Innovation Configuration

Evidence-Based Practices for Improving Challenging Behaviors of Students With Severe Disabilities

David L. Westling
Western Carolina University

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IDEAs that Work

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The CEEDAR Center

University of Florida
360 Norman Hall
PO Box 117050
Gainesville, FL 32611

www.ceedar.org
ceedar@coe.ufl.edu
352.273.4259

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Innovation Configuration for Evidence-Based Practices for Improving Challenging Behaviors of Students With Severe Disabilities

This paper features an innovation configuration (IC) matrix that can guide teacher preparation professionals in the development of appropriate content for evidence-based practices (EBPs) for improving challenging behaviors of students with severe disabilities. This matrix appears in Appendix A.

An IC is a tool that identifies and describes the major components of a practice or innovation. With the implementation of any innovation comes a continuum of configurations of implementation from non-use to the ideal. ICs are organized around two dimensions: essential components and degree of implementation (Hall & Hord, 1987; Roy & Hord, 2004). Essential components of the IC—along with descriptors and examples to guide application of the criteria to course work, standards, and classroom practices—are listed in the rows of the far left column of the matrix. Several levels of implementation are defined in the top row of the matrix. For example, no mention of the essential component is the lowest level of implementation and would receive a score of zero. Increasing levels of implementation receive progressively higher scores.

ICs have been used in the development and implementation of educational innovations for at least 30 years (Hall & Hord, 2001; Hall, Loucks, Rutherford, & Newton, 1975; Hord, Rutherford, Huling-Austin, & Hall, 1987; Roy & Hord, 2004). Experts studying educational change in a national research center originally developed these tools, which are used for professional development (PD) in the Concerns-Based Adoption Model (CBAM). The tools have also been used for program evaluation (Hall & Hord, 2001; Roy & Hord, 2004).

Use of this tool to evaluate course syllabi can help teacher preparation leaders ensure that they emphasize proactive, preventative approaches instead of exclusive reliance on behavior reduction strategies. The IC included in Appendix A is designed for teacher preparation programs, although it can be modified as an observation tool for PD purposes.

The Collaboration for Effective Educator, Development, Accountability, and Reform (CEEDAR) Center ICs are extensions of the seven ICs originally created by the National Comprehensive Center for Teacher Quality (NCCTQ). NCCTQ professionals wrote the above description.

There is little that is more difficult for teachers of students with severe disabilities than dealing with the challenging behaviors that their students sometimes display. These behaviors may include aggression, self-injury, non-compliance, inappropriate social behavior, or stereotyped behaviors. They are often intense and present physical, instructional, or social concerns for teachers. They can also disrupt learning and are often dangerous to others and the students exhibiting the behaviors. Often, challenging behaviors have been occurring over a long period, are frequently demonstrated, and are difficult to modify (Dunlap & Carr, 2007; Horner & Carr, 1997). There are a number of studies that have found that both general and special education teachers feel ill equipped to deal with challenging behaviors and are not adequately prepared in their teacher education programs to do so (e.g., Abidin & Robinson, 2002; MacDonald & Speece, 2001; Nelson, Maculan, Roberts, & Ohlund, 2001; Westling, 2010).

Given the nature of serious challenging behaviors and, as teachers often cite, the lack of preparation to deal with them, there is a clear need for teacher education programs to offer high-quality preparation to pre-service teacher candidates who will be responsible for educating students with severe disabilities. Not only are challenging behaviors potentially harmful and disruptive, but they also prevent students with severe disabilities from being accepted by others and participating in inclusive educational and community settings (Lohrmann & Bambara, 2006). Fortunately, almost 40 years of research in applied behavior analysis (ABA) has demonstrated that non-aversive procedures can be used to decrease the occurrence of challenging behaviors if one can successfully hypothesize the function of the behavior (i.e., why it occurs) and create interventions that address the function (e.g., Carr, 1977; Carr & Durand, 1985; Horner et al., 1990). For the purpose of this paper, students with severe disabilities include students with

moderate, severe, or profound intellectual disabilities; students with multiple disabilities; and some students with autism spectrum disorders (ASD).

> Positive Behavioral Interventions and Supports (PBIS) is defined as
>
> an applied science that uses educational methods to expand an individual's behavior repertoire and systems change methods to redesign an individual's living environment to first enhance the individual's quality of life and, second, to minimize his or her problem behavior. (Carr et al., 2002, p. 4)

Carr and colleagues (2002) stated that PBIS emerged from three major sources: (a) ABA, (b) the normalization/inclusion movement, and (c) person-centered values. Carr and colleagues further stated, "Were it not for the past 35 years of research in applied behavior analysis, [PBIS] could not have come into existence" (p. 5).

The relevance of PBIS to public schools, and thus to teachers, has been underscored in the Individuals with Disabilities Education Act (IDEA, 2004), which requires

- consideration by the individualized education program (IEP) team of the use of PBIS for any student whose behavior impedes his or her learning or the learning of others and
- use of a functional behavioral assessment (FBA) if a student who does not have a behavior intervention plan is removed from his or her current placement for more than 10 school days for behavior that turns out to be a manifestation of the child's disability or to address any behavior that results in a long-term removal (PBIS, 2015a).

Similar to Response to Intervention (RtI), PBIS is a three-tiered approach to preventing and improving behavioral challenges (Sugai & Horner, 2009). The tiers include a primary level that

focuses on school-wide behavior for all students; a secondary level targeting group intervention for selected students; and a tertiary level, which targets individual students with the most challenging behaviors—usually students with severe disabilities or severe behavior disorders (PBIS, 2015b).

The remainder of this paper features intervention components that should be incorporated into teacher education programs for future teachers of students with severe disabilities. Although it is important for teachers to be knowledgeable about primary and secondary PBIS prevention and intervention strategies, this paper focuses on interventions considered for the tertiary level because a number of students with severe disabilities require such interventions. Additionally, this paper focuses on the ABA-based components of PBIS. As Dunlap (2006) pointed out,

> These practices are derived largely from principles of instrumental learning, such as positive reinforcement and stimulus control, and extend to the considerable assessment and intervention technology that developed over the early years of ABA. This technology includes refined strategies of instruction, antecedent manipulations, contingency management, and functional analysis and functional assessment. (p. 58)

Although a complete discussion of PBIS would include strategies requiring systems change, such as facilitating inclusion and person-centered lifestyles, discussion of these topics is beyond the scope of this paper.

The descriptions of strategies presented in this paper are succinct and were not intended to provide all of the technical information necessary to teach the components to teacher candidates. Instead, the intention was to allow teacher education program professionals to assess their instructional content in order to determine if the components of tertiary-level PBIS are adequately presented in a systematic manner and can be successfully used by their graduates.

There are numerous textbooks referenced in this paper that course instructors can use while instructing students in the use of these procedures.

This paper addresses the following topics: (a) collecting important student information; (b) using a daily behavior measurement system; (c) conducting indirect and direct FBAs; (d) testing hypotheses through functional analyses; and (e) creating function-based, multi-component behavior intervention plans (BIPs). The last section of this paper addresses plan components, including modifying establishing operations (EOs) and setting events and using antecedent interventions, teaching replacement behaviors, and modifying consequences. Levels of support for EBPs, including the essential components of each intervention and key research references that help to establish the level of evidence, are presented at the end of the paper (see Appendix B).

Collecting Important Student Information

One of the primary reasons for the occurrence of challenging behaviors by students with severe disabilities is an insufficient skill repertoire (Carr et al., 1999). If an individual needs or desires something but cannot adequately communicate the need or desire, then he or she may engage in self-injurious or aggressive behavior. If a condition or situation is not desirable and the individual wants to get away from it but is unable to do so and cannot request assistance, then, again, an episode of challenging behavior may occur. If someone with severe disabilities wants social attention or contact but has not learned how to properly interact with another person, then the form of interaction, such as touching someone in a way that he or she does not prefer, may be inappropriate.

When an individual with severe disabilities engages in some form of challenging behavior, an important first step for the teacher is to assess the key skills the individual possesses and lacks. Assessment may be done informally through observation or more formally through

the use of adaptive behavior assessments. There is a strong level of evidence to support the need to collect relevant information about the skills and abilities of students with severe disabilities who engage in challenging behavior. Collecting relevant information is critical for developing an effective BIP.

There are three skill areas that may be inversely related to the occurrence of challenging behaviors by students with severe disabilities: (a) functional communication skills, (b) personal abilities, and (c) social skills. If skills in these areas are low, then there is an increased probability that challenging behaviors will occur. In the area of communication, the teacher should know the level of development of the student's expressive and receptive language. Students whose language—especially their ability to functionally communicate their wishes and desires—is not well developed are in a high-probability category for exhibiting challenging behavior (Lee, Odom, & Loftin, 2007; Petty, Allen, & Oliver, 2009). If a student cannot use an acceptable and comprehensible form of communication to seek attention; inform another person of something; or make a request (e.g., ask for assistance, a break, an object, or food; engage in an activity), then functional communication training (FCT) should be provided.

Likewise, teachers must be aware of a student's social-skill repertoire. Teachers should assess skills such as how well a student meets new peers, initiates interactions with peers, handles teasing, accepts criticism or correction, reacts when pushed or bumped, and follows teachers' directions. Deficiencies in skills may increase challenging behaviors, and, therefore, instruction in these areas is critical (Anderson, Oti, Lord, & Welch, 2009). Also, teachers must be aware of the personal skills the student has or lacks such as visual and hearing ability and skills necessary for daily living in the home and community. Students who lack key skills may

engage in challenging behaviors to avoid or escape from them or gain more assistance to complete them (Kanne et al., 2011).

It is important to keep in mind that in this phase of assessment, the focus is on the student and what the student can and cannot do, not on the challenging behavior. The better teachers understand the relevant skill strengths and limitations of the student, the better teachers will be able to intervene to improve the challenging behavior.

Using a Daily Behavior Measurement System

Teachers should use a direct observation behavior measurement system to measure the occurrence of the challenging behaviors they hope to reduce and replacement behaviors they hope to increase. Data collection should begin before an intervention begins to determine the baseline or pre-intervention level of the behavior. When an intervention plan has been developed and implemented, data collection should continue just as it did during the baseline period for as long as the plan is in place and, if possible, beyond this period of time to determine the effectiveness of the intervention. There is a strong level of evidence to support the need to collect daily behavioral data in order to evaluate the effectiveness of a BIP. Continual behavior measurement allows teachers to compare the level of the behavior during baseline, intervention, and follow-up and determine if a sufficient change in the behavior has occurred. Research shows that by continually reviewing data, teachers can make informed decisions about the effectiveness of interventions (Browder, Liberty, Heller, & D'Huyvetters, 1986; Deno, 2003; Farlow & Snell, 1989; Fuchs & Fuchs, 1986; Jimenez, Mims, & Browder, 2012). Although this evidence is largely based on monitoring the learning of new behavioral or academic skills, the value of data collection for monitoring the changes in challenging behavior can be readily extrapolated from this research. The need to monitor changes in challenging behaviors or replacement behaviors is evident in the multitude of studies that have been conducted using PBIS (e.g., Carr et al., 1999;

Carr, Robinson, Taylor, & Carlson, 1990; Dunlap & Carr, 2007; Horner & Carr, 1997; National Autism Center, 2009).

Continual measurement of behavior means that data should be collected 3 to 5 days per week during a time of day when the behavior is most likely to occur; this time period should remain constant for as long as data are collected. Data should always be collected under the same conditions (e.g., location, activities, people present) unless systematic changes are introduced as part of the BIP. A daily data collection system is essential for teachers and others to determine whether the plan is working.

There are several units of behavioral measures that may be used for continual data collection, but the three that are most often used are (a) frequency, or rate, of the behavior (i.e., number of behaviors/amount of time); (b) duration of the behavior (i.e., number of minutes of behavior/total minutes of observation); and (c) behavioral latency (i.e., amount of time between a stimulus and initiation of the behavior; Alberto & Troutman, 2012; Cooper, Heron, & Heward, 2007). The unit of measure will depend on the nature of the behavior, but all units require one essential prerequisite—the behavior must be adequately and clearly defined in an observable manner to such a degree that any two people independently observing the student can agree at least 80% of the time about whether the behavior has occurred to the same extent. This means that instead of stating a vague behavior, such as “he gets mad” or “she shuts down,” specific behavioral pinpoints, such as “he hits his head with his hand” or “she puts her head down on her desk,” should be used. It is important to remember that the behavior must be observable, and the observer must be able to accurately distinguish between the occurrence and non-occurrence of the behavior.

The specific unit of behavioral measure will be used for different types of behavior. Frequency, or rate, of behavior is defined as the number of behaviors divided by the amount of time of the observation session (usually number of minutes or number of hours). Frequency is useful for discrete behaviors such as the number of times in 1 hr that a student hits another student. Duration of behavior is the number of minutes of behavior per minutes of observation session and is often reported as a percent (e.g., the temper tantrum lasted for 15 min during the 1-hr observation period, or for 25% of the time). Duration is a solid unit of measure for behaviors that are continual or ongoing like temper tantrums or off-task behaviors, but these behaviors must be well defined. Finally, latency indicates the amount of time in seconds or minutes between when a stimulus is presented or occurs and the initiation of a response. For example, a latency measure could be used to determine how long it takes a student to initiate a response to a teacher's direction (Alberto & Troutman, 2012; Cooper et al., 2007).

Teachers must know how to collect behavioral data using a raw data collection form and how to transfer the daily data to graph paper so that the line graph may be inspected over time (i.e., days, weeks, and months). Alternatively, teachers can enter their data into Excel, which can produce a graphic display of the data (Dixon et al., 2009; Vanderbilt Kennedy Center for Excellence in Developmental Disabilities, 2014). Textbooks about ABA (e.g., Alberto & Troutman, 2012; Cooper et al., 2007) or teaching methods for students with severe disabilities (e.g., Snell & Brown, 2010; Westling, Fox, & Carter, 2014) provide directions about how data should be collected, presented, and analyzed.

The value of data collection is using the data to make important decisions. When a BIP is created and introduced, it is implied that the teacher is making changes in the environment or the skills of the student so that the challenging behavior will decrease over time and more

appropriate behavior will increase. If the plan has been well developed and is implemented as developed, the trends in data should bear out the quality of the BIP by reflecting improvement in the student's behavior. Changes may be gradual, but if they are trending in the desired directions, positive progress is occurring. On the other hand, if the behavioral data points are not showing desired changes or the changes are too variable after a sufficient amount of time, a change in the BIP may be necessary. Teachers should become skilled at not only accurately collecting behavioral data, but also interpreting it and making decisions about the effectiveness of the plans they have implemented. Previously cited references on the use of ABA and PBIS and teaching students with severe disabilities address making intervention decisions using behavioral data.

Conducting Indirect and Direct Functional Behavior Assessments

The purpose of an FBA is to find variables related to the occurrence of challenging behaviors and determine the function or purpose of the behavior, allowing for the development of a function-based intervention. There are two types of FBAs teachers should understand and be able to use. The first is an indirect FBA, which is used by asking someone to provide information based on memory or perception of events or by the teacher using his or her memory to complete a questionnaire about key events. The second is a direct FBA, which requires observation and data recording to capture key information.

An FBA, whether direct or indirect, assumes that the challenging behavior has a function and may occur more or less often in specific situations or under specific conditions. Using an indirect FBA, the teacher tries to identify EOs and the related condition (i.e., setting events) that affect the occurrence of the behavior (i.e., behavioral antecedents that trigger behavior and behavioral consequences that maintain the behavior through reinforcement).

Although indirect FBAs are recommended and are commonly used in schools, as Cooper and colleagues (2007) described, indirect assessments have both a major advantage and a major disadvantage. The advantage is that they allow for the gathering of a great deal of information. The disadvantage is that they rely on memory or perception, and, therefore, the generated information may not be completely accurate. For this reason, they are usually recommended but without a strong research base. Therefore, the level of evidence can only be judged as moderate.

EOs and setting events are terms that are often interchangeably used (Alberto &Troutman, 2012) but are also given distinct meanings by some authorities. Cooper and colleagues (2007) defined EOs as "a motivating operation that establishes (increases) the effectiveness of some stimulus, object, or event as a reinforcer. For example, food deprivation establishes food as an effective reinforcer" (p. 695). Setting events are

> events that momentarily change the value of reinforcers and punishers in a student's life . . . . Setting events can explain why a student may work quietly and effectively for several days then, suddenly, engage in serious problem behavior in the same situation. (Freeman, Britten, McCart, Smith, & Sailor, 2000)

From a practical point of view, it is important for teachers to understand EOs and setting events in order to understand their impact on a student's behavior. For example, if a student sometimes comes to school without having eaten, having been exposed to an abusive environment, or not having adequate sleep, then these conditions can make the student more or less responsive to reinforcement and other environmental conditions; therefore, the teacher would document the conditions in the indirect FBA.

In the indirect FBA, the teacher also tries to identify triggers that precede the behavior. The trigger prompts the behavior to occur because of the association that has been established

between the trigger and reinforcement. Examples of triggers for challenging behavior among students with severe disabilities include removing a favorite item, giving a direction, interrupting an activity, physical prompting, ceasing interaction with the student, or initiating a transition. Because the subsequent behavior results in gaining something (e.g., getting the item back, getting the teacher's attention) or escaping or avoiding something (e.g., not being touched, not having to do a task), the behavior tends to recur when the trigger is presented. Often, there is an interaction between EOs or setting events and triggers that results in an increased chance that the behavior will occur. For example, if a student has not slept well the previous night and the teacher directs the student to engage in a strenuous or difficult task, the direction may serve as a trigger for the student to refuse to comply or have a temper tantrum, which then allows the student to avoid the task.

Teachers should also use the indirect FBA to note consequential events that immediately follow a behavior and may serve as either positive reinforcement (i.e., the student gains something) or negative reinforcement (i.e., the student avoids or escapes from an undesirable condition). For example, the teacher giving attention to a student or even reprimanding the student could serve as positive reinforcement. Also, the student escaping from an undesired task could serve as negative reinforcement. The teacher should note on the indirect FBA any behavioral consequences that may occur after a challenging behavior, which serve to maintain or strengthen and reinforce it.

In addition to the teacher noting various conditions associated with the occurrence of challenging behavior, the indirect FBA can also be used to identify conditions that are associated with a decreased probability of the challenging behavior occurring. Teachers who note these conditions will be able to realize that the challenging behavior is not random and is occurring

more often in relation to certain conditions rather than others. For example, the teacher may observe that the behavior is more likely to occur in the special education classroom than during physical education. Conditions associated with a decreased probability of the behavior occurring may be useful while devising a BIP.

When the concerning behavior occurs at school, the indirect FBA should be used to collect information about school conditions that affect the behavior. Because one can assume that the teacher will be well aware of the student and conditions related to the student's behavior, the teacher can rely on memory or perception to complete an indirect FBA. However, because behavior may vary when the student is in settings or conditions in which the teacher is not present, the teacher can gain valuable knowledge by asking other teachers to complete an indirect FBA. Additionally, to gain even more information, enhance collaboration, and develop a more comprehensive BIP, the teacher, if possible, should interview the student's parents using an indirect FBA to learn about the occurrence of the behavior in the home and factors that appear to be related (Dunlap, Newton, Fox, Benito, & Vaughn, 2001; Peck Peterson, Derby, Berg, & Horner, 2001).

Based on data collected using an indirect FBA, the teacher should be able to form an initial hypothesis about why a behavior occurs. The most common hypotheses are that the behavior allows the student to gain something (e.g., attention, a tangible item, sensory stimulation) or avoid or escape from something (e.g., a demand situation, a difficult task, another undesirable desirable condition).

Indirect FBA data procedures and forms are often developed and provided by state education agencies (SEAs) or local education agencies (LEAs). Other materials, such as those by Bambara and Kern (2005); Crone and Horner (2003); O'Neill, Horner, Albin, Storey, and

Sprague (2014); and Umbreit, Ferro, Liaupsin, and Lane (2007), are available as commercial products.

The indirect FBA, as described above, is the first tool used by teachers to identify variables related to the occurrence of challenging behaviors because it is easy to conduct and requires relatively little time. However, there is a much stronger research base for developing successful BIPs based on direct FBAs that use direct observation of the student to determine conditions related to the behavior. Therefore, teachers should be skilled in conducting direct FBAs as well as indirect FBAs.

The direct FBA requires a direct observation of the student for a period of time (usually 1 hr) and is likely to be more valid if the observation occurs over several days. The observation should occur in natural settings where the challenging behavior typically occurs such as in the classroom or lunchroom. Cooper and colleagues (2007) described three types of direct FBAs: (a) A-B-C continuous recording, (b) A-B-C narrative recording, and (c) scatterplots. Of these, the A-B-C continuous or narrative recordings are methods that may be most helpful to teachers. These data collection systems require that the observer watch the student in situations in which behaviors are likely to occur and note the occurrence of behavioral antecedents (i.e., A), challenging behavior (i.e., B), and the immediate consequences (i.e., C). For example, the special education teacher may watch a student during a lesson on literacy conducted by the classroom teacher and note behaviors as they happen in real time (see Table 1).

Table 1

A-B-C Observation

Antecedent	Behavior	Consequence
T. asks S. to respond	S. bites self, puts head down	T. ignores, goes to next S.
T. physically prompts S.	S. screams, bites self	T. says stop, goes to next S.
T. asks S. to respond	S. puts head down	T. ignores, goes to next S.
T. asks S. to respond	S. bites self, throws book	T. corrects, goes to next S.

Note. T = teacher; S = student with severe disability

While conducting an A-B-C assessment, the teacher should identify relevant conditions related to the observation, including the observer; date and time of the observation; and the environmental conditions during the observation such as location, group size, people present, and activities. For example, during the A-B-C observation session (see Table 1), the teacher would note on the paper the date of the observation; the beginning and ending time of the observation; that he or she was the observer; the names of T. and S.; the instructional activity (e.g., literacy instruction); the location of the instruction (e.g., the classroom); other students present; and any other conditions that may serve as setting events.

After enough observation sessions have been conducted to determine if a pattern exists, the teacher should be able to conduct a descriptive analysis of the data from the observation session(s) to determine whether a conditional probability exists (i.e., if there is a likelihood that a behavior will occur after specific antecedents and will be followed by specific consequences). The percent of time specific antecedents preceded the behavior (e.g., T. asks S. to respond) and the percent of time that specific consequences follow a behavior (e.g., T. ignores, goes to next S.) should be calculated. Based on the correlations between antecedents, behaviors, and consequences, the teacher should be able to develop a hypothesis about the student's behavior.

In the above case (see Table 1), for example, it may be hypothesized that the student's behavior was occurring to escape from or avoid the literacy task.

Forms for conducting direct FBAs using the A-B-C data collection system can be seen in textbooks about PBIS or ABA (e.g., Alberto & Troutman, 2012; Bambara & Kern, 2005; Cooper et al., 2007; Umbreit et al., 2007) and can be easily constructed by teachers. There are also available apps such as ABC Data Pro (CBTAonline, 2014) to assist with data collection and analysis.

Although conducting a direct FBA assessment is an important skill for teachers to learn, teachers should also be aware of its limitations. The results of the FBA may not reveal the true function of the behavior or may reveal that there are multiple functions. It is also important to note that the results of a direct FBA, although based on actual observation, are only correlational. In order to determine whether conditions are of a causal nature, a functional analysis must be conducted.

Testing Hypotheses Through Functional Analyses

Functional analyses are carried out using ABA experimental procedures that include controlling the presence or absence of different variables or conditions during different experimental phases and recording their effects on the individual's behavior. Iwata, Dorsey, Slifer, Bauman, and Richman (1994) conducted the most comprehensive and well-recognized functional analysis. In their study, the researchers created analog conditions in which students with severe disabilities and self-injurious behaviors were placed in an observation room and exposed to different contingency conditions to determine whether different conditions differentially affected the levels of their challenging behaviors. Iwata and colleagues created four types of conditions: (a) social disapproval, a condition that resulted in attention when the targeted behavior occurred; (b) academic demand, a condition that resulted in the participant

escaping from the task if he or she engaged in the target behavior; (c) unstructured play, during which no demands were made and the individual was allowed to play with available toys or engage in any other behavior with no attention for the behavior (i.e., experimental control condition); and (d) the individual was alone in the room without toys or another person. Iwata and colleagues found that six of the nine subjects in the study showed different levels of self-injurious behavior as a result of the conditions in which they were placed. They concluded, "These results provide direct empirical evidence that self-injury may be a function of different sources of reinforcement . . . a finding that has significant implications for treatment" (pp. 205-206).

The type of functional analysis Iwata and colleagues (1994) conducted is considered the most valid approach to determining variables related to the occurrence of behavior and is considered "the standard of scientific evidence by which other assessment alternatives are evaluated" (Cooper et al., 2007, p. 505). However, Cooper and colleagues (2007) also recognized the difficulties associated with conducting analog functional analyses. For example, the time, effort, and professional expertise required to conduct the analysis may be viewed as prohibitive. Perhaps because of the complexity of the traditional functional analysis Iwata and colleagues (1994) conducted, other researchers have attempted to devise additional forms of functional or experimental analyses that may be shorter in duration and more possible to conduct in natural settings. Some of these include a brief functional analysis (Northup et al., 1991); trial-based functional analysis (Bloom, Iwata, Fritz, Roscoe, & Carreau, 2011; Sigafoos & Saggers, 1995); and structural analysis (Stichter & Conroy, 2005; Stichter, Sasso, & Jolivette, 2004), which focuses more specifically on identifying antecedent and contextual conditions that influence behavior and is primarily for students with emotional and behavior disorders.

The question is, to what extent should teachers learn to use functional analysis? Unlike functional assessments, which teachers are likely to understand and use because of an IDEA (2004) requirement, functional analyses are not usually taught in teacher education programs. Although there is no direct evidence of this, as previously reported, teachers have shared that they are not adequately prepared to deal with challenging behaviors (e.g., Abidin & Robinson, 2002; MacDonald & Speece, 2001; Nelson et al., 2001; Westling, 2010). Further, in a review of studies in which functional assessments and functional analyses were used in school settings, Ervin and colleagues (2001) found that the experimenter conducted the functional analysis procedures either alone or with school personnel almost 75% of the time, and school personnel conducted these procedures alone only 21% of the time. It is likely, therefore, that the extent to which teachers conduct functional analyses would depend on their training. Usually, training would require at least a master's degree program with sufficient course work in ABA procedures and research design. Therefore, it is important to note that staff development and coaching has been successfully used to teach practicing teachers how to conduct and interpret functional analyses and implement interventions based on the results (Erbas, Tekin-Iftar, & Yucesoy, 2006; Erbas, Yucesoy, Turan, & Ostrosky, 2006; Kunnavatana et al., 2013; Machalicek et al., 2010; McKenney, Waldron, & Conroy, 2013; Sasso et al., 1992). It seems feasible that special education professionals could provide this content as part of degree programs, at least at the graduate level, given adequate faculty expertise. What is likely of equal importance is that special education teachers at least be familiar with the process of functional analysis because there may be times when a behavior specialist may ask teachers to collaborate on conducting a functional analysis. Functional analysis procedures are briefly presented below.

Creating Function-Based, Multi-Component Behavior Intervention Plans

If variables that cause and maintain challenging behaviors can be identified and modified, then subsequent occurrences of the behavior can be diminished (Cooper et al., 2007). Function-based interventions are based on functional assessments or functional analyses that assume a function or purpose for the behavior that has been identified. Additionally, there is an assumption that if the function can be achieved through more appropriate behavior, the necessity for the challenging behavior is reduced. For example, it is likely that the non-verbal girl who grabs toys from other children does so to gain access to the desired object. If the girl is denied access to the toy by grabbing it but learns to use functional communication to request and gain access to another toy, then grabbing a toy from a playmate may be reduced in the future.

Function-based interventions are typically comprised of at least three components: (a) altering conditions that precede the behavior (e.g., EOs, setting events, triggers, conditions); (b) teaching alternative behaviors such as the use of functional communication; and (c) altering the consequences of the behavior so that the alternative behavior, not the challenging behavior, results in reinforcement (Bambara & Kern, 2005; Cooper et al., 2007; Umbreit et al., 2007). Teachers should learn, therefore, that the BIP should be designed as a comprehensive plan that is based on knowledge about the student and the occurrence of the student's behavior under different circumstances and conditions as identified by the indirect and direct FBAs and, if possible, confirmed through a functional analysis. The multi-component BIPs can be rated as a strong EBP.

As previously indicated, the BIP should include three parts to the extent that each will be helpful in reducing challenging behavior: (a) modifying EOs and setting events and using antecedent interventions as prevention tactics, (b) teaching alternative or replacement behaviors, and (c) using appropriate consequence tactics. Each of the three parts of the BIP is discussed in

more detail below. While considering these components, teachers must learn to implement the BIP with a high degree of fidelity, meaning it must be implemented exactly as planned and written in order to be effective. All team members must agree with the plan so that it can be implemented as designed, and the behavior-monitoring plan, which should have been initiated during the baseline period, must continue during the intervention phase to determine if the plan is effective.

Modifying Establishing Operations and Setting Events and Using Antecedent Interventions

If EOs or setting events can be identified and modified, then modification may be a useful intervention. For example, if a student is avoiding difficult work when he or she has not slept well the night before, a possible modification would be allowing him or her to sleep before working. In some cases, it may be possible for a teacher or a teacher working in collaboration with other teachers, other professionals such as social workers or health care providers, or parents to modify conditions that are related to challenging behaviors. For example, it may be possible to make changes in schools if certain locations, activities, lighting or sound stimuli, or other individuals tend to increase the chance that challenging behaviors occur. However, other conditions, such as medical or biological conditions, medicinal effects or side effects, dietary conditions, tiredness or fatigue, pain or discomfort, or long-term abuse or neglect, will likely be more difficult to change without the cooperation of parents or other professionals or agencies. There is strong evidence related to improving behavior through successfully modifying these conditions.

The first step to modifying EOs or setting events is to recognize their potential to influence behavior and document any recognized influence on the indirect FBA. Then, the determination must be made as to whether the condition can be modified. If it can be modified, then the modification of conditions should be stated on the BIP. Using antecedent interventions

as prevention tactics may also be possible if one or more behavioral triggers can be identified and eliminated. Alternatively, introducing antecedent conditions may reduce the probability that a behavior will occur. For example, if a verbal prompt results in a behavior, a visual prompt may be used instead, or if a difficult or undesirable task results in the behavior, then providing extra instructional assistance may reduce the occurrence of the behavior.

There are two types of antecedent interventions: (a) modifying or eliminating behavioral triggers that prompt or trigger challenging behavior and (b) adding antecedents or antecedent conditions that reduce the probability of the challenging behavior occurring and increase the probability that more appropriate behavior will occur. Several studies have shown that antecedent interventions can be effective in reducing the occurrence of challenging behavior so much that the evidence of this form of intervention can be considered strong.

If behavioral triggers or conditions are identified and recorded on the indirect and direct FBAs, then the teacher may be able to use substitute stimuli (e.g., prompts, cues, directions) that do not trigger the behavior but achieve a suitable outcome. For example, if a certain type of direction, such as a direct statement of what the student is to do or the use of a physical prompt, results in a behavior, then a substitute such as a gesture or a visual cue may be substituted to prompt the behavior. Also, if the tone of the teacher's voice results in behavior such as a temper tantrum, a change in the tone may be sufficient to reduce the occurrence of the behavior.

A behavioral trigger prompts a behavior to occur because the student has learned that the trigger, or a discriminative stimulus, is indicating that the challenging behavior will result in a desired consequence such as gaining or avoiding something. Therefore, it is important to conduct indirect and direct FBAs to determine the function of the behavior and consider how to create antecedent conditions so that the student will be more likely to engage in appropriate

behavior than the challenging behavior. For example, if the function of the behavior is determined to be seeking attention, then antecedent interventions, which will be enacted before the behavior has had a chance to occur, may include scheduling adult attention as a form of noncontingent reinforcement, similarly scheduling peer attention, or increasing proximity to the student. If such interventions are provided, the need to seek attention using inappropriate behavior is reduced. Additionally, if the function of the behavior is to escape from an activity, then antecedent interventions may include adjusting demand level or task difficulty, offering choices, increasing the student's interest in activities, ensuring that activities have functional or meaningful outcomes, altering the task length, modifying the mode of doing the task, using task interspersal training, increasing predictability, or modifying instructional delivery. Such antecedent interventions may reduce the need to escape from the task (Kern & Clarke, 2005).

Similarly, if it is determined that the function of the behavior is to continue using or gaining access to a tangible item, like getting a toy or continuing to play on a computer, then antecedent interventions could include providing a warning before removing the item, scheduling a transitional activity, or increasing accessibility to items to reduce the aversive condition associated with removal of a desired object. Finally, if the function of the behavior is to experience sensory stimulation, such as making repetitive sounds, then antecedent interventions may include providing alternative sensory reinforcement such as allowing the student to listen to music through headphones (Kern & Clarke, 2005). Creating antecedent interventions to reduce the occurrence of challenging behaviors will almost always be an important component of a BIP.

Teaching Replacement Behaviors

Teaching replacement behaviors provides the student with a new, acceptable behavior that achieves the same function as the challenging behavior or allows the student to avoid circumstances that prompt the behavior. For example, the student may learn to communicate his

or her need for assistance, learn appropriate social behavior, or learn to remove himself or herself from a volatile situation.

Challenging behaviors often occur because students with severe disabilities are unable to engage in more appropriate behaviors, such as communicative behavior, to achieve their desired outcomes. Therefore, they engage in challenging behaviors, which function to achieve a desired outcome, whether it is gaining something or avoiding or escaping from some condition or activity. If more appropriate replacement behaviors, such as an intentional communicative act, can be learned, then the challenging behavior is no longer necessary (Carr et al., 1999). Therefore, teachers should recognize the importance of including replacement behaviors as part of the BIP and know what these should be and how to teach them. A number of replacement behaviors may be targeted, and as they increase and are reinforced, the challenging behavior becomes less functional and is less likely to happen. The research supporting this component of a BIP is considered strong.

Functional communication is one of the most important types of replacement behaviors. Many students with severe disabilities either lack a functional communication system or ineffectively use the communication system they have. Therefore, they engage in challenging behaviors to achieve outcomes such as gaining attention, gaining assistance or support, gaining a tangible item, or avoiding or getting out of something they do not like. FCT is a process of teaching communication skills as replacement behaviors (Carr & Durand, 1985; Durand, 1990). The premise of FCT is that if the person can gain access to the desired consequence more easily by using an appropriate communicative response, then the challenging behavior will decrease because it is no longer necessary or efficient for achieving the desired consequence. Students should learn functional communication skills so that they can appropriately request attention;

assistance; a break; a condition (e.g., work with another student); an object; or an activity. For FCT to be effective, it must achieve the same results as the challenging behavior, lead to response success, be as efficient as the challenging behavior, be acceptable to key individuals, and be easy to interpret.

Along with functional communication, other replacement behaviors or skills can serve to reduce the need for challenging behavior and should be taught when necessary. These include learning self-management and social skills or how to escape or avoid a task or condition in an appropriate way. Students could also improve academic skills, learn to express choices appropriately, or engage in various forms of behavior that are incompatible with, or an alternative to, the challenging behavior.

Modifying Consequences

The final component of the BIP for students with severe disabilities is modifying the occurrence of behavioral consequences so that the consequence for the challenging behavior (e.g., attention, avoiding or escaping, gaining a tangible item) does not occur, and instead, alternative and/or more appropriate behavior is reinforced. The intention of this part of the BIP is that the challenging behavior will undergo behavioral extinction while reinforcement strengthens the replacement behavior. Using consequence tactics will occur if a specific consequence can be identified that is positively or negatively reinforcing the challenging behavior and can be eliminated, thus putting the challenging behavior on extinction. At the same time, a consequence tactic can be used to reinforce the replacement behavior. Often, the reinforcement that is maintaining the challenging behavior can be manipulated to reinforce the more appropriate behavior. The array of research on these procedures provides strong evidence for their value as a component of the BIP.

The most desirable way to modify consequences is to use differential reinforcement of alternative behavior (DRA) or differential reinforcement of incompatible behavior (DRI) when the alternate or incompatible behavior is the replacement behavior targeted for increase. With DRA, the teacher identifies a replacement behavior that is an alternative to the challenging behavior and reinforces it when it occurs. Similarly, with DRI, the teacher identifies behavior that is incompatible with the challenging behavior and reinforces it when it occurs. For example, an alternative behavior to a temper tantrum may be to use a form of functional communication to request assistance. When this is done, the teacher reinforces the alternative behavior (i.e., DRA). With the same student, the teacher could provide reinforcement for participating in a learning activity and staying engaged during instruction. Because these behaviors are incompatible with having a temper tantrum, the teacher would use DRI. Determining what will serve as effective reinforcing stimuli for students with severe disabilities can be accomplished by asking another person, such as a parent or another teacher, what will work or by conducting a preference assessment to see what the student chooses. Ultimately, whatever is used as reinforcement should cause a behavior to increase and maintain over time.

At the same time the teacher is reinforcing the replacement behavior, he or she should avoid inadvertently reinforcing challenging behavior; that is, these challenging behaviors should be placed on extinction. Teachers may inadvertently reinforce challenging behaviors of students with severe disabilities by giving the student attention (e.g., warning or reprimanding them); letting them avoid or escape from a task; or letting them gain access to tangible reinforcement, such as a favorite toy or food, immediately after they engage in the challenging behavior. Teachers who are careful to avoid responding to the challenging behavior and instead use DRA

and DRI to reinforce appropriate behaviors will be more likely to see decreases in the challenging behavior and increases in replacement behavior.

Teachers should also be aware of how different schedules of reinforcement affect behavior, including challenging behavior. This concept helps teachers understand why many challenging behaviors continue to occur even when they are not continually reinforced. Intermittent reinforcement schedules include fixed-ratio schedules, variable-ratio schedules, fixed-interval schedules, and variable-interval schedules of reinforcement. Alberto and Troutman (2012) and Cooper and colleagues (2007) have provided details about the effects of intermittent schedules of reinforcement. Challenging behaviors are often inadvertently reinforced on some intermittent schedule, usually a variable schedule. Intermittent schedules of reinforcement strengthen the occurrence of the behavior, making it more resistant to extinction. When a teacher says he or she tries to ignore the behavior, this implies that the teacher does not reinforce every episode of the behavior but does attend to some. The implication is that the behavior is intermittently reinforced and, therefore, has become more difficult to eliminate.

Of all the variables related to the occurrence of challenging behaviors, consequences of behavior are the most influential. Therefore, the BIP must include a very specific statement of how consequences will be modified to reduce the occurrence of challenging behaviors and strengthen more appropriate replacement behaviors.

Summary

To date, PBIS offers the most effective approach for improving serious challenging behaviors of students with severe disabilities (Carr et al., 1999; Dunlap & Carr, 2007; Horner & Carr, 1997; National Autism Center, 2009). In order to provide an appropriate education to students with severe disabilities, teachers of these students must have sufficient preparation. Although many special education program professionals recognize this and include some level of

training in this area (Ryndak, Clark, Conroy, & Holthaus, 2001), many teachers still do not feel prepared to address the needs of students with challenging behaviors.

Much of the available research focuses on individual components of PBIS such as teaching functional communication skills or modifying EOs (e.g., Carr & Durand, 1985; Horner, Day, & Day, 1997). However, it is the use of these components in combination as part of a three-part comprehensive plan that is likely to lead to the most effective outcomes in schools, homes, and communities (Dunlap & Carr, 2007; Horner & Carr, 1997). Specifically, as discussed in this paper, teachers should be able to collect and interpret behavioral data; gather relevant information about student characteristics that may affect behavior; conduct indirect and direct FBAs to learn about factors that increase or decrease the probability of challenging behavior; and based on the FBAs, create and implement BIPs that incorporate prevention tactics, replacement behaviors, and consequence tactics. If possible, teachers should also conduct functional analyses that will allow them to learn the variables that affect the behavior.

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Appendix A

Innovation Configuration for Evidence-Based Practices for Improving Challenging Behaviors of Students With Severe Disabilities

Essential Components	Implementation Levels				
Instructions: Place an X under the appropriate variation implementation score for each course syllabus that meets the criteria level from 0 to 3. Score and rate each item separately.	**Level 0**	**Level 1**	**Level 2**	**Level 3**	**Rating**
	There is no evidence that the component is included in the syllabus, or the syllabus only mentions the component.	Must contain at least one of the following: reading, test, lecture/presentation, discussion, modeling/ demonstration, or quiz.	Must contain at least one item from Level 1, plus at least one of the following: observation, project/activity, case study, or lesson plan study.	Must contain at least one item from Level 1 as well as at least one item from Level 2, plus at least one of the following: tutoring, small group student teaching, or whole group internship.	Rate each item as the number of the highest variation receiving an X under it.
1.0 Collect Important Student Information					
1.1 - Students' functional communication skills and characteristics. 1.2 - Social skills. 1.3 - Personal abilities.					

Essential Components	Implementation Levels				
Instructions: Place an X under the appropriate variation implementation score for each course syllabus that meets the criteria level from 0 to 3. Score and rate each item separately.	**Level 0**	**Level 1**	**Level 2**	**Level 3**	**Rating**
	There is no evidence that the component is included in the syllabus, or the syllabus only mentions the component.	Must contain at least one of the following: reading, test, lecture/presentation, discussion, modeling/ demonstration, or quiz.	Must contain at least one item from Level 1, plus at least one of the following: observation, project/activity, case study, or lesson plan study.	Must contain at least one item from Level 1 as well as at least one item from Level 2, plus at least one of the following: tutoring, small group student teaching, or whole group internship.	Rate each item as the number of the highest variation receiving an X under it.
2.0 Use A Daily Behavior Measurement System					
2.1 - Identify and define significant challenging behaviors. 2.2 - Develop behavioral pinpoints. 2.3 - Use observation forms for collecting frequency or duration data on behavior. 2.4 - Use graphs to display recorded behavior. 2.5 - Interpret trends on graphs and make decisions.					

Essential Components	Implementation Levels				
Instructions: Place an X under the appropriate variation implementation score for each course syllabus that meets the criteria level from 0 to 3. Score and rate each item separately.	**Level 0**	**Level 1**	**Level 2**	**Level 3**	**Rating**
	There is no evidence that the component is included in the syllabus, or the syllabus only mentions the component.	Must contain at least one of the following: reading, test, lecture/presentation, discussion, modeling/ demonstration, or quiz.	Must contain at least one item from Level 1, plus at least one of the following: observation, project/activity, case study, or lesson plan study.	Must contain at least one item from Level 1 as well as at least one item from Level 2, plus at least one of the following: tutoring, small group student teaching, or whole group internship.	Rate each item as the number of the highest variation receiving an X under it.
3.0 Conduct Indirect Functional Behavior Assessments Using Interviews					
3.1 - Identify establishing operations (EOs) and setting events that affect the occurrence of the behavior. 3.2 - Identify environmental conditions and activities that increase or decrease the behavior. 3.3 - Identify behavioral antecedents that trigger behavior. 3.4 - Identify behavioral consequences that reinforce and maintain the behavior.					

Essential Components	Implementation Levels				
Instructions: Place an X under the appropriate variation implementation score for each course syllabus that meets the criteria level from 0 to 3. Score and rate each item separately.	**Level 0**	**Level 1**	**Level 2**	**Level 3**	**Rating**
	There is no evidence that the component is included in the syllabus, or the syllabus only mentions the component.	Must contain at least one of the following: reading, test, lecture/presentation, discussion, modeling/ demonstration, or quiz.	Must contain at least one item from Level 1, plus at least one of the following: observation, project/activity, case study, or lesson plan study.	Must contain at least one item from Level 1 as well as at least one item from Level 2, plus at least one of the following: tutoring, small group student teaching, or whole group internship.	Rate each item as the number of the highest variation receiving an X under it.
4.0 Conduct Direct Functional Behavior Assessments					
4.1 - Record specific behavior antecedents (i.e., A). 4.2 - Record challenging behaviors (i.e., B). 4.3 - Record what happens immediately after the behavior, (i.e., the consequence of the behavior [i.e., C]).					

Essential Components	Implementation Levels				
Instructions: Place an X under the appropriate variation implementation score for each course syllabus that meets the criteria level from 0 to 3. Score and rate each item separately.	**Level 0**	**Level 1**	**Level 2**	**Level 3**	**Rating**
	There is no evidence that the component is included in the syllabus, or the syllabus only mentions the component.	Must contain at least one of the following: reading, test, lecture/presentation, discussion, modeling/ demonstration, or quiz.	Must contain at least one item from Level 1, plus at least one of the following: observation, project/activity, case study, or lesson plan study.	Must contain at least one item from Level 1 as well as at least one item from Level 2, plus at least one of the following: tutoring, small group student teaching, or whole group internship.	Rate each item as the number of the highest variation receiving an X under it.
5.0 Create Multi-Component Behavior Intervention Plans					
5.1 - Plan to modify EOs and setting events and use antecedent interventions. 5.2 - Plan to teach replacement behaviors. 5.3 - Plan to use appropriate consequences.					

Essential Components	Implementation Levels				
Instructions: Place an X under the appropriate variation implementation score for each course syllabus that meets the criteria level from 0 to 3. Score and rate each item separately.	**Level 0**	**Level 1**	**Level 2**	**Level 3**	**Rating**
	There is no evidence that the component is included in the syllabus, or the syllabus only mentions the component.	Must contain at least one of the following: reading, test, lecture/presentation, discussion, modeling/ demonstration, or quiz.	Must contain at least one item from Level 1, plus at least one of the following: observation, project/activity, case study, or lesson plan study.	Must contain at least one item from Level 1 as well as at least one item from Level 2, plus at least one of the following: tutoring, small group student teaching, or whole group internship.	Rate each item as the number of the highest variation receiving an X under it.
6.0 Modify Establishing Operations or Setting Events					
6.1 - Medical interventions. 6.2 - Dietary interventions. 6.3 - Interventions for tiredness or fatigue. 6.4 - Interventions for pain or discomfort. 6.5 - Environmental interventions.					

Essential Components	Implementation Levels				
Instructions: Place an X under the appropriate variation implementation score for each course syllabus that meets the criteria level from 0 to 3. Score and rate each item separately.	**Level 0**	**Level 1**	**Level 2**	**Level 3**	**Rating**
	There is no evidence that the component is included in the syllabus, or the syllabus only mentions the component.	Must contain at least one of the following: reading, test, lecture/presentation, discussion, modeling/ demonstration, or quiz.	Must contain at least one item from Level 1, plus at least one of the following: observation, project/activity, case study, or lesson plan study.	Must contain at least one item from Level 1 as well as at least one item from Level 2, plus at least one of the following: tutoring, small group student teaching, or whole group internship.	Rate each item as the number of the highest variation receiving an X under it.
7.0 Use Antecedent Interventions					
7.1 - Avoid behavioral triggers. 7.2 - Modify the environment. 7.3 - Modify curriculum and instructional practices. 7.4 - Offer choices and preferred activities. 7.5 - Provide non-contingent reinforcement. 7.6 - Use interspersal training/behavioral momentum. 7.7 - Increase predictability. 7.8 - Use social stories.					

Essential Components	Implementation Levels				
Instructions: Place an X under the appropriate variation implementation score for each course syllabus that meets the criteria level from 0 to 3. Score and rate each item separately.	**Level 0**	**Level 1**	**Level 2**	**Level 3**	**Rating**
	There is no evidence that the component is included in the syllabus, or the syllabus only mentions the component.	Must contain at least one of the following: reading, test, lecture/presentation, discussion, modeling/ demonstration, or quiz.	Must contain at least one item from Level 1, plus at least one of the following: observation, project/activity, case study, or lesson plan study.	Must contain at least one item from Level 1 as well as at least one item from Level 2, plus at least one of the following: tutoring, small group student teaching, or whole group internship.	Rate each item as the number of the highest variation receiving an X under it.
8.0 Teach Replacement Behaviors					
8.1 - Provide functional communication training (FCT). 8.2 - Teach self-instruction and self-direction. 8.3 - Teach appropriate escape/avoidance skills. 8.5 - Teach social skills.					

Appendix B

Levels of Support for Evidence-Based Practices for Improving Challenging Behaviors of Students With Severe Disabilities

Essential Components	CEEDAR Level of Evidence	Supportive Research
1.0 Collect Important Student Information		
1.1 - Students' functional communication skills and characteristics. 1.2 - Social skills. 1.3 - Personal abilities.	Strong	Anderson et al., 2009; Kanne et al., 2011; Lee et al., 2007; Petty et al., 2009
2.0 Use A Daily Behavior Measurement System		
2.1 - Identify and define significant challenging behaviors. 2.2 - Develop behavioral pinpoints. 2.3 - Use observation forms for collecting frequency or duration data on behavior. 2.4 - Use graphs to display recorded behavior. 2.5 - Interpret trends on graphs and make decisions.	Strong	Browder et al., 1986; Deno, 2003; Farlow & Snell, 1989; Fuchs & Fuchs, 1986; Jimenez et al., 2012

Essential Components	CEEDAR Level of Evidence	Supportive Research
3.0 Conduct Indirect Functional Behavior Assessments Using Interviews		
3.1 - Identify establishing operations (EOs) and setting events that affect the occurrence of the behavior. 3.2 - Identify environmental conditions and activities that increase or decrease the behavior. 3.3 - Identify behavioral antecedents that trigger behavior. 3.4 - Identify behavioral consequences that reinforce and maintain the behavior.	Moderate	Ervin et al., 2001; Horner & Carr, 1997; Kinch et al., 2001; O'Neill & Johnson, 2000; Swender et al., 2006
4.0 Conduct Direct Functional Behavior Assessments		
4.1 - Record specific behavior antecedents (i.e., A). 4.2 - Record challenging behaviors (i.e., B). 4.3 - Record what happens immediately after the behavior, (i.e., the consequence of the behavior [i.e., C]).	Strong	Cihak et al., 2007; Dunlap et al., 1991; Horner & Carr, 1997; Kennedy & Souza, 1995; Mueller et al., 2011; O'Neill & Johnson, 2000; Piazza et al., 1996; Sigafoos et al., 1996

Essential Components	CEEDAR Level of Evidence	Supportive Research
5.0 Create Multi-Component Behavior Intervention Plans		
5.1 - Plan to modify EOs and setting events and use antecedent interventions. 5.2 - Plan to teach replacement behaviors. 5.3 - Plan to use appropriate consequences.	Moderate	Buschbacher et al., 2004; Carr & Carlson, 1993; Carr et al., 1999; Carr et al., 1990; Cihak et al., 2007; Day et al., 1994; Dunlap & Carr, 2007; Dunlap et al., 1991; Horner & Carr, 1997; LaVigna & Willis, 2012; McClean & Grey, 2012; Sigafoos et al., 1996
6.0 Modify Establishing Operations or Setting Events		
6.1 - Medical interventions. 6.2 - Dietary interventions. 6.3 - Interventions for tiredness or fatigue. 6.4 - Interventions for pain or discomfort. 6.5 - Environmental interventions.	Strong	Carr et al., 2003; Chandler et al., 1992; Dadson & Horner, 1993; Kennedy & Itkonen, 1993; Lohrmann-O'Rourke & Yurman, 2001; Wacker et al., 1996

Essential Components	CEEDAR Level of Evidence	Supportive Research
7.0 Use Antecedent Interventions		
7.1 - Avoid behavioral triggers. 7.2 - Modify the environment. 7.3 - Modify curriculum and instructional practices. 7.4 - Offer choices and preferred activities. 7.5 - Provide non-contingent reinforcement. 7.6 - Use interspersal training/behavioral momentum. 7.7 - Increase predictability. 7.8 - Use social stories.	Strong	Carr et al., 1999; Carlson et al., 2008; Dunlap et al., 1991; Horner et al., 1997; Karkhaneh et al., 2010; Mace & Belfiore, 1990; National Autism Center, 2009; Piazza et al., 1996; Vaughn & Horner, 1997
8.0 Teach Replacement Behaviors		
8.1 - Provide functional communication training (FCT). 8.2 - Teach self-instruction and self-direction. 8.3 - Teach appropriate escape/avoidance skills. 8.5 - Teach social skills.	Strong	Carr & Durand, 1985; Carr et al., 1999; Carlson et al., 2008; Davis et al., 2012; Day et al., 1994; Dyer et al., 1990; Horner & Day, 1991; Koegel et al., 1992; National Autism Center, 2009