relationship with an organization, a school should review the organization carefully to determine (a) the nature of services provided, (b) skills and credentials of service providers, and (c) evidence that the organization has worked closely and successfully with schools.

Whether a school builds internal capacity or relies on outside expertise, there are several key areas in which autism-specific expertise is required including evaluating autism spectrum disorder, selecting appropriate interventions, training and coaching, and progress monitoring. Each is described next.

Evaluating ASD

Schools supporting students with ASD will need access to expertise in how to best identify students with ASD. As described later, there are a variety of assessments available for use in this process and a gated assessment system is recommended. Autism evaluations are best conducted by a multidisciplinary team whose members have specific knowledge about ASD. Further, at least some team members should be well versed in the diversity of ways that ASD can present across core deficit areas and in assessing for commonly observed comorbidities. While it is possible for such teams to be made up entirely of "in-house" staff, it is more common for districts to put together a team that works across schools in the district. This is particularly true in rural areas, where specialists may work across multiple buildings.

Selecting Appropriate Interventions

Students who meet eligibility criteria for ASD may require supports in multiple areas, including but not limited to deficits in social communication and interaction and restricted or repetitive patterns of behavior, interests, and activities. For example, beyond these two diagnostic areas, many students with ASD struggle with planning and organization, following routines and schedules, acquiring and maintaining skills, and problem behavior. In a later section we review evidence-based interventions for students with ASD, providing a schematic for matching intervention to student need.

As schools build capacity in supporting students with ASD, they will need access to one or

more individuals who are well versed in evidence-based interventions for this population. Because there are many interventions that either are not supported by evidence (e.g., sensory integration therapy; Leong, Carter, & Stephenson, 2014) or have been shown to be ineffective at best (e.g., facilitated communication; Lillenfeld, Marshall, Todd, & Shane, 2014) and, at worst, harmful (e.g., holding therapy; Mercer, 2014), it is important that those who are guiding intervention decisions understand how to evaluate the literature supporting a given intervention. The first question is whether an intervention has been found to be effective in experimental (either a randomized controlled trial or single-subject design) studies.[1] If an intervention is evidence-based, those assessing the intervention also should determine whether the resources required to implement the intervention are available in the school. For example, discrete trial training has been found to be an effective intervention for teaching skills (Smith, 2001) but it requires access to a highly trained instructor who can work with a student on a 1:1 basis, which may be unfeasible for many schools. Further, discrete trial training generally is implemented in a setting in which distractions have been minimized, something that can be difficult to do in a typical classroom.

School-based mental health professionals will generally have sufficient training in research methodology to evaluate the extant literature and to work with teams to analyze resources needed for a given intervention. Schools without access to such systems may have school psychologists or other individuals with this skillset or be able to identify and hire one or more individuals with expertise in identifying evidence-based interventions and matching intervention to student need. Rural schools may be better off relying on an outside consultant to fulfill this role, particularly if there are only a few students with ASD in the school.

[1]What Works Clearinghouse provides guidelines for evaluating both group design and single-subject design research; guides can be found at http://ies.ed.gov/ncee/wwc/StudyReviewGuide.

Initial Training and Ongoing Coaching

Schools supporting students with ASD will need access to both initial training and ongoing consultation. This training will be necessary first to provide basic understanding of ASD (via awareness level training) and to then build skills in evidence-based supports.

Awareness-Level Training

As a starting point to capacity building, whether the goal is to build internal capacity or utilize outside resources, schools will want to begin with awareness-level training for all faculty and staff. The goal of such training is to provide all educators with a background in ASD, so that everyone is familiar with the features of ASD and the heterogeneity of the disorder. This training also should provide teachers with guidance in creating learning environments that facilitate learning for students with ASD and an overview of evidence-based intervention (Goodall, 2015). Some schools may also want to include information about evidence-based versus nonevidence-based interventions and, if most teachers are not familiar with data-based decisions, guidance on the importance of collecting and using relevant information to guide decisions about interventions.

Training in Specific Interventions

Whether schools have within-school expertise or are using outside consultation, a major focus of training will be helping teachers and other staff learn to implement evidence-based interventions with specific students. Behavioral skills training (BST; Miltenberger, 2008) is an instructional strategy that addresses the shortcomings of typical in-service (i.e., those that rely solely on didactic instruction) training by including modeling, rehearsal, and feedback in addition to initial instruction. Behavioral skills training can be either group-based (if more than one person will be implementing the intervention) or individualized and consists of didactic instruction and modeling of the skill or technique by the instructor, followed by an opportunity for trainees to prac-

tice the skill or technique with each other or with the instructor, and finally an opportunity for trainees to receive targeted feedback on their performance during the role-play. Training continues with a combination of didactic instruction, modeling, and rehearsal plus feedback until the trainee is implementing the newly learned skill to some preset fidelity criterion. For example, if a teacher was learning to deliver a reinforcer contingent on a specific student behavior, training might continue until the teacher delivered the reinforcer after the target behavior on four out of five consecutive opportunities and never when the target behavior did not occur. Relative to didactic instruction, BST tends to be more engaging for those participating and has been shown to increase treatment fidelity upon initial implementation of interventions (Hogan, Knez, & Kahgn, 2015). BST has been demonstrated to be an effective instructional method for training professionals who work closely with students with ASD across contexts such as teaching proper assessment procedures (Barnes, Mellor, & Rehfeldt, 2014) and intervention strategies (Downs, Downs, & Rau, 2008; Severtson & Carr, 2012).

Although preimplementation training is necessary for educators who will provide interventions for student with ASD, it is by no means sufficient as a stand-alone strategy for at least three reasons: (a) decreased fidelity seems to naturally occur over time, (b) prevalence of paraprofessionals working with students with ASD, and (c) high turnover among educators working with students with ASD.

First, research has shown that even after initial training that resulted in high-quality implementation, implementers often fail to implement the procedure they were trained on with fidelity over time (Long & Maynard, 2014; Sanetti, Kratochwill, & Long, 2013). There are many reasons this might occur, including failure to understand key features of the intervention, poor contextual fit, lack of time or resources, and loss of skill over time. Second, in many schools, interventions for students with ASD are delivered by paraprofessionals, not teachers. Unfortunately, the number of paraprofessionals trained to work with students with ASD has not increased at the same rate as autism diagnoses in recent years (Rispoli, Neely, Lang, & Ganz, 2011) and paraprofessionals tend to be less experienced than certified teachers (Koegel, Robinson, & Koegel, 2009). Third, changes in system capacity (e.g., staff turnover, multiple roles for a single individual) represent a significant barrier to the sustainability of school-based programs (McIntosh, Horner, & Sugai, 2009) if there is not a plan in place for ongoing training and consultation.

For these reasons, it is critical that schools provide staff with access to ongoing training and coaching to ensure high-quality implementation. Coaching should consist of ongoing observations and feedback paired with time for the coach and implementer to meet to discuss any barriers to implementation and to review progress-monitoring data (discussed next) to determine whether any changes are needed in the intervention. Although it is tempting to regard the additional time needed for ongoing observation and performance feedback as unnecessary, research has shown that performance feedback is superior to other methods for improving fidelity such as follow-up interviews and commitment planning (Noell et al., 2005).

Information Systems to Monitor Student Outcomes

Data-based decision making is critical to providing students with the most appropriate educational and behavioral supports. For schools to effectively support students with ASD they must have access to a data information system that allows for adequate progress monitoring of all students receiving intervention.

A useful system will allow educators to define target behaviors (skills or behaviors to increase and challenging behaviors to decrease) for a given student. Educators should be able to develop and enter individualized operational definition of target behaviors and develop an individualized data collection system for a given student and target behavior. There are several commercially available data systems available;

however most are tied to a specific curriculum (e.g., ACE®; http://www.acenecc.org/) or intervention (e.g., catalyst for discrete trial training; http://www.datafinch.com/aboutus). Thus, most educators choose to rely on computer-based spreadsheets such as Excel.

Monitoring the fidelity of implementation is also an important aspect of data-based decision making. Treatment fidelity (also referred to as treatment integrity, procedural fidelity, etc.) refers to the extent to which an intervention has been implemented as intended (Sanetti & Kratochwill, 2009). The importance of monitoring treatment fidelity is twofold; it ensures that services for students with ASD are implemented appropriately, which is tied to improved student outcomes (Wilkinson, 2006). Further, when faced with interventions that do not appear to be effective it allows educators to determine whether the intervention itself is inappropriate for the student or whether the individual implementing the intervention requires additional training or guidance. In this sense, assessment of treatment fidelity is both important for positive student outcomes and allows schools to allocate resources more efficiently (DiGennaro Reed & Codding, 2014; Fryling, Wallace, & Yassine, 2012). Research on treatment integrity suggests that ongoing coaching is necessary to maintain high levels of fidelity (Mortenson & Witt, 1998; Witt, Noell, LaFleur, & Mortenson, 1997); however it can be difficult to determine when additional coaching is needed. The Treatment Integrity Planning Protocol (TIPP; Sanetti & Kratochwill, 2009; available from study authors) provides a means for making this determination. The TIP is a structured format used by an intervention consultant (e.g., school-based mental health professional) and teacher to (a) define an intervention, (b) determine logistics of integrity assessments (e.g., who will conduct, when data will be collected, how data will be used), and (c) develop a psychometrically sound treatment integrity assessment. Research on the TIPP suggests that self-assessment of treatment integrity can be an accurate way to gauge fidelity of implementation and thus determine whether additional coaching is needed, and that use of this protocol increases treatment integrity.

Key Features of Effective Supports for Students with ASD

Once schools have determined whether they will use internal expertise, outside supports, or some combination of the two and have developed a framework for initial evaluation, intervention selection, training/ongoing consultation, and data-based decision making, they will need to define the specific practices that will occur with regard to identification of students and implementation of interventions. Each is discussed next.

Identifying Students with Autism Spectrum Disorder

Children with ASD generally are diagnosed by a psychologist or neurologist in a clinical setting using clinical interviews with caregivers (e.g., Autism Diagnostic Interview-Revised; Kim, Hun, & Lord, 2013), rating scales, and observations (e.g., Autism Diagnostic Observation Schedule, Carr, 2013). Additionally, a comprehensive assessment of cognitive functioning is typically included in the diagnostic process. Although a child must meet diagnostic criteria (using the DSM-5; American Psychiatric Association, 2013) to receive services through private or Medicaid-sponsored insurance (for variations see Johnson, Danis, & Hafner-Eaton, 2014), in the school public school system an individual must only meet eligibility based on the definition of ASD outlined by state educational laws. In addition, each state is required to follow the minimum requirements set forth by the 1997 amendments to the *Individuals with Disabilities Education Act* (IDEA) (1997). Each state has set forth its own guidelines and definitions to guide school-based teams through the process of identifying whether a student qualifies for autism-related services. These requirements vary greatly throughout the United States (Barton et al., 2016). Because of this variability, we provide a framework of recommended assessments and evaluations teams can utilize to help identify stu-

dents in need of autism-related services rather than specific guidelines for diagnosis.

A goal of school-based services for students with ASD should be to ensure that all students in need of support receive assistance. Due to the heterogeneity in presentation of ASD, it will be impossible to meet this goal if eligibility assessment is reserved only for students who "look like they have ASD" or who have received a diagnosis of ASD from a behavioral health provider. Further, using only a single assessment modality likely will result in either over- or under-identification of students with ASD. We thus recommend that educators use a gated screening system to identify students who might meet eligibility criteria for ASD. Assessments used should be evidence based, and we provide examples of evidence-based measures at each gate. This is an ideal role for school-based mental health professionals as these providers are well trained in assessment and in school-wide screening. Wilkinson (2010) provides guidelines for multi-gated assessment, which we describe below.

The first step in the gated system is screening, the purpose of which is to quickly assess the entire population (e.g., all kindergartners). Examples of evidence-based screening tools appropriate for use in schools are the Modified Checklist for Autism in Toddlers, Revised (M-CHAT-R; Robins, 2016); Autism Spectrum Screening Questionnaire (ASSQ; Ehlers, Gillberg, & Wing, 1999); and Pervasive Developmental Disorder Screening Test-II (PDDST-II; Siegal, 2004), and the Childhood Asperger Syndrome Test (CAST; Scott, Baron-Cohen, Bolton, & Brayne, 2002). These measures differ with regard to the age range they are appropriate for and the intended purpose. See Table 14.1 for detailed information about each screener.

Students who are identified via the screening in gate 1 or who educators or parents believe are exhibiting signs of ASD move on to gate 2. The goal of the second gate of the model is to assess the extent to which symptoms of autism are present. This is achieved by administering the Children's Communication Checklist Second Edition (CCC-2; Bishop, 2006), Social Communication Questionnaire (SCQ; Rutter, Bailey, & Lord, 2003), and/or Social Responsiveness Scale—2 (SRS-2; Constantino, 2012). These tools will allow the evaluator to determine the severity of impairment in the following domains: (a) reciprocal social behavior, (b) pragmatic language and communication, and (c) stereotypical behavior and restricted range of interest. The team should continue to gate 3 if either of the following criteria are met: (a) scores suggest that ASD symptoms are present, or (b) symptoms are not present but there is continued concern about the student's social interaction, and communicative, skills and the presence of restricted or repetitive behavior, interests, or activities.

Students who meet the criteria to advance to the third gate should receive a more comprehensive multidisciplinary evaluation. Ozonoff, Goodlin-Jones, and Solomon (2005) recommend the following components be included in the comprehensive assessment: (a) parent interviews and questionnaires (e.g., Autism Diagnostic Interview-Revised [ADI-R]; Lord, Rutter, & Le Couteur, 1994); (b) autism diagnostic tools (e.g., ASSQ); (c) diagnostic observation instruments (e.g., Autism Diagnostic Observation Schedule -2 [ADOS -2]; Lord et al., 2012); (d) intellectual assessment; (e) language assessment; and (f) adaptive behavior assessment. Once students with ASD have been identified, the focus shifts to intervention. In the next section we explore interventions for students with ASD. We begin by reviewing the literature supporting interventions for this population and then describe a general framework schools might use to approach intervention.

Evidence-Based Interventions for Autism Spectrum Disorder

Autism is a heterogeneous disorder with a complex and multifaceted presentation. As a result, no single intervention will be appropriate for use with all, or even most students with ASD. There has been a marked increase in research on interventions for ASD in the last 5–10 years (Smith & Iadarola, 2015), and educators are now faced

Table 14.1 Assessment measures for use in multidisciplinary, gated assessment of ASD

Gate used and measure	Age range	Intended purpose	Number of items	Person completing
Gate I				
M-CHAT-R	≥18 months	Parent-report screening tool to assess risk for ASD. Recommended to be complete at well-child visits	20	Parents
ASSQ	7–16	Screen for high-functioning autism	27	ParentsTeachers
PDDST-II	12–48 months	Identify autism	23	Parents
CAST	4–11	High-functioning autism screening tool	37	Parents
Gate 2				
CCC-2	4–11	Screen for general language impairments, identify pragmatic language impairment and communication impairments, and determine if further assessment is needed	70	Parents
SCQ	4–adult	Screen for characteristics of autistic behavior between ages 4 and 5 and at time of completing the measure	40	Parents
SRS	4–18	Identify skill level of reciprocal social interactions	65	ParentsTeachers
Gate 3				
ADI-R	>2	Used to diagnose autism	93	Experienced clinical interviewer
ADOS	>12 months	Used to diagnose autism	One module depending on age	Trained clinician

with a dizzying array of possible interventions to choose from. Broadly speaking, interventions can be classified as either comprehensive or focused. Comprehensive interventions address most or all areas of need whereas focused interventions target one or a restricted range of goals. Comprehensive interventions generally consist of several focused interventions. An example of an evidence-based comprehensive intervention for young children with ASD is the UCLA Young Autism Program developed by Lovaas et al. (Smith, Groen, & Wynn, 2000). This comprehensive intervention includes several focused interventions such as discrete trial training, prompting, and reinforcement. Due to the broad focus of comprehensive interventions, they tend to be designed for use over extended periods of time (many months or years). Although comprehensive intervention models for schools are in use, to date none have been designated as evidence-based in empirical reviews (see National Autism Center, 2015; Odom, Boyd, Hall, & Hume, 2010). This is unfortunate as comprehensive interventions provide the user with guidelines for assessing the needs of an individual (identifying intervention targets) and then matching intervention to those intervention targets. Comprehensive interventions also provide guidance with regard to which

focused intervention should be used and often provide specific methods for progress monitoring over time.

Focused interventions address a specific target, such as deficits in functional communication or social skills, or behavioral excesses such as repetitive behavior, obsessive behavior, or problem behavior. Focused interventions typically are designed for use during a more limited time frame, such as a couple of months or at most a year. There are now many different focused interventions addressing deficits and excesses associated with a diagnosis of ASD. Several reviews of this literature have been conducted in recent years (e.g., National Autism Center, 2015) with the most recent review by Wong et al. (2015). Wong et al. included studies that (1) were published between 1999 and 2011, (2) had participants who had a diagnosis of ASD and were between the ages of birth and 22, and (3) examined interventions that targeted behavioral, developmental, or academic outcomes. They excluded interventions that could not reasonably be implemented in typical educational, home, or community settings (e.g., dolphin therapy). Wong et al. identified 27 focused interventions that met the criteria for evidence-based[2] but did not analyze results based on setting in which interventions were conducted, so it was not possible to determine which interventions have been shown to be effective when implemented in typical school settings.

To begin to answer this question, we reviewed the literature on the 27 interventions identified by Wong et al. (2015), and analyzed outcomes for studies conducted in schools. Those interventions are listed in Table 14.2. Three interventions, scripting, cognitive behavioral interventions, and parent-implemented interventions, had no peer-reviewed publications supporting use in the schools through 2011. Of the remaining 24 interventions, 5 interventions (antecedent-based interventions, computer-aided instruction, peer-mediated intervention, visual supports, social narratives) had ten or more published studies documenting effectiveness in school settings and three interventions (functional behavior assessment,[3] time delay, and social skills training) had five or more studies supporting effectiveness.

Notably, many of the interventions included in the Wong et al. (2015) review are not specific strategies but rather a general approach that may be applied in different ways. For example, antecedent intervention does not refer to a specific intervention but rather to some manipulation of the environment that occurs prior to a target behavior. The goal can be to set the occasion for or increase the likelihood of a desired behavior (e.g., Taylor et al., 2005) or to reduce the probability of a problem behavior (e.g., Horner, Day, & Day, 1997). Other interventions combine one or more focused interventions. For example, Taylor et al. restricted access to preferred items to increase the likelihood that students would request items from peers, thus increasing social interactions with peers.

Because there are no evidence-based comprehensive interventions designed for use in typical schools, educators will need to select focused interventions appropriate for a given student and context. To assist in this process, we created tables that identify evidence-based interventions appropriate for deficits and excesses associated with autism spectrum disorder (see Tables 14.3, 14.4, and 14.5). In these tables, interventions were

[2]Wong et al. (2015) developed criteria based on published criteria for group designs and single-subject research. A focused intervention was defined as evidence based if (a) at least two high-quality studies with experimental or quasi-experimental designs conducted by two different research groups documented efficacy or (b) it was supported by at least five high-quality single-subject design studies conducted by at least three distinct research groups with at least 20 participants across those studies, or (c) studies supporting the intervention included at least one high-quality experimental/quasi-experimental design and three high-quality single-case designs conducted by more than one research group. "High quality" was defined based on published definitions for each type of experiment. See Wong et al. for definitions.

[3]Although Wong et al. (2015) considered functional behavior assessment an intervention, functional behavior assessment is better considered a label for a variety of different assessment methods used to develop a hypothesis about effects of environmental variables on problem behavior.

Table 14.2 Evidence-based interventions for ASD

Intervention	Definition	Total studies	Studies conducted in schools
Antecedent-based intervention	Alter the environment prior to occurrence of a target behavior to increase the likelihood of a desired behavior or decrease the likelihood of a problem behavior	32	15
Cognitive behavioral intervention	Interventions that address private behavior (thoughts, feelings) as well as overt behavior	4	0
Computer-aided instruction and intervention	Electronic items or equipment are used to facilitate the learner's skill acquisition	20	12
Differential reinforcement [of alternative (DRA), other (DRO), or incompatible (DRI) behavior]	Reinforcement withheld for problem behavior and instead delivered contingent on a specified desired behavior (DRA), any behavior except the problem behavior (DRO), or a response that cannot be emitted simultaneously with the problem behavior (DRI)	26	3
Discrete-trial training	Adult-directed instruction using massed trials within which each trial consists of an antecedent (the prompt), the child's response, and a predetermined adult-delivered consequence (e.g., reinforcement or specific error-correction procedure)	13	2
Exercise	Physical exertion designed to either increase desired behavior or reduce problem behavior	6	3
Extinction	The consequence that reinforced problem behavior is no longer forthcoming, leading to a reduction in that behavior	11	2
Functional behavior assessment	Method of identifying the context in which a problem behavior occurs as well as events that precede and reliably evoke the behavior and events that follow and reinforce the behavior	10	5
Functional communication training	Learner is taught a communication response that serves the same function as the problem behavior	12	3
Modeling	Learner develops a new skill by observing and then imitating another person engaged in the behavior	5	1

(continued)

Table 14.2 (continued)

Intervention	Definition	Total studies	Studies conducted in schools
Naturalistic intervention	Instructional strategies are derived from the principles of behavior analysis and are embedded within the learner's typical activities and routines. Specific target behaviors are encouraged in a sequential manner to build more complex skills	10	1
Parent-implemented intervention	Interventions are delivered by parents in home or community settings	20	0
Peer-mediated instruction and intervention	Adults train typically developing peers to implement strategies designed to help the learner acquire new skills	15	10
Picture exchange communication system	The learner uses a picture to communicate. Training follows six specific phases: (a) learning how to use the system, (b) increasing distance between the learner and the person to communicate with and increasing persistence, (c) picture discrimination, (d) sentence structure, (e) responsive requesting, and (g) commenting	6	3
Pivotal response training	Specific areas identified as key to development (motivation, response to multiple cues, self-management, self-initiation) are targeted for intervention that is delivered in a way that capitalizes on the learner's interests	8	4
Prompting	Cues delivered by the instructor that include verbal, model, or hand-over-hand cues to assist the learner in implementing a behavior	33	9
Reinforcement	Response-dependent delivery (of a desired item or activity) or removal (of an non-preferred item or activity) that leads to an increase in the likelihood of the response occurring in the future	43	8
Scripting	Verbal or written description of a scenario or specific skill that is used prior to the situation that is targeted	9	0

(continued)

Table 14.2 (continued)

Intervention	Definition	Total studies	Studies conducted in schools
Self-management	The learner monitors and records their own behavior and either delivers rewards or recruits rewards contingent on desired behavior	10	3
Social narratives	Individualized description of a social context with key features and desired behavior emphasized	17	10
Social skills training	Instruction in pro-social behavior that includes didactic instruction, role-plays or other opportunities to practice, and feedback	15	5
Structured play groups	Adult-directed play activities occurring within a defined activity and with preselected typically developing peers	4	2
Task analysis	A complex behavior or multistep activity is broken into its component steps to facilitate instruction	8	3
Time delay	Once the learner reliably emits a target behavior following a prompt, a brief delay between the naturally occurring cue for the behavior and the prompt is introduced. The delay is gradually increased over time	12	5
Video modeling	A model (adult or peer) is videoed engaging in the target behavior and the video is used to facilitate learning	32	9
Visual supports	Prompts that are visible to the learner, such as pictures, the way objects are arranged, a schedule, a map, etc. (also called stimulus prompts)	18	10

Note: We counted a study if data from at least one participant were conducted in an in-use portion of a school. Studies in which all data were collected in an empty classroom or unused office were not included. We also excluded preschools

indicated as appropriate for a given deficit or excess if at least one school-based study documented use of the intervention for that problem area. Tables 14.3, 14.4, and 14.5 list interventions that may be appropriate for social communication and interaction; restricted or repetitive behavior, interests, and activities; and commonly occurring additional problems, respectively. In addition there are several comprehensive systems for assessing student needs, selecting appropriate curricula, and monitoring progress that could be useful for educators including the Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP; Sundberg, 2008) and the Assessment of Basic Learning and Language Skills-Revised (ABLLS-R; Partington, 2008).

Table 14.3 Evidence-based interventions for social communication and interaction

Intervention	Domain			
	Difficulty communicating wants and needs	Limited peer interaction	Limited play skills	Deficits in nonverbal communication
Antecedent-based interventions				
Cognitive behavioral intervention				
Computer-aided instruction				
Differential reinforcement	x	x	x	
Discrete trial training	x			
Exercise			x	x
Extinction				
Functional behavior assessment				
Functional communication training	x			
Modeling		x	x	x
naturalistic intervention		x	x	x
Peer-mediated instruction and intervention		x	x	x
Picture exchange communication system	x			
Pivotal response training	x			
Prompting	x	x	x	x
Reinforcement	x	x	x	x
Scripting		x		
Self-management		x		
Social narratives		x		x
Social skills training		x		x
Structured play groups		x	x	
Task analysis				
Time delay				
Video modeling		x	x	x
Visual supports				

Directions for Future Research

The number of students with ASD being served in public schools is growing and this pattern has highlighted pressing needs in many schools. There exists a wide gap between research and current educational practice for students with ASD (Kasari & Smith, 2013; Wong et al., 2015), with evidence-based practices implemented only rarely in schools. Addressing this problem will require a focused and sustained research initiative focused on (a) intervention development and (b) systems to guide initial and ongoing intervention.

First, with regard to intervention, there is a need for comprehensive intervention packages

Table 14.4 Evidence-based interventions for restricted or repetitive behavior, interests, or activities

	Domain	
Intervention	Repetitive behaviors or stereotypy	Ritualistic behavior
Antecedent-based interventions	x	x
Cognitive behavioral intervention	x	x
Computer-aided instruction		
Differential reinforcement	x	x
Discrete trial training		
Exercise	x	x
Extinction		
Functional behavior assessment	x	x
Functional communication training		
Modeling		
Naturalistic intervention		
Peer-mediated instruction and intervention		
Picture exchange communication system		
Pivotal response training		
Prompting	x	
Reinforcement	x	x
Scripting		x
Self-management	x	x
Social narratives		
Social skills training		
Structured play groups		
Task analysis		
Time delay	x	x
Video modeling		
Visual supports		

with documented efficacy and effectiveness in public schools. A comprehensive, school-based intervention would be beneficial as it would provide educators with an evidence-based means of assessing a student's skills and current levels of performance and then using that information to identify appropriate intervention strategies. Research in this area must focus not simply on the development of a comprehensive intervention model, but also on ensuring that it can feasibly be implemented in schools that vary greatly with regard to access to resources and expertise.

Of course, and as highlighted in this chapter, there is an equally pressing need for a model to guide implementation of supports for students with ASD. This framework would delineate mechanisms for building staff capacity, conducting assessments (determining eligibility, progress monitoring, and summative evaluation), and implementing effective intervention. Research evaluating such a school-based model should not simply explore efficacy but also effectiveness across a range of settings (e.g., rural schools, urban schools) and with varying amounts of resources available.

Table 14.5 Evidence-based interventions for commonly occurring difficulties associated with autism spectrum disorder

	Domain			
Intervention	Difficulty with schedules or routines	Difficulty completing academic tasks	Difficulties in skill acquisition or maintenance	Challenging behavior
Antecedent-based interventions	x	x		x
Cognitive behavioral intervention				
Computer-aided instruction	x	x	x	
Differential reinforcement	x	x		x
Discrete trial training	x			
Exercise				x
Extinction				x
Functional behavior assessment				x
Functional communication training				x
Modeling	x			
Naturalistic intervention	x			
Peer-mediated instruction and intervention				
Picture exchange communication system				
Pivotal response training				
Prompting	x	x	x	x
Reinforcement	x	x	x	x
Scripting	x	x		
Self-management	x			x
Social narratives	x			
Social skills training				
Structured play groups				
Task analysis	x	x	x	x
Time delay				x
Video modeling	x			
Visual supports	x	x	x	

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