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**The Effectiveness of Function-Based Interventions in
Inclusive Classrooms of Elementary Schools**

by

Eunyoung Shin

A Starred Paper

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St. Cloud State University

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Chapter 1: Introduction

In 1975 the U.S. Congress passed the Education for All Handicapped Children Act (EAHCA) which mandated students with disabilities to be educated in the least restrictive environment (LRE). The EAHCA required that the general education classroom should be the first consideration of placing students with disabilities before placing students with disabilities in separate special education classrooms all day long. At that time, the term of mainstreaming emerged to support the practice of educating students with disabilities in the LRE. When the EAHCA was renamed as the Individuals with Disabilities Education Act (IDEA) in 1990, the term of mainstreaming was replaced by the term of inclusion. While mainstreaming emphasized that students with mild disabilities should be educated in the general education classroom with their peers during non-academic activities for part of the day, inclusion allowed all students with disabilities, including student with severe disabilities, to participate in academic and non-academic activities in the general education classroom with their peers as much extend as appropriate possible (Alquraini & Gut, 2012). According to the National Center for Education Statistics (NCES; 2019), based on all students who were 6 to 21 years old served under IDEA, the percentage of students with disabilities who spent most of their time in general education classrooms, which is also referred to as inclusive classrooms, had increased over the past few years. In alignment with this tendency, many researchers have reported the advantages of inclusion when it comes to academic and social competence for both students with and without disabilities (Mavropoulou & Sideridis, 2014).

While students with disabilities who receive special education services have meaningful opportunities by accessing inclusive classrooms, there have been concerns that their challenging

behaviors have negatively influenced academic progress and positive social relationships with their peers. In addition, students without disabilities whose challenging behaviors have negatively affected their academic performances in inclusive classrooms are called at-risk students (Lewis, McIntosh, Simonsen, Mitchell, & Hatton, 2017). Both at-risk students and students with disabilities have been jeopardized with their continued placements in inclusive classrooms due to the ongoing challenging behaviors (Lohrmann & Bambara, 2006). To prevent delayed support until those students are relocated to segregated classrooms, appropriate interventions are recommended to implement in their natural environments (McIntosh & Goodman, 2016). As a result, the No Child Left Behind Act (NCLB; 2001) mandated that schools should implement effective interventions to support students who engage in challenging behaviors while keeping them in their current placements.

The need for effective behavior intervention strategies in school settings is on the rise by considering that the Individuals with Disabilities Education Act (1997) which started requiring functional behavior assessments (FBAs) and behavior support plans (BSPs), and it applies to all students regardless of the categories of their disabilities when their behavior issues interfere with the academic performances. The evidence-based practice to deal with challenging behaviors involves the implementation of FBAs to design individualized function-based interventions (FBIs) (Scott & Cooper, 2017). FBAs are assessments to figure out the reason why a student engages in challenging behaviors by identifying relations between behaviors and environments which occur and maintain behaviors (O'Neill et al., 1997). FBIs, which are part of BSPs or behavior intervention plans (BIPs), are proactive behavior interventions to prevent challenging behaviors and increase appropriate behaviors by modifying environments and teaching

replacement behaviors based on the information of FBAs (Goh & Bambara, 2012). Moreover, interventions based on FBAs have proven to be more successful in reducing challenging behaviors and increasing appropriate behaviors than the intervention without FBAs (Ingram, Lewis-Palmer, & Sugai, 2005).

School-wide positive behavioral interventions and supports (SWPBIS), which is also referred to as positive behavioral interventions and supports (PBIS), is a multi-tiered systematic approach to prevent challenging behaviors across all students in schools (Sugai & Horner, 2002). In the traditional SWPBIS model, FBAs and FBIs are generally conducted for students who exhibit severe behaviors, and do not respond to primary (Tier 1) or secondary (Tier 2) behavioral supports of SWPBIS in more segregated settings such as self-contained classrooms, therapy rooms, or treatment facilities (Umbreit & Ferro, 2015). Nevertheless, researchers supported FBAs and FBIs at the tertiary level (Tier 3) of SWPBIS to be applied and extended to inclusive settings for any students with and without disabilities who have challenging behaviors. It may contribute to providing more meaningful education, including both academic and social achievement for at-risk students and students with disabilities. Moreover, the potential effectiveness of FBIs in inclusive classrooms will encourage school personnel to have positive perspectives on inclusive education (Walker, Chung, & Bonnet, 2018).

The purpose of this paper was to review the literature that demonstrates the effectiveness of FBIs based on FBAs implemented in inclusive classrooms of elementary schools in supporting at-risk students and students with disabilities.

Research Question

One question guided this literature review: Are function-based interventions (FBIs) based on functional behavior assessments (FBAs) effective in reducing challenging behaviors or increasing appropriate behaviors for at-risk students and students with disabilities in inclusive classrooms of elementary schools?

Focus of the Paper

In Chapter 2, the review of the literature includes 12 studies. The studies include a range of dates from 2007 to 2019 that examined the effectiveness of FBIs based on FBAs for at-risk students and students with disabilities implemented in inclusive classrooms of elementary schools. I located my research by using the Academic Search Premier, ERIC, PsycINFO and ProQuest Dissertation. I used several keywords and combinations of keywords, including *FBI*, *function-based support*, *SWPBIS*, *PBIS*, *PBS*, *BIP*, *Individualized positive behavioral interventions and support*, *FBA*, *functional assessment*, *inclusion*, *inclusive classroom*, *general education classroom*, *regular education classroom*, *elementary school*.

Historical Background

In the late 1970s, challenging behaviors started to be labeled with the concept of “function.” Challenging behaviors were simply considered as unwanted responses that should be discouraged or removed prior to the introduction of this concept, but the functional approach resulted in addressing why individuals engaged in challenging behaviors. The field of function-based interventions (FBIs) has evolved since then (Dunlap & Fox, 2011).

Carr (1977) initiated to identify the function of self-injurious behavior (SIB) which might be reinforced by gaining attention, escaping from task demands, or gaining sensory stimulation.

Iwata, Dorsey, Slifer, Bauman, and Richman (1982) developed experimental procedures for identifying and deciding the function of SIB. After those studies were conducted for individuals with severe developmental disabilities in residential facilities, Repp, Felce, and Barton (1988) developed interventions for SIB for children with severe developmental disabilities in segregated special education classrooms. Thus, those early studies focused on individuals with intellectual or developmental disabilities who have severe challenging behaviors (e.g., physical aggression and self-injury), and interventions were implemented by clinicians or research staff in segregated environments (Umbreit & Ferro, 2015).

However, the use of FBIs was extended from individuals with severe disabilities to those with mild or moderate disabilities or at-risk individuals. In addition, the placement for implementing FBIs switched from restrictive environments to natural environments (Umbreit & Ferro, 2015). General education classrooms started implementing FBIs to assist students with mild disabilities to maintain access to less restrictive environment. To illustrate, researchers worked with both the student with emotional and behavioral disorder (EBD) and the student with attention deficit hyperactivity disorder (ADHD) in general education classrooms (Kern, Childs, Dunlap, Clarke, & Falk, 1994; Umbreit, 1995).

Many recent studies that conduct FBAs and BSPs (i.e., FBIs) in school settings have been enhanced. Furthermore, IDEA (1997) and the reauthorization of IDEA (2004) has continually encouraged teachers to use FBAs and BSPs for students with challenging behaviors in schools (Goh & Bambara, 2012). As a result, 29 states have ratified special education legislation for FBAs and BSPs restated or exceeded IDEA requirements (von Ravensberg & Blakely, 2014).

Theoretical Background

Functional approaches to behavior intervention planning were established on the foundation of positive behavior support (PBS). PBS is an applied science that uses educational methods and environmental redesign to improve the individual's quality of life and reduce problem behaviors. PBS emerged from applied behavior analysis, the normalization/inclusion movement, and person-centered values (Carr et al., 2002). In order to prevent and eliminate challenging behaviors in schools, school-wide positive behavioral interventions and supports (SWPBIS) applies those characteristics of PBS to the whole school context as a three-tiered model: (a) primary prevention, general strategies for all students in all school setting; (b) secondary prevention, targeted strategies for at-risk students with developing chronic challenging behaviors; and (c) tertiary prevention, highly intensive individualized support for students with pervasive challenging behaviors. The use of FBAs and FBIs is recommended in the tertiary prevention for any student who is not responsive to primary or secondary preventions (Horner, Sugai, Todd, & Lewis-Palmer, 2005).

FBAs determine the function of behavior which is the reason why a student engages in challenging behaviors. The functions of behaviors include seeking social attention, obtaining access to tangibles reinforcements or preferred activities, escaping or avoiding from unwanted tasks or activities, and gaining automatic or sensory reinforcement (O'Neill et al., 1997). FBAs can be categorized as indirect (e.g., interview, checklist, and rating scale), descriptive/non-experimental (e.g., direct observation using ABC recording), and experimental (e.g., functional analysis and trial-based functional analysis) methods. The majority of the procedures of FBAs includes gathering indirect data, building preliminary hypotheses, and verifying those hypotheses

by collecting data using interview, direct observation or manipulating setting events, antecedents, and consequences (Anderson, Rodriguez, & Campbell, 2015).

FBI s are designed and developed when the function of challenging behaviors is identified through FBAs. The types of interventions can be categorized as antecedent-based, consequence-based, and multi-component interventions (Walker et al., 2018). First, antecedent-based interventions are to identify triggers and signs of challenging behaviors and to modify the environment prior to exhibiting the challenging behavior (e.g., prompting, visual supports, curricular modification, choice-making, noncontingent reinforcement, and self-monitoring). Second, consequence-based interventions are to implement corresponding to the challenging behaviors (e.g., differential reinforcement, extinction, positive reinforcement, and redirection). Lastly, multi-component interventions are a combination of two or more interventions, which include antecedent-based interventions, teaching replacement behaviors, and consequence-based interventions (Goh & Bambara, 2012).

The empirical support of FBAs and FBI s has been developed by researchers since the early 1990s. Some researchers have started to examine the effectiveness of FBI s for students being engaged in challenging behaviors in inclusive classrooms (Lloyd, Barton, Ledbetter-Cho, Pennington, & Pozorski, 2019). Goh and Bambara (2012) concluded that the implementation of FBI s was effective across various students (i.e., developmental disabilities, other disabilities, and no diagnosed disability) and a variety of classroom settings (i.e., general and special education settings). In addition, Walker et al. (2018) demonstrated that more positive behavior outcomes were presented when FBI s were implemented by teachers compared to researchers and in whole-group rather than in small-group. Lloyd et al. (2019) also supported the success of teacher-

implemented FBIs for students with and without disabilities in K-8 inclusive education classrooms. Prospectively, many current studies support the evidence of FBIs implemented in diverse students regardless of disabilities, school personnel including teachers and paraprofessionals, and school settings outside of just special education classrooms.

Importance of the Topic

More and more teachers feel burnt-out in school as they struggle with students' challenging behaviors. They express their concerns about not being prepared and being poorly supported to deal with the increasing number of students' challenging behaviors. Researchers found that teachers with higher levels of self-efficacy for classroom management were less likely to have burnout syndrome (Aloe, Amo, & Shanahan, 2014). Baker (2005) found that a strong sense of self-efficacy was connected to a teacher's willingness to implement effective behavior management strategies to meet the needs of individual students. Hence, teachers' self-efficacy can be enhanced by their positive perceptions of implementing FBAs and FBIs for students' challenging behaviors in their classrooms.

Despite the proven effectiveness of FBIs in the school system supported by many researchers, school personnel (e.g., general education teacher, special education teacher, school psychologist, behavior specialist, social worker, paraprofessional, and administrator) have been struggling to conduct FBAs and FBIs in school systems. This is because there are no specific procedures, regulations, and guidelines in the regulations when school personnel conduct FBAs and FBIs (Scott, Anderson, & Spaulding, 2008). In addition, there are barriers such as higher student-teacher ratio, no prior training, lack of administrative support, insufficient time, availability of resources and collaborating with family as well as other school staffs (Bambara,

Goh, Kern, & Caskie, 2012). As I am a special education teacher, I would like to focus on school personnel's capacities to strengthen their knowledge and skills of FBIs based on FBAs. Therefore, I believe that the implementation of FBAs and FBIs by trained school personnel could help to mitigate those limitations in a productive way.

Considering this, this paper examined how effective FBIs are to reduce challenging behaviors or to increase appropriate behaviors for at-risk students and students with disabilities in inclusive classrooms of elementary schools.

Definition of Terms

ABC recording is a direct observational tool to collect information to analyze relations between the behavior and its antecedents and consequences (Mayer, Sulzer-Azaroff, & Wallace, 2014).

Contingencies are relations between behaviors and antecedents and consequences, which can occur naturally or intentionally by presenting, withdrawing, or withholding stimuli to influence behaviors (Mayer et al., 2014).

Differential Reinforcement of Alternative behavior (DRA) is one of the consequence-based interventions by which any alternative behaviors are reinforced although reinforcement is withheld from challenging behaviors (Mayer et al., 2014).

Differential Reinforcement of Other behaviors (DRO) is one of the consequence-based interventions to deliver reinforcement for any appropriate behavior when challenging behaviors do not occur during a certain time (Mayer et al., 2014).

Functional analysis is an experimental assessment to identify relations between behaviors and environments by manipulating antecedents and consequences related to the function of behaviors (Anderson et al., 2015).

Function Behavioral Assessment (FBA) is an assessment applied to figure out the reason why a student engages in challenging behaviors by identifying relations between behaviors and environments that occur and maintain behaviors (O'Neill et al., 1997).

Function-Based Intervention (FBI) is a proactive behavior intervention to prevent challenging behaviors and to increase appropriate behaviors by modifying environments and teaching replacement behaviors based on the information of FBA (Goh & Bambara, 2012).

Function Matrix is a visual tool to determine the function of behavior (Umbreit, Ferro, Liaupsin, & Lane, 2007).

Inclusive Classroom is a general education classroom where students with disabilities should be taught with students without disabilities (Alquraini & Gut, 2012).

Individuals with Disabilities Education Act (IDEA) is a law that provides free appropriate public education to eligible children with disabilities in the United States. In 1990, the United States Congress reauthorized the Education for All Handicapped Children Act (EHA) of 1975 (Yell, 2012).

Least Restrictive Environment (LRE) refers to students with disabilities learning with students without disabilities in public or private schools or other facilities “to the maximum extent appropriate.” Students with disabilities are placed in special education classrooms or separate schools only when they are not able to learn adequately with other supports and services in general education classrooms (Education for All Handicapped Children Act, 1975),

Non-Contingent Attention (NCA) is one of the antecedent-based interventions in which social attention is consistently delivered regardless of an individual's behaviors (Banda & Sokolosky, 2012)

School-Wide Positive Behavioral Interventions and Supports (SWPBIS) is a multi-tiered framework to build efficient and effective positive behavior systems in schools by reducing discriminatory discipline practices (Sugai & Horner, 2002).

Chapter 2: Review of the Literature

The purpose of this literature was to examine the effectiveness of function-based interventions (FBIs) based on functional behavior assessments (FBAs) implemented in inclusive classrooms of elementary schools in supporting at-risk students and students with disabilities. This chapter is organized into three types of function-based interventions: (a) antecedence-based interventions; (b) consequence-based interventions; and (c) and multi-component interventions. All studies were conducted in elementary schools in the United States except for two studies (i.e., South Korea and Iceland). Participants ranged in the grade levels from kindergarten to sixth grade. Studies within each section are presented in chronological order, beginning with the oldest study.

Antecedent-Based Interventions

Haley, Heick, and Luiselli (2010) investigated the effectiveness of the antecedent-based intervention using visual cards for a student with autism spectrum disorder (ASD) in the second-grade inclusive classroom. The participant, Sean, was an 8-year-old male diagnosed with ASD in second grade. He spent most of his school time in the second-grade classroom, which consisted of 18 students without disabilities and three students with special needs. He engaged in vocal stereotypy, defined as any audible vocalizing without context or purpose (e.g., repetitive sounds, humming, and singing), which impeded his learning in class.

To determine the function of vocal stereotypy, FBAs including an interview and direct observation were conducted. Sean's vocal stereotypy was observed by the researcher throughout the school day. In addition, the special education teacher was interviewed, and it was found that

his vocal stereotypy occurred when he was alone, which appeared that his vocal stereotypy was automatically reinforced by sensory stimulation (Haley et al., 2010).

The researcher developed an alternating treatments design consisting of five phases: the baseline for four sessions, the initial intervention for nine sessions, the withdrawal for four sessions, the second intervention for seven sessions, and the generalization for five sessions, to evaluate the effectiveness of the intervention. Each session lasted 30 minutes. The data for vocal stereotypy across phases were collected by 15-second interval recording. During baseline and withdrawal phases, Sean was redirected to work on his task when his vocal stereotypy occurred but received a reward for a choice activity when he was not engaged in vocal stereotypy for 2 minutes. Before the implementation of the intervention, the student and the paraprofessional received training in using visual cards in the special education classroom. Sean was taught to discriminate between two visual cards; these were a red one containing his name and the word “quiet” and a green one containing his name and the phrase “okay to speak out.” He should be quiet when the red card was on his desk but was allowed to speak out when the green card was on his desk. During intervention phases, the paraprofessional picked up the red card and placed it in front of his face to show him the red card when his vocal stereotypy occurred. On the contrary, any responses were not shown when the green card was provided, and his vocal stereotypy occurred. The paraprofessional presented each visual card for 15 minutes. During the generalization period, the intervention was implemented by removing his name, words, and phrase on the cards in other classes (Haley et al., 2010).

As a result, a mean of vocal stereotypy was 48% during the baseline phase. During the initial intervention phase, an average of vocal stereotypy was 21% when the red card was

presented and was 46% when the green card was presented. During the withdrawal phase, vocal stereotypy averaged 43%. During the second intervention phase, an average of vocal stereotypy was 18% when the red card presented and was 50% when the green card was presented. The result of the generalization phase was similar to that of intervention phases (Haley et al., 2010).

Interobserver agreement (IOA) which is the degree in which two or more observers agree upon the occurrence of the behavior was 92.4%. Treatment fidelity is to assess how consistently and correctly intervention procedures were implemented, which was 96.2% during the intervention sessions (Haley et al., 2010).

Consequently, researchers reported that the antecedent-based intervention using visual cards was effective to decrease vocal stereotypy for the student with ASD in the inclusive classroom. However, identified limitations of this study were the small sample size, insufficient time for the intervention, the short-term outcome, and the single-component intervention (Haley et al., 2010).

Banda and Sokolosky (2012) studied that using noncontingent attention (NCA) was beneficial for a student with attention deficit hyperactivity disorder (ADHD) to decrease talking-out behaviors in the first-grade inclusive classroom. The participant, Andrew, was a 7-year-old male diagnosed with ADHD. He stayed in the special education classroom as well as the first-grade classroom which consisted of 19 students. His challenging behaviors were talking-out behaviors (e.g., growling, shill sounds, and self-talk) that interrupted the other students' work.

FBAs including an interview with the teacher, direct observation, and functional analysis were conducted to figure out the function of talking-out behavior. Through an interview and direct observation in the classroom, researchers hypothesized that the function of talking-out

behavior was to gain attention from the teacher. Functional analysis was conducted to definitively prove the hypothesis with three conditions: demand, attention, and play conditions. First, the teacher stopped him from doing his task when the talk-out behavior occurred during the demand condition. Next, he gained attention (i.e., “Talking quietly” or “No talking”) from the teacher when he engaged in the talking-out behavior during the attention condition. Last, he received the preferred task while the taking-out behavior was ignored during the play condition. Thus, the functional analysis demonstrated Andrew’s behavior was caused by attention from the teacher (Banda & Sokolosky, 2012).

The FBI using NCA intervention originated from noncontingent reinforcement (NCR). NCR is the antecedent-based intervention to provide reinforcement on a fixed-time schedule without any relation to any behaviors including the target behavior. In this regard, NCA is to provide attention on a fixed-time schedule regardless of any specific behaviors (Banda & Sokolosky, 2012).

A withdrawal design to assess the effectiveness of the intervention consisted of the baseline for five sessions, the first intervention for nine sessions, the withdrawal for five sessions, and the second intervention for ten sessions. The frequencies of talk-out behaviors were recorded for 5 minutes each session. During baseline and withdrawal phases, the teacher redirected him to focus on his work when the talking-out behavior occurred and provided reinforcements (e.g., verbal praise or stickers) to him when he finished his task. During intervention phases, the teacher received training about NCA. The teacher started using a greeting, smile, or eye contact and then interacted with Andrew for 5 seconds (e.g., “Doing OK?” or “Let’s keep working”) on a fixed-interval 20-second schedule for 5 minutes. The

vibration of the timer prompted the teacher to implement NCA. This intervention encouraged him to keep his work while providing social attention to him (Banda & Sokolosky, 2012).

Results showed that an average of frequencies of talking-out behaviors was 22.2 during the first baseline phase and decreased to 9.5 during the first intervention phase. An average of frequencies of talking-out behaviors was 38.8 during the withdrawal phase and decreased to 6.6 during the second intervention phase. Thus, Andrew was less engaged in talking-out behaviors during the intervention phases rather than during the baseline and withdrawal phases (Banda & Sokolosky, 2012).

IOA was 95% during the functional analysis and was 96% during the baseline and intervention phases. Treatment fidelity using a checklist was 96%. Social validity is to assess the acceptability and feasibility of the interventions. Social validity using the Likert-type questionnaire was responded by the general education teacher who implemented the intervention. She strongly agreed with most of the questions. Therefore, the teacher was satisfied with the positive outcome and had a plan to continually implement NCA in the classroom (Banda & Sokolosky, 2012).

Overall, using NCA was effective for the student with ADHD to decrease talking-out behaviors maintained by social attention in the inclusive classroom. This is because the participant could receive enough attention from the teacher before engaging in attention-seeking behavior. Yet, there were some limitations to this study. There was only one participant. In addition, it would be difficult for the teacher to implement a dense reinforcement schedule (e.g., a fixed-interval 20-second schedule) across school settings. Finally, there were no schedule thinning and long-term outcomes of NCA (Banda & Sokolosky, 2012).

Sanford and Horner (2012) investigated that adjusting the instructional difficulty had a positive influence on decreasing the challenging behavior and increasing academic engagement in the inclusive classroom. Four participants who displayed the challenging behaviors (e.g., talking out, out of the seat, playing with items irrelevant to the task, and noncompliance) during reading instruction from three elementary schools were nominated by school personnel. Moreover, all participants who needed additional instructional support in reading were identified as at-risk for reading failure through the Dynamic Indicators of Basic Early Literacy Skills (DIBELS; Good & Kaminski, 2002). Jeff was a 7-year-old male with learning disability (LD). Hayla was a 9-year-old female with LD. Elliott was a 9-year-old female with LD. Jon was an 8-year-old male with ASD. All of them received special education services. This study was conducted for Jeff and Hayla in the same small group reading instruction in the second-grade classroom with one assistant, whereas for Elliott and Jon both in different small groups reading instruction in the third-grade classroom with a different assistant.

According to FBAs, interviews with general education teachers and assistants were conducted. To confirm hypotheses of challenging behaviors, direct observations for Jeff and Hayla and functional analyses for Jon and Elliott were implemented based on their school schedules. Eventually, all participants' challenging behaviors were maintained by escaping from reading tasks (Sanford & Horner, 2012).

A nonconcurrent multiple baseline design across participants consisted of two phases: Phase A: frustration-level placement and Phase B: instructional level placement. Each phase lasted for about a month. Both the challenging behavior and the academic engagement were collected with a 10-second interval schedule for 15 to 20 minutes. In Phase A, the current

classroom curriculum was used. In Phase B, the appropriate level of the curriculum was provided for each student. To evaluate students' reading difficulties before the intervention, DIBELS oral reading fluency (ORF) was conducted by members of the research team to measure the number of correct words (CWPM) that participants read in 1 minute. To provide the appropriate instructional level of reading material rather than the inappropriate frustration-level, the Reading Mastery program (Science Research Associates, 2002) was implemented as the antecedent-based intervention. All assistants who implemented the intervention using the Reading Mastery program received the training for 1 hour per day for 2 weeks. Specifically, each participant's curriculum that included three passages from their current and next lessons was used to decide what levels of reading accuracy and fluency each participant had in their curriculum (Shapiro, 2004). Passages consisted of 150 to 200 words. Finally, the median of the three scores helped to identify each student's appropriate level in reading (Sanford & Horner, 2012).

Results indicated the effects of the intervention on challenging behaviors, academic engagement, and the reading performance. First, averages of challenging behaviors were a 16% decrease for Jeff, an 18% decrease for Hayla, a 20% decrease for Elliott, and a 10% decrease for Jon from Phase A to Phase B, respectively. In addition, means of the academic engagement showed a 15% increase for Jeff, a 12% increase for Hayla, a 17% increase for Elliott, and a 10% increase for Jon from Phase A to Phase B, respectively. Furthermore, the reading performance was evaluated by the reading fluency and accuracy. Reading fluencies in two sections, the current and next lessons, were 63 and 9 CWPM increases for Jeff, 33 and 17 CWPM increases for Hayla, 11 and 17 CWPM increases for Elliott, and 51 and 29 CWPM increases for Jon from

Phase A to Phase B, respectively. Reading accuracies were evaluated in the next lesson during Phase A and in both the current and next lessons during Phase B. All students read between 80% and 89% accuracy (i.e., frustration-level) in the next lesson during Phase A. They read between 97% and 100% accuracy (i.e., independent level) in the current lesson during Phase B. Three of them demonstrated between 91% and 94% accuracy (i.e., instructional level) and the other showed 98% accuracy (i.e., independent level) in the next lesson during Phase B (Sanford & Horner, 2012).

IOA using Cohen's Kappa (Watkins & Pacheco, 2000) was calculated. The trained observers measured that a mean of Kappa for academic engagement across participants was .7, and a mean of Kappa for challenging behavior across participants was .64. The score of Kappa between .6 to .75 was considered to be a good agreement (Sanford & Horner, 2012).

Overall, this study demonstrated that providing appropriate levels of learning materials for students who engaged in the challenging behaviors maintained by escaping from the tasks was effective to decrease the challenging behaviors and to increase the academic engagement during reading class. Researchers recommended that the antecedent-based intervention can be more simply implemented by teachers rather than multi-component interventions. Nevertheless, limitations were presented by the lack of instructional intensity and short-term outcomes (Sanford & Horner, 2012).

Table 1*Summary of Antecedent-Based Interventions Studies*

Authors	Study Design	Participants	Procedure	Findings
Haley, Heick, & Luiselli (2010)	Quantitative •Alternating treatments design	One participant with autism spectrum disorder (ASD). He attended the special education classroom and the second-grade classroom.	FBA (i.e., interview and direct observation) indicated that the function of his vocal stereotypy was the sensory stimulation. The FBA included visual cards that say “quiet” and “okay to speak out.”	<ul style="list-style-type: none"> •Results indicated that his vocal stereotypy decreased during intervention phases compared to baseline phases. •Using visual cards was effective to reduce the challenging behavior for the student with ASD in the inclusive classroom.
Banda & Sokolosky (2012)	Quantitative •ABAB withdrawal design	One participant with attention deficit hyperactivity disorder (ADHD) who attended the special education classroom and the first-grade classroom.	FBA (i.e., interview, direct observation, and functional analysis) were conducted. The intervention of Non-contingent attention (NCA), which means that social attention is consistently delivered regardless of behavior, was implemented.	<ul style="list-style-type: none"> •Results indicated NCA was successful in decreasing the challenging behavior maintained by gaining attention from the teacher in the inclusive classroom. •General education teachers will need training and support to design and implement FBAs.
Sanford & Horner (2012)	Quantitative •Multiple baseline design	Four participants: three participants with learning disabilities (LD) in second or third grade and one participant with ASD in third grade.	FBA (i.e., interview, direct observation, and functional analysis) were conducted. The direct observation for two participants and the functional analysis for the other two participants were conducted to figure out the function of their off-task behaviors. The FBA was providing their reading instructional level.	<ul style="list-style-type: none"> •Results suggested providing appropriate levels of learning materials for students who engaged in the challenging behaviors maintained by the escape from the tasks was effective to decrease the challenging behaviors and to increase the academic engagement during the reading class.

Consequence-Based Interventions

Shunmate and Wills (2010) examined the effectiveness of the consequence-based interventions based on the functional analysis for at-risk students in inclusive classrooms. Three

participants were identified as at-risk for reading failure in second grade: Brandon, a 7-year-old male; Paul, an 8-year-old male; LaTonya, a 7-year-old female. They engaged in high rates of disruptive (e.g., arguing, taunting, making audible noise, and talking to peers) and off-task behaviors (e.g., pencil tapping and gazing around the classroom) in the reading class. This study was conducted in a small group including six other students in the second-grade classroom.

Teacher interviews and direct observations were conducted to hypothesize the function of behaviors prior to the functional analysis. The teacher reported that participants' disruptive and off-task behaviors were maintained by gaining attention or avoiding tasks. However, it was in disagreement with the researcher's hypothesis derived from direct observations, in which the function of behaviors was to gain attention. Thus, the functional analysis was necessary to explicitly identify the function of behaviors (Shunmate & Wills, 2010).

The general education teacher received training on the functional analysis for three experimental conditions: attention, escape, and play conditions. These three conditions were conducted during the small group of the reading class for 15 minutes each day over 3 days. During the attention condition, the teacher provided verbal attention to the participant about disruptive and off-task behaviors while ignoring all appropriate behaviors. The reading tasks were not removed if disruptive and off-task behaviors occurred. During the escape condition, the participant was prompted to start reading every 30 seconds. If the participant started reading, the teacher verbally praised him or her. If the participant did not comply with it within 5 seconds after the second prompt, the task was removed, and all behaviors were ignored until the next trial. The participant only received attention from the teacher while engaging in on-task behaviors. During the play condition, the participant was allowed to read his or her preferred

book. The teacher provided attention every 30 seconds, but the attention was not delivered within 5 seconds after any inappropriate behaviors occurred. As a result, the highest levels of all participants' behaviors occurred during the attention condition compared to other conditions. All participants' disruptive and off-task behaviors were maintained by gaining attention from the teacher (Shunmate & Wills, 2010).

A multiple baseline design consisting of the baseline, the functional analysis, and the intervention phases across the participants was used to assess the effectiveness of interventions. Each student's disruptive and off-task behaviors were collected by a 10-second partial interval recording. During the intervention phase, two consequence-based interventions, differential reinforcement of other behaviors (DRO) with extinction and differential reinforcement of alternative behaviors (DRA), were implemented. The DRO was that the teacher provided attention if the participants were not engaged in disruptive and off-task behaviors within 5 seconds before the end of a 1-minute interval schedule. The self-monitoring form was used for the teacher to examine whether he delivered the attention. In addition, the DRA was that the participants received attention from the teacher when raising their hands without inappropriate behaviors (Shunmate & Wills, 2010).

As a result, during the baseline phase, the average range of disruptive and off-task behaviors across participants was 20% to 80%. During the functional analysis phase, the range of disruptive and off-task behaviors across participants also averaged 20% to 80% in the attention condition. During the intervention phase, all participants' disruptive and off-task behaviors decreased to below 20% and maintained near zero (Shunmate & Wills, 2010).

IOA across all conditions and three participants averaged 98%. Treatment fidelity was a mean of 97% during the functional analysis and averaged 99% across all three participants during the intervention. Social validity using a 5-point Likert scale indicated that the teacher agreed on the easiness and usefulness of the functional analysis and the interventions to decrease the disruptive and off-task behaviors (Shunmate & Wills, 2010).

In conclusion, the DRO with extinction and the DRA based on the functional analysis were effective for at-risk students to decrease the disruptive and off-task behaviors in the inclusive classroom. Nevertheless, the functional analysis implemented by the teacher had restrictions to control the conditions in the inclusive classroom. More studies should evaluate the functional analysis conducted by the teacher in small group settings or in larger groups of students in the inclusive classroom (Shunmate & Wills, 2010).

Austin, Groves, Reynish, and Francis (2015) examined the usefulness of the DRO considering reinforcements derived from the trial-based functional analysis for students who engaged in off-task or calling out behaviors in inclusive classrooms. Three at-risk participants engaged in the highest rates of off-task or calling out behaviors that had a bad effect on their academic achievements. Dylan, an 8-year-old male, and Joe, a 7-year-old male, were placed in the same third-grade classroom. Jacob, a 5-year-old male, was placed in the first-grade classroom. Dylan engaged in off-task behaviors such as distraction from learning. Joe and Jacob engaged in calling out behaviors such as talking to others without permission. Target behaviors, off-task and calling out behaviors, were collected as occurrence or nonoccurrence per trial during the trial-based functional analysis.

Researchers suggested that the trial-based functional analysis may require less time to conduct because only the first reinforcement is provided, unlike the traditional functional analysis that involves repeated reinforcements during test sessions. In this study, all trial-based functional analyses and interventions were implemented by the teacher or assistant in inclusive classrooms. They received training through written instructions and role-play scenarios at least twice from researchers (Austin et al., 2015).

According to the trial-based functional analysis, each trial consisted of a test segment and a control segment. These procedures were applied to three conditions: teacher's attention, peer's attention, and escaping from demands. The test and control segments lasted for 2 minutes. Each condition's reinforcement (i.e., providing teacher's attention, providing peer's attention, or eliminating nonpreferred tasks) was freely available for 2 minutes during the control segment, and then the test segment started when the target behavior occurred. During the test segment, each condition's reinforcement was provided for 30 seconds when the participants engaged in the target behaviors, and then the test segment was terminated. Each condition had at least 10 trials. For each participant, 8 to 11 trials were tested per day for 3 to 4 days (Austin et al., 2015).

Results of the trial-based functional analysis showed that the most possible function of the behavior was hypothesized by comparing the highest occurrences of behaviors during the test segment with the relatively few occurrences of behaviors during the control segment. The highest occurrences of behaviors for Dylan were 80% during the escape test segment, and few occurrences of behaviors were 10% during the escape control segment. The highest occurrences of behaviors for Joe were 80% during the teacher's attention test segment, and few occurrences of behaviors were 10% during the teacher's attention control segment. The highest occurrences

of behaviors for Jacob were 90% during the teacher's attention test segment, and no occurrence of behaviors was observed during the teacher's attention control segment. Consequently, Dylan's target behavior was maintained by escaping from the demand, whereas Joe and Jacob's target behaviors were maintained by the teacher's attention (Austin et al., 2015).

An alternating treatments design was conducted to evaluate the effect of interventions. Each session lasted for 10 minutes during the mathematics, English, or science class. The 20-sec-partial-interval recording for Dylan and the frequency recording for Joe and Jacob were used for 10 minutes. During baseline phases, all participants performed ongoing classroom activities. During intervention phases, the DRO interventions considering reinforcements (i.e., DRO adult-attention, DRO peer-attention, and DRO escape) were implemented with a 2-minute interval schedule for each participant. If the participants were not engaged in their target behaviors within 2 minutes, each participant could receive each reinforcement for 30 seconds: spending time with the teacher for the DRO adult-attention, working with the preferred peer for the DRO peer-attention, or taking a break time for the DRO escape. The teacher notified the participants that they could receive the reward if they continually focused on their tasks for 2 minutes. However, the interval was rearranged, and the target behavior was ignored when the target behavior occurred within 2 minutes. Particularly, the DRO escape and the DRO adult-attention for Dylan, all three DRO interventions for Joe, and the DRO adult-attention and the DRO peer-attention for Jacob were implemented (Austin et al., 2015).

Results displayed the effective intervention by comparing among intervention conditions. Dylan's off-task behavior was an average of 60% during the baseline phase. His behavior further decreased to an average of 16% during DRO escape sessions compared to an average of

32% during DRO adult attention sessions. For Joe, the rate of calling out behavior averaged 2.5 incidences per minute during the baseline phase. The DRO adult attention ($M = 0.06$) was the most effective intervention for Joe to decrease the calling out behavior compared to the DRO peer attention ($M = 0.4$) and the DRO escape ($M = 1.1$). For Jacob, the rate of calling out behavior was a mean of 2.4 incidences per minute during the baseline phase. His calling out behavior further decreased to 0.8 during DRO adult attention sessions compared to 1.8 during DRO peer attention sessions. Thus, the trial-based functional analyses provided accurate information about the reinforcement enhancing the target behavior and supported to figure out the most effective DRO intervention for each participant (Austin et al., 2015).

IOA for the trial-based functional analysis was 100%. IOA for the intervention averaged 99% for Dylan, 98% for Joe, and 96% for Jacob. Treatment fidelity for the trial-based functional analysis averaged 91% and for the interventions averaged 100%. Moreover, social validity indicated the teachers' and students' perceptions of the trial-based functional analysis and DRO interventions. They positively responded to each question. Teachers strongly agreed that DRO interventions were effective to decrease off-tasks or calling out behaviors. In addition, the teachers were willing to continue using them in the future. Students answered that rewards were useful to engage in the appropriate behaviors in class (Austin et al., 2015).

Overall, this study suggested that the DRO considering reinforcements based on the trail-based function analysis was effective for students who were engaged in off-task or calling out behaviors in inclusive classrooms. Nevertheless, the limitations of this study were providing the different number of interventions for each participant and the absence of teaching replacement behaviors (Austin et al., 2015).

Table 2*Summary of Consequence-Based Interventions Studies*

Authors	Study Design	Participants	Procedure	Findings
Shunmate & Wills (2010)	Quantitative •Multiple baseline design	Three participants nominated as at-risk for reading failure in second grade. They were taught in a small group during the reading class.	FBI (i.e., interview, direct observation, and functional analysis) were conducted to figure out functions of disruptive and off-task behaviors. Trained teachers conducted functional analysis and implemented differential reinforcement of other behaviors (DRO) with extinction and differential reinforcement of alternative behaviors (DRA).	<ul style="list-style-type: none"> •The DRO and the DRA interventions were effective to reduce participants' disruptive behaviors and off-task behaviors. •Results supported the teacher could be encouraged to conduct functional analysis, the DRO, and the DRA in the inclusive classroom.
Austin, Groves, Reynish, & Francis (2015)	Quantitative •Alternating treatments design	Three participants nominated as at-risk in the first or third grade.	The trial-based functional analysis consisting of test and control segments was conducted by the teacher or assistant. The DRO adult-attention, the DRO peer-attention, and the DRO escape were implemented for each participant in inclusive classrooms.	<ul style="list-style-type: none"> •Results suggested the DRO considering different reinforcements based on the trial-based functional analysis was effective for students who engaged in disruptive and off-task behaviors in inclusive classrooms.

Multi-Component Interventions

Blair, Umbreit, Dunlap, and Jung (2007) examined the effectiveness of FBIs in the inclusive classroom. This study was conducted in the kindergarten classroom of the public elementary school in South Korea; it consisted of 22 students without disabilities and three students with disabilities. The participant, Minsu, was a 6-year-old male with ASD. He engaged in challenging behaviors such as crying, screaming, pinching and biting his peers, being out of the seat, and hurting himself. His peer, Hyungjun, was selected to provide the peer attention to Minsu.

FBA's were conducted to search reinforcers for Minsu's challenging behaviors. First, researchers interviewed Minsu's mother, the general and special education teachers by using a 22-item questionnaire, to gather information about the function of challenging behaviors in the classroom. In addition, ABC data was collected by the researcher five times for 15 minutes at once during teacher-directed group activities which challenging behaviors occurred most often. Consequently, the results of interviews and direct observations reported that Minsu's challenging behaviors were maintained by gaining attention and escaping from tasks (Blair et al., 2007).

The functional analysis was conducted during teacher-directed group activities with the eight experimental conditions: preferred and non-preferred activities (2) * group and no group modification (2) * replacement skill and no replacement instruction (2). A total of 24 conditions were conducted for 2 weeks since eight conditions were repeated three times. During each condition, the challenging behaviors were collected with a 10 sec-partial-interval recording. Results showed the highest levels of challenging behaviors occurred when non-preferred activities, a large group, and no replacement skill instruction were presented to Minsu. Thus, the reasons why Minsu engaged in challenging behaviors were: (1) to gain attention from his peers and teacher during a large group, and (2) to escape from non-preferred tasks (Blair et al., 2007).

Prior to the implementation of interventions, both the general and special education teachers collaborated with researchers, received technical assistance, and participated in 80 minutes training each day for 3 days. Training included modifying activities and routines, providing physical and verbal prompts, using modeling to teach the communicative replacement skill, and responding to challenging behavior. The special education teacher helped the general

education teacher to develop and implement interventions. Minsu's mother observed him in his classroom to learn strategies and then apply them at home (Blair et al., 2007).

FBI (i.e., the modification of routines, the replacement skill instruction, and the modification of responses) were implemented during circle-time activities. First of all, the modification of routines involved providing preferred materials (e.g., puzzles, picture-matching games, and photos of real objects) and activities to allow Minsu to make choices in the inclusive classroom. Multimedia (e.g., PowerPoint materials, a projector, and visual presentation equipment), songs with finger play and physical movements, and peer modeling were used. Second, during the replacement behavior instruction, Minsu learned about how to use the communication card to initiate interactions with his peers and teachers. Both physical and verbal prompts were gradually faded. Last, the modification of responses involved that teachers ignored Minsu's challenging behaviors while providing attention to his replacement behavior or appropriate behaviors. The delayed replacement was implemented for the generalization (Blair et al., 2007).

A multiple baseline design across activities (i.e., music, center activities, and circle time) was conducted to evaluate the benefit of interventions. Data were collected for 13 weeks, and follow-up data were collected for 6 additional weeks. The challenging behavior, the replacement behavior, the appropriate behavior, and the positive interaction were collected by a 10 sec-partial-interval recording (Blair et al., 2007).

Results described challenging behaviors, replacement behaviors, appropriate behaviors, and positive interactions across activities between the baseline phase and the intervention phase. First, a mean of challenging behaviors was 85% during the baseline phase and decreased to 25%

during the intervention phase. Second, the replacement behavior was not observed during the baseline phase and averaged 16% during the intervention phase. Furthermore, the appropriate behavior averaged 7% during the baseline and increased to an average of 40% during the intervention phase. Also, a mean of positive interactions with his peer was 6% during the baseline phase and increased to 48% during the intervention phase. Last, a mean of positive interactions with his teacher was 23% during the baseline phase and increased to 64% during the intervention phase (Blair et al., 2007).

IOA for the functional analysis averaged 92%. An average of IOA for the challenging behavior was 91%, for the replacement behavior was 91%, for the appropriate behavior was 94%, for the peer's positive interaction was 91%, and for the teacher's positive interaction was 92%. Treatment fidelity was 1.7 out of 2 scores. Social validity from the general education teacher and the assistant averaged 4.5 out of 5, which indicated strong support for FBIs (Blair et al., 2007).

Overall, the multi-component intervention based on FBAs was effective in reducing Minsu's challenging behaviors and increasing replacement behaviors, appropriate behaviors, and positive interactions with his peers and teacher. The limitation of the study was that the high level of teachers' cooperation and commitment might not be guaranteed in non-research settings because investment, dedication, and cooperation were more accessible to implement interventions during the research rather than in the field (Blair et al., 2007).

Janney, Umbreit, Ferro, Liaupsin, and Lane (2012) demonstrated the contribution of extinction procedures within FBIs for students with at-risk for EBD in inclusive classrooms. Participants met the following criteria: (a) the student received more than three office discipline

referrals (ODRs) and fell far below academic standards in at least one content area, (b) the student was requested to get assistance from the Student Behavior Intervention Team (SBIT), and (c) the student's challenging behavior was not responded to interventions from SBIT. Moreover, the Teacher Form of the Social Skills Rating System (SSRS; Gresham & Elliott, 1990), which is used for identifying students with EBD, was conducted to measure social skills, problem behaviors, and academic competence by teachers. Through those criteria and the SSRS, three students were nominated as at-risk for EBD. Hugo was a 6-year-old male in the first-grade classroom with 14 students. Tomas was a 7-year-old male in the second-grade classroom with 14 students. Eric was an 8-year-old male in the third-grade classroom with 21 students. All of them often engaged in off-task behaviors (e.g., calling out, talking with peers, or task refusal). This study was conducted in each participant's inclusive classroom.

The record review using the School Archival Records Search (SARS), the teacher interviews, the student interviews, and direct observations using ABC recording were carried out to figure out the functions of behaviors. ABC data were collected during four or five observations for each student. In addition, the functions of behaviors were identified through the Function Matrix (Umbriet et al., 2007). As a result, the function of Hugo's off-task behaviors was to gain attention from the teacher. Tomas's off-task behaviors were maintained by gaining attention from the teacher or the peer, and Eric's off-task behaviors were reinforced by the teacher's attention and avoiding writing tasks (Janney et al., 2012).

The Function-Based Intervention Decision Model (Umbreit et al., 2007) was conducted by the collaboration between teachers and the researcher for each participant. Answering two questions is at the start of this process: (1) "Can the individual perform the replacement

behavior?” and (2) “Do antecedent conditions represent effective practice?” Depending on the answers to these questions, three methods to four possible situations are implemented. In addition, three components (i.e., adjusting antecedents, providing reinforcements for the replacement behavior, and developing extinction procedures) are included in each intervention. Based on participants’ performances on replacement behaviors and antecedent conditions in the classrooms, Method 3 (i.e., adjusting the contingencies) for Hugo, Method 2 (i.e., improving the environment) for Tomas, and Method 1 (i.e., teaching the replacement behavior) and Method 2 (i.e., improving the environment) were selected for Eric, respectively. The combination of antecedent adjustments (e.g., providing the seating arrangement, small groups, and shorten assignments), reinforcement for replacement behavior (e.g., delivering attention and verbal praise if the on-task behavior lasted for 1 minute), and the extinction procedures (e.g., redirecting and ignoring the off-task behavior) were developed (Janney et al., 2012).

To evaluate the effectiveness of FBIs including extinction procedures, researchers conducted a combination of ABC and withdrawal design (ABABCB): A (i.e., baseline), B (i.e., full intervention), and C (i.e., partial intervention). The full intervention consisted of antecedent adjustments, reinforcement for the replacement behavior, and the extinction procedure. The partial intervention meant that the extinction procedure was excepted from the full intervention. On-task behaviors were observed with a 15-sec whole-interval recording for 10 or 15 minutes (Janney et al., 2012).

Table 3 illustrated all students’ on-task behaviors increased during the full intervention phases compared to the baseline and withdrawal phases. Moreover, on-task behaviors rapidly decreased from the full intervention phase to the partial intervention phase (Janney et al., 2012).

Table 3*Percentage of Participants' On-Task Behaviors*

	Baseline	First Full Intervention	Withdrawal	Second Full Intervention	Partial Intervention	Third Full Intervention	Follow-Up
Hugo	41%	74.40%	30%	78%	58.50%	75.50%	86%
Tomas	23.67%	75.55%	36%	82.75%	67.29%	84.80%	88.80%
Eric	2.25%	56.67%	2.67%	71%	42%	75.20%	58%

IOA was a mean of 87.27% for the participants' on-task behaviors and 95.27% for treatment integrity. Treatment fidelity averaged 93.33% for Hugo, 94.73% for Tomas, and 87.97% for Eric. Social validity to survey teachers' perceptions of interventions was an average of 86 out of 90 scores during the full intervention, which was highly rated rather than an average of 48 out of 90 scores during the partial intervention. Social validity to check students' opinions of interventions averaged 41 out of 42 scores (Janney et al., 2012).

Overall, this study indicated that FBIs including the extinction procedure were more highly effective and acceptable to increase on-task behaviors compared to the intervention excluding the extinction procedure. However, limitations of this study were the small sample size, the absence of functional analysis, and the insufficient measurement for the components of FBIs (Janney et al., 2012).

Reeves, Umbreit, Ferro, and Liaupson (2013) examined the effectiveness of FBIs including the task analysis for students with ASD to increase on-task behaviors in inclusive classrooms. Participants who were Sam, Ron, and Joe were 7-year-old triplets with ASD. They spent most of their school time in a first-grade classroom with 18 students. The participants engaged in off-task behaviors such as failing to start an assignment, discontinuing their work,

and whining. Their replacement behaviors were on-task behaviors based on steps in the task analysis.

FBA and the task analysis were conducted prior to the intervention. First, FBAs included interviews with two assistants, direct observations, and the Function Matrix (Umbreit et al., 2007). Through the implementation of FBAs for each participant, the function of off-task behaviors for Ron and Sam was to gain attention from the teacher and assistants. The functions of off-task behaviors for Joe were avoiding tasks and gaining attention from the teacher and assistants. Moreover, the task analysis was used to identify the replacement behavior which is a significant component of FBAs. It determined whether each participant performed 11 steps of the task analysis (e.g., going to the seat within 1 minute and getting materials) independently or with the verbal prompt during three sessions. Results of the task analysis averaged 52% for Ron, 54% for Sam, and 48% for Joe, respectively (Reeves et al., 2013).

FBAs were designed based on results of the FBAs and the task analysis assessment. Method 1 (i.e., teaching the replacement behavior) was selected within the Function-Based Intervention Decision Model (Umbreit et al., 2007) for the three participants. The interventions included antecedent adjustments (e.g., using the visual schedule and reminding expected behaviors before activities), reinforcement for the replacement behavior (e.g., providing verbal praise and a token to exchange for preferred activities about on-task behaviors), and the extinction procedures (e.g., ignoring off-task behaviors and reminding participants of raising a hand for help or a break) (Reeves et al., 2013).

A withdrawal design for on-task behaviors and multiple probes for steps in task analysis across participants were conducted. The teacher and assistants were trained to implement

interventions in the inclusive classroom. One of the researchers and an instructional specialist provided modeling about interventions for the first 3 days of the intervention phase. On-task behaviors were collected with a 30-second whole-interval recording (Reeves et al., 2013).

As illustrated in Table 4, all participants' on-task behaviors during the intervention phases were much higher than during the baseline and withdrawal phases. In addition, 11 steps in task analysis were collected again after participants did the replacement behavior with an average of 80% (Reeves et al., 2013).

Table 4

Percentage of Participants' On-Task Behaviors and Task Analysis Assessments

	Ron		Sam		Joe	
	On-Task Behavior	Steps in the Task Analysis	On-Task Behavior	Steps in the Task Analysis	On-Task Behavior	Steps in the Task Analysis
Baseline	42%	-	48%	-	50%	-
Intervention 1	85%	93%	87%	98%	90%	91%
Withdrawal	47%	27%	21%	45%	37%	40%
Intervention 2	96%	94%	94%	93%	77%	100%
Follow-up	93%	97%	98%	100%	100%	97%

IOA averaged 92% for Ron, 95% for Sam, and 95% for Joe, respectively. Treatment fidelity was 99% for Sam and Ron, and 95% for Joe during the intervention and follow-up phases. In addition, social validity using a 4-point Likert-type scale by the teacher and two assistants was 20 out of 20, which was a high rating (Reeves et al., 2013).

In conclusion, this study demonstrated the effectiveness of FBIs and the task analysis for students with ASD to increase on-task behaviors in the inclusive classroom. Fortunately, the

task analysis was very useful to figure out and complete the replacement behavior. However, the limitation of this study was the lack of variety in sample size (Reeves et al., 2013).

MacLeod, Hawken, O'Neill, and Bundock (2016) examined applying FBIs typically implemented in Tier 3 to Tier 2 interventions in inclusive classrooms. One of Tier 2 interventions is to use the Check-in/Check-out (CICO) intervention, which is also referred to as the Behavior Education Program (BEP). Crone, Hawkin, and Horner (2010) explained that the CICO coordinator provides behavioral expectations listed on a Daily Progress Report (DPR) to students during check-in and then gives praise and a reward to students based on their performance during check-out.

Four participants were nominated following these criteria: a) participating in the CICO intervention, b) approaching the DPR goal inconsistently, c) receiving at least one office discipline referral, and d) consenting to this study. All of them received special education services and spent most of the school day in both inclusive and special education classrooms. James was a 10-year-old male student with LD in the third-grade classroom. Seth was an 11-year-old male student with emotional disturbance in the fourth-grade classroom. Carlos was an 8-year-old male student with emotional disturbance (ED) in the second-grade classroom. Eric was a 7-year-old male student with LD in the first-grade classroom. They engaged in challenging behaviors such as being out of seats, playing with objects, or talking to their peers about unrelated activities (MacLeod et al., 2016).

Researchers conducted FBAs including interviews and direct observations. Each student's teacher was interviewed for 20-30 minutes. To confirm hypotheses derived from interviews, the ABC recording was conducted in inclusive classrooms when the challenging

behaviors most often occurred. It lasted 20 minutes 2 to 3 times per week for 2 weeks.

Researchers collaborated with teachers to develop and determine the hypotheses. In addition, researchers and teachers designed each student's intervention, which was a combination of adjusting antecedent, teaching replacement behaviors, and adjusting consequence. Teachers and students received training on interventions via verbal explanations, modeling, and feedback by researchers. The first session of interventions was implemented by the researcher, and then teachers implemented interventions in the following sessions (MacLeod et al., 2016).

This study specified individual FBIs based on FBAs. First, the function of James's challenging behaviors was to escape from his tasks. Interventions for James were improving the spelling skills, teaching him how to request the spelling words, and increasing reinforcement for on-task behaviors. Second, the function of Seth's challenging behaviors was to gain attention from his teacher. Interventions for Seth involved providing his preferred book during the reading period, delivering the teacher's attention, and earning points to play basketball with the teacher. Third, the function of Carlos' challenging behaviors was to gain attention from the teacher. Interventions for Carlos included modifying curriculum, providing easier math problems, teaching him to raise his hand for help, and delivering the teacher's attention. The three of them used a self-monitoring program prompted by a vibrating timer. Last, the function of Eric's challenging behavior was to gain attention from peers. Interventions for Eric included reminding him to raise his hand rather than talking to his peers, providing a short checklist of steps to him, and allowing him to interact with his peers after completing the checklist of steps (MacLeod et al., 2016).

A multiple baseline design across participants was conducted to evaluate the combination of FBIs and CICO interventions. Challenging behaviors were collected by using a 10-second interval for 20 minutes. According to the existing Tier 2 intervention (i.e., CICO intervention), the scores of the DPR were collected for all sessions. Moreover, participants' same-gender peers who were not participating in CICO or other interventions were compared to participants (MacLeod et al., 2016).

As a result, all participants' challenging behaviors decreased during the intervention phase compared to the baseline phase. During the baseline phase, a mean of challenging behaviors was 41% for James, 49% for Seth, 45% for Carlos, and 24.5% for Eric, respectively. During the intervention phase, challenging behaviors decreased to 4% for James, 2% for Seth, 14% for Carlos, and 12% for Eric, respectively. In addition, data on the peer comparison indicated four participants' challenging behaviors were consistent with or lower than their peers in most of the sessions. Furthermore, all participants demonstrated that the rates of office discipline referrals decreased between the baseline and intervention phases per week (MacLeod et al., 2016).

IOA averaged 87% for James, 95% for Seth, 92% for Carlos, and 91% for Eric. Treatment fidelity showed an average of 83% for James' and Seth's teachers, 78% for Carlos' teacher, and 83% for Eric's teacher. Social validity using the Likert type scale ranging from 1 to 6, which were 4 to 6 for all teachers and 5 or higher for all participants. Results of treatment fidelity and social validity showed that the implementation of FBIs was useful for students who did not respond to Tier 2 in inclusive classrooms (MacLeod et al., 2016).

In brief, the combination of Tier 2 (i.e., CICO) and Tier 3 (i.e., FBIs) influenced on decreasing the challenging behaviors for all participants who failed to respond to Tier 2 interventions in inclusive classrooms. Nevertheless, limitations of this study included the absence of experimental function analyses, short-term outcomes, and the teachers' consciousness about the observers being in their classrooms (MacLeod et al., 2016).

McKenna, Flower, Falcomata, and Adamson (2017) examined FBIs including replacement behavior training for students with at-risk for EBD in inclusive classrooms. Two participants were placed in the same second-grade classroom: Eric, a 7-year-old male, and Kevin, an 8-year-old male. Both were considered at-risk for EBD due to a number of disciplinary referrals for aggression and a low-grade level in academic performances. Challenging behaviors included yelling, physical and verbal aggression, teasing, work refusals, and throwing objects. Eric and Kevin had the same classroom teacher who was the one that collaborated in this study.

FBAs included record review, teacher and student interviews, and direct observations. First, records including office discipline referrals, report cards, and additional school records were examined by the researcher. In addition, teacher and student interviews, and direct observations were conducted to confirm information from reports to hypothesize the functions of challenging behaviors. Consequently, both Eric and Kevin's challenging behaviors were maintained by avoiding tasks and gaining attention from the teacher (McKenna et al., 2017).

Before implementing interventions, the teacher and students received the training from researchers. During the modification training, researchers provided recommendations, modeling, and feedback to the teacher. During the replacement behavior training, the researchers collected

concerns from the teacher and students to discuss possible solutions with them collaboratively. In addition, modeling, role-play, feedback, and problem-solving scenarios were implemented for students to improve their replacement behaviors. Interventions consisted of modifying antecedent and consequent conditions, and teaching replacement behaviors. Specifically, antecedent adjustments were providing attention prompted by a timer, pointing worksheet, preparing calming space, and shorter assignments. Consequent adjustments were providing specific feedback and compliments, reinforcing peers who ignored challenging behaviors, and using computers with peers. Replacement behaviors were asking for help, recruiting attention, ignoring peers' off-task behaviors, and using calming strategies. Thus, multi-component interventions were designed and implemented for each participant (McKenna et al., 2017).

A multiple probe design across participants was conducted in intervention and replication settings for 15 weeks. Challenging and replacement behaviors were recorded by a 10-second partial interval recording for 15 minutes. During baseline phases, only reinforcement such as free time was delivered to Eric and Kevin when they engaged in appropriate behaviors. Eric and Kevin's intervention and replication settings were conducted during an English Arts class consisting of 20 students. In the replication setting, the teacher could not provide any feedback and contextual factors to support their replacement behaviors generalized (McKenna et al., 2017).

Challenging behaviors were calculated by the percentage of nonoverlapping data (PND) and the percentage of all nonoverlapping data (PAND). PND values are interpreted based on the following percentages: a highly effective intervention (> 90%), an effective intervention (70%-90%), a questionable intervention (50%-70%), and an ineffective intervention (<50%). For Eric,

PND was 95% and PAND was 96.5% in the intervention setting, and PAN was 92.3% and PAND was 95% in the replication setting. For Kevin, PND was 50% and PAND was 88.4% in the intervention setting, and PAN and PAND were 100% in the replication setting. Both of them were less engaged in challenging behaviors during the intervention phases compared to the baseline phases in the intervention and replication settings. Additionally, replacement behaviors for Eric and Kevin increased from the baseline phases to the intervention phases in both settings (McKenna et al., 2017).

IOA using kappa coefficients for challenging behavior averaged .833 for Eric and .866 for Kevin. IOA for replacement behaviors averaged .833 for Eric and .944 for Kevin. Both IOA data showed acceptable levels. Moreover, treatment fidelity across settings averaged 82.2% for Eric and 76.2% for Kevin. Social validity using an Intervention Rating Profile-15 (IRP-15; Martens, Witt, Elliott, & Darveaux, 1985) was conducted before and after the intervention. For Eric, the teacher rated 78 out of 90 in pre-intervention and 79 out of 90 in post-intervention. For Kevin, the teacher scored 84 out of 90 in pre-intervention and 74 out of 90 in post-intervention. Both teachers provided favorable scores and agreed on the effectiveness of interventions in their classrooms (McKenna et al., 2017).

Overall, this study demonstrated that FBIs adding the replacement behavior training was effective to decrease challenging behaviors and to increase replacement behaviors. This study was limited by the difficulty of experimental control (e.g., absences and school events) and the researchers' expectancy effect (McKenna et al., 2017).

Hendrix, Vanel, Bruhn, Wise, and Kang (2018) found the effectiveness of FBIs implemented by paraprofessionals in the inclusive classroom. The participant, Daniel, was a 12-

year-old male. He received special education services under a non-categorical eligibility system. He was in the sixth-grade classroom with 31 students. His disruptive behaviors were yelling, teasing, swearing, throwing items and interrupting others. Two paraprofessionals rotated days to support him in the inclusive classroom.

To determine the function of Daniel's disruptive behaviors, FBAs consisted of the formal and informal interviews, direct observations using ABC recording, and the Function Matrix (Umbreit et al., 2007). First, the general education teacher indicated that his disruptive behaviors more often happened during the science class or unstructured times (e.g., transitions from one activity). The special education teacher said that his disruptive behaviors were maintained by avoiding tasks and gaining attention from others. The paraprofessionals also hypothesized that his behaviors were maintained by gaining attention from others. Daniel reported that his behavior frequently occurred during the science class since his seating being located at the door allowed him to talk to others. Next, disruptive behaviors were observed by researchers during the science class through the ABC recording for a week. Last, data on interviews and direct observations were analyzed by the Function Matrix. Results indicated that the function of disruptive behaviors was to gain attention from the teacher and peers (Hendrix et al., 2018).

The Function-Based Intervention Decision Model (Umbreit et al., 2007) was implemented by paraprofessionals under the supervision of researchers. The general education teacher agreed to support the implementation of interventions. Daniel, the general education teacher, and paraprofessionals received the training about the procedures of interventions from researchers prior to the intervention. Method 2 (i.e., improving the environment) was selected within the Function-Based Intervention Decision Model. First of all, antecedent adjustments

included teaching how to use the concern card, providing attention using a timer every 5 minutes, and evaluating his disruptive behaviors every 4 minutes during 20 minutes on a self-monitoring form. According to the self-monitoring, Daniel monitored his replacement behaviors (i.e., working on assigned tasks, talking about task-relevant topics, and appropriately using the concern card) with an electronic device. He answered three responses (i.e., yes, no, or I didn't need help) and compared forms from paraprofessionals at the end of the period. Second, reinforcement included providing attention and verbal praise for appropriate behaviors, giving a ticket in the schoolwide intervention system, and selecting a reward (i.e., reviewing classwork with a peer, walking to the office, and playing games). Third, extinction procedures were that paraprofessionals ignored his disruptive behaviors, but provided the verbal redirection with limited attention (Hendrix et al., 2018).

A withdrawal design was conducted. A 15-second partial interval recording was used to measure disruptive behaviors. Data were collected three times each week for 15 minutes per session during the baseline and intervention phases. As a result, an average of Daniel's disruptive behaviors was 22.6% during the baseline phase and decreased to an average of 0.7% during the first intervention phase. An average of his disruptive behaviors was 21.7% during the withdrawal phase and immediately decreased to 1.4% during the second intervention phase (Hendrix et al., 2018).

IOA was 94% during the baseline and was 98% during the intervention. Treatment fidelity using a checklist was 98.8%, which was a high level of integrity. Social validity was measured by the general education teacher and paraprofessionals using IRP-15 (Martens et al.,

1985). Two paraprofessionals rated 64 and 66 out of 90 at acceptable levels, respectively. The general education teacher rated 78 out of 90 at a high level (Hendrix et al., 2018).

This study demonstrated FBIs implemented by paraprofessionals were effective to decrease disruptive behaviors in the inclusive classroom. It might be difficult especially for the general education teacher who handles many students or receives little training to implement FBIs. Considering those barriers, researchers supported that the paraprofessional can be a useful resource to help the general education teacher to manage the classroom effectively. Limitations of this study were no generalization to different students under different conditions, the lack of data on replacement behaviors, and the absence of paraprofessionals' involvement in FBAs (Hendrix et al., 2018).

Petursdottir and Ragnarsdottir (2019) examined that FBIs with fading a token system were effective to decrease disruptive behaviors and to increase the academic engagement for students in inclusive classrooms. Three participants in two public elementary schools in Iceland were nominated in this study. All participants' challenging behaviors had not responded from Tier 1 and Tier 2 behavior supports, and negatively influenced their academic engagement. Andri was an at-risk, 7-year-old male in the second-grade classroom with 50 students. Birgir was an 8-year-old male with ADHD in the third-grade classroom with 23 students. David was an 8-year-old male with ASD in the same third-grade classroom as Birgir. All of them obtained assistance from the paraprofessional or the special education teacher in their inclusive classrooms.

FBAs, which included interviews and direct observations, were conducted by the researcher. The general and special education teachers, parents, and students were interviewed

by using interview forms. Direct observations with ABC recording were conducted in class periods in which the challenging behaviors frequently occurred. Through interviews and direct observations, the functions of behaviors were hypothesized for each participant. Individually, Andri's challenging behaviors were maintained by gaining attention from teachers and peers. Birgir engaged in challenging behaviors due to escaping from tasks. David's challenging behaviors were sustained by gaining attention from teachers and peers and escaping from tasks (Petursdottir & Ragnarsdottir, 2019)

To create FBIs, researchers collaborated with teachers. Teachers, parents, and other school staff had meetings to discuss interventions before starting each intervention phase. Each participant's teacher implemented interventions with written instructions and supervision. Each participant's interventions consisted of setting event modifications, adjusting antecedent and consequence, and teaching replacement behaviors depending on the functions of behaviors. First, setting event modification was supporting sleep and medication at home. Second, antecedent adjustments were setting a timer for work time, providing shortened tasks, reminding for transitions, and delivering visual prompts. Third, teaching replacement behaviors were developing self-regulation, reading instructions, raising a hand, and waiting for help. Last, consequence adjustment was providing differential reinforcement of appropriate behaviors with the individualized token economy. The booklets for the token economy included instructions, target behaviors, daily goals, and desired reinforcements such as taking a break or gaining attention from peers. The token was not provided if the participant engaged in challenging behaviors. Particularly, the intensity of using tokens gradually decreased such as approaching higher levels of tasks, longer work time, and delayed delivering reinforcements for participants'

independence. Fading token systems were divided into B1 to B15 versions, which was the most intensive token system to the lowest intensive token system (Petursdottir & Ragnarsdottir, 2019).

A multiple baseline design across participants was conducted for 8 to 17 weeks. During the baseline phase, teachers implemented usual behavior supports such as providing classroom expectations, verbal prompts, and praise. During intervention phases, FBIs including token systems with four to seven levels of intensity were implemented for each participant. During the follow-up phase, any token was not delivered, but praise for appropriate behaviors was provided. The frequency of disruptive behaviors and the duration of academic engagement were collected by the researcher and the trained observer for 20 minutes. The average length of the academic engagement was measured by dividing the total duration with the observation time and multiplying by 100% (Petursdottir & Ragnarsdottir, 2019).

As a result, Andri's disruptive behaviors scored a mean of 33.8 during the baseline phase and a mean of 4.7 incidences during the intervention phase. His academic engagement averaged 37% during the baseline phase and 91% during the intervention phase. Birgir's disruptive behaviors showed a mean of 36.5 during the baseline phase and a mean of 7.8 incidences during the intervention phase. His academic engagement averaged 59% during the baseline phase and 88% during the intervention phase. David's disruptive behaviors indicated a mean of 17.6 during the baseline phase and less than 5 incidences during the intervention phase. His academic engagement averaged 60% during the baseline phase and 94% during the intervention phase. All participants maintained the low frequencies of disruptive behaviors and improved academic engagement during the follow-up phase (Petursdottir & Ragnarsdottir, 2019).

IOA across all participants averaged 93% throughout all sessions. Treatment fidelity indicated acceptable levels through weekly observations, meeting with teachers and students, and token booklets. Social validity using interviews with participants, teachers, and parents showed their positive perceptions of FBIs (Petursdottir & Ragnarsdottir, 2019).

Overall, this study demonstrated that the implementation of FBIs with fading token systems was effective to decrease disruptive behaviors and to increase academic engagement. Furthermore, reduced and withdrawn token systems supported students' improved behaviors to be maintained and generalized. However, future research should show long-term outcomes for maintenance and generalization (Petursdottir & Ragnarsdottir, 2019).

Summary

This chapter presented a review of the 12 studies that examined the effectiveness of function-based interventions (FBIs) based on functional behavior assessments (FBAs) for at-risk students and students with disabilities in inclusive classrooms of elementary schools.

Conclusions and recommendations are discussed in Chapter 3.

Table 5

Summary of Multi-Component Interventions Studies

Authors	Study Design	Participants	Procedure	Findings
Blair, Umbreit, Dunlap, & Jung (2007)	Quantitative •Multiple baseline design	One participant with ASD in the kindergarten classroom in the public elementary school in South Korea.	FBAs (i.e., interview, direct observation, and functional analysis) were conducted. Multi-component interventions (i.e., antecedent and consequent modifications, replacement skill instruction, and social interactions with peers and teachers) were implemented.	•Results showed multi-component interventions based on FBAs were effective in decreasing the participant's challenging behaviors and in increasing his appropriate behaviors across the activities in the inclusive classroom.

Table 5 (continued)

Authors	Study Design	Participants	Procedure	Findings
Janney, Umbreit, Ferro, Liaupsin, & Lane (2012)	Quantitative •Combined ABC and withdrawal phase design (ABABCB)	Three participants who were nominated as at-risk for emotional and/or behavioral disorders (EBD) in the first, second, or third grade.	FBAAs (i.e., interview, direct observation, and Function Matrix) were conducted. FBIs using the Function-Based Intervention Decision Model were implemented by trained teachers. Interventions with extinction procedures and interventions without extinction procedures were compared.	<ul style="list-style-type: none"> •All participants' on-task behaviors increased during interventions with extinction procedures and decreased during interventions without extinction procedures. •Results suggested that the function-matched extinction procedure was an essential component in FBIs.
Reeves, Umbreit, Ferro, & Liaupsin (2013)	Quantitative •ABAB withdrawal design	Three participants with ASD in the first grade. They received special education services.	FBAAs (i.e., interview, direct observation, and Function Matrix analyses) and the task analysis were conducted. FBIs using the Function-Based Intervention Decision Model were implemented by the trained teacher and assistants.	<ul style="list-style-type: none"> •During the intervention phases, all participants' on-task behaviors increased. Each participant completed the steps of the task analysis independently. •Results suggested that FBIs and the task analysis were effective for students with ASD in the inclusive classroom.
MacLeod, Hawken, O'Neill, & Bundock (2016)	Quantitative •Multiple baseline design	Four participants: two participants with LD in the first-or third-grade, two participants with Emotional Disturbance (ED) in the second-or fourth grade. All of them spent most of the school day in both inclusive and special education classrooms.	FBAAs (i.e., interview and direct observation), office discipline referrals (ODRs), and daily progress report (DPR) were conducted to figure out the functions of challenging behaviors. Based on each participant's function of behavior, FBIs including adjusting antecedents, teaching replacement behaviors, and adjusting consequences were conducted by trained teachers. In addition, self-monitoring was involved.	<ul style="list-style-type: none"> •All participants' challenging behaviors decreased during the intervention phase compared to the baseline phase. •Data on peer comparison indicated that participants' challenging behaviors were with or below their peers' challenging behaviors during the intervention phase. •Results suggested that the implementation of FBIs was effective for students who did not respond to Tier 2 interventions.

Table 5 (continued)

Authors	Study Design	Participants	Procedure	Findings
McKenna, Flower, Falcometa, & Adamson (2017)	Quantitative •Multiple baseline design	Two participants: one participant at-risk and the other participant with ADHD in the second-grade classroom.	FBAAs (i.e., interview and direct observation) were conducted to hypothesize the function of the behavior. FBAs involving a combination of adjusting antecedents, teaching replacement behaviors, and adjusting consequences were implemented by trained teachers.	•Results demonstrated that FBAs were effective for all participants to decrease challenging behaviors and increase replacement behaviors during the intervention and replication phases compared to the baseline phase.
Hendrix, Vancel, Bruhn, Wise, & Kang (2018)	Quantitative •ABAB withdrawal design	One participant identified as an “eligible individual” that qualified for special education services. He was placed in the sixth-grade classroom.	FBAs (i.e., interview and direct observation) and FBIs (i.e., Function-Based Intervention Decision Model) were used in the general education classroom. The general education teacher and two paraprofessionals received the training to implement interventions that included antecedent adjustments (i.e., concern card and self-monitoring), replacement behavior, reinforcement, and extinction.	•The participant’s disruptive behaviors decreased during intervention phases and increased during the withdrawal phase. •Results demonstrated that the individualized FBI was effective to decrease disruptive behaviors. In addition, the role of the general education teacher and two paraprofessionals was helpful to implement interventions.
Petursdottir & Ragnarsdottir (2019)	Quantitative •Multiple baseline design	Three participants in the two public elementary schools in Iceland: One participant with at-risk in the second grade. Two participants with ADHD or ASD in the third grade.	FBAs (i.e., interview and direct observation) were conducted by the researcher. FBIs (i.e., setting event modifications, adjusting antecedent and consequence, and teaching replacement behaviors) including fading token economy systems were implemented by collaboration between researchers and teachers. The intensity of using tokens gradually decreased.	•Results indicated the implementation of FBAs with fading token systems was effective to decrease disruptive behaviors and increase academic engagement. In addition, reduced and withdrawn token systems supported student’s improved behaviors to be maintained and generalized.

Chapter 3: Conclusions and Recommendations

The purpose of this paper was to evaluate the effectiveness of function-based interventions (FBIs) based on functional behavior assessments (FBAs) implemented in inclusive classrooms of elementary schools in supporting at-risk students and students with disabilities. Chapter 1 included background information on the topic and Chapter 2 presented a review of the related literatures. In this chapter, I discuss conclusions from findings, recommendations for future research, and implications for current practices.

Conclusions

All the information presented comes from empirical evidence that followed quantitative research. I reviewed 12 studies ranging in dates from 2007 to 2019 that examined the effectiveness of FBIs based on FBAs for at-risk students and students with disabilities implemented in inclusive classrooms of elementary school. Three of the studies implemented antecedent-based interventions (Banda & Sokolosky, 2012; Haley et al., 2010; Sanford & Horner, 2012), two of the studies implemented consequence-based interventions (Austin et al., 2015; Shunmate & Wills, 2010), and seven of the studies implemented multi-component interventions (Blair et al., 2007; Hendrix et al., 2018; Janney et al., 2012; MacLeod et al., 2016; McKenna et al., 2017; Petursdottir & Ragnarsdottir, 2019; Reeves et al., 2013).

All three of the studies demonstrated that antecedent-based interventions were effective to decrease challenging behaviors although they differed with regard to the behavioral interventions that each utilized. Haley et al. (2010) supported that using visual cards was effective for the student with ASD to decrease the vocal stereotypy maintained by sensory stimulation. Banda and Sokolosky (2012) asserted that using non-contingent attention (NCA)

was helpful for the student with ADHD to decrease talking-out behaviors maintained by social attention. Sanford and Horner (2012) demonstrated that providing the appropriate instructional level of materials was useful for students with LD and ASD to decrease challenging behaviors maintained by social attention or avoiding tasks.

Challenging behaviors identified by the experimental FBAs significantly decreased in two studies on consequence-based interventions. These studies concluded that the decrease of challenging behaviors was due to the effectiveness of consequence-based interventions.

Shunmate and Wills (2010) asserted that using the differential reinforcement of other behavior (DRO) with extinction and the differential reinforcement of alternative behavior (DRA) was effective for at-risk students to decrease disruptive and off-task behaviors sustained by social attention. Austin et al. (2015) offered that using the DRO considering reinforcements was effective for at-risk students to decrease off-task or calling out behaviors sustained by social attention or avoiding tasks.

All seven of the studies described that multi-component interventions (i.e., antecedent adjustments, teaching the replacement behavior, and consequence adjustments) were effective to decrease challenging behaviors or increase appropriate behaviors. Three of the studies showed the implementation of the Function-Based Intervention Decision Model (Umbreit et al., 2007): for the student who received special education services to decrease disruptive behaviors maintained by social attention (Hendrix et al., 2018); for at-risk students to increase on-task behaviors (Janney et al., 2012); and for students with ASD to increase on-task behaviors (Reeves et al., 2013). MacLeod et al. (2016) presented that the combination of Tier 2 (i.e., CICO) and Tier 3 (i.e., FBIs) was effective for students with LD or ED to decrease the challenging

behaviors maintained by social attention or avoiding tasks. Three of the studies provided the outcomes of both challenging and appropriate behaviors. Blair et al. (2007) proved that the combination of interventions was effective for the student with ASD to decrease challenging behaviors maintained by social attention and avoiding tasks and to increase appropriate behaviors. McKenna et al. (2017) claimed that the implementation of FBIs including the replacement behavior training was useful for at-risk students to decrease challenging behaviors sustained by social attention or avoiding tasks and increase replacement behaviors. Petursdottir and Ragnarsdottir (2019) explained that FBIs with fading a token system were effective to decrease disruptive behaviors and to increase the academic engagement for the at-risk student or students with ASD or ADHD.

Of the 12 studies reviewed, seven of the studies conducted indirect and descriptive FBAs (Haley et al., 2010; Hendrix et al., 2018; Janney et al., 2012; MacLeod et al., 2016; McKenna et al., 2017; Petursdottir & Ragnarsdottir, 2019; Reeves et al., 2013), three of studies conducted indirect and experimental FBAs (Austin et al., 2015, Blair et al., 2007; Shunmate & Wills, 2010), and two of the studies conducted indirect, descriptive and experimental FBAs (Banda & Sokolosky, 2012; Sanford & Horner, 2012). Haley et al. (2010) supported that the descriptive FBA implemented by school personnel in the classroom can be easier and faster than the experimental FBA. Furthermore, Shunmate and Wills (2010) asserted that it can be difficult for school personnel to conduct the experimental FBA in the classroom because of larger demands for many students. On the contrary, Austin et al. (2015) contended that the trial-based functional analysis can be simpler to conduct the procedures than traditional functional analysis.

Ten of the studies presented the teacher or assistant as the intervention agent (Austin

et al., 2015; Banda & Sokolosky, 2012; Blair et al., 2007; Janney et al., 2012; MacLeod et al., 2016; McKenna et al., 2017; Petursdottir & Ragnarsdottir, 2019; Reeves et al., 2013; Sanford & Horner, 2012; Shunmate & Wills, 2010), and two of the studies presented the paraprofessional as the intervention agent (Haley et al., 2010; Hendrix et al., 2018). All studies demonstrated that people who delivered interventions were school personnel who received training from researchers. Banda and Sokolosky (2012) mentioned that the teacher-implemented intervention is highly likely to increase the treatment fidelity in inclusive classrooms. However, Hendrix et al. (2018) supported the paraprofessional can usefully provide help to the general education teacher to manage a large group of students in inclusive classrooms as the intervention agent.

Five of the studies demonstrated the team approach (Blair et al., 2007; Janney et al., 2012; MacLeod et al., 2016; McKenna et al., 2017; Petursdottir & Ragnarsdottir, 2019). The team approach is described as a collaboration with researchers and school personnel to design and implement FBIs. Blair et al. (2007) included that both general and special education teachers collaborated with researchers. To be specific, the special education teacher helped the general education teacher to develop and implement interventions. Janney et al. (2012) and McKenna et al. (2017) conducted that general education teachers and researchers collaboratively developed the interventions. Petursdottir and Ragnarsdottir (2019) suggested that not only teachers but also parents and other school staff related to students were involved in the team to discuss interventions.

Recommendations for Future Research

Present findings contributed to proving the effectiveness of the FBI implemented in inclusive classrooms of elementary schools for at-students and students with disabilities. However, there were several limitations and suggestions for future studies in all 12 studies.

First, most of the studies cited small sample sizes as a limitation. Four of the studies targeted one participant (Banda & Sokolosky, 2012; Blair et al., 2007; Haley et al., 2010; Hendrix et al., 2018), whereas other four that included three or four participants also listed small sample sizes as a limitation (Janney et al., 2012; Reeves et al., 2013; Sanford & Horner, 2012; Shunmate & Wills., 2010). Haley et al. (2010) said that the effectiveness of the interventions can be restricted to generalize the results to other students and conditions. Hence, future research should examine the replication of the FBI for a larger group of students. In addition, various types of participants (e.g., gender, grade, and cultural background), teachers, activities, and settings should be considered in future studies.

Second, five of the studies listed short-term outcomes (Banda & Sokolosky, 2012; Haley et al., 2010; MacLeod et al., 2016; Petursdottir & Ragnarsdottir, 2019; Sanford & Horner, 2012). MacLeod et al. (2016) indicated that the short-term outcome is difficult to examine the maintenance and generalization of the effectiveness. Thus, future studies need to examine whether a low level of challenging behavior or a high level of appropriate behavior would be maintained without the intervention as long-term outcomes.

Third, five of the studies used the single-component intervention (Austin et al., 2015; Banda & Sokolosky, 2012; Haley et al., 2010; Sanford & Horner, 2012; Shunmate & Wills, 2010). Haley et al. (2010) suggested that other intervention procedures (e.g., reinforcement contingencies) would be needed if students with severe disabilities do not respond to the

antecedent-based intervention. Austin et al. (2015) mentioned that the consequent-based intervention focuses on decreasing challenging behaviors rather than teaching replacement behaviors. Future studies should identify and compare the specific components of function-based interventions such as single- or multi-components interventions, which have a positive effect on students' outcomes.

Fourth, two of the studies mentioned the insufficient time for the intervention (Haley et al., 2010; Sanford & Horner, 2012). Sanford and Horner (2012) described that providing the interventions for several weeks is not sufficient for students to decrease challenging behaviors and to increase appropriate behaviors. Future research should increase the time and intensity of the interventions for students.

Last, two of the studies cited the absence of experimental FBAs (Janney et al., 2012; MacLeod et al., 2016). Although experimental FBAs can provide more accurate information to figure out the function of challenging behaviors rather than the descriptive FBAs, they would be complicated to control experimental conditions and time-consuming in inclusive classrooms. Future studies should evaluate the feasibility of experimental FBAs conducted by the teacher in larger groups of students in inclusive classrooms.

Implications for Current Practice

As a special education teacher in the elementary school in South Korea, I was thinking of how to provide effective interventions to students with disabilities who received special education services in inclusive classrooms without taking them to the special education classroom whenever challenging behaviors occurred. Furthermore, I believed providing effective interventions to at-risk students prior to the special education referral would not only

save resources (e.g., time and budget) but also be a proactive and preventative approach. Hence, my paper reviewed the literature that demonstrates one of the most effective interventions, FBIs based on FBAs, implemented in inclusive classrooms of elementary schools in supporting at-risk students and students with disabilities.

After reviewing the literature, this paper provides five implications for current practice. First, descriptive FBAs can be more practical than experimental FBAs in inclusive classrooms. Research succeeded to figure out the correct functions of challenging behaviors by the descriptive FBAs; therefore, all studies using the descriptive FBAs demonstrated that participants' challenging behaviors decreased after the implementation of FBIs. Anderson et al. (2015) said descriptive FBAs are more commonly used by teachers or other school personnel in classroom settings while experimental FBAs are used by researchers in isolated settings. Second, multi-component interventions supported by many researchers have more chances to succeed in positive outcomes rather than single-component interventions such as antecedent-based interventions and consequence-based interventions. For example, Goh and Bambara (2012) demonstrated that 66 studies out of 83 studies used multi-component interventions, thus supporting the effectiveness of multi-component interventions. Third, school personnel should be encouraged to receive training on how to implement FBAs and FBIs. Special education teachers can improve their professional areas and general education teachers' understanding of FBAs and FBIs would increase the positive perspective of inclusive education for all students. Moreover, the trained paraprofessionals can help teachers to collect data and implement interventions because teachers have too many demands in the classroom. Fourth, the team-based development process is fundamentally important to provide continued support to students who

have challenging behaviors. Team members (e.g., general and special education teachers, parents, paraprofessionals, school psychologists, social workers, and administrators) have responsibilities to design and create behavioral intervention plans. For example, school psychologists can collaborate with teachers in inclusive classrooms and team members can keep monitoring students' behaviors. Last, administrators should encourage school personnel to implement the FBI by supporting sufficient resources (e.g., technical assistance and meeting time) and training for continuing growing.

Currently, the individual education program (IEP) teams in the United States develop the behavior support plan (BSP) for the student who engages in challenging behaviors regardless of categories of disabilities. In South Korea, the positive behavior support plan, which is referred to as the BSP or BIP in the United States, is not required, but still recommended in the IEP. According to the effectiveness of the FBI, special education teachers in South Korea can develop function-based interventions by receiving resources and training. Furthermore, not only special education teachers but also general education teachers can have the knowledge and acceptance function-based interventions, so that all school personnel collaboratively support students who engage in challenging behaviors in inclusive classrooms.

Summary

The findings of these studies supported that the implementation of function-based interventions derived from information of functional behavior assessments resulted in decreasing challenging behaviors or increasing appropriate behaviors for at-risk students and students with disabilities in inclusive classrooms of elementary schools. A few articles showed results of both challenging behaviors and appropriate behaviors. Individualized single- or multi-component

interventions were provided depending on functions of challenging behaviors: social attention, escape from tasks, and sensory stimulation.

The classification of interventions in my paper can suggest the importance of all components of function-based interventions although some researchers have mentioned which component is better than others. The combination of three components (i.e., modifying antecedent, teaching replacement behaviors, and adjusting consequence) can be supported in the classroom at school. Significantly, school personnel are encouraged to consider three components of function-based intervention linked with the function of challenging behaviors, so that the success rate of student's outcomes would be increased.

In addition, all interventions were implemented by general education teachers, assistants and paraprofessionals who received training. This factor might help to enhance the effectiveness of interventions because they already have relationships with students rather than other school staffs. Expert teachers take charge of dealing with challenging behaviors in classrooms by professional knowledge and skills. However, team members such as paraprofessionals, school psychologists, administrators, and parents should constructively collaborate with teachers to increase the feasibility and sustainability of interventions.

I believe that function-based interventions implemented in inclusive classrooms promote a positive school climate. If at-risk students and students with disabilities who are engaged in challenging behaviors are fully supported to participate in class independently and interact with their peers in natural environments at school, it would be strongly possible for them to be eventually involved in society in the future. Therefore, more schools all over the world should consider implementing function-based interventions in inclusive classrooms.

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