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Educational Accommodations for Students With Behavioral Challenges: A Systematic Review of the Literature

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Educational policies mandate the consideration of accommodations so that students with disabilities become proficient in the objectives outlined by state academic content standards and demonstrate proficiency on high-stakes assessments. However, neither policies nor empirical research provide sufficient guidance for educators to effectively select and implement accommodations. This study reviews the effectiveness of accommodations for students in the special education eligibility category of emotional disturbance and those with diagnoses of attention deficit hyperactivity disorder (ADHD). First, we propose definitions that delineate accommodations from modifications and interventions. Next, we identify strategies that could serve as potential accommodations for this population. Next, we conduct a systematic literature review and calculate effect sizes to evaluate the effectiveness of the included strategies. Finally, we review the evidence to determine whether each included strategy meets the proposed definition of an accommodation. Although several potential strategies are beneficial to youth with ADHD and/or emotional and behavioral disorders, this review indicates that very few purported accommodations actually meet all the criteria in the definition of accommodations, and there is very little evidence supporting the effectiveness of commonly recommended accommodations for youth with behavioral challenges. Our critique of the state of the science on accommodations highlights several important issues that can be used to inform current research and practice in schools.

Keywords: classroom accommodations, assessment accommodations, ADHD, attention deficit hyperactivity disorder, EBD, emotional and behavioral disorders

Policy and legislation place a priority on teaching students with disabilities, including children and youth with behavioral challenges, in general education settings with academic goals similar to those of typically developing peers (Gunter, Denny, & Venn, 2000; Mooney, Denny, & Gunter, 2004). The Individuals with Disabilities Education Improvement Act (IDEIA) of 2004 and Section 504 of the

Rehabilitation Act of 1973 mandate the consideration and use of needed accommodations to "level the playing field" between students with disabilities and those without (Byrnes, 2008; Fuchs, Fuchs, Eaton, Hamlett, & Karns, 2000; S. J. Thompson, Lazarus, Thurlow, & Clapper, 2005). And in the current educational climate of accountability, educators are expected to implement effective interventions, accommodations, and modifications to assist students to become proficient in the objectives outlined by grade-level academic content standards and to demonstrate proficiency on high-stakes assessments (Mooney et al., 2004; Rosenberg, Sindelar, & Hardman, 2004; Salend, 2004; S. J. Thompson, Morse, Sharpe, & Hall, 2005). Although maladaptive behavior often interferes with academic performance for the students themselves and for their classmates as well as the instructional delivery of the teacher (Wehby, Lane, & Falk, 2003), priority is placed on teaching students with disabilities in general education settings with the same instructional goals as typically developing peers (Gunter et al., 2000; Mooney et al., 2004).

Unfortunately, neither IDEIA nor empirical research provides sufficient guidance for selecting effective accommodations to mitigate the impact of behavioral deficits on learning, and much more research is needed to advance our ability to help these students succeed (Braden & Joyce, 2008; Byrnes, 2008). Therefore, the purpose of this study is to review the effectiveness of accommodations for students with behavioral challenges, specifically students with emotional and behavioral disorders (EBDs) and/or attention deficit hyperactivity disorder (ADHD), to inform current practice in schools.

This group was selected for two reasons. First, students with EBDs and ADHD are both in need of services to address behavioral difficulties and can be served within the special education system. Students with EBD may receive special education services under the classification of emotional disturbance (ED) and represent 7.83% of all students with disabilities receiving services (Data Accountability Center, 2011). Similarly, students with ADHD often receive special education services under the eligibility categories of ED or Other Health Impairment. Second, although the eligibility criteria for ED and diagnostic criteria for ADHD are distinct and derived from unique sources (i.e., IDEIA and the *Diagnostic and Statistical Manual*, fourth edition, text revisions [*DSM-IV-TR*], American Psychiatric Association, 2000), many similarities exist.

Youth with ADHD exhibit similar academic and behavioral challenges in the classroom as do youth with EBD (see Barkley, Anastopoulos, Guevremont, & Fletcher, 1992; Walker, Colvin, & Ramsey, 1995), and studies have documented similar long-term outcomes in functioning for the two groups (see Ingram, Hechtman, & Morgenstern, 1999; Malmgren, Edgar, & Neel, 1998). This overlap is not surprising, given that approximately 65% of students with EBDs have been found to be eligible for a disruptive behavior disorder diagnosis and 42% of this population met criteria for ADHD (Garland et al., 2001). These findings indicate that the behavioral manifestations and school impairment of children with EBDs and those with ADHD are similar.

In addition to having similar behavioral and social impairment, these students also demonstrate significant academic impairment (Kent et al., 2011; Nelson, Benner, Lane, & Smith, 2004) and perform at a lower academic level than their typically developing peers (Lane, 2007). Specifically, a majority of students with

EBDs perform below grade level in reading, mathematics, and writing (Gresham, Cook, Crews, & Kern, 2004; Landrum, Tankersley, & Kauffman, 2003; Wagner, Kutash, Duchnowski, Epstein, & Sumi, 2005). Each of these are core subjects in which demonstration of grade-level content mastery is required by a majority of students (i.e., 95% of all groups of students) for school districts to demonstrate adequate yearly progress and avoid negative sanctions imposed through statewide accountability systems (S. J. Thompson, Lazarus, et al., 2005). Temple-Harvey and Vannest (2012) found that only 34% of students with EBDs participated in and met minimum standards on statewide assessments in math. Similarly, Carr-George, Vannest, Willson, and Davis (2009) found that only 44% of 56% of students who participated in the statewide assessment of reading met minimum standards. In addition to the poor individual outcomes associated with the academic impairment of students with ADHD and EBDs, their poor achievement compromises the success of districts attempting to reach their goals.

Adding to these academic difficulties, emotional and behavior problems often interfere with successful inclusion in the general education curriculum (Gresham et al., 2004; Landrum et al., 2003). Externalizing behaviors that are commonly demonstrated by children with EBDs include aggression, acting out, fidgeting and squirming, out-of-seat behavior, noncompliance, and impulsivity. Indeed, students with EBDs demonstrate more disruptive behavior and receive more office referrals and exclusionary discipline than students with other disabilities, often resulting in removal from the learning environment (Achilles, McLaughlin, & Croninger, 2007; Blackorby & Cameto, 2004). Because these disruptive behaviors interrupt the learning of the affected child, as well as the learning of others, students in this population are often excluded from learning opportunities (even when receiving instruction in general education settings) either through exclusionary practices or by means of impairment.

Problems demonstrated by these students not only interfere with academic progress but ultimately are costly to society. Youth with EBDs constitute approximately 15% to 20% of the population in juvenile justice facilities, a rate up to 10 times higher than their representation in the community (Grisso, 2008). In addition, youth with ADHD have an increased probability of substance abuse, interpersonal difficulties, and unemployment or underemployment (Barkley, Murphy & Fischer, 2008; Molina, Pelham, Gnagy, Thompson, & Marshal, 2007). Significantly lower numbers of young adults identified with EBDs in high school maintain employment after high school compared to their nondisabled peers. Wagner and Newman (2012) found that 91% of young adults had worked for pay at some time after leaving high school, but only 49.6% were employed at the time of the study compared to 66.1% of same-age peers. In addition, in 2009, 60.5% had been arrested at least once, and 44.2% had been on probation or parole. Thus, given the costs of impairment to students with EBDs and ADHD, their peers, their teachers and administrators, and society, it is important for us to identify effective means to improve their outcomes and minimize those costs.

In an attempt to help these students, schools are devoting valuable fiscal resources to them. In 1995, Chambers, Parrish, Hikido, and Duefias found that the cost to a school of educating a student with EBDs was three times the cost of educating a student without a disability, and recent analyses for students diagnosed with ADHD indicate that students with ADHD cost the districts approximately

$5,007 more per student to educate than their peers without ADHD (Robb et al., 2011). If these costs were leading to improved outcomes, then they may be justifiable; however, this does not appear to be the case. The value achieved from these expenditures may be compromised by frequently recommended and implemented strategies (e.g., S. J. Thompson, Morse, et al., 2005) that may not be effective with these students.

Intervention, Accommodation, and Modification

To reduce the negative impact of impairment associated with EBDs and ADHD on academic performance, create equal opportunities for those with disabilities, and level the playing field, IDEIA and Section 504 mandate the consideration and use of reasonable interventions, accommodations, and modifications. IDEIA (2004) mandates that the individual education plan (IEP) team determine whether a student needs accommodations. The IEP includes a list of instructional and testing accommodations (Luke & Schwartz, 2007), and "all children with disabilities are included in all general State and district-wide assessment programs … with appropriate accommodations and alternate assessments, where necessary and as indicated in their respective individualized education programs" (IDEIA, 2004). Section 504 requires that any program or activity that receives federal funds provide needed services including a 504 plan that includes modifications and accommodations for any student with a physical or mental impairment that "substantially limits one or more major life activities" (Americans with Disabilities Act, 2008). The No Child Left Behind Act of 2001 requires that students with disabilities participate in statewide assessments, with accommodations as needed.

To advance our understanding of services for students with EBDs and ADHD, we must address two shortcomings in the literature. The first is a lack of clear definitions of and distinctions among the terms *intervention, accommodation*, and *modification* specific to fields related to public education (Bolt & Thurlow, 2004; Hollenbeck, Tindal, & Almond, 1998; Sireci, Scarpati, & Li, 2005; S. Thompson, Blount, & Thurlow, 2002). To review the evidence related to these three types of services (interventions, accommodations, and modifications), we must first clearly define each of these terms. The second shortcoming involves the use of heterogeneous samples to evaluate the potential benefit of strategies for accommodating and decreasing school impairment (Zenisky & Sireci, 2007). A discussion of both shortcomings is provided below.

Definitions of Intervention, Accommodation*, and* Modification

The terms *intervention, accommodation*, and *modification* are often used interchangeably in the literature (Bolt & Thurlow, 2004; Hollenbeck et al., 1998; Sireci et al., 2005; S. Thompson et al., 2002). Although the terms may have varied definitions across related fields, our interest here is specific to the definitions of each term in fields associated with public education such as school psychology, education, and educational psychology. A consensus definition is needed that will be applied in all related disciplines, as professionals in each field have the potential to be involved in selecting services through involvement in IEP or Section 504 teams. Neither IDEIA nor Section 504 provides a clear definition (Edgemon, Jablonski, & Lloyd, 2006; Elliott, McKevitt, & Kettler, 2002; Elliott, Ysseldyke, Thurlow, & Erickson, 1998) of any of the three terms. In response to a public

comment recommending definitions of *accommodation* and *modification*, representatives from the Office of Special Education Programs responded in the federal registry with the following statement: "The terms 'accommodations' and 'modifications' are terms of art referring to adaptations of the educational environment, the presentation of educational material, the method of response, or the educational content" (IDEIA Regulations, 2006). This lack of clarity in definitions results in confusion. For example, Raggi and Chronis (2006) provided a review of *task/instructional modifications* that includes some of the same strategies (e.g., choice of assignments, shortened assignments, dividing tasks into smaller subtasks) as those discussed by Reid (1999) as *educational accommodations* as well as those described by DuPaul and Weyandt (2006) as *interventions.*

Clear definitions of terms provide a foundation for a scientific approach and increase the probability of consistency, completeness, and uniformity (Jonas & Chez, 2003). In addition to advancing the science, the adoption of clear definitions is also of considerable value to the professional practice. IEP teams are expected to select and implement unique interventions, accommodations, and modifications as needed. Without a clear definition of each type of service, educators might select a strategy for one purpose when the strategy is designed for another. For example, if a modification (e.g., lowered reading level) is selected for a student with a reading deficit when an intervention (e.g., tutoring in reading) was indicated, then unintended gaps "between the achievement of students with disabilities and expectations of proficiency at a particular grade level" (National Center on Response to Intervention, n.d.) can occur. This is a common error. B. Parker (2006) found that general education teachers could not discriminate between instructional strategies and accommodations, and Ysseldyke et al. (2001) noted that "upon closer examination it becomes clear why more modifications than accommodations were reported" (p. 217), explaining that many strategies listed on the IEPs as modifications were actually accommodations.

Clarification of terminology is also important for determining what adjustments may be provided during high-stakes testing procedures. Accommodations that are used during high-stakes testing should be selected from instructional accommodations included in the IEP (Cox, Herner, Demczyk, & Nieberding, 2006; Ketterlin-Geller, Alonzo, Braun-Monegan, & Tindal, 2007; S. J. Thompson, Morse, et al., 2005), and modifications cannot be included on high-stakes assessments (Christensen, Lazarus, Crone, & Thurlow, 2008). Given the important role of high-stakes testing, it is critical to understand the distinction between accommodations and modifications to appropriately assess students with disabilities.

Numerous professional associations and investigators have proposed definitions for *intervention, accommodation*, and *modification;* however, the definitions are not widely or consistently applied. Before completing a systematic review of the literature on the effectiveness of services for children with EBDs and ADHD that can inform both science and practice, we reviewed the literature to identify the key components of each of these definitions.

We began by considering the literature pertaining to what constitutes an adequate definition. First, an appropriate and adequate definition states both the necessary and the sufficient conditions for the correct use of a concept (Hospers, 1967; Ossorio, 1981). Second, given that interventions, accommodations, and modifications constitute sets, set theory terminology is relevant. Thus, a definition of these

terms has to specify the criteria for set membership (Bergner, 1997). Third, one conventional test of the appropriateness of a definition has been that the definiendum (i.e., the term to be defined) and the definiens (i.e., the defining term[s]) are interchangeable in any given statement without altering the meaning of that statement (Flew, 1979; Hospers, 1967). Finally, definitions state what something is. Definitions are thus (a) neither a statement about what causes something, what is caused by something, or what typically co-occurs with something; (b) not a statement of a theory of something; (c) and not necessarily empirical.

Consistent with these principles, we followed a four-step process to arrive at our definitions. First, we surveyed the literature and summarized definitions offered therein. Second, we identified components of definitions most often (> 70%) proposed by authors and compared them to the above-outlined criteria. When a component fit these criteria, we included it in our definition. Third, we took components that were included by only a small number of authors and compared them with the above criteria. We ensured that there was no redundancy or overlap between these and the agreed-on (included in Step 2) components. We included these components if they posed incremental utility to the definitions. Finally, we compared the resulting definitions to trends in the field regarding the use of these terms to ensure that the definitions reflect the intended use of the terms. Results of each of these procedures led to the following definitions of strategies in the context of K–12 settings.

1. Modifications are changes to practices in schools that alter, lower, or reduce expectations to compensate for a disability.

   Example: A student with a reading disability is allowed to take an alternative English class that includes only literature and exams written three grade levels below the student's actual grade level.

2. Accommodations are changes to practices in schools that hold a student to the same standard as students without disabilities (i.e., grade-level academic content standard) but provide a differential boost (i.e., more benefit to those with a disability than those without) to mediate the impact of the disability on access to the general education curriculum (i.e., level the playing field).

   Example: The same science test taken by all students in the class is read to the student with a reading disability. The student is accountable for all of the same grade-level science content but is not required to read the test items independently.

3. Interventions are changes made through a systematic process to develop or improve knowledge, skills, behaviors, cognitions, or emotions.

   Example: A student with a reading disability receives remedial reading instruction in addition to the grade-level curriculum to improve his or her reading skills to grade-level expectations.

Accommodations are typically sorted into four categories (DeSchenes, Ebeling, & Sprague, 1994; Tindal & Fuchs, 2000). *Presentation* accommodations are changes in the way that instruction, assignments, or assessments are presented or delivered to the student. *Response* accommodations are changes in the way that

students are permitted to respond to instruction (on assignments or assessments) or organizational devices to be used by the student as an aid to formulate a response and include methods of increasing active engagement such as choral responding. *Timing/scheduling* accommodations are changes in (a) the organization of time allotted for an activity or test, (b) the amount of time allocated for the presentation of a lesson or test, or (c) the time allowed for the student to complete a lesson or test. *Setting* accommodations are changes to the location (i.e., physical placement) in which students complete assignments or assessments and/or the instructors present at that location (e.g., peers, teaching assistants, tutors).

Limitations of Heterogeneous Samples

Accommodations are intended to mediate the impact of a given disability. Thus, to provide recommendations about accommodations for students with behavioral challenges, it was important to ensure that our review was restricted to studies with samples that evaluated the benefit of accommodations specifically for such students. Unfortunately, the current state of the literature presents challenges in this regard. For example, interventions for children with disabilities are usually developed to address a specific set of deficits. Thus, evaluations of many interventions are restricted to samples of participants who exhibit these deficits to a degree that causes significant impairment. However, this is not the case for the evaluation of accommodations. Studies on the use of testing accommodations (see reviews by Cormier, Altman, Shyyan, & Thurlow, 2010; Sireci et al., 2005; Tindal & Fuchs, 2000) include students with any disability and thus do not inform us about the effectiveness of accommodations specifically for students with EBDs or ADHD.

Although there is considerable variability in the population of students with EBDs and those with ADHD, there is greater consistency in the types of behaviors that lead to impairment within these groups than when considering students with *any* disability (e.g., visually impaired). Like interventions, accommodations are intended to address specific areas of impairment; thus, a review of the effectiveness of accommodations for behavioral challenges should be restricted to studies that included only students exhibiting the specific type of impairment being addressed by the accommodation. For example, accommodations that are appropriate and effective for students with reading disabilities may not be effective for students with EBDs or ADHD because their impairment and reasons for poor performance differ. The student with a reading disability may not understand the material in his or her history book because he or she cannot read it or process the visually presented phonemic information, but the student with ADHD may not understand the material because he or she has difficulty sustaining attention long enough to grasp the content. Reading the history text to the student with a reading disability is likely to improve comprehension for that student (as the input is auditory, not visual) but may not benefit the student who cannot sustain attention. As a result, our review of the evidence supporting specific accommodations is impairment specific and related to the most common problems exhibited by students with emotional and behavioral problems and those diagnosed with ADHD.

The Current Study

Although policies are in place requiring the consideration and use of accommodations, the evidence pertaining to their benefits for students with EBDs

and ADHD has not been adequately synthesized. As a result, there is little to guide educators in the use of appropriate strategies or to guide researchers as they prioritize next steps in this research agenda. Further, there are serious questions regarding the value of district expenditures for these students. Given this situation, research is needed that examines the outcomes of accommodations for students with EBDs and ADHD in classroom settings to address these questions. As an initial step in this line of research, we believe that a review of the scientific evidence pertaining to the use of accommodations with students with EBDs and ADHD to guide practice and research in the field is warranted. This study fulfills that need by reviewing the scientific basis of services provided for students with EBDs and ADHD to inform practice and lay the groundwork for further research.

Method

The review of the literature reported here involved first (a) identifying strategies that could potentially accommodate the impairments of children with EBDs or those with ADHD and then (b) reviewing studies that assessed the effectiveness of one or more of these strategies. In Phase 1, we completed a systematic review of past reviews and discussion articles and found a total of 149 strategies designed to address the academic, emotional, and behavioral problems of elementary or secondary school students. From this set of 149, using the special education criteria for ED and the diagnostic criteria for ADHD, we selected strategies that have the potential to mitigate the impairments associated with EBDs or ADHD (e.g., shortened assignments to mediate deficits in attention). Next, we excluded strategies that met our definition of *intervention* or *modification*, as the goal of this study was to review the evidence for the effectiveness of strategies that may be considered accommodations. In Phase 2, we conducted a systematic literature review to evaluate the evidence of effectiveness of the included strategies and determine whether they meet our proposed definition of an accommodation.

Phase 1: Strategy identification

We identified and categorized strategies to be included in our review through a four-step process (see Figure S1, available online). First, we completed a comprehensive literature review to gather review or discussion articles related to intervention, accommodation, or modification of assignments and assessments for students with EBDs or ADHD. Articles were selected that stated the purpose was to review or discuss interventions, accommodations, or modifications of tasks, assignments, tests, or assessments for students aged 5 to 19 years. We found 27 review or discussion articles (noted in the references with **). Second, we reviewed those articles and found 149 strategies that were intended to address academic or behavioral impairment associated with students with EBDs or ADHD.

Third, we evaluated the 149 strategies described in these articles to select those that target the impairments associated with children with EBDs or ADHD. Based on Barkley et al. (2006), we distinguished between symptoms (i.e., behavioral expressions associated with a disorder) and impairment (i.e., the consequences associated with these behaviors). We chose to focus on impairment instead of symptoms as impairment in functioning has more treatment utility than symptoms

alone (Pelham, Fabiano, & Massetti, 2005). Because there are no symptom-based criteria for EBD, impairment associated with the *DSM-IV-TR* (American Psychiatric Association, 2000) symptoms for the disorders most prevalent among those with EBDs—namely, oppositional defiant disorder, conduct disorder, ADHD, depression, and any anxiety disorder (Déry, Toupin, Pauze, & Verlaan, 2004; Doll, 1996)—were used. The first two authors independently identified which of the 149 strategies targeted the impairment associated with the symptoms of oppositional defiant disorder, conduct disorder, ADHD, depression, and any anxiety disorder, with 85.6% interrater agreement. The third author categorized the strategies when disagreement existed, and a majority consensus was accepted. This categorization resulted in 111 strategies.

Fourth, we evaluated the 111 strategies and excluded those that met the definition for intervention or modification, as our goal was to synthesize the evidence of effectiveness for services that may be accommodations. Following the same procedures as above, the first two authors independently categorized the 111 strategies, with 93.7% interrater agreement, and in cases wherein disagreement occurred, the third author categorized the strategy and majority agreement was accepted. This categorization resulted in 68 strategies for review as potential accommodations (see Table 1). We refer to the resultant list as potential accommodations for the following reasons: (a) We could not refer to the resultant list as a list of accommodations, because at this stage in our review process, we did not yet compare the strategies on the list to the definition of accommodation; and (b) Although we excluded strategies that met our definition of *intervention* and *modification*, there is not a phrase to collectively refer (i.e., a collective noun) to the list of remaining strategies. Fourth, in line with prior reviews (e.g., Tindal & Fuchs, 2000), each strategy on this list of 68 was sorted into one of four categories: presentation ($n = 38$), response ($n = 12$), setting ($n = 10$), and timing/scheduling ($n = 8$).

Phase 2: Review of the effectiveness of the potential accommodations.

We conducted a systematic and comprehensive review of the literature to identify studies that evaluated the effectiveness of 1 or more of the 68 potential accommodations. First, we selected studies from those included in the 27 prior reviews and discussion articles from which we selected the initial set of strategies. Second, we followed the standard methods identified by Cooper and Hedges (1994) by completing keyword and title searches of EBSCO Research Complete, ERIC, and PsycINFO, using the following keywords and their related acronyms: *accommodation(s), modification(s), intervention(s), attention deficit hyperactivity disorder, attention deficit disorder with hyperactivity, attention deficit disorder, hyperkinesis, hyperactivity, emotional and behavior disorders, emotional disturbance, behavior disorders, behavioral disorders, other health impairment, assessment, testing, instruction, adaptations*, and *universal design.* We also searched for these terms in combination with each of the 68 included potential accommodations. Third, we completed a historical search of the references in each of the selected articles. These procedures resulted in 201 studies to be considered. Fourth, the first two authors coded the 201 studies for inclusion based on the criteria described below.

TABLE 1
Potential accommodations for emotional and behavioral disorder and attention deficit hyperactivity disorder, by type

Presentation		
• Add movement (from one desk to another, between tasks, use gross motor tasks, tasks that require frequent active, motoric response) during task or between tasks	• Eliminate irrelevant cues in task	• Mixed rate of presentation
• Arrows in the corners of pages that are part of continuing sections	• Examples "set off" from test items	• Multiple accommodations (i.e., packaged)
• Check for understanding (ask student to repeat directions, clarify directions, student is allowed to ask for clarification)	• Familiar person administers assessment	• Outlines for lectures
• Choice making	• Fast-paced and highly structured direct instruction	• Passages in shaded box
• Complete small components of exam on separate days	• Highlight relevant information (key words in the directions)	• Prompting (prompt card for appropriate behavior, sequential, pacing variations, assistance card, taped prompts)
• Computer-assisted learning programs	• Increase size of answer bubble	• Read out loud (student reads out loud)
• Copy of teacher's lecture notes	• Increase spacing between items	• Reduce visible print
• Cues (to begin and stay on task, on answer form)	• Individually administered	• Shorten task instructions
• Decrease task repetitiveness	• Add interest	• Stop signs at ending page
• Directions short and simple, simplify language in directions (increased specificity)	• Intersperse different activities (difficult and easy tasks, high- and low-interest activities), movement between tasks	• Study buddy
• Intratask (within task) stimulation (engaging stimuli in the task); add color, shape, and texture	• Job card with step-by-step directions	• Tape lectures
• Markers to maintain place	• Taped books	• Teacher proximity • Video presentation

(continued)

TABLE 1 (continued)

Presentation		
Response		
• Constructed diagram format	• Write in test book	• Homework kept to an absolute minimum
• Monitor placement of student responses	• Word processor instead of writing	• Peer note taker
• Opportunities to respond	• Graph paper	• Story mapping
• Respond orally rather than in writing (scribe)	• Graphic organizer	• Template
Timing/Scheduling		
• Break the assignment or test into smaller sub-units with break after subunits	• Extended (extra) time	• Shorten task length
• Flexible schedule (daily schedule with seat-work in the morning and hands-on work in the afternoon)	• Frequent breaks	• Shorten time
	• Frequent deadlines	• Untimed test
Setting		
• Adaptive or special furniture (e.g., standup desk, therapy ball)	• Clear workspace (no items)	• Distance from other students
• Add music or accompanying sound	• Preferential seating (close to the teacher and away from high-traffic areas)	• Individual desks in rows
• Carrel/cubicle (student works in study carrel)	• Small group	• Location with minimal distractions
• Assistance cards		

Inclusion criteria

We included studies in our final review that (a) were published in English; (b) were published after 1974, when Public Law 94-142, The Education for All Handicapped Children Act, was instituted; (c) were published in peer-reviewed journals or technical reports; (d) identified at least some of the participants as having ADHD and/or EBD; (e) included participants with multiple types of disabilities if outcome scores were disaggregated for students with ADHD and/or EBD; (f) included participants who were 5 to 19 years old; (g) were conducted in K–12 general or special education classrooms or analogous settings (e.g., a summer treatment program or university school designed to mimic a typical classroom); and (h) were group design or single-case design (SCD) studies that had adequate experimental control and documentation of a causal relationship between a researcher-manipulated independent variable and a change in a dependent variable.

We based our decisions for Inclusion Criterion h on the What Works Clearinghouse SCD technical documentation (Kratochwill et al., 2010) indicating that experimental control within SCD studies is achieved through replication of the intervention in reversal design studies (introduction and withdrawal of the independent variable), alternating treatment designs (iterative manipulation of the independent variable across phases), and multiple baseline designs (staggered introduction of the independent variable across different points in time).

Study selection

We coded the 201 studies following the inclusion criteria in a hierarchical manner. Figure S2 (available online) represents this process, and additional information follows regarding specifics for studies that did not meet the inclusion criteria for dissemination format, participants, setting, or design. Studies that were not peer-reviewed were excluded, comprising 26 dissertations, 11 "other" reports, 17 presentations, 1 master's thesis, 1 unpublished manuscript, and 1 online report. Studies excluded due to participant characteristics included youth with learning disabilities, speech or language disabilities, mental retardation, visual or physical disabilities, Down's syndrome, hydrocephalus, and cerebral palsy. Studies excluded due to setting were conducted in clinics, a small room outside of the classrooms, and laboratories (settings that did not mimic typical classroom conditions). All of the studies excluded due to design employed an AB design. Our hierarchical elimination process resulted in 18 articles for review (see Table S1, available online) that evaluated the effectiveness of 12 of the 68 previously identified potential accommodations.

Study coding

The 18 studies were divided among the four authors and coded for information pertaining to study characteristics, evidence for the effectiveness of the potential accommodation, and whether the potential accommodation met the components of the definition of *accommodation.* The following characteristics were coded for each study: (a) the term the author used to reference the potential accommodation (e.g., *intervention, accommodation, strategy*), (b) the number of participants, (c) participant gender, (d) participant ethnicity, (e) interobserver agreement, (f) percentage of fidelity, (g) reported sample attrition, (h) setting, (i) participant disability or educational category (i.e., EBD, ADHD, or both),

(j) whether the potential accommodation met the components of the definition of *accommodation*, and (k) method of reporting results (i.e., visual analysis, statistical significance, standard deviation [*SD*], confidence interval [CI], and/or effect size [ES]).

Reliability of literature review and coding

To estimate reliability of study selection, we ensured that all possible studies were identified through three reliability procedures. First, the first two authors began the search by agreeing to the exact key words and search engines that were used. Second, these two authors simultaneously completed searches using 20% of the keywords and Boolean strings and found that identical studies were identified that met inclusion criteria with 100% accuracy. Third, the first author completed an independent search with half of the keywords, and the second author ensured accuracy through reliability calculated as percentage of agreement at 100%.

To estimate reliability of study coding and judgments on evidence of definitional criteria and effectiveness, interrater agreement was calculated through simple percentage agreement and Cohen's (1960) Kappa. First a coding spreadsheet was created with cells for coding and the operational definitions of each of the 16 codes. Second, the authors independently coded each study for characteristics and for evidence. Third, an agreement/disagreement matrix was created with author coding for 20% of the studies. Fourth, simple percentage agreement was calculated at 93.8% by dividing the number of agreements by the number of agreements plus the number of disagreements. Percentage agreement is an index of the agreement between two raters in relation to the total number of items coded (Ary & Suen, 1989). Fifth, Kappa was calculated using SPSS at 0.813. Kappa is a conservative measure of reliability used to adjust for the possibility of chance agreement and thus might underestimate agreement (Ary & Suen, 1989).

Evidence of definitional criteria and effectiveness

Each potential accommodation was deemed to have sufficient evidence to be considered an effective accommodation for students with EBDs or ADHD if the studies reviewed provided evidence of each of the four criteria of the definition: Criterion 1 (constitutes changes to practices in schools), Criterion 2 (holds the student to the same grade-level academic content standards), Criterion 3 (mediates the impact of the disability on access to general education curriculum), and Criterion 4 (provides a differential boost). A potential accommodation met Criterion 1 if it constituted a technique that was different or implemented differently for the student than for typically developing same-age peers and was relevant to the student's educational disability category or mental health diagnosis. We determined that the potential accommodation met Criterion 2 if the authors reported that the academic level of the task, assignment, or assessment was based on the student's assigned grade level or was at the grade level of the majority of students in the class. If the authors reported that the academic level of the assignment was individualized to the student (e.g., based on an IEP), then we could not assume that it was on the same grade level as for peers.

We determined that the potential accommodation met Criterion 3 if the authors reported that the students with EBDs or ADHD performed better on the outcome variables of interest and ESs were in the moderate-to-large range as a result of the

potential accommodation. Studies with conflicting outcomes for different variables were coded as "unclear." We determined that the potential accommodation met Criterion 4 if the authors compared the study outcomes for students with EBDs or ADHD to outcomes of typically developing peers and found that the group of students with EBDs or ADHD benefited from the potential accommodation to a greater extent than the group of students without EBDs or ADHD and effective sizes were in the small- to large-effect range.

For SCD studies, Tau *U* was calculated when the authors reported sufficient information. For group-design studies, if the study authors reported Cohen's *d*, it is presented here. If not, we calculated Cohen's *d* if sufficient information was available. In addition, we calculated 95% CIs for all ESs. Procedures for each are presented below.

ESs that represent Criterion 3 in the definition of accommodations for the included SCD studies were calculated through a three-step process for studies with useable graphs. SCD studies do not measure Criterion 4 as no comparison group with EBDs or ADHD was included. First, studies were reviewed to determine if data were presented in a legible graph with identifiable scales for the x- and y-axis and points equidistant from each other. ESs were calculated for all outcome variables within each study with a usable graph. Of 11 studies, 9 included useable graphs with 35 graphed outcome measures. Schilling, Washington, Billingsley, and Dietz (2003) and West and Sloane (1986) did not have useable graphs; thus, ESs could not be calculated for those two studies.

Second, data were extracted by digitizing graphs using Getdata Graph Digitizer (Version 2.21), a process that involves importing the graph, setting the scale, and capturing the value of each data point. Third, Tau *U*, a nonoverlap with trend ES (R. I. Parker, Vannest, Davis, & Sauber, 2011), was calculated using an online Tau *U* calculator (singlecaseresearch.org). Tau *U* was selected over other single-case ESs (e.g., percentage of nonoverlapping data, improvement rate difference) as Tau *U* can control for positive baseline trend, as well as ceiling and floor effects, and demonstrates sensitivity to phase change with data collected over brief periods of time (R. I. Parker, Vannest, Davis, et al., 2011). Tau *U* combines overlap between phases with trends from within the intervention phase, controlling for positive baseline trend (R. I. Parker, Vannest, Davis, et al., 2011). For reversal design studies, Tau *U* was calculated between A_1 and B_1 and A_2 and B_2 and combined to produce a single ES for each outcome variable. In studies with multiple participants and the same outcome variable, each Tau *U* for that outcome was combined using WinPEPI (Abramson, 2011) to produce a single ES for each variable in the study (R. I. Parker, Vannest, Davis, et al., 2011). The algorithm for WinPEPI to calculate the overall ES is the weighted average of all individual ESs, with weights equaling the inverse of the variance. For multiple baseline design studies, Tau *U* was combined across each phase to calculate an ES for each outcome variable. CIs were calculated for each ES. These ESs are relevant with regard to Criterion 3 only.

We report Cohen's *d* for group-design studies. When Cohen's *d* was not reported by the authors (i.e., either no ES was reported or an ES other than Cohen's *d* was reported), we calculated Cohen's *d* using means and *SD*s (or, in one case, using *t* values and degrees of freedom) reported in the study. For Criterion 3, we calculated within-group, and for Criterion 4, we calculated between-group ESs. For studies in which groups were not equal at baseline ($n = 1$), we calculated a standard

d for between-group differences at pretreatment (i.e., with the accommodation) and posttreatment (i.e., without the accommodation) and subtracted pretreatment *d* from posttreatment *d.* ESs are not reported for studies in which the authors did not report means and *SD*s or *t* values and degrees of freedom ($n = 2$). In addition, 95% CIs were calculated using ESCI-delta, a script for Excel developed by Cumming and Finch (2001).

Reliability was calculated for graph digitizing and ES calculations. One author and a research associate independently digitized 20% ($n = 7$) of the graphs, which represented 35 graphed outcome measures across all studies. Agreement was considered achieved if a data point was within one point, resulting in a reliability of 90%. Additionally, one author and a research associate independently calculated Cohen's *d* and Tau *U* with 100% agreement.

Results

The results below begin with a description of the study characteristics (i.e., sample, study design, method of result reporting) of 18 studies included in this review. Description of the sample includes the number of participants, gender, disability/eligibility, setting, ethnicity, fidelity, and interrater observations (see Table S2, available online). For method of result reporting, we coded and reported if the authors reported use of statistical or visual analysis, means, *SD*s, CIs, and ESs (see Table S2, available online). In addition, for SCD studies, the type of design is identified.

After summarizing the characteristics of the reviewed studies below, we summarize the results for each potential accommodation in the categories of presentation, response, timing/scheduling, setting, and packages of multiple potential accommodations. Under each category, the results are summarized per potential accommodation, providing (a) the authors' purported rationale for the potential accommodation, (b) evidence of effectiveness, and (c) extent to which the potential accommodation meets all four components of the definition of an accommodation. The four components are commensurate with the four elements of our definition. The summary of evidence includes a description of the studies that evaluated the specified potential accommodation and the following information for each study: (a) the dependent variable, (b) the number of participants in the study, (c) the special education eligibility category or mental health diagnosis of the participants, the age or grade level of the participants, and the outcomes of the study including ESs. Given the heterogeneity in study design, as well as the limited information offered in some studies, a single meta-analytic ES could not be reported. However, ESs reported by the author or calculated in the current study are presented in Table 2 and in this section.

Study Characteristics

The results below summarize the coding of the 18 studies (7 group and 11 SCDs) that evaluated the effectiveness of 12 potential accommodations and the extent to which each meets the definition of an accommodation. It should be noted that across these 18 studies, the evaluated potential accommodation was referred to as an accommodation in only 3 studies (2 examining extended time and 1 examining small-group instruction). In the other studies, the evaluated potential accommodation was referred to as an *intervention* ($n = 5$), a *modification* ($n = 1$), a

TABLE 2
Effect sizes (ESs) and confidence intervals (CIs) for Criterion 3 (within group)

Potential Accommodation	Author(s) and Year	Outcome	E(n)	C(n)	ES	95% CI for ES		Direction of the relationship[a]
						Lower	Upper	
Choice making	Cole, Davenport, Bambara, & Ager (1997)	Task engagement	3	N/A	0.49[b]	0.24	0.75	Preferred > nonpreferred
		Task engagement			0.50[b]	0.25	0.75	Preferred > choice
Choice making	Powell & Nelson (1997)	Undesirable behavior	1	N/A	–0.97[b]	–1.54	0.40	No choice > choice
Choice making	Jolivette, Wehby, Canale, & Massey (2001)	Problem completion	3	N/A	0.36[b]	–0.05	0.76	Choice > no choice
		Accuracy			0.04[b]	–0.38	0.46	Choice > no choice
		Task engagement			0.78[b]	–0.16	1.08	Choice > no choice
		Off task			–0.74[b]	–1.15	0.34	No choice > choice
		Disruptive behavior			–0.49[b]	–0.89	0.09	No choice > choice
Choice making	Dunlap et al. (1994)	Disruptive behavior	3	N/A	–0.86[b]	–1.40	0.68	No choice > choice
		Task engagement			0.80[b]	0.51	1.09	Choice > no choice
Interest	Clarke et al. (1995)	Desirable behavior	4	N/A	0.85[b]	0.55	1.16	Interest > standard
		Disruptive behavior			–0.40[b]	–0.60	1.40	Standard > interest
Intratask stimulation	Zentall & Leib (1985)	Activity level	15	16	[c]	[c]	[c]	[c]
		Performance			[c]	[c]	[c]	[c]
Fast-paced instruction	West & Sloane (1986)	Classroom disruption	5	N/A	[c]	[c]	[c]	[c]
		Performance accuracy			[c]	[c]	[c]	[c]
		Response rate			[c]	[c]	[c]	[c]
Shortened task length	Miller, Gunter, Venn, Hummel, & Wiley (2003)	On task	3	N/A	0.53[b]	0.29	0.77	Shortened > standard length
		Correct responses			0.13[b]	–0.11	0.37	No effect

(continued)

TABLE 1 (continued)

Potential Accommodation	Author(s) and Year	Outcome	E(n)	C(n)	ES	95% CI for ES Lower	95% CI for ES Upper	Direction of the relationship[a]
Adaptive furniture	Schilling, Washington, Billingsley, & Deitz (2003)	In-seat behavior	3	N/A	[c]	[c]	[c]	[c]
		Legible word productivity			[c]	[c]	[c]	[c]
Teacher proximity	Granger, Whalen, Henker, & Cantwell (1996)	Aggression	26	23	[c]	[c]	[c]	[c]
		Noncompliance			[c]	[c]	[c]	[c]
		Socially appropriate behavior			[c]	[c]	[c]	[c]
		Disengagement			[c]	[c]	[c]	[c]
Extratask stimulation	Pelham et al. (2011)	Rule violations: Music	41	26	0.27[d]	–0.23	0.76	Silence > music
		Rule violations: Video			–0.19[d]	–0.68	0.30	No effect
		Teacher prompts: Music			0.12[d]	–0.38	0.61	No effect
		Teacher prompts: Video			–0.91[d]	–1.42	–0.39	Video > silence
		Seatwork completion: Music			–0.16[d]	–0.65	0.33	No effect
		Seatwork completion: Video			0.62[d]	0.12	1.12	Silence > video
Extratask stimulation	Whalen, Henker, Collins, Finck, & Dotemoto (1979)	Task attention	22	39	[c]	[c]	[c]	[c]
		Inappropriate behavior			[c]	[c]	[c]	[c]
Small group	Hart, Massetti, Fabiano, Pariseau, & Pelham (2011)	On task during instruction	33	N/A	–0.49[d]	–0.00	0.97	Small group > whole group

(continued)

TABLE 1 (continued)

Potential Accommodation	Author(s) and Year	Outcome	E(n)	C(n)	ES	95% CI for ES		Direction of the relationship[a]
						Lower	Upper	
		Work productivity during testing			0.30[d]	–0.19	0.49	Whole group > small group
Extended time	Lewandowski, Lovett, Parolin, Gordon, & Codding (2007)	Items attempted	27	27	–1.07[d]	–1.64	–0.49	18 minutes > 12 minutes
		Items correct			–0.97[d]	–1.53	–0.40	18 minutes > 12 minutes
Extended time	Pariseau, Fabiano, Massetti, Hart, & Pelham (2010)	Problems completed correctly per minute	33	N/A	–0.64[d]	–1.12	0.14	30 minutes > 45 minutes
		Appropriate behavior			0.08[d]	–0.56	0.40	No effect
OTR	Sutherland, Alder, & Gunter (2003)	Correct responses	9	N/A	0.88[b]	0.41	1.34	Increased OTR > standard
		Disruptive behavior			–0.67[b]	–1.14	0.21	Standard > increased OTR
		On task			0.93[b]	0.46	1.40	Increased OTR > standard
Multiple	Dunlap, Kern-Dunlap, Clarke, & Robbins (1991)	Appropriate social behavior	3	N/A	0.55[b]	0.33	0.77	Packaged > standard
		Inappropriate vocalizations			–0.94[b]	–1.70	0.72	Standard > packaged
		Disruptive			–0.84[b]	–1.06	0.61	Standard > packaged
		On task			0.97[b]	0.73	1.22	Packaged > standard
Multiple	Dunlap, White, Vera, Wilson, & Panacek (1996)	Task engagement	1	N/A	1.00[b]	0.58	1.40	Packaged > standard
		Problem behavior			–0.94[b]	–1.68	0.32	Standard > packaged

Note. E(n) = sample size of experimental group; C(n) = sample size of control group; N/A = not applicable; OTR = opportunities to respond.
[a]> indicates that the dependent variable was greater in the group preceding the > than in the group that followed.
[b]Tau *U* for single-case design studies.
[c] Insufficient information to calculate or interpret ES.
[d]Cohen's *d* for group design.

material modification ($n = 1$), or an *intervention and curricular modification* ($n = 3$), or the researchers did not refer to it using any singular noun ($n = 6$). These findings provide further evidence of the need for a clear and consistent definition.

Sample

Cumulatively, the group studies included 362 students: 197 students with EBDs or ADHD in seven experimental groups ($M = 28.14$, $SD = 8.45$, median = 27) and 131 students without EBDs or ADHD in five control groups ($M = 26.2$, $SD = 8.34$, median = 26). The SCD studies included 34 students with EBDs or ADHD ($M = 3.09$, $SD = 2.21$, median = 3.00). Of the 18 studies, 8 were conducted in analogue settings and 10 in school settings. Of the 18 studies, 5 included students with EBDs, 9 studies included students with ADHD, 1 study included students with hyperactivity, and 3 studies included students with both EBDs and ADHD. All 18 studies reported the gender of the 362 participants: 318 males including 199 males with EBDs or ADHD and 44 females including 9 with EBDs or ADHD. Four studies reported information about race/ethnicity: 163 youth (110 with EBDs or ADHD) included 135 European Americans (82.82%), 12 African Americans (7.36%), 4 Hispanics (2.45%), 4 Asian Americans (2.45%), 3 American Indians (1.84%), and 5 identified as not European Americans without further information (only the percentage of European Americans was reported in the study). Three of the authors reported the results of fidelity measures with results ranging from 89.2% to 100%. A total of 15 reported the results of interrater observations (3 Kappa, 1 Yule's Y, 11 simple agreements). Simple agreement ranged from 81.9% to 100%, Kappa from .60 to .91, and Yule's Y from .62 to .84. Only 1 study reported study attrition.

Study Design and Result Reporting

Of the 11 SCD studies, 6 used a reversal design, 3 used multiple baseline, 1 used an alternating treatment design, and 1 used a multielement design (see Table S1, available online). All of the 11 SCD studies used visual analysis (i.e., interpreting the intervention effect by visually examining the change between phases on graphed data) for result interpretation. Five reported means with ranges but without *SD*s, CIs, or ESs (see Table S2, available online); 4 reported means without ranges, *SD*s, CIs, or ESs; 1 reported means and ranges without *SD*s and CIs but with ESs for a student questionnaire and not for observation data; and 1 reported means without ranges as well as *SD*s without CIs or ESs. In addition, 1 reported the percentage of overlapping data.

Seven group-design studies were quasi-experimental without randomization (Gall, Gall, & Borg, 1999; Gersten et al., 2005; see Table S1, available online), and five did include control groups of participants without EBDs or ADHD. All seven reported results in relation to statistical significance. Five reported means with *SD*s and ESs but no CIs. One reported means without *SD*s, CIs, or ESs, and one reported means without *SD*s or CIs and reported ESs for only one dependent variable (i.e., teacher ratings).

Potential Accommodations: Presentation

Eight studies measuring the effectiveness of potential presentation accommodations were reviewed including four of choice making (i.e., Cole et al., 1997;

Dunlap et al., 1994; Jolivette et al., 2001; Powell & Nelson, 1997), one of interest (Clarke et al., 1995), one of intratask stimulation (Zentall & Leib, 1985), one of fast-paced instruction (West & Sloane, 1986), and one of shortened task length (Miller et al., 2003).

Choice Making

The first potential presentation accommodation reviewed was choice making. Choice making is an antecedent strategy in which the student is given the opportunity to select an academic task, behavior, or activity from two or more options that have the same goal and that the teacher perceives as equally acceptable. Allowing students a choice of preferred activities or tasks between teacher-approved options is described as a proactive strategy designed to prevent behavior problems by giving the student the opportunity to control his or her own environment (Jolivette et al., 2001), which in turn may increase competence and autonomy (Dunlap et al., 1994). Further, as appropriate behavior increases, positive teacher-student interactions are expected to increase.

Summary of evidence. Four SCD studies (n = 10) examined the impact of student choice on task engagement, work productivity, and undesirable behaviors (e.g., disruptive behavior, off task, being out of seat) for 2 students (7 and 13 years old) diagnosed with ADHD, 5 with EBDs (5 to 11 years old), and 1 with EBDs and ADHD (11 years old). One participant with pervasive developmental disorder and 1 with pervasive developmental disorder and seizure disorder included in the Cole et al. (1997) study were not included in this review. The authors of all four studies evaluated the number of math problems completed and number of problems completed correctly by students as the primary outcome variables through mean comparisons and counts.

Across studies, when participants were provided an opportunity for choice making, task engagement, work productivity, and accuracy increased (see Table 2 for ESs). Based on visual analyses (i.e., comparison of data points and slope between phases) in a reversal design study, Dunlap et al. (1994) found very high task engagement in the choice conditions and very little task engagement in the no-choice condition. Jolivette et al. (2001), in a multiple baseline design study, found task engagement higher in the choice condition (M = 83%–88.90%) compared with the no-choice condition (M = 20%–58.50%), supported by a moderate Tau *U*. Jolivette et al. (2001) found more problems completed (M = 35.60–52.82) and completed with accuracy (M = 35.60–52.82) in the choice condition compared with the no-choice condition (M = 26–26.20). However, choice making produced only a small effect on problem completion and a moderate effect on accuracy. Cole et al. (1997), using an alternating treatment design study, found task engagement higher with moderate effects when a choice was given (M = 80%) and when preferred tasks were assigned (M = 80%) compared with when nonpreferred tasks were assigned (M = 11%). Cole et al. (1997) found work production to be higher during choice (M = 1.9) and when preferred tasks were assigned (M = 1.7) compared with when nonpreferred tasks were assigned (M = 0.8); however, graphed data were not available for ES calculation.

When choices were provided, undesirable behaviors decreased. Cole et al. (1997), Dunlap et al. (1994), and Jolivette et al. (2001) found low levels of disruptive behavior

during the choice condition (near zero, $M = 0\%–0.36\%$, $M = 10\%$, respectively) and high levels of disruptive behavior during the no-choice condition. Effects ranged from small (Jolivette et al., 2001) to moderate (Dunlap et al., 1994). Jolivette et al. (2001) found off-task behavior lowest in the choice-making condition ($M = 16.63\%–27.80\%$) compared with no choice ($M = 38.67\%–62.33\%$), with moderate effects. Through the use of visual analysis in a reversal design study, Powell and Nelson (1997) found that during choice conditions, undesirable behaviors decreased substantially with a large effect. Thus, evidence suggests that providing choices is a promising strategy for improving the academic and behavioral performance of students with an EBD or ADHD. However, variability in effects is evident.

Accommodation criteria. These four studies do not provide sufficient evidence to determine whether providing choice is an accommodation. Providing an opportunity to choose among tasks is a change in typical school procedures (Criterion 1) and mediates the impact of the disability (Criterion 3) as ESs ranged from small to large. However, it cannot be concluded that choice meets the definition of an accommodation as (a) the academic assignments in two studies (Dunlap et al., 1994; Jolivette et al., 2001) were at the academic level of the individual student (Criterion 2) consistent with each student's IEP (i.e., indicating that assignments were potentially below the state-mandated level) and could not be determined in one study (Cole et al., 1997) and (b) none of the studies evaluated whether choice provided a differential boost for those with EBDs or ADHD relative to those without (Criterion 4).

Interest

The second potential presentation accommodation reviewed was adding an element of student interest to assigned tasks. For example, worksheets could include pictures of cars or common cartoon characters that interest the student (Clarke et al., 1995). Clarke et al. (1995) posited that incorporating student interest into curriculum, when indicated by a functional assessment or analysis, is an antecedent preventive technique.

Summary of evidence. One single-case design study ($n = 3$; Clarke et al., 1995) evaluated the effectiveness of incorporating interest on disruptive behavior, desirable behavior, and work productivity of 2 students (5 and 11 years old) with an EBD and 1 student (5 years old) with an EBD and ADHD. Data from 1 student with autism was not included in this review. Clarke et al. (1995), in a reversal design study, found that when interest was included, disruptive behavior of the 3 students decreased from averages during the standard assignment condition of 68%, 31%, and 12% to averages during interesting assignments of 19%, 8%, and 2%, respectively. Although 1 participant demonstrated consistent declines in problem behavior, data for 1 participant were extremely variable with considerable overlap between baseline and intervention phases, and 1 student demonstrated low rates of disruptive behavior throughout with some variability; thus the ES was small. However, desirable behavior increased from 28%, 55%, and 32% to 72%, 94%, and 84%, respectively, with a large ES. Work productivity (i.e., average sessions with completed assignments) was measured for 2 of the 3 participants and

increased from 82% to 97% and from 0% to 100%, respectively. Thus, this study provides preliminary evidence for the effectiveness of incorporating interest for students with EBD and ADHD.

Accommodation criteria. Insufficient evidence is available to determine whether incorporating student interest into activities, as assessed by Clarke et al. (1995), is an accommodation. Specifically, incorporating interest is a change in school practices (Criterion 1) and mediated the impact of the disability (i.e., disruptive behaviors decreased and desirable behaviors increased, which in turn corresponded to increased work productivity; Criterion 3). However, it is unclear if the activities tested in this study were within the grade-level academic content standard for the students' grade levels (Criterion 2). Specifically, although the authors stated that instructional objectives were not modified, 1 student with ADHD was 1 year below academic norms, 1 student with an EBD was on grade level, and no information was provided about the academic level of the additional student with an EBD. As information varies across participants and no comparison of outcomes between the students with EBDs or ADHD to those without was made (i.e., a differential boost; Criterion 4), we cannot conclude that incorporating interest meets the definition of an accommodation.

Intratask Stimulation

The third potential presentation accommodation was intratask stimulation, which includes strategies that co-occur with another task. One example of intratask stimulation is highlighting important words in the text while reading. According to optimal stimulation theory (e.g., Hebb, 1955), without an optimal level of stimulation, all organisms shift attention and activity (e.g., sensation seeking). Some researchers believe that children with hyperactivity are understimulated relative to children without hyperactivity, and optimal stimulation theory posits that children with hyperactivity self-stimulate by engaging in sensation-seeking activity. Prior research on environmental structure informed Zentall and Leib's (1985) rationale for using intratask stimulation by indicating that increasing environmental structure can improve the behavior of children with EBDs (Gallagher, 1972; Haring & Phillips, 1962; Hewett, 1967) and hyperactivity (Whalen et al., 1979; Zentall, 1980).

Summary of evidence. One group-design study (Zentall & Leib, 1985) compared the effectiveness of intratask stimulation on the activity level and task performance of 15 students diagnosed with ADHD to 16 students without ADHD during an art activity (third to sixth grade). When intratask stimulation was included in the form of added structure, the authors found that both students with and students without ADHD showed statistically significant decreases in activity levels in the high-structured condition (i.e., replicating two art designs from models; M = 548.7 activity units) relative to the low-structured activity (i.e., creating original designs; M = 725.9 activity units) at the $p < .01$ level. Groups did not differ when task completion was compared across high- and low-structure conditions, as indicated by the quantity and quality of the art project. Zentall and Lieb (1985) did not provide sufficient evidence to calculate ES.

Accommodation criteria. Zentall and Leib (1985) found that both groups with and groups without ADHD benefited from adding structure to a task. Although added intratask stimulation is a change in school practices (Criterion 1), holds students to the same grade-level academic content standard standards (Criterion 2), and might mediate the impact of the disability (Criterion 3), the outcomes indicated that there was no differential boost associated with this strategy, as students with and without ADHD responded similarly (Criterion 4). Thus, adding structure as intratask stimulation does not meet the definition of an accommodation.

Fast-paced instruction. The fourth potential presentation accommodation reviewed was fast-paced instruction—that is, briskly presenting a new stimulus (e.g., a flashcard) with shortened wait time for the student response (e.g., verbal answers) before the next stimulus is presented. West and Sloane (1986) presented a new task every 20 seconds to students in the fast presentation rate group and a new task every 60 seconds to students in the slow presentation rate group. West and Sloane contended that increased rates of instruction might provide fewer opportunities for disruptive behavior and increase consistent attention.

Summary of evidence. Using an SCD, West and Sloane (1986) evaluated the effectiveness of fast-paced instruction on the classroom disruption, performance accuracy, and response rate through mean comparisons of 4 students (7 to 8 years old) with EBDs. The results of 1 student with intellectual handicaps were omitted from this review. The authors compared the effects of the outcomes of two presentation rates (fast, slow) paired with two reinforcement schedules (fast, slow), resulting in four treatment conditions. A new task was presented every 20 seconds to students and in the fast presentation rate groups and every 60 seconds to students in the slow presentation rate groups. Point delivery schedules included giving the students points for correct responses every 20 seconds in the fast rate condition and every 240 seconds in the slow rate condition. In this multielement design study, disruptive behavior was observed by 1 or more students in 80% of intervals during the slow rate and 55% in the fast rate. However, means of performance accuracy were higher in the slow rate (M = 86%) than in the fast rate (M = 79%). So the benefit of decreasing disruptive behavior was offset by a decrease in accuracy in the fast condition. West and Sloane did not provide sufficient information to calculate ES.

Accommodation criteria. Insufficient information is available to determine whether fast-paced instruction is an accommodation for students with EBDs and/or ADHD. Although fast-paced instruction constitutes a change in school practices (Criterion 1), West and Sloane (1986) did not provide sufficient information to determine whether the academic content of the lessons was equivalent to grade-level content standards for the students' appropriate grade levels (Criterion 2). A differential boost was not measured (Criterion 4), and because one area of impairment (i.e., disruptive behavior) improved whereas another (i.e., accuracy) worsened with the fast-paced presentation, we cannot conclude that the impact of the disability was mediated (Criterion 3). Therefore, we cannot conclude that fast-paced instruction meets the definition of an accommodation for students with EBDs or those with ADHD.

Shortened Task Length

Shortened task length refers to instructing students to complete fewer repetitive questions on an assignment, resulting in a shorter assignment that covers the same content but reduces the amount of practice completed by the students. The rationale for shortening the length of assignments is that students who may be overwhelmed with large tasks and avoid them may complete short tasks and thus increase their engagement in the practice of academic skills. Although this strategy may improve the students' engagement in assignments, it results in students with disabilities receiving less practice with academic skills than students without disabilities.

Although Miller et al. (2003) did not explain why shortening task length is useful in improving the performance of youth with EBDs, they argued that youth with EBDs exhibit inappropriate classroom behaviors to disguise a lack of academic ability. The authors appear to imply that shortening task length would benefit youth with EBDs because shortening the task would reduce the need for youth to be disruptive to stop working or be removed from the learning environment and thus escape tasks. The authors cited the rationale of Kern, Childs, Dunlap, Clarke, and Falk (1994), stating that youth display disruptive behavior to avoid or escape academic assignments.

Summary of evidence. Miller et al. (2003) evaluated the effectiveness of shortened assignments on the average number of correct academic responses and the on-task behavior of 3 students (9 to 12 years old) with EBD. The authors analyzed overlapping data points with two outcome measures, the percentage of time on task, and rates of correct responding. Miller et al., in a multiple baseline design study, found that shortening a mathematics assignment by half had no effect on correct responding; however, a moderate improvement in on-task behavior was found for all 3 participants. During the standard-length condition, the average number of correct responses per minute was 4.3, 5.62, and 2.56 for each of the 3 children whereas during the shortened condition, the average correct responses per minute were 3.8, 5.59, and 3.7, respectively. Percentage of time on task during the observed intervals increased from 68%, 80%, and 69% for the 3 children to 84%, 91%, and 78%, respectively. The outcomes suggest requiring students to attend to undesirable tasks for less time may yield higher percentages of time on task than requiring them to attend to undesirable tasks for more time without any benefit in accuracy.

Accommodation criteria. Shortening task length constitutes a change in school practices and holds the students to the same grade-level academic content standard. However, as no effect was found for the rate of correct responding and a moderate effect was found for on-task behavior, we cannot determine that the impact of the disability was mediated and a differential boost was not measured. Thus, it cannot be concluded that shortening task length meets the definition of an accommodation.

Summary: Potential Presentation Accommodations

Information provided in the reviewed studies is not sufficient to determine whether any of the potential presentation accommodations met the definition of

accommodation. Although they involved changes in typical school procedures (Criterion 1) and some partially mediated the impact of the disability (Criterion 3), there was either insufficient information on the academic level of individual students or the students' academic levels were below the state-mandated level (Criterion 2). Furthermore, in the studies reviewed, researchers did not hold the students to the same grade-level academic content standard when adding structure and shortening task length (Criterion 2). Finally, none of the studies reviewed measured or found a differential boost for those with EBDs or ADHD relative to those without (Criterion 4). It should also be noted that the entire literature for all five potential presentation accommodations is based on 51 students with one of the studies (Zentall & Leib, 1985) including more than half of all participants.

Potential Accommodations: Setting

Five studies of the effectiveness of potential setting accommodations were reviewed, including one of adaptive furniture, one of teacher proximity, two of extratask stimulation, and one of small-group instruction (see Table 2).

Adaptive Furniture

Adaptive furniture refers to furniture that has been changed in some way to accommodate the impairment. For example, Schilling et al. (2003) evaluated the use of therapy balls as chairs for students with ADHD. Schilling et al. argued that because children diagnosed with ADHD frequently (a) experience significant sensory motor problems, with a negative impact on typical school activities; (b) have difficulty sitting still and maintaining attention; and (c) have deficits in sensory modulation (i.e., adjustment of physiological and internal processes to changing sensory information), adapting the furniture to the needs of these youth might help to mitigate the behavior problems of these children at school. The authors evaluated one such environmental adaptation, the use of therapy balls as chairs.

Summary of evidence and accommodation criteria. Schilling et al. (2003) evaluated the effectiveness of adaptive furniture on legible word productivity and in-seat behavior of three fourth-grade students with ADHD. In this reversal design study, the authors found that when students were allowed to sit on therapy balls instead of regular chairs, both legible word productivity and in-seat behavior increased, as evidenced by visual analysis. However, insufficient evidence was available to calculate an ES.

Accommodation criteria. Insufficient evidence is available to determine whether allowing students with EBDs to sit on therapy balls is an accommodation. Although this potential accommodation designates a change in practices in schools and holds students to the same grade-level academic content standard, the evidence supporting mediating the impact of the disability is minimal (visual analyses only), and Schilling et al. (2003) did not measure a differential boost for students with ADHD.

Teacher Proximity

The second reviewed potential setting accommodation is teacher proximity. Granger et al. (1996) referred to teacher proximity as a function of access to the

teacher by the student. In the "teacher available" condition, teachers were instructed to facilitate student progress and redirect inappropriate behavior; that strategy was compared with a "teacher distal" condition wherein the teacher was across the room from the group of students providing undivided attention to another group of students. Granger et al. contended that teacher proximity to a student is a contextual variable that may or may not moderate the differences in behavior between students with ADHD and their typically developing peers.

Summary of evidence. Granger et al. (1996) evaluated the impact of teacher proximity on the behavior of 49 boys (5 to 12 years old), 26 with ADHD (13 ADHD only and 13 ADHD-aggressive); a comparison group consisted of 23 boys without ADHD engaged in an activity requiring mutual social demands (i.e., cooperative group effort) and in an activity requiring independent social demands (i.e., completed individually). They also evaluated the effects of stimulant medication on the behavioral outcomes of the two groups of students with ADHD and reported findings based on two age groups within the three diagnostic groups. Given the variety of contextual conditions (cooperative/individual, teacher proximal/distal), medication conditions, and the three groups of participants divided into two age groups, it is difficult to confirm a meaningful effect of teacher proximity alone on the groups of youth with ADHD as well as between the groups with ADHD and those without. For example, from the data provided, calculating ES to assess for a differential boost without considering medication effects resulted in 16 Cohen's *d*s, ranging from −0.96 to 1.87 with a mean of 0.10 (*SD* = 0.68). We note that the authors did report some improvements in behavior for boys with ADHD when a teacher was closer to the students compared to farther away from them; however, these benefits were restricted to certain outcome variables and depended on participant age and cooperative/individual social demands.

Accommodation criteria. It cannot be determined whether teacher proximity was a change in school practices or whether academic content standards were maintained as the authors did not provide sufficient information. Teacher proximity might be a change in school practices. The results of the Granger et al. (1996) study are suggestive of potential benefits for teacher proximity and possibly a differential boost, but the design of this study makes definitive conclusions about their findings as related to these criteria impossible.

Extratask Stimulation

The third potential setting accommodation is extratask stimulation. For example, music can be presented in the room, or movement can be added to the task. To set the stage for their rationale, Pelham et al. (2011) outlined the controversy pertaining to the distractibility of children with ADHD. Some experts argue that distractors have a negative impact on the performance of children with ADHD. Others contend that children with ADHD are underaroused and attempt to achieve an optimal level of arousal through disruptive behaviors and external stimulation (see Zentall & Leib, 1985). However, distractors that are highly salient (e.g., colored pictures; Radosh & Gittelman, 1981; Rosenthal & Allen, 1980), task relevant (e.g., visual distractors in figures, linguistic distractors during reading; Zentall & Shaw,

1980; Zentall, Zentall, & Barak, 1978; Zentall, Zentall, & Booth, 1978), or compete with each other (not less salient or novel ones such as a separate computer monitor with cartoons displayed; Lee & Zentall, 2002) have been found to increase levels of distractions and impairment for children with ADHD.

Summary of evidence. Two studies evaluated extratask stimulation. Pelham et al. (2011) evaluated the impact of extratask stimulation in the form of video and music stimuli as distracters on the behavior and academic productivity of 41 nine-year-olds diagnosed with ADHD compared with that of 26 students not diagnosed with ADHD. The authors found that a video stimulus resulted in distraction for boys both with and without ADHD but resulted in higher levels of distraction in the group with ADHD. The level of distraction was measured as on-task behavior through direct observation coded dichotomously. This higher level of distraction with the video stimulus led to more rule violations, more teacher prompts, and less seatwork completion between the groups ($d = -1.03 - [1.41]$), and within the group with ADHD ($d = -0.91 - 0.62$). However, relative to a no-distractor condition, there were individual differences in response to the music stimulus. The rate of work completion for the boys in the control group was not affected by the music—none improved and 1 demonstrated worsened performance. However, 29% of students with ADHD benefited from background music with increased seatwork completion ($d = -0.16$).

In an earlier study, Whalen and colleagues (1979) evaluated the effect of adding high ambient noise levels (i.e., rock music played on the radio) on the task attention and inappropriate behaviors (verbalization, physical contact, gross motor movement, high-energy acts, unexpected behavior) of 22 nine-year-old boys with hyperactivity, divided into medicated (i.e., dose of methylphenidate prescribed by participant physician) and nonmedicated (i.e., placebo) groups, and 39 without hyperactivity. The authors did not report sufficient information to calculate ES. The authors reported that adding music during an academic task led to reduced task attention and increased inappropriate behavior for all three groups. However, the decrease in task attention and increase in some inappropriate behaviors were greater for nonmedicated boys with ADHD, with differences in the probability of noise making between the groups of nonmedicated boys with hyperactivity and the comparison group being statistically significant at the $p < .01$ level.

Both groups were more likely to maintain attention to task in the quiet condition; however, the difference between on-task behavior during the noisy and quiet conditions was greater for the nonmedicated boys with hyperactivity, who were noisier than boys in the comparison group. In addition, the authors observed higher energy levels during noisy periods with within-group differences being statistically significant for nonmedicated boys with hyperactivity. Noisy periods resulted in more unexpected sudden activity than quiet periods to a greater degree for nonmedicated boys with hyperactivity than the other two groups. Also, nonmedicated boys with hyperactivity demonstrated more negative verbalizations during quiet periods than noisy periods. The authors did not provide sufficient information to calculate ES.

Accommodation criteria. Extratask stimulation constitutes a change to regular school practices and holds students to the same grade-level academic content

standard. Extratask stimulation, in the form of music, may mediate the impact of the disability for a minority of students; however, the two studies reviewed yielded mixed results. The evidence suggests that many students do worse if music is playing while they are attempting to complete academic tasks. Extratask stimulation in the form of video did not mediate the impact of the disability and might do more harm than good. Based on this evidence, extratask stimulation appears to not meet criteria for an accommodation for most students with ADHD.

Small-Group Instruction

The fourth reviewed potential setting accommodation is small-group instruction, which refers to instructing groups of students in smaller numbers than is frequently found in a typical classroom (e.g., four to six students; Hart et al., 2011). Citing benefits for children without disabilities, Hart et al. (2011) reasoned that small-group instruction has potential as an accommodation for students with ADHD, citing research that shows small-group instruction to be associated with increases in active learning in the general education setting (Foorman & Torgesen, 2001). Similarly, smaller class size has been linked to an enhancement in students' academic performance, engagement levels, and a reduction in disruptive classroom behavior (Finn, Gerber, Achilles, & Boyd-Zaharias, 2001; Finn & Pannozzo, 2004; Finn, Pannozzo, & Achilles, 2003). Further, Hart and colleagues hypothesized that small-group instruction would have beneficial effects for students with ADHD, as it reduces the student-teacher ratio and allows teachers to more readily monitor student behavior and provide feedback.

Summary of evidence. In one group-design study, Hart et al. (2011) evaluated the effectiveness of small-group instruction on the on-task behavior and work productivity of 33 students (7 to 12 years old) diagnosed with ADHD. Assessed via direct observation, students with ADHD were on task more during small-group instruction relative to whole-group and independent seatwork conditions (d = 0.68 and 0.49, respectively). Conversely, students with ADHD demonstrated less productivity during small-group testing than during whole-group testing (d = −0.29).

Accommodation criteria. Although small-group instruction constitutes a change to regular school practices and holds students to the same grade-level academic content standard, it is unclear if the impact of the disability was mediated, as work productivity worsened during small-group instruction relative to the other conditions. As the authors did not measure a differential boost, conclusions cannot be drawn. Thus, small-group instruction does not meet the criteria for an accommodation.

Summary: Potential Setting Accommodations

Insufficient evidence is available to determine whether the reviewed potential setting accommodations meet the definition of accommodation. Three of the potential setting accommodations (i.e., allowing students to sit on therapy balls, providing extratask stimulation, and small-group instruction) involve changes in practices in schools, but it is not clear whether teacher proximity was a change in school practices

(Criterion 1). Although the therapy ball strategy, extratask stimulation, and small-group instruction hold students to the same grade-level academic content standard, it cannot be determined whether state-mandated standards were maintained in the above studies (Criterion 2). The evidence suggesting that therapy balls mediate the impact of the disability is based on only 3 students with no opportunity to evaluate the magnitude of the effect, and teacher proximity yielded positive effects only for a minority of the dependent variables assessed (Criterion 3). Studies examining therapy balls and small-group instruction did not measure a differential boost. Teacher proximity does provide such a boost, and extratask stimulation might for a minority of children; however, results are mixed (Criterion 4).

Potential Accommodations: Timing/Scheduling

Two studies (Lewandowski et al., 2007; Pariseau et al., 2010) evaluated the effectiveness of extended time (i.e., allowing students more time to complete a test or assignments than are given to typically developing peers). Lewandowski et al. (2007) argued that youth with ADHD have a slower information-processing speed than peers, exhibit distractibility, have difficulty sustaining attention, and have a core deficit in executive functioning. Thus, test taking under timed conditions is particularly difficult, and students with ADHD often need additional time to demonstrate their knowledge. In contrast, Pariseau and colleagues (2010) argued that the provision of extended time for students with ADHD may be contraindicated by evidence suggesting that sustained attention is an area of weakness for individuals with this disorder. Thus, the rationale for their investigation was to determine the relative costs and benefits of extended time for students with ADHD.

Summary of Evidence. These two group-design studies evaluated the effectiveness of extended time on the classroom behavior, rate of work completion, and mathematics calculations of students with ADHD. Lewandowski and colleagues (2007) compared 27 students with ADHD and 27 students without in fifth to ninth grade. Pariseau and colleagues (2010) evaluated 33 students (M age = 9.59, SD = 1.51) diagnosed with ADHD. Across studies, mixed results were found.

Lewandowski et al. (2007) found that, on the Nelson-Denny Reading Test, children with and without ADHD attempted more items (d = −0.06) and answered more items correctly (d = −0.03) in the extended time condition (18 minutes) than in the standard condition (12 minutes). Further, the students without ADHD answered more items correctly than the group with ADHD during the 12-minute standard time condition (control M = 89.33, ADHD M = 64.52) and the 18-minute extended time condition (control M = 131.74, ADHD M = 97.52) and attempted more items than the students with ADHD during standard time (control M = 93.22, ADHD M = 72.07) and extended time (control M = 137.93, ADHD M = 108.04). In addition, the control group answered a higher percentage of items correctly than the group with ADHD in both standard (control M = 95%, ADHD M = 88%) and extended time (control M = 95%, ADHD M = 89%). Pariseau et al. (2010) found that youth with ADHD completed more correct mathematical problems per minute in the standard condition (i.e., 30 minutes) compared with the extended (i.e., 45 minutes) condition (d = −0.65). Further, the extended time condition did not reduce the behavioral problems of students with ADHD relative to the standard condition (d = 0.08).

Accommodation Criteria and Summary

Extended time constitutes a change in school practices and holds students to the same grade-level academic content standard. The determination of whether it mediates the impact of the disability depends on the behavior being targeted. If the manifestation of the disability being targeted is slow performance on tasks, then the evidence suggests that extended time does not mediate the disability because efficiency is no greater during the extended time than the standard time (Lewandowski et al., 2007) and may even be worse (Pariseau et al., 2010). If the behavior being targeted is completing tasks within the time given, then the evidence suggests that given extended time, students can complete more tasks and extended time may mediate the impact of the disability.

However, the findings from the Lewandowski et al. (2007) study indicate that extended time does not provide a differential boost to students with ADHD, as both groups benefited from extended time, and in fact the control group benefited more than the group with ADHD on the number of items attempted and number answered correctly. In conclusion, students with ADHD and those without can complete more work when they have more time to complete the work compared to when they have less time; however, students with ADHD will be less efficient and exhibit more behavior problems than those without the disorder. Thus, we cannot conclude that it meets the definition of an accommodation.

Potential Accommodations: Response

One study (Sutherland et al., 2003) that evaluated the effectiveness of a potential response accommodation, opportunities to respond (OTR), which refers to providing students with frequent opportunities to actively respond to academic requests. Sutherland et al. (2003) contended that as a relationship exists between problem behavior and instruction, increasing effective instruction will increase appropriate behavior. Increasing OTR is one effective instructional technique.

Summary of Evidence

This single-case study evaluated the effect of increasing OTR on the frequency of correct responses, disruptive behavior, and on-task behavior of 9 students (8 to 12 years old) with EBDs. In this reversal design study, the mean rate of correct responses per minute increased from 1.24 (*SD* = 0.53) in baseline to 2.69 (*SD* = 0.70) with increased OTR, decreased during the withdrawal phase (*M* = 1.35, *SD* = 0.8), and subsequently increased again when increased OTR was reintroduced (*M* = 2.60, *SD* = 0.60; see Table 2 for Tau *U* values). The percentage of correct responses increased from 71.8% (*SD* = 10.7) during baseline to 75.5% (*SD* = 10.6) during the use of increased OTR, decreased to 55.5% (*SD* = 4.9) during withdrawal, and increased to 73.8% (*SD* = 12.8) when OTR was reintroduced. The mean rate of disruptive behaviors per minute decreased from 2.64 (*SD* = 0.80) during baseline to 2.10 (*SD* = 0.25) during the use of OTR, increased during the withdrawal phase to 3.05 (*SD* = 0.18), and decreased to 1.91 (*SD* = 0.44) with the reintroduction of OTR with a moderate effect. The percentage of on-task intervals increased from 55% during baseline (SD = 9.4) to 78.9% (*SD* = 10.0) during the use of increased OTR, decreased to 65.4% (*SD* = 5.7) during withdrawal and increased to 82.6% (*SD* = 7.6) when increased OTR was reintroduced, indicating a strong effect.

Accommodation Criteria

We cannot determine whether increasing OTR is an accommodation. Although teachers' providing high rates of OTR may be a change in typical school practices, we cannot determine whether it mediates the impact of the disability, whether the skills taught to the students in this study were academically equivalent to grade-level state standards, or whether it provided a differential boost, as the design of the study does not allow us to address these questions. No summary is needed for potential response accommodations as OTR is the only potential accommodation in this area studied.

Potential Accommodations: Multiple Packaged

Two studies (Dunlap et al., 1991; Dunlap et al., 1996) evaluated the effectiveness of a package of multiple potential accommodations selected through functional assessment or analysis that changes the antecedent to problem behavior to address the function of the maladaptive behavior. For example, Dunlap et al. (1991) implemented and evaluated a set of potential accommodations based on the results of a functional assessment indicating that problem behaviors were least likely to occur when tasks (a) included shortened fine-motor and academically concentrated tasks, (b) were interspersed with large-motor activities, (c) incorporated student interest, and (d) were selected from a choice of activities and materials. Dunlap et al. (1991) argued that strategies selected from functional assessment or analysis are a viable alternative to intensive interventions such as medication and restrictive placements, as the strategy is selected from hypothesis testing that identifies the specific conditions under which the student is least likely to demonstrate a problem behavior.

Summary of Evidence

Two SCD studies evaluated the effects of using multiple potential accommodations derived from functional assessment or analysis on task engagement, disruptive behavior, task performance, on- and off-task behavior, and social interactions of 3 students (7 to 9 years old) with EBDs and 1 student (12 years old) with an EBD and ADHD. Assessed by direct observation in a multiple-baseline-design study, when packaged strategies were selected based on the results of functional analysis, task engagement, task performance, and on-task behavior increased and inappropriate verbalizations and disruptive behavior decreased relative to the baseline conditions. Dunlap et al. (1991) found that during the baseline phase, the percentage of intervals with disruptive behavior were highly variable; however, disruptive behavior was observed on 43% of the morning intervals and 78% of the afternoon intervals. During the intervention phase, disruptive behavior decreased to 4% and 0% of the morning and afternoon intervals, respectively, and on-task behavior increased from 89% to 100% of morning and afternoon intervals with strong effects (see Table 2). Appropriate social behavior increased from 28% and 33% across morning and afternoon periods to 47% and 49%, respectively, with moderate effects. Inappropriate vocalizations decreased from 7% and 8% in the mornings and afternoon to 0.3% for both periods.

In the second study, Dunlap et al. (1996) tested individualized strategies based on the results of functional assessment that included differing combinations of enlarged print size, increased spacing between letters, reduced assignment length,

underlining words, providing choices, and concrete activities with 3 students (7 and 9 years old). Results of this reversal design study were similar to those of Dunlap and colleagues (1991), as the participant demonstrated increased task engagement (Tau $U = 1.00$) and performance and decreased problem behavior (Tau $U = 0.94$) when provided these potential accommodations.

Accommodation Criteria and Summary

Despite the above-mentioned encouraging findings, insufficient evidence is available to determine whether packages of potential accommodations based on the results of functional assessment or analysis are an accommodation. Each package was a change in typical school procedures (Criterion 1); however, although the application of grade-level academic content standard was not specifically addressed, students in both studies were below grade level, and activities were designed at each student's academic level, indicating that the potential accommodation packages did not hold the students to the same grade-level academic content standard (Criterion 2). Further, although the packages did mediate the impact of the disability as evidenced by increasing appropriate social interactions, task engagement, and performance and decreasing disruptive behavior (Criterion 3), the presence of a differential boost was not measured, as there were no participants without a disorder (Criterion 4). Therefore, packages comprising multiple potential accommodations do not yet meet the criteria for an accommodation.

Discussion

We reviewed the literature for scientific evidence to guide the use of accommodations with students with EBD and those with ADHD. Our purpose was to evaluate the effectiveness of potential accommodations specific to this population, to determine which potential accommodations met the definition of accommodation, and to highlight prioritized areas for future research. Unfortunately, similar to the results of the Tindal and Fuchs (2000) review of the evidence for the effectiveness of accommodations for all disabilities, we found that experts in the field recommend many accommodations; yet few have scientific evidence of effectiveness. In fact, of the 12 potential accommodations reviewed, only 4 were evaluated in more than one study, and only 5 of the 12 were evaluated with more than 10 participants across all studies. Our conclusions and critique of the state of the science on accommodation effectiveness highlight several important issues for future research. Below, we discuss these issues and the implications of our findings for future research aimed at determining which strategies are truly accommodations that lead to functional improvements for students with behavioral challenges.

Research Quality

We acknowledge that our criteria for including studies in this review were less rigorous than standards of evidence typically established by experts and professional organizations such as the What Works Clearinghouse (see http://ies.ed.gov/ncee/wwc/documentsum.aspx?sid=19) and the APA Presidential Task Force on Evidence-Based Practice (2006). However, given the minimal amount of research conducted in this area, we decided to be overly inclusive in our selection of articles. For example, the What Works Clearinghouse (for group design) requires two studies showing statistically significant positive effects for an intervention to be

considered to have positive effects. The standards for SCD require five SCD papers for "Meets Evidence Standards" or "Meets Evidence Standards With Reservations."

Only choice making, packaged interventions, extended time, and extratask stimulation were evaluated in more than one study. Choice making was evaluated in four SCD studies, packaged interventions were evaluated in two SCD studies, and extended time and extratask stimulation were evaluated in two quasi-experimental designs. As a result, none of the proposed accommodations meet evidence standards according to either of these sets of criteria. This conclusion is independent of whether the proposed accommodations meet the definition of *accommodation;* this finding simply reflects the lack of support for effectiveness. Considerably more research, including replication of findings, is needed to build a substantive research base (B. Thompson, 2006).

Of the 68 potential accommodations recommended for this population in the literature, we found only 18 peer-reviewed studies that evaluated 12 of the potential accommodations with limited samples of students and minimal diversity (i.e., race, gender, age). Participants in the studies were primarily Caucasian, male, and in elementary schools. However, minimal participant demographic information was provided, and only 4 studies reported the ethnicity of participants. In addition, the methods of reporting results were insufficient in most papers. One SCD study (out of 11) and 5 group-design studies (out of 7) reported *SD*s with means, and none of the authors reported CIs. According to the American Psychological Association (2009), means and *SD*s should always be reported, and the use of CIs is strongly recommended. In addition, none of the SCD studies reported ESs, and only 33% of the studies reported ESs for any outcome variable. The effectiveness of the potential accommodations cannot be compared across studies without ESs, as replication cannot be determined using statistical significance testing (Harrison, Thompson, & Vannest, 2009; B. Thompson, 2002).

Definitions and Criteria

This is the first review paper to attempt to clarify mutually exclusive definitions for *accommodations, interventions*, and *modifications.* In developing these definitions, we took a systematic approach and included most aspects of definitions proposed by others and incorporated established procedures for definition development. Although there is room for improvement, we encourage researchers and educators to consider adopting these definitions in their work and to systematically examine the application of these definitions in both research and practice. Adopting standard definitions of these terms can reduce the confusion in both science and practice. This review also represents the first attempt to examine the extent to which each potential accommodation met all four criteria contained within the proposed definition of *accommodation.* In this small body of research, no potential accommodations were found that met all components of the definition. Thus, in the context of accommodation development research, it is important to consider both (a) developing accommodations that have the potential to meet all four criteria in the definition and (b) evaluating the effectiveness of the accommodation using methods and measurements that allow for assessment of all four criteria in the definition.

With regard to the first criterion (change in school practices), 16 of 18 studies provided sufficient data to determine whether the strategy represented a departure from typical school practice. Thus, future studies should continue to articulate the extent to which a given practice departs from standard school practice to establish a normative record about which practices are considered to be departures from school practice. With regard to the second criterion (grade-level academic content standard), it is important to recognize a key difference between a modification and an accommodation. A modification involves changing the difficulty or grade level of the task to make it easier, whereas an accommodation maintains the difficulty of the content to match the grade of the student. In 7 of the 18 studies reviewed, the grade level of the academic content was not reported.

Although some potential accommodations can be applied to any assignment or task at the appropriate grade level, we evaluated the potential accommodations based on information provided by the authors of each study. This choice is not simply an arbitrary issue of definitions, as typically accommodations can be used on state-mandated assessments whereas modifications to the academic content are not allowed. Furthermore, according to best practices and many state requirements, accommodations included on mandated assessment should be the same as those implemented during classroom instruction. To determine whether research was conducted on an accommodation or a modification, future studies should include information about the content of the assignment, tasks, and outcome variables as they relate to grade-level standards.

Not surprisingly, all 18 studies provided data that allowed us to assess the third criterion (mediates the impact of the disability); indeed, the goal of most of the studies was to examine whether the service improved the performance of the target population. Based on Criterion 3, choice making, adding interest, adaptive furniture, OTR, and packaged potential accommodations selected based on the function of the behavior benefited some students with EBDs and ADHD. Fast-paced instruction, teacher proximity, shortened task length, and small-group instruction mediated some behavioral impairment associated with EBDs and ADHD. Extended time does not appear to mediate the impact of EBDs or ADHD. In addition, mixed results were found for extratask stimulation in the form of background music. Nevertheless, as noted earlier, the evidence supporting the benefit of any of these potential accommodations to students is based on very small samples and too few studies to conclude that any of them mediate the impact of the disability.

The selection of relevant outcome measures is an important factor when determining whether a potential accommodation mediates impairment associated with a disability. For example, some of the research was straightforward such as giving students (with or without disabilities) more time to complete a task and observing the likelihood of task completion. Similarly, making a task shorter also increases the likelihood that students with disabilities will complete it. Although these strategies do not reduce the grade level of the academic task (i.e., modification), they are simply a reduction in expectations and may compromise learning. Questions persist about whether simply reducing expectations by shortening tasks or extending time enhances learning and engagement in the instructional activities. Studies examining the effect of services on learning academic skills should be prioritized in future work.

Only 5 of 18 studies—1 of teacher availability, 2 of extratask stimulation, 1 of extended time, and 1 of added structure—used a methodology that allowed us to evaluate the fourth criterion, whether the potential accommodation provided a differential boost, and 3 studies provided ESs or sufficient information to calculate ESs. One of the reasons that it was often not possible to determine differential boost was that, similar to Tindal and Fuchs (2000), we found that a majority of reviewed studies did not include a comparison of outcomes between groups of youth with EBDs or ADHD and those without. Teacher availability (Granger et al., 1996) was the only strategy with some evidence of a differential boost, but due to design issues as detailed previously, we were not able to draw conclusions about differential boost from that study. Both children with hyperactivity and those without benefited from adding structure to tasks (Zentall & Leib, 1985), and children without ADHD benefited more from extended time than did those with ADHD (Lewandowski et al., 2007).

Some of the potential accommodations were more beneficial for small groups of students with EBDs or ADHD than for those without. For example, extratask stimulation in the form of background music may provide a differential boost for a minority of students with ADHD (Pelham et al., 2011), but evidence of an overall effect was not found. Whalen et al. (1979) provided contradictory evidence, reporting harmful effects of extratask stimulation to children with hyperactivity. Additional research is available on the effect of playing background music with this population, but none met our inclusion criteria. For example, Abikoff, Courtney, Szeibel, and Koplewicz (1996) found that boys with ADHD completed more arithmetic problems correctly with background music than with speech or silence, but the study was conducted in a room that did not mimic typical classroom conditions. Additional applied research is needed to compare the effects of each of these potential accommodations in students with EBDs or ADHD to those who do not have these disabilities.

Differential boost was not included in all prior definitions. We elected to include differential boost as a component of our definition because the very purpose of an accommodation is to provide equal access to students with disabilities and thus level the playing field (Luke & Schwartz, 2007). This claim does not mean that the strategy cannot provide any benefit to a student without a disability. However, we agree with the description of differential boost reported by others (Phillips, 1994; Tindal & Fuchs, 2000) who stated that if an accommodation provides the same or less benefit to students with EBDs and ADHD as to those without, then it does not level the playing field. Allowing a student who is blind to read a book written in Braille would be an effective accommodation for a student with a visual impairment but would not provide any benefit to a student who does not have a visual impairment and thus would be considered an accommodation. None of the potential accommodations that we reviewed met this standard.

If Not Accommodations, Then What?

There is minimal evidence that some of the strategies reviewed might help some students improve their behavior, but there is little to suggest that they are more beneficial for children with EBDs and ADHD than for other students. Thus, it is possible that if further research determines that some of these strategies benefit students with EBDs and ADHD, then these practices simply represent good

teaching. Providing students with choices, access to teachers, OTRs, and many of the other practices recommended as accommodations or interventions are techniques that are likely to help all students and might be effectively used within a program based on universal design for learning (UDL) principles. UDL addresses learner diversity during curriculum design and includes differentiation within the curriculum (Hall, Strangman, & Meyer, 2003). Loe and Feldman (2007) contended that the antecedent-oriented management strategies reviewed by Hoffman and DuPaul (2000) are appropriate for UDL. In addition, within UDL, some previously timed tasks and assessments could be administered without time limitations (depending on the purpose of time restraints), and thus any benefit of extended time would be afforded to all students (Johnstone, Thompson, Bottsford-Miller, & Thorlow, 2008; Lewandowski et al., 2007). Some contend that the effectiveness of accommodations is established on a case-by-case basis by special educators in the classroom and that empirical evidence is not necessary. However, referring to these techniques as *accommodations* or *interventions* may reduce the expectation that they should be provided to all students. They may become something that is provided only if stipulated on an IEP or in a 504 plan. Instead, the techniques with evidence of benefit to students may serve as an addition to the definition of best practices that we expect from all teachers.

Unintended Consequences

There are many techniques that are recommended as accommodations that have not been evaluated in any applied research that we could find. For example, reducing consequences for late assignments and providing teacher-prepared notes to students during class are two recommended practices. We acknowledge that, as a field, we have worked hard to ensure equity for individuals with disabilities. However, it is worthwhile to consider the negative side effects that may be associated with many of these services. Specifically, there may be disadvantages to providing some proposed accommodations alone instead of accompanying them with interventions. For example, if a child with a deficiency in reading were provided with recorded books and tests were read to him or her, these techniques might appear to benefit the student. Missing in this package of services is a remedial reading intervention to improve the student's reading to the point where the accommodations are no longer needed. Concern exists that as general and special education teachers are strongly encouraged to provide accommodations, many may provide accommodations instead of the interventions and effective instruction that are needed to reduce or eliminate the impairment associated with the disability. Thus, these students may never get to a point where they can independently function and meet grade-level academic, behavioral, and social expectations. Services that focus only on reducing expectations instead of including interventions that will enhance learning and independent functioning may further disable students and ensure their lack of preparedness for adulthood. Used inappropriately, accommodations can simply water down the curriculum and, in essence, deny students access to the general education curriculum. In fact, some have argued that accommodations should be used only as last resorts for these students after all forms of intervention have been tried or in combination with interventions (Evans, Owens, Mautone, DuPaul, & Power, in press).

Limitations

We acknowledge that this review is not without limitations. Because our goal was to review studies that provide evidence of the effectiveness of accommodations in the context of typical classroom conditions, we excluded studies that were conducted in settings that did not mimic typical classroom conditions (e.g., in clinics, small rooms with one-to-one staff ratios, laboratories). This exclusion criterion may have reduced the number of high-quality, rigorous studies that assessed all four criteria in the definition of *accommodations.* In addition, some may view our combining of youth with EBDs and youth with ADHD as a limitation, as this combination results in a heterogeneous group of students. However, had we excluded either group, the number of studies reviewed would have decreased by 50%; additionally, the presenting problems of children with these disorders are usually quite similar, and a large portion of those with EBDs meet diagnostic criteria for ADHD. Finally, although we calculated individual ESs, it was not possible to calculate an overall or meta-ES. However, given the small number of studies and the heterogeneity of study designs and outcome variables, the literature on this topic is insufficient for such a quantitative analysis.

Conclusion

Within an era of evidence-based interventions, the lack of research on the effective use of accommodations is surprising. As a field we acknowledge, emphasize, and strongly encourage, at times through mandates, the use of strategies with evidence for effectiveness; however, our results indicate that this is not the case with accommodations. Multiple accommodations are being recommended without any evidence of effectiveness. This approach costs students in terms of their potential long-term outcomes, costs teachers' effort and time providing services unlikely to work, and costs districts and communities the resources used to provide these strategies. The lack of scientific attention to this area of research contributes to these unfortunate practices, and much more intervention, modification, and accommodation development and evaluation work for students with EBDs and ADHD is needed. This need for research may be most needed for adolescents as a very small portion of the work that has been done has focused on this age group in secondary schools. As stated by Luke and Schwartz (2007), "as researchers and policy makers continue to wrestle with these complex issues, IEP teams will need to stay current as policies and recommended practices evolve" (p. 5).

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References marked with two asterisks indicate prior reviews or discussion articles included in Phase 1.

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