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A Synthesis of Empirically supported classwide Interventions: Matching Interventions to Common Functions of Classroom Behavior Problems

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A SYNTHESIS OF EMPRICALLY SUPPORTED CLASSWIDE INTERVENTIONS: MATCHING INTERVENTIONS TO COMMON FUNCTIONS OF CLASSROOM BEHAVIOR PROBLEMS

by

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Abstract

The most common forms of intervention for behavioral concerns of students in the school setting are schoolwide positive behavior support (PBS) systems and individualized interventions based upon functional behavior assessment (FBA). Research has shown positive outcomes for both schoolwide PBS systems and individual interventions utilizing FBA. However, less research has been done with classwide behavior interventions. A review of the literature was conducted to indentify classwide behavior interventions conducted in a regular education classroom with primarily regular education students. Studies identified to meet inclusion criteria were assessed to determine the possible function or combination of functions served. Twenty-one studies were identified examining twenty-three classwide behavior interventions. Results indicate that school-based problem solving teams have many successful classwide behavior interventions to choose from when consulting with a teacher. In addition, the vast majority of classwide interventions reviewed were implemented by a classroom teacher indicating high feasibility of usage. These results, discussion of function(s) addressed, and limitations or areas with need for further examination are discussed as well as implications for school-based problems solving teams, the school psychologist in particular.

Introduction

Behavioral problems of children in public school have been a focus of many researchers and educators for the past decade. Behavioral problems can range from simple to severe, with estimates of 50% of teacher referrals for intervention services being due to conduct or behavior problems (Bramlett, Murphy, Johnson, Wallingsford, & Hall, 2002).

In response to these behavioral concerns, there has been an increase in outcome research examining school-based positive behavior support (PBS) systems. These programs are designed to efficiently and effectively allocate school resources to positively support important behavior change for all children (Sugai & Horner, 2008). PBS is emerging as a potentially viable approach to prevent and reduce the number of students who exhibit disrupting behavior problems in the classroom setting, which interferes with academic learning time (Ervin, Schaughency, Matthews, Goodman, & McGlinchey, 2007; Lane, & Menzies, 2003; Lassen, Steele, & Sailor, 2006; Luiselli, Putnam, & Sunderland, 2002; Sprague, Walker, Golly, White, Myers, & Shannon, 2001; Walker, Cheney, Stage, & Blum, 2005). Reduction of behavior problems is accomplished by preventing behavior problems for most students with a universal level of intervention given to all students, and providing students with more intensive levels of instruction and behavioral intervention at the early onset of problems. For some students, addressing difficulties early on may provide adequate support to prevent further problems that may eventually have lead to a referral for a special education evaluation. Within this model, reallocation of existing school resources to maximize the effectiveness of interventions at each level is considered a key element for obtaining positive outcomes for all students. Optimal allocation of resources is to have the most abundant resource in a school setting, such as teachers, adequately support most of the student population. Less abundant personal, such as

school psychologists, are allocated to support the fewer number of students who continue to struggle even when given a universal level of intervention.

In a PBS model, support is typically allocated at various tiers or levels. The three tiers frequently included are schoolwide/classwide, small group, and individual (Hieneman, Dunlap, & Kincaid, 2005). Within the PBS model schoolwide and classwide empirically supported interventions that are likely to prevent problems, are first applied. The effects on student behavior are then monitored to determine if most students in a given classroom are responsive to these schoolwide or classwide efforts. Thus attention to interventions at the universal level, that will be implemented by teachers and effectively support most of the student population, is warranted.

In a schoolwide intervention all students in the school are given the same basic level of support. Supports for behavior provided at the schoolwide level typically include defining expected behaviors for all school settings, teaching all students the defined expected behaviors, and implementing a reward systems for appropriate behavior and a continuum of consequences for misbehavior of all students. Intervention at this level is typically focused on behaviors in transitional non-classroom settings such as the cafeteria, playground, hallways, or on the bus. In contrast, a classwide intervention is localized to a classroom population and is specifically designed to minimize time spent handling disruptive behavior in the classroom setting and maximize time spent on academic learning. The support that is provided by schoolwide and classwide interventions aims to sufficiently support 80% of a student population and serves as a primary prevention or tier one intervention. Tier two and tier three interventions ideally support the remaining 20% of students who may require more intensive or individualized interventions than those provided at the schoolwide or classwide level. Typically tier two and tier three

interventions involve services that are more focused and targeted, and thus serve as a secondary intervention. More intensive interventions are provided to small groups or individual students and functional assessment may be conducted to design individual interventions at this level (Sugai & Horner, 2002).

Much of the research done to date on positive behavior support has focused on either schoolwide or individual/small group interventions. Classroom interventions within a schoolwide tiered system has been researched much less (Hieneman, Dunlap, & Kincaid, 2005). Ideally, classwide interventions teach and promote positive classroom behavior and prosocial competencies. Logically, if most students were adequately supported in the classroom, then only a few children would require more intensive small group/individual support due to continued behavior problems (Gresham, 2005). This reduction of problem behaviors due to effective classroom intervention enables schools to allocate limited professional resources to those who truly need intensive support possibly due to a disability rather than to those students who would respond to "remediation" support in the general education classroom.

While studies on classwide behavior interventions have shown to be beneficial in reducing rates of behavior problems they have also been criticized as being too broad or lacking an emphasis and understanding of specific students behavior patterns (Conroy, Stichter, Daunic, & Haydon, 2008; Handler, Rey, Connell, Their, Feinberg, & Putnam, 2007; Tingstrom, Sterling-Turner, & Wilczynski, 2006). To determine what type of intervention appropriately addresses behavior problems, a vast amount of research has shown that determination of the function of the student's behavior may lead to effective treatment planning. Specifically, functional assessments are conducted to identify what type of reinforcer is maintaining problem behaviors. Following conduction of a functional assessment, interventionists may be able to reverse the maintaining

contingency by providing the identified reinforcer only for appropriate classroom behavior (Asmus, Vollmer, & Borrero, 2002). Interventions that modify controlling events by eliminating or reducing the occurrence of an identified consequence (following problem behavior) and increasing the occurrence of an identified consequence, (following appropriate behavior) have been shown to reduce problematic behavior and increase appropriate classroom behavior (Kern & Clemens, 2007; Newcomer & Lewis, 2004). Several reviews suggest four common functions of disruptive behavior: teacher attention, peer attention, tangible items, and escape (Ellis & Magee, 2004; Ervin, Radford, & Bertsch, Piper, Ernhardt, & Poling, 2001; Lane, Umbreit, & Beebe-Frankenberger, 1999). Though individualized interventions have been shown to be beneficial, they have also been criticized due to use of complex functional assessments that are quite time consuming and require additional staff and/or financial resources.

Classwide intervention strategies, however, typically emphasize behavior modification (BM) strategies to increase the adherence to classroom rules of all class members (Conroy et al., 2008; Handler et al., 2007; Tingstrom et al., 2006). The objective of a behavior modification approach is to override the current contingencies that are maintaining inappropriate behavior by having students choose to obtain stronger reinforcing events for desired behaviors or avoid stronger punishing events for inappropriate behaviors (Mace, 1994; Shores, Gunter, Denny, & Jack, 1993). The effectiveness of this approach is demonstrated in a number of studies including use of classwide group-oriented contingencies and token economies (Baybak, Luze, & Kamps, 2000; Bowen, Jenson, & Clark, 2004; Rathvon, 1999). There are three broad types of group contingencies: independent, interdependent, and dependent. Independent group contingencies involve the use of the same target behavior, the same criteria for earning access to reinforcement, and the same reinforcer across students. However, each student earns access to the reinforcer

contingent upon his or her own behavior. With interdependent group contingencies, a group of students receive access to reinforcement contingent upon the behavior of the entire group. Dependent group contingencies involve providing the group with access to reinforcement contingent upon the behavior of one or a few students (Kelshaw-Levering, Sterling-Turner, Henry, & Skinner, 2000).

Although there is a strong research base supporting BM strategies, there are currently no clear guidelines informing the field on what type of BM approach is best. Classroom-based interventions using a BM strategy typically include a number of components that may be responsible for the behavior change. This complexity of classwide interventions makes it problematic for researchers to determine exactly which component works for what student in a given classroom. But in general, a BM approach frequently has a behavior occurrence contact some sort of stimulus that would serve as a positive reinforcement if the behavior increases and the increase is maintained when the behavior predictably contacts the stimulus. For classwide interventions, this stimulus varies but may also include contacting social attention. For example, Skinner, Cashwell, and Skinner (2000) showed a decrease in classwide disruptive behavior when they employed peer attention for desired behavior by having peers "tootle" or report to the teacher observations of fellow students engaging in appropriate classroom behavior or prosocial behavior. Likewise, Koch and Breyer (1974) showed an increase in classwide appreciated behaviors when teacher attention was with the occurrence of desired behavior by having a teacher praise a group of students when following directions as teachers gave a mark on a student's chart contingent upon the desired behavior. Alternatively, a BM approach may include a negative reinforcement function when the occurrence of a desirable behavior allows escape or a reduction from aversive task (e.g., difficult school work) by giving free time for completing

some of the task. For example, in the study conducted by Christ and Christ (2006), free time was earned once the class reached an academic goal.

Recently, a meta-analysis by Gresham, McIntyre, Olson-Tinker, Dolstra, McLaughlin, and Van (2004) has shown support for a behavior modification approach relative to interventions based on the results of a functional assessment. This meta-analysis reviewed 150 studies from the Journal of Applied Behavior Analysis (JABA) between 1991 and 1999, which focused on school-based interventions. Gresham et al. (2004) found that over half of the studies (n =78) did not report utilization of a functional behavioral assessment (FBA) component as part of their intervention implementation. Interestingly, it was also found that the interventions based on FBA information were no more effective that interventions not reporting to have used FBA information in their intervention design and implementation. These findings are interesting given that FBA is a required component in certain instances under special education law, and are considered best practice by many (if not most) behavior analysts. Though these findings sit awkwardly with best practice of behavior analysts, Gresham noted the high rate of interventions not mentioning FBA utilization does not mean they did not utilize FBA rather they may just not have reported its use.

Although future studies are needed to compare effects and advantages to FBA based and non-FBA based interventions, findings from effective FBA based intervention can potentially be incorporated into non-FBA interventions. If a BM approach is designed to meet common functions of problem behavior that is typically addressed in a FBA based intervention, then this multi-component treatment could potentially match with the four common functions of misbehavior in the classroom. Classwide behavior intervention within a PBS model has two goals. The primary goal is to increase the frequency of appropriate behaviors and/or decrease the

frequency of inappropriate behaviors for all students in the class. The secondary goal is to increase time available for the teacher to deliver curriculum by decreasing the time teacher spends managing inappropriate behaviors (Gettinger & Seibert, 2002). Thus, a desirable intervention at the classwide level in a PBS model is to implement intervention strategies that are likely to have a large impact and sustained effect for an optimal number of students. An examination of individualized approaches that are effective for those students who are not responsive to classwide strategies may reveal how current empirically based classwide intervention may potentially be modified to address the functional needs of even more students in a given classroom. An advantage of combining a BM approach with a functional approach is that it expands on the reasons why a treatment is likely to be effective in the classroom.

One criticism of BM is that findings from studies using this approach are often inconsistent across study participants. Current research on functional assessment approaches have shown that these inconsistent effects of behavior modification on behavior change may be due to a mismatch between operant function and treatment (Asmus et al., 2002; Mace, 1994). Moreover, for many students with normal cognitive ability, functions of problem behaviors may change over time. Identification and manipulation of variables that control socially significant behavior for every student in a class would be a daunting task. But this task is unnecessary if a treatment to change group behavior is conscientiously selected to address most students' needs with reasonable classroom accommodations. Findings from reviews of the literature in functional assessment suggest common functions may have important implications on planning and implementing classwide interventions. Although behavior modification strategies typically used in classwide interventions places an emphasis on modifying and controlling behavior (Knitzer, Steinberg, & Fleisch, 1990), many of these interventions may potentially be modified

with consideration of variables that frequently are functionally related to students' problem behavior. Specifically, a selected behavior modification strategy has the potential to address common functions of behavior that occur in the classroom if they include teacher attention, peer attention, and escape from work as the reinforcement strategy for improved desired behavior (Ellis & Magee, 2004; Ervin et al., 2001; Umbreit, & Beebe-Frankenberger, 1999). Given that only a few functions have been identified, programming these preferred consequential events to increase association with desirable behavior in the form of classwide interventions would potentially address the individual needs of many students.

An optimal approach to classwide intervention that would benefit most of the children in the class would need to meet three critical requirements. First, interventions must result in meaningful improvements in desirable outcomes such as rule compliance and academic improvements (Witt, VanDerHeyden, & Gilbertson, 2004). Second, effective interventions occur across contexts and result in long-term behavior change (Goldstein & Martens, 2000). Third, no intervention is effective if it is not used, thus interventions must be acceptable to teachers and utilized correctly in the classroom (Gresham, 1989). A potential fourth approach may be to incorporate treatment that potentially addresses multiple functions of multiple behaviors exhibited by individual students in a given classroom (Gresham, 1991). A classwide intervention that attends to frequent reasons why common problem behaviors occur in the classroom may be more likely to increase the number of students who would respond to a classwide intervention. Examining the extent that proven classwide interventions within the literature addressed behavior functions may further provide guidance on the selection of classwide interventions implemented by teachers that are most likely to provide positive outcomes for most children. To determine classwide interventions that increases the likelihood

that most children's behavioral needs are met in a classroom, an analysis of prior research on effective classwide interventions may indicate which of the previously studied classwide interventions addressed one or more of the four common functions: escape, peer attention, teacher attention, and tangible items.

Purpose

Given the mixed effectiveness of a functional approach and a non-functional approach for intervention planning for individual students, this literature review will seek to explore the potential of classwide interventions, as it has been applied in the regular education classroom, for addressing common functions of behavior (Ervin et al., 2001; Kern, Hilt, & Gresham, 2004). This review is proposed to provide an overview of the empirically supported interventions used to increase classwide behavior management in regular education settings. Next, the identified effective classroom intervention will be analyzed to explore the extent that proven classwide interventions addressed one or more of the components that commonly maintain problem behaviors: teacher attention, peer attention, obtaining a tangible item, or escape/avoidance of an aversive event. Effective strategies will also be evaluated for the impact of these interventions on students across grade levels, treatment integrity, teacher acceptability, generalization, and maintenance. A secondary goal of this review is to identify which classwide interventions have effectively enhanced two critical behaviors: classroom rule-abiding behaviors and academic performance.

Importantly, knowledge from this synthesis of study and outcomes from each of the functions of behavior will be used to determine the most optimal approach based on the most current data to deliver effective intervention in the classroom that would have potentially positive impact in addressing the needs of most children in the classroom. Empirically supported strategies that address more than one function of behavior problems can then be employed by school psychologists and school-based problem solving teams to address the most common functions of student disruptive problems in the classroom. Using this approach, the anticipated outcome is that fewer children would require more intensive academic or behavioral intervention

services. Finally, the existing literature will be examined to determine the current limitations or gaps in the research and to identify research questions that could address these gaps and limitations.

Method

Study Selection

To conduct the current analysis, studies were located by searching databases consisting of peer reviewed research articles on intervention research. PsychInfo, Psychology and the Behavioral Sciences Collection, and ERIC were the databases utilized as the primary source for locating studies that focused on classwide behavior interventions implemented in a regular education setting. The following descriptors were utilized in the database search: Class wide/class-wide/classwide intervention, behavior modification, functional assessment, intervention, behavior intervention, behavior management, group contingencies, and response to intervention. The references of all selected studies references were reviewed in an effort to find other potential studies that met the inclusion criteria.

Studies that were included in this literature review met the following inclusion criteria: 1) an intervention was delivered in a classroom setting, 2) the dependent variable was focused on decreasing rates of negative/undesired behavior or increasing rates of positive/desirable behavior, 3) intervention was delivered to all students in a classroom, not just an individual student or small group of students, 4) no more than 50% of the participants were identified as special education students, and 5) behavior of approximately 40% of the class or more was observed and reported.

Areas of Evaluation and Coding Procedures

A total of 21 studies were identified as fitting the inclusion criteria for this review (see studies with * in Reference section). Given that many behavior modification strategies were investigated in the 1970s, included studies ranged between 1969 and 2007. The author reviewed and coded each of the identified studies as described in the following sections.

The focus of this review was on classwide behavioral intervention; therefore the demographics of the participating classrooms in a study were coded rather than the individual participants. Each article was coded according to grade level of the class (elementary, junior high/middle school, high school). Race/ ethnicity (African American, Asian, Caucasian, Latino, Native American, Other) was coded if any percentage of each category was reported in the participant section of the coded articles. Finally, although each study was conducted within a regular education classroom setting, the representation of special education students in each setting was coded three ways. First if the class included no special education eligible students, the class was coded as regular education only. Second if the class included any special education eligible students as well as the regular education students, the class was coded as "blend." Third if there was no mention of special education eligible students involved in the classroom, the class was coded as "no mention."

The independent variable (i.e., classwide treatment) was also categorized for each study. Although all treatment types were considered at the onset of the evaluation of the study, all treatments that were examined in the included studies fell into one of the following treatment categories: interdependent group contingency, independent group contingency, and dependent group contingency.

A main area of this review focused on identification of the function(s) that the intervention is likely to address based on the treatment design and reinforcement options provided to the students. Therefore, each study was coded as to the following function or combination of functions that the intervention provided: teacher attention (TA), peer attention (PA), escape (ESC), and/or Tangible. The following definitions for each function were utilized.

Teacher attention was coded when authors reported that student(s) earned the attention of an adult (teacher, teacher aide, principal, etc.) as part of the reinforcement system. Examples include praise, high five from an adult, call home from teacher, etc. Additionally teacher attention was coded for reinforcement activities that potentially gain adult attention or are completed with an adult (earning sticker/stamp from adult, helping teacher, home reward with parent, playing game with teacher, lunch with teacher, etc.). Peer attention was coded when authors reported that student(s) earned the attention of a peer or earned an activity with a peer (free time with a peer, play game with a peer, change seats to sit by a friend, share work with class, etc.) as part of the reinforcement system. Additionally, peer attention was coded for all group contingencies with the exception of the independent group contingency. This was based on the assumption that interdependent and dependent group contingencies are designed to have students earn a reward based on the evaluation of the group (interdependent) or one or more other student's behavior (dependent). Because this reward is based on group behavior, there is a high potential for peer attention to be provided as students prompt each other or support classmates who follow the rules. Escape was coded when authors reported that student(s) had the option to earn class time to do preferred activities in place of typical class activities (free time, leave class early, nap, listen to music on headphones, or have extra recess) as part of the reinforcement system. Tangible was coded when authors reported that student(s) had the option to earn an object (pencil, sticker, eraser, snack, object from "treasure chest", etc.) as part of the reinforcement system.

Target behaviors that were measured in each classroom were also coded. Given that the focus of this review was the effect of behavioral interventions on classwide behavior change, the dependent variable of each study (i.e., target behavior) was also coded by classroom rather than

by participants. The dependent variable was coded based on reported labels of the behaviors, which included on-task behavior, following directions, gaining teacher attention appropriately, completing assignments, and "tootling." Disruptive behavior was also coded and including out of seat, touching others, talking out, inappropriate behavior/off-task behavior, and noncompliance. Moreover, the behaviors were also coded based on behavior dimension (frequency, rate and percentage).

To examine treatment effects obtained under various types of interventions, the mean of the target behavior performance during the baseline and treatment phase of the study was recorded. Several calculation guidelines were followed when recording this mean. First, for studies that reported more than one classroom, the mean of all classrooms was calculated and recorded for each phase. Second, for studies that reported separate student performance in one class, the mean of all students in the class was reported. Finally, for withdrawal single study subjects (ABA) that reported more than one baseline phase, the recorded mean was calculated using included both phases. Likewise, this guideline was followed when a treatment phase was conducted with a class several times in a study.

All studies were reviewed for follow-up maintenance. If follow-up maintenance was collected a "yes" was coded, if no maintenance was collected or there was no mention a "no" was recorded. If "yes" was coded for follow-up maintenance the duration of follow-up (days measured) was coded as well as whether treatment results successfully maintained following removal of intervention treatment (coded as "yes" or "no"). Generalization was also examined and was coded as the type of generalization that was assessed including across setting, across behaviors, or across subject areas, or not assessed. Several aspects of the methods that were employed in each study were examined. First, the design of the intervention was categorized.

All studies were single subject studies and were coded as withdrawal (ABAB), multiple phase (ABACBC), multi-element, multiple baseline, or AB or ABC design. Second, the data collection method for target behaviors was also reviewed and coded as direct classroom observation, record review, interview, pre/post test, pre/post observation, pre/post rating, and/or permanent product review. Third, the length of the intervention was coded as the number of days the authors reported the intervention was implemented. For the few studies that did not report the length of the intervention in the narrative, the length of the intervention was coded based upon the number of days that the treatment was graphed.

Finally, as treatment integrity is vital to accurately interpret the effect of an intervention, all studies were coded "yes" if treatment integrity was measured and "no" if treatment integrity was not measured or there was no mention. Those studies that did measure treatment integrity were further coded based on reported percentage of treatment integrity (80-100%, 60-80%, 40-60%, below 40%).

Several factors that may reflect potential feasibility of application in a school setting without researchers support were categorized in this review. First, logistics of how both the teacher and students were trained on the intervention procedures were coded separately. Training consisted of any described activities informing teachers or student participants on how to implement and participate in the intervention. Training activities were coded as verbal instructions, written instructions, demonstrated in setting, role play, guided practice in the setting, performance feedback, role play, or no mention of training methods. Second, the individual(s) who implemented the intervention were coded as: researcher, teacher, student, or aide. Lastly all studies were reviewed and coded for social validity. Each study was coded

based upon if a social validity measure was given to participants (teacher, students, parents) as well as coded for which participants favored the intervention (teacher, student, and parent).

Results

Demographics

Figures 1 through 3 present the reported demographic data of participating classrooms in each study. Of the twenty-one studies, the majority of the studies (n = 18; 85.7%) were implemented in an elementary setting, and more studies were conducted in a junior high/middle school setting (n = 2; 9.5%) than a high school setting (n = 1; 4.8%). Few classrooms participated in each of the studies. Specifically, 19% (n = 4) had more than two classrooms, 19% (n = 4) had two classrooms, and 62% (n = 13) had one classroom in each study.

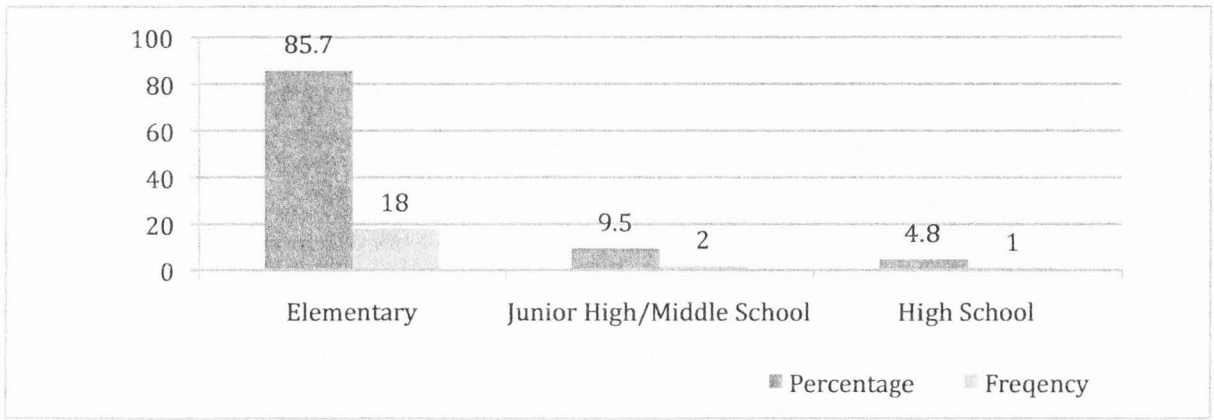

Figure 1. School setting per study.

The racial and ethnic composition of the participating classroom in each study was also reviewed (see Figure 2). Approximately half of the studies (48%) reported information regarding race/ethnicity composition of the participating classrooms. Of the studies whom reported ethnic groups, 33% reported actual percentages/frequencies of the ethnic population per classroom, while 14% of the studies did not report percentages, but merely stated the various race/ethnicity of students in the classroom. Thus calculating the percentage of specific race/ethnicity populations by classroom was not possible.

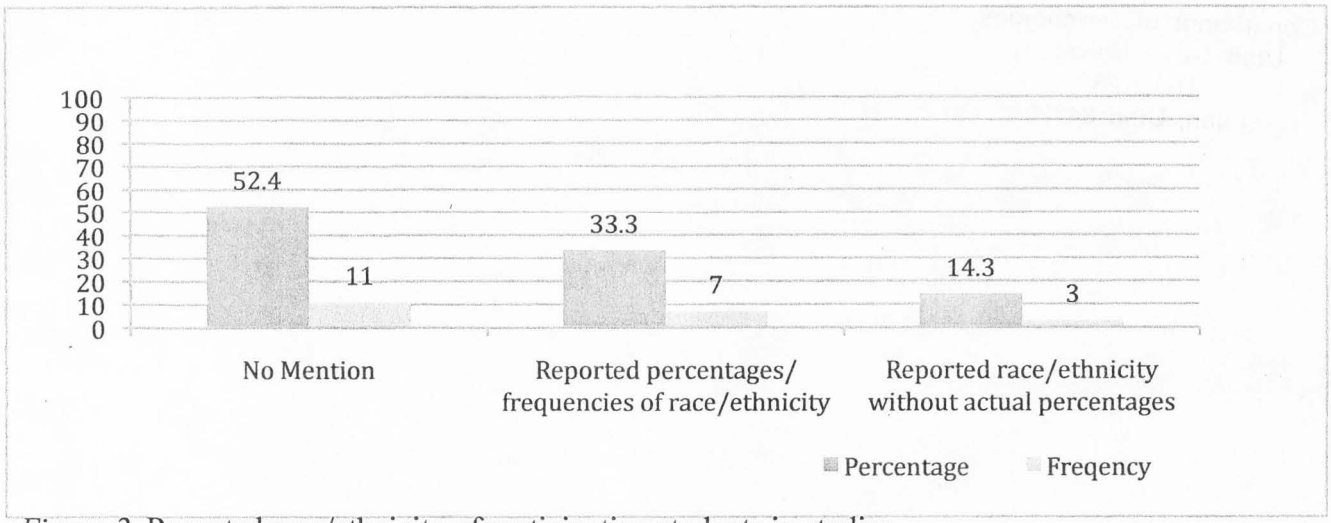

Figure 2. Reported race/ethnicity of participating students in studies.

Finally, though all studies were conducted in a regular education classroom, the classroom make-up of regular education students and special education students was examined (see Figure 3). The majority of the studies (n = 14; 66.7%) did not provide any information regarding participation of special education students in the classroom. Of the remaining studies, 23.8% (n = 5) indicated that special education students were part of the participating classroom and 9.5% (n = 2) of the studies reported that the classrooms were comprised of only regular education students.

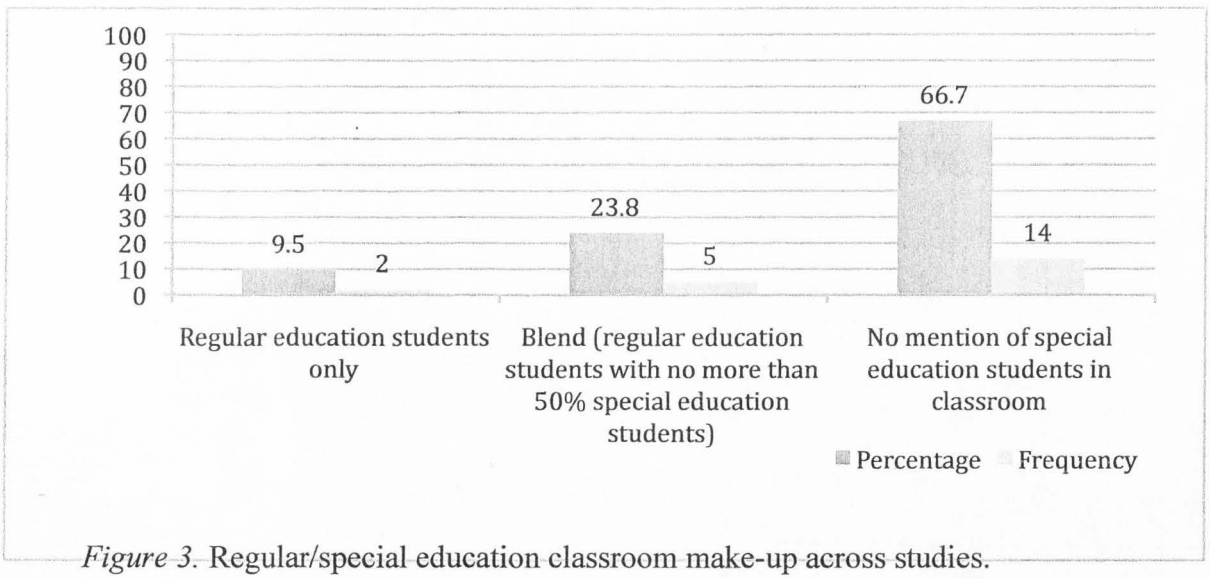

Figure 3. Regular/special education classroom make-up across studies.

Summary of Interventions and Functions

Although there were 21 studies reviewed, the effects of 23 interventions were examined in these studies because some studies compared the effects of two different interventions. All of the interventions reviewed (N = 23) utilized a group contingency (see Figure 4). The majority of interventions utilized an interdependent group contingency (n = 15), while twenty-one percent (n = 5) utilized an independent group contingency. Two interventions utilized both interdependent and independent group contingencies during the intervention. Only one intervention utilized a dependent group contingency. In addition to coding based upon which type of group contingency was utilized, each intervention was coded by broad types of intervention: token economy (n = 16), response cost (n = 5), response cards (n = 1), and home-based contingency management (n = 1).

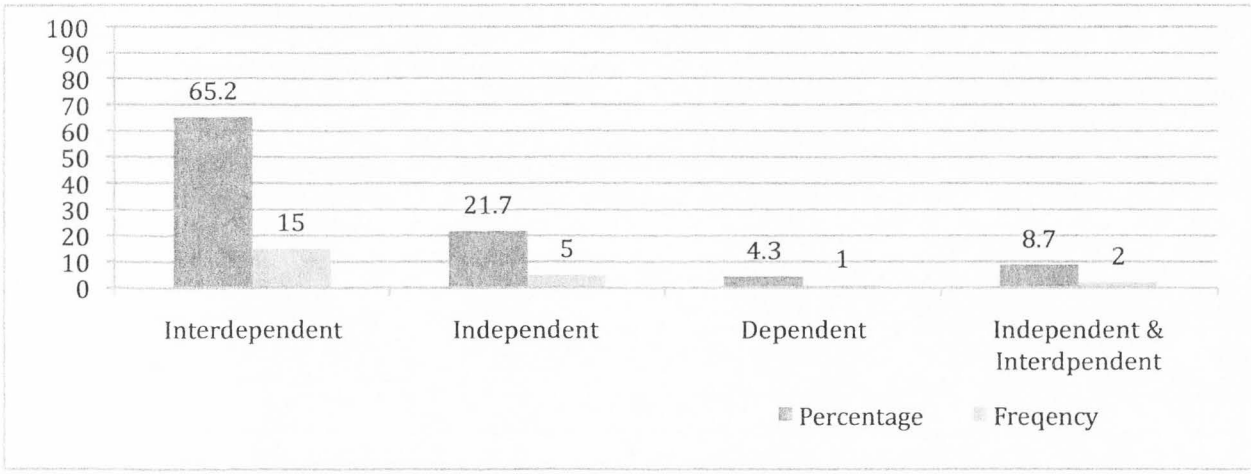

Figure 4. Type of group contingency utilized per intervention.

Of the 23 interventions reviewed, each was coded for the function or combination of functions that each intervention and reinforcement system addressed (see Figure 5). The only function or combination of functions that was not observed amongst the interventions reviewed were ESC, Tangible, TA + ESC, TA + Tangible, and TA + ESC + Tangible.

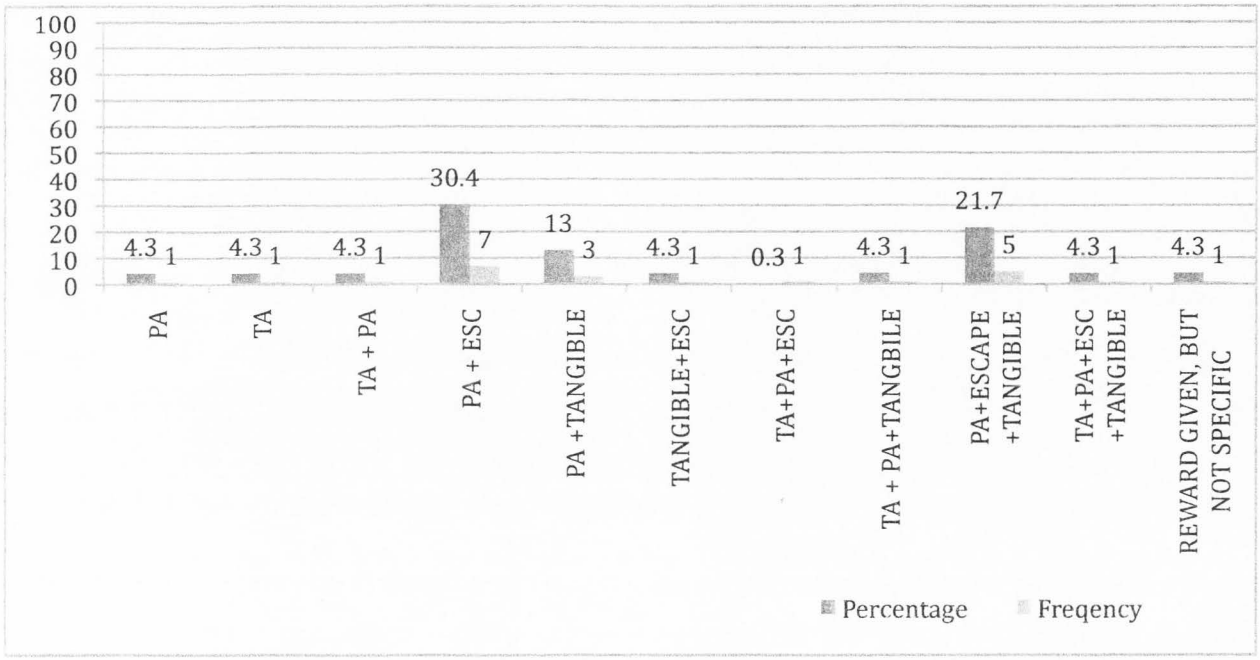

Figure 5. Function(s) addressed by each intervention/reinforcement per intervention.

Summary of Study Methods

Study Design. As shown in Figure 6, five types of single subject experimental designs were employed to investigate the effects of reviewed interventions (N = 23) on behavior: multi element, multiple baseline, ABAB withdrawal, multiple phase ABACBC, and AB or ABC design. Of the five designs the most utilized designs were the withdrawal designs and multiple baseline design with 57% (n = 13) utilizing a withdrawal design and 13% (n = 5) utilized the multiple baseline design. The remaining 30% consisted of multi element design (n = 2) and AB or ABC design (n = 3).

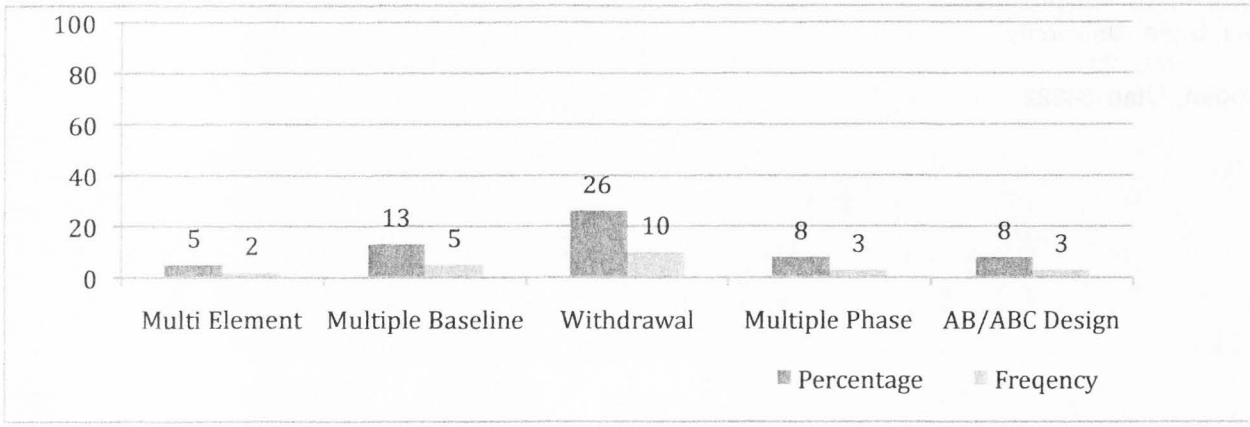

Figure 6. Study design used to examine intervention effects per intervention.

Table 1 presents the data collection methods used for each function. All functions examined in this study were investigated using an experimentally controlled single subject design (range, 1 to 3 studies) with the exception of the intervention function PA + ESC (AB design).

Table 1

Experimental Design Used per Function

	Experimental Design									
Function	Multi-element		Multiple Baseline		ABAB Withdrawal		Multiple phase abacbc		AB design	
	n	%	n	%	n	%	n	%	n	%
PA	0	-	1	4.30%	0	-	0	-	0	-
TA	0	-	0	-	0	-	1	4.30%	0	-
TA + PA	0	-	0	-	1	4.30%	0	-	0	-
PA + ESC	0	-	3	13.00%	2	8.70%	0	-	2	8.70%
PA + Tangible	0	-	1	4.30%	2	8.70%	0	-	0	-
Tangible + ESC	0	-	1	4.30%	2	8.70%	0	-	0	-
TA + PA + ESC	0	-	0	-	1	4.30%	0	-	0	-
TA + PA + Tangible	0	-	0	-	0	-	1	4.30%	0	-
PA + ESC + Tangible	1	4.30%	2	8.70%	1	4.30%	1	4.30%	0	-
TA + PA + ESC + Tangible	0	-	0	-	1	4.30%	0	-	0	-
Unspecified reward	0	-	0	-	0	-	0	-	1	4.30%

Note: PA=Peer Attention, TA= Teacher Attention, ESC= Escape.

Collection Method. The most frequent method used to examine behavior change for each intervention (N = 23) in the reviewed studies was direct observation (see Figure 7). The other methods reported in this review include a review of records, review of permanent product, and pre/post rating scale. Each of these methods was employed in one study each (4.3%). Only one study utilized a combination of collection methods (direct observation and permanent product review). Table 2 presents the data collection methods used for each function. The change of behavior was most frequently measured using direct observation under the intervention functions PA + ESC and PA + ESC + Tangible. A direct observation data collection method was used to evaluate the effects of nine intervention functions on behavior change (range, 1 to 7 studies): PA, TA, TA + PA, PA + ESC, PA + Tangible, Tangible + ESC, TA + PA + ESC, PA + ESC + Tangible, and TA + PA + ESC + Tangible. Although behavior change with the intervention function TA + PA + Tangible was not examined using direct observation, this function was examined using permanent products.

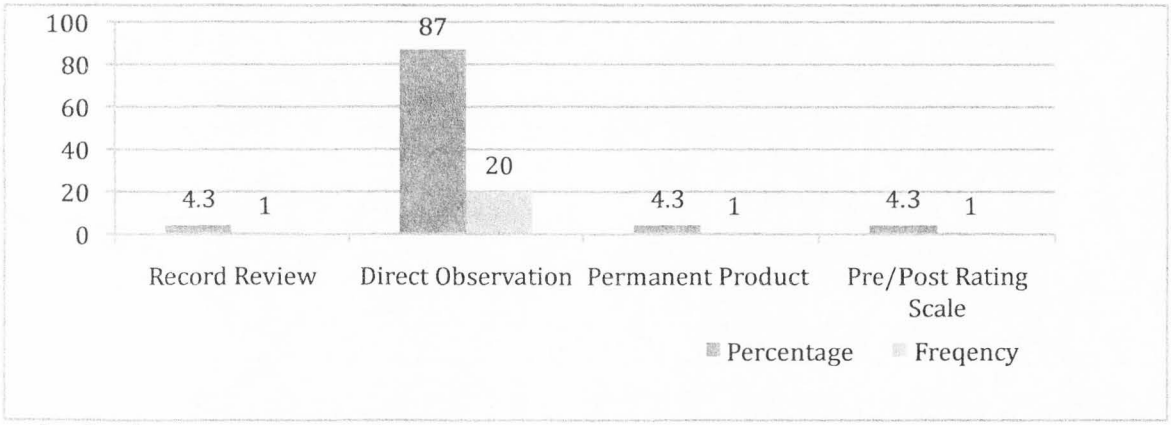

Figure 7. Study data collection method per intervention.

Table 2

Data Collection Methods Used per Function

	Behavior Data Collection Method							
Function	Record review		Direct observation		Permanent product		Pre-post rating scale	
	n	%	n	%	n	%	n	%
PA	0	-	1	4.50%	0	-	0	-
TA	0	-	1	4.50%	0	-	0	-
TA+ PA	0	-	1	4.50%	0	-	0	-
PA + ESC	0	-	7	31.80%	0	-	0	-
PA + Tangible	1	4.50%	1	4.50%	0	-	1	4.50%
Tangible + ESC	0	-	1	4.50%	0	-	0	-
TA+PA+ ESC	0	-	1	4.50%	0	-	0	-
TA + PA + Tangible	0	-	0	-	1	4.50%	0	-
PA + ESC + Tangible	0	-	5	23.0%	0	-	0	-
TA + PA + ESC + Tangible	0	-	1	4.50%	0	-	0	-
Unspecified reward	0	-	1	4.50%	0	-	0	-

Note: PA=Peer Attention, TA= Teacher Attention, ESC= Escape.

Treatment Integrity. Of the 23 interventions implemented in the reviewed studies, 30% (n = 7) reported treatment integrity (see Figure 8). All studies that measured treatment integrity reported high levels of integrity indicating that treatment steps were accurately implemented 80% to 100% of the time that integrity levels were observed. Interventions that addressed the following five functions reported high levels of treatment integrity (range, 1 to 2 studies): PA, PA + TA, PA + Tangible, PA + TA + Tangible, and PA + ESC + Tangible (see Table 3).

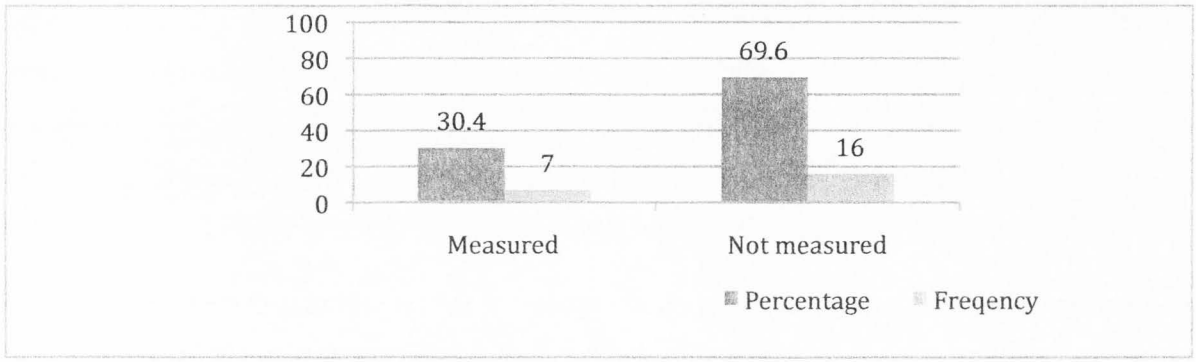

Figure 8. Reported treatment integrity per intervention.

Table 3

Reported Treatment Integrity per Function

Function	n	%
PA	1	4.30%
TA + PA	1	4.30%
PA + Tangible	2	8.70%
TA + PA + Tangible	1	4.30%
PA + ESC + Tangible	2	8.70%

Note: PA=Peer Attention, TA= Teacher Attention, ESC= Escape.

Length of Study. The mean length of intervention across all studies was 24.6 days (SD = 27.5). However the length of intervention (days) was highly variable between studies and ranged between 4 and 133 days. In sum, 8 interventions (26.6%) were conducted between 4 and 10 days, 14 interventions (46.6%) were conducted between 11 and 20 days, 2 interventions (6.6%) were conducted between 21 and 30 days, 4 interventions (13.3%) were conducted between 40 and 50 days, and 2 interventions (6.6%) were conducted for more than 94 days. (Figure 9 presents length of intervention data.)

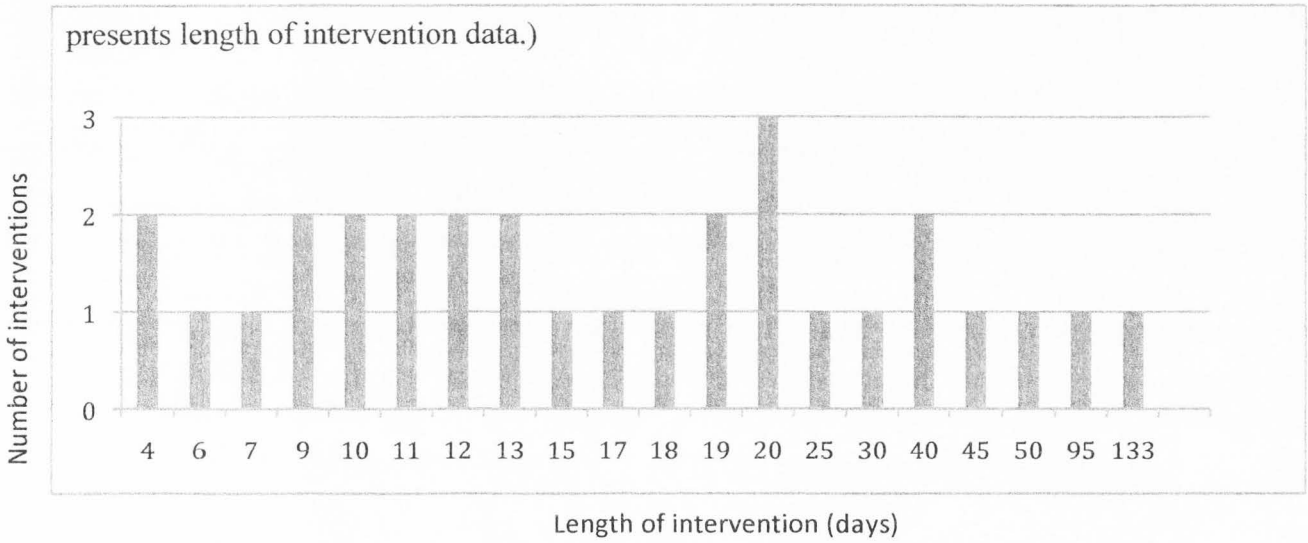

Figure 9. Number of intervention days implemented per study

Summary of Practical Feasibility of Intervention Procedures

Treatment Implementer. The majority (n = 21; 91.3%), of the interventions implemented in each of the reviewed studies were implemented by the classroom teacher, by an aide alone, or by both the aide and the teacher (See Figure 10). A small percent, 8.7% (n = 4), were implemented by the teacher in conjunction with a researcher. Interventions addressing the following nine functions were implemented by a teacher alone (range, 1 to 5 studies): TA, PA, PA + ESC, PA + Tangible, Tangible + ESC, TA + PA + Tangible, TA + PA + ESC, PA + ESC + Tangible, and TA+ PA+ Tangible + ESC (see table 4).

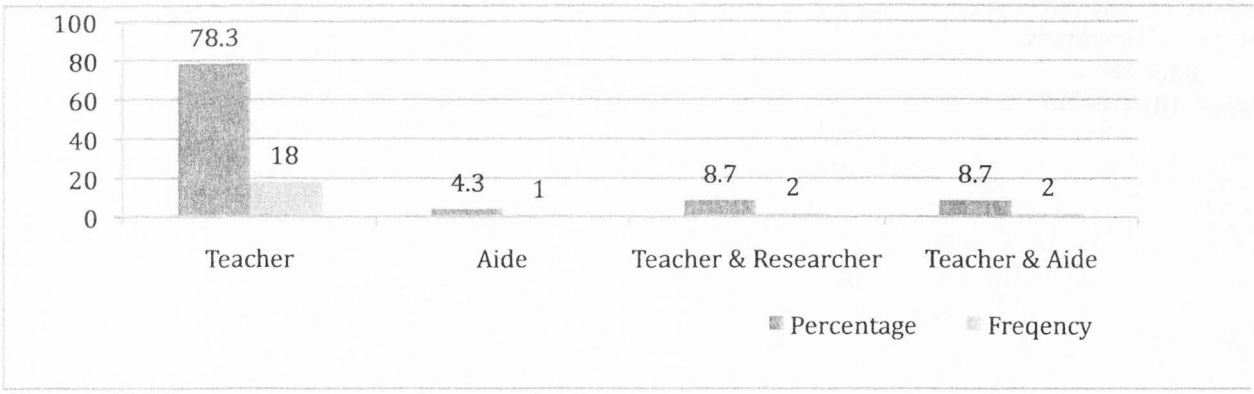

Figure 10. Treatment agent per intervention.

Table 4

Treatment Agent per Function

Function	Treatment Implementer							
	Teacher		Aide		Researcher and Teacher		Teacher and aide	
	n	%	n	%	n	%	n	%
PA	1	4.30%	0	-	0	-	0	-
TA	1	4.30%	0	-	0	-	0	-
TA+ PA	0	-	0	-	1	4.30%	0	-
PA + ESC	5	21.70%	1	4.30%	0	-	1	4.30%
PA + Tangible	2	8.70%	0	-	1	4.30%	0	-
Tangible + ESC	1	4.30%	0	-	0	-	0	-
TA + PA + ESC	1	4.30%	0	-	0	-	0	-
TA + PA + Tangible	1	4.30%	0	-	0	-	0	-
PA + ESC + Tangible	4	17.40%	0	-	0	-	1	4.30%
TA + ESC + Tangible	0	-	0	-	0	-	0	-
TA + PA + ESC + Tangible	1	4.30%	0	-	0	-	0	-
Unspecified reward	1	4.30%	0	-	0	-	0	-

Note: PA=Peer Attention, TA= Teacher Attention, ESC= Escape.

Social Validity. A social validity measure was conducted with teacher, students, and/ or parents for approximately half of the interventions (n = 12) reviewed in this study (see Figure 11). Social validity was assessed by both the teacher and students in sixty-six percent of the interventions reviewed (n = 8), by the teacher alone in twenty-five percent of the interventions reviewed (n = 3), and by teacher, students, and parents in eight percent of the interventions reviewed (n = 1). The most commonly utilized manner of measuring social validity was survey/questionnaire (n=5), followed by anecdotal reporting (n=4), and one study utilized researcher informal interview. Results from all studies that assessed social validity showed that teachers, students, and/ or parents favored the intervention.

Table five presents the social validity assessments conducted per intervention function. Interventions that addressed the following six functions (range, 1 to 5 studies) were reported to have been favored by teachers: PA, PA + ESC, PA + Tangible, PA + TA + ESC, PA + ESC + Tangible, and TA + PA+ ESC + Tangible. Five (33%) of the following intervention functions were reported to have been favored by students (range, 1 to 2 studies): PA, PA + ESC, PA + Tangible, PA + TA + ESC, and PA + ESC + Tangible.

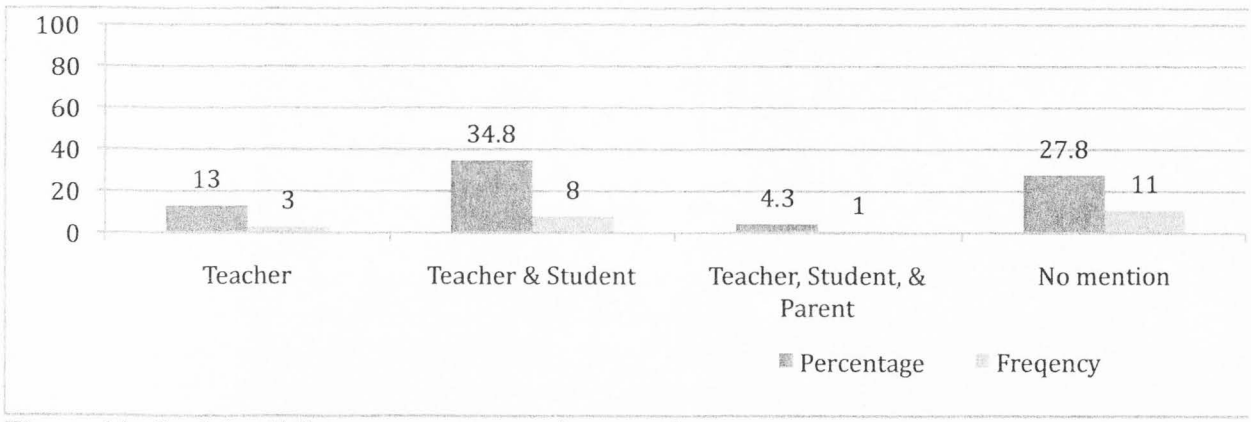

Figure 11. Social validity assessments per intervention.

Table 5

Social Validity Assessments per Function

Function	Social validity Measure							
	Teacher		No mention		Teacher and Student		Teacher, Student and Parent	
	n	%	n	%	n	%	n	%
PA	0	-	0	-	1	4.30%	0	-
TA	0	-	1	4.30%	0	-	0	-
TA + PA	0	-	0	-	1	4.30%	0	-
PA + ESC	2	8.70%	3	13.00%	2	8.70%	0	-
PA + Tangible	0	-	2	8.70%	1	4.30%	0	-
Tangible + ESC	0	-	1	4.30%	0	-	0	-
TA + PA + ESC	0	-	0	-	1	4.30%	0	-
TA + PA + Tangible	0	-	0	-	0	-	1	4.30%
PA + ESC + Tangible	0	-	3	13.00%	2	8.70%	0	-
TA + PA + ESC + Tangible	1	4.30%	0	-	0	-	0	-
Unspecified reward	0	-	1	4.30%	0	-	0	-

Note: PA=Peer Attention, TA= Teacher Attention, ESC= Escape.

Teacher/Aide Training. The majority of the studies reviewed did not mention the method utilized to train the teacher/aide on the intervention protocol/procedures (see Figure 12). However, the five studies that reported teacher training were specific as to what type or combination of training was provided. The most common training provided was verbal training (n = 5), followed by written scripts (n = 4), performance feedback/coaching (n = 3), guided practice (n = 2), roleplay (n = 2), modeling (n = 2), and demonstrations in setting (n = 1). When examining type of teacher/aide training and the function of the intervention, one type of teacher/aide training was reported for four intervention functions each in one study: PA, TA + PA, PA + Tangible, and TA + PA + Tangible (see Table 6). However, no consistent type of teacher/aide training was reported across functions.

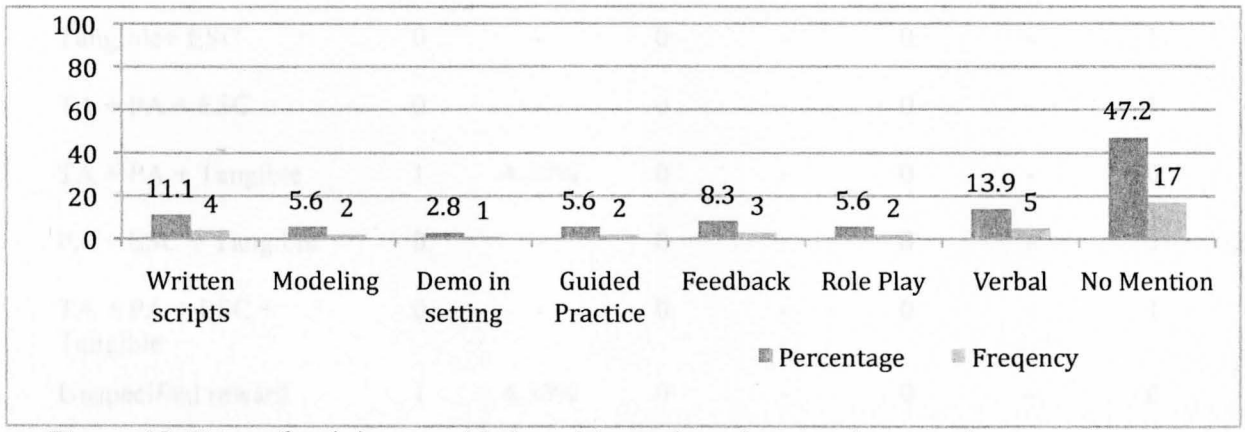

Figure 12. Type of training provided to aides and teachers per intervention.

Table 6

Type of Training Provided to Aides and Teachers per Function

Function	Type of Training							
	Written		Model		Guided Practice		No Mention	
	n	%	n	%	n	%	n	%
PA	1	4.30%	0	-	0	-	0	-
TA	0	-	0	-	0	-	1	4.30%
TA + PA	0	-	1	4.30%	0	-	0	-
PA + ESC	0	-	0	-	0	-	7	30.40%
PA + Tangible	1	4.30%	0	-	1	4.30%	0	-
Tangible+ ESC	0	-	0	-	0	-	1	4.30%
TA + PA + ESC	0	-	0	-	0	-	1	4.30%
TA + PA + Tangible	1	4.30%	0	-	0	-	0	-
PA + ESC + Tangible	0	-	0	-	0	-	5	21.70%
TA + PA + ESC + Tangible	0	-	0	-	0	-	1	4.30%
Unspecified reward	1	4.30%	0	-	0	-	0	-

Note: PA=Peer Attention, TA= Teacher Attention, ESC= Escape.

Student Training. In contrast to the teacher/aide training, the majority of studies reviewed reported the type of training or combination of training that was provided to the students in participating classrooms (see Figure 13). Similar to the teacher/aide trainings, the most commonly provided training was verbal training (n = 20). Guided practice (n = 3), roleplay (n = 2), performance feedback/coaching (n = 1), demonstration in the classroom (n = 1), modeling (n = 1), and written scripts (n = 1) were utilized. When examining type of student training and the function of the intervention, the nine intervention functions that reported some type of student training included (range, 1 to 5 studies): PA, PA + TA, PA + ESC, PA + Tangible, Tangible + ESC, TA + PA + ESC, TA + PA + Tangible, PA + Tangible + ESC, and TA + PA + Tangible + ESC (See Table 7). However, no consistent type of student training was reported across functions.

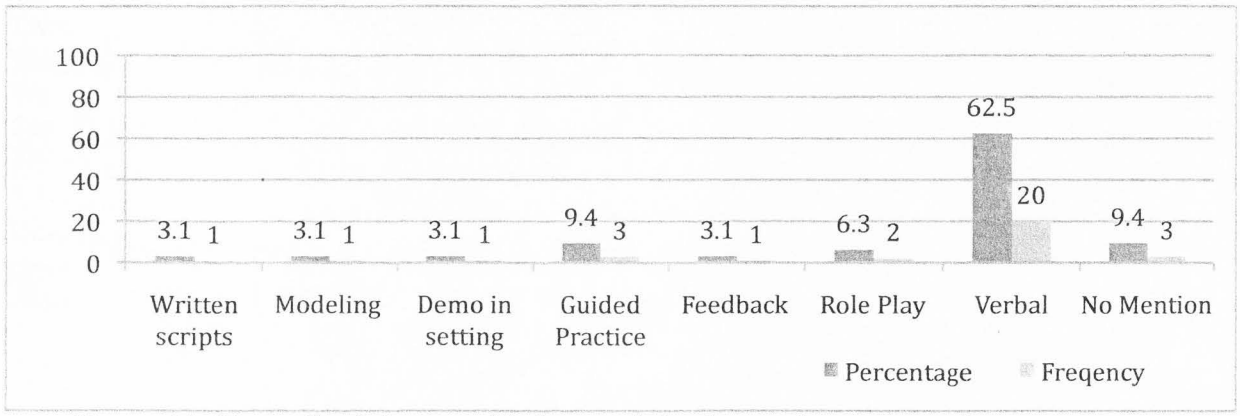

Figure 13. Type of training provided to participating students per study.

Table 7

Type of Training Provided to Participating Students per Function

Function	Type of Training											
	Written		Model		Demo in setting		Guided Practice		No Mention		Verbal	
	n	%	n	%	n	%	n	%	n	%	n	%
PA	1	4.30%	0	-	0	-	0	-	0	-	0	-
TA	0	-	0	-	0	-	0	-	1	4.30%	0	-
TA + PA	0	-	0	-	1	4.30%	0	-	0	-	0	-
PA + ESC	0	-	0	-	0	-	0	-	1	4.30%	6	26.10%
PA + Tangible	0	-	0	-	0	-	2	8.70%	0	-	1	4.30%
Tangible+ ESC	0	-	0	-	0	-	0	-	0	-	1	4.30%
TA + PA + ESC	0	-	0	-	0	-	0	-	0	-	1	4.30%
TA + PA + Tangible	0	-	1	4.30%	0	-	0	-	0	-	0	-
PA + ESC + Tangible	0	-	0	-	0	-	0	-	0	-	5	21.70%
TA + PA + ESC + Tangible	0	-	0	-	0	-	0	-	0	-	1	4.30%
Unspecified reward	0	-	0	-	0	-	0	-	1	4.30%	0	-

Note: PA=Peer Attention, TA= Teacher Attention, ESC= Escape.

Summary of Outcomes

Of the 21 studies reviewed, 57% (n = 12) observed whether or not there was a change in inappropriate behaviors, 29% (n = 6) observed whether or not there was a change in appropriate behaviors, and 14% (n = 3) observed whether or not there was a change in both inappropriate and appropriate behaviors. Additionally, 10% (n = 2) observed whether there was a change in academic engagement/participation in addition to a change in appropriate behaviors.

Table 8 presents baseline mean, standard deviation, and change mean for each function and appropriate behavior combination. As noted in Table 8, all functional interventions show a positive change or increase in appropriate behaviors during the treatment/intervention phase. For positive behavior change, on-task (percentage) was the most frequently observed behavior (n = 10). The only function or combination of functions that were utilized more than once amongst these ten interventions was PA+ ESC+ Tangible (n = 2), PA+ ESC (n = 2), and ESC (n = 2). The highest gains in the percentage of on-task behavior per observation session were obtained with PA, however the baseline performance was much lower than other studies and this was based only on findings from one study. In general, the percentage of on task behavior was approximately 50%, on average, during baseline for five of the seven functions that reported on-task behavior. When comparing change in on-task behavior between these five functions, greater gains in on-task behavior is observed as more functions were included in the intervention that was implemented. The baseline for the behavioral measure, percentage of following direction, also had a 50% baseline performance and a similar increase in behavior with the intervention targeting PA as the increase observed for on-task behaviors with two or three functions which also include PA. Lowest gains were noted with two single functions that was not PA.

Table 9 presents baseline mean, standard deviation, and change mean for each function and inappropriate behavior combination. Similar to positive behavior change, all functional interventions show a negative change or decrease in inappropriate behaviors during the treatment/intervention phase. When comparing possible reinforcement function with behavior measured, only the PA + ESC function was replicated (n = 2) for change in percentage of talking out and disruptive behaviors. When examining inappropriate behavior change, the frequency or percentage of disruptive behavior was the most frequently measured behavior (n = 11). The largest reduction in the percentage of disruptive behavior occurred with PA + ESC + Tangible, however this was based only on findings from one study and baselines varied across baseline (range, 56% to 9%). In addition, there were two functions examined for four other inappropriate behavior measures, but there was not a consistent pattern of greater decreases in inappropriate behaviors whenever a behavior change was evaluated with more than one function.

Table 8 During

Mean Appropriate Behaviors During Baseline and Intervention Mean for each Intervention Function Reviewed

Function	Behavior	Baseline mean	Treatment mean
PA	On task (percent)	10%	81%
PA + ESC + Tangible	On task (percent)	43%	84%
PA + ESC + Tangible	On task (percent)	59%	86%
TA + PA + ESC	On task (percent)	56%	88%
PA + ESC	On task (percent)	39%	68%
PA + ESC	On task (percent)	63%	90%
Tangible	On task (percent)	50%	72%
ESC	On task (percent)	46%	63%
ESC	On task (percent)	58%	80%
TA+ PA + ESC + Tangible	On task (percent)	66%	85%
PA	Gain teacher attention (percent)	47%	85%
PA	Follow directions (percent)	52%	85%
PA + Tangible	"Tootling" (frequency count)	7	29

Note: PA=Peer Attention, TA= Teacher Attention, ESC= Escape.

Table 9

Mean Inappropriate Behaviors During Baseline and Intervention Mean for each Intervention Function Reviewed

Function	Behavior	Baseline mean	Treatment mean
PA + ESC + Tangible	Disruptive (percent)	56%	11%
PA + Tangible	Disruptive (percent)	40%	24%
TA + PA + ESC + Tangible	Disruptive (percent)	9%	1%
PA + ESC	Disruptive (percent)	54%	34%
PA + ESC	Disruptive (percent)	54%	36%
PA + ESC	Disrupt (frequency)	19	1
TA + PA	Disrupt (frequency)	7	1
TA	Disrupt (frequency)	2.2	0.6
PA + ESC + Tangible	Talking out (percent)	96%	19%
PA + ESC	Talking out (percent)	24%	9%
PA + ESC	Talking out (percent)	95%	10%
TA + PA + Tangible	Off-task (percent)	30%	4%
TA + PA + ESC + Tangible	Off-task (percent)	25%	14%
PA + ESC + Tangible	Out of seat (percent)	82%	9%
PA + ESC	Out of seat (percent)	65%	5%
PA + ESC	Teacher prompt (frequency)	17	8
PA + Tangible	Negative event per week	8	6
ESC + Tangible	Off-task rate per minute	0.7	0.2
PA + ESC + Tangible	Off-task rate per minute	0.7	0.1

Note: PA=Peer Attention, TA= Teacher Attention, ESC= Escape.

Discussion

School based interventions have been developed for both minor and severe inappropriate behaviors. There is currently a strong base of empirical support that suggests that both schoolwide behavior interventions and individualized interventions are effective within a Positive Behavior Support (PBS) program (Carr, Dunlap, Horner, Koegel, Turnbull, Sailor, Anderson, Albil, Koegel, & Fox, 2002; Sugai & Horner, 2008). In this paper, empirically based classwide behavior interventions that can be utilized within a PBS approach were reviewed. In addition, this review attempted to examine each identified intervention to determine the type of function(s) addressed. The following section discusses several of the findings of the current literature available on classwide behavior interventions and suggests potential areas for future research as well as implications for school-based problems solving teams, the school psychologist in particular.

Surprisingly, only twenty-one studies were identified in which classwide interventions were conducted in regular education classrooms with primarily regular education students attending the classroom. While the primary goal of the current literature review was to gain an awareness of the availability of classwide behavior interventions for regular education classroom settings, another goal of this literature review was to examine the classroom demographics of the studies to ascertain which interventions may be best suited to specific student demographics (i.e. grade level, gender, race). Due to the limited amount of studies identified, conclusions could not be drawn by grade level. However, as the majority of the interventions reviewed (85.7%) were conducted in an elementary setting there is stronger evidence to support use in an elementary setting relative to studies conducted with secondary students. Overall generalizabilty to other classrooms is also limited as few classrooms participated in each study. As classrooms are

composed of complex relationships between teacher, student, and classroom setting, each factor and variability amongst factors may likely influence intervention outcomes in different classrooms (Conroy, Stichter, Daunic, & Haydon, 2008). Concordantly, conclusions are unclear as to demographic compatibility given that only sixty-six percent of the studies reported the classroom composition of regular education and special education, less than half of the reviewed studies reported on the race of the student participants, and even fewer reported data on gender composition in the classroom. Clearly future replication studies or follow-up studies should include such demographic information in order to derive more solid conclusions regarding the likelihood of behavior change with various classroom populations.

At the onset of this literature review, it was anticipated that both behavior and academic change would be reviewed in the studies utilizing classwide behavior interventions, however only two studies reported academic and behavior change. In the study by Winette, Battersby, and Edwards (1975), overall classwide student on task behavior increased by 17% with an intervention that targeted an ESC function. Additionally, a 38% increase of classwide math completion and a 34% increase of classwide language completion were observed following implementation of the classwide behavior intervention. In the study by Lo and Cartledge (2004) a 17% decrease in overall classwide student off task behavior was observed when implementing an intervention that targeted an TA + PA + Tangible function. Additionally, a 20% increase in social studies quiz scores was observed. Prior research has shown implementing PBS interventions at the school wide level, with high fidelity, is associated with academic gains (Algozzine & Algozzine, 2009). As only two studies reported classwide data on both academic and behavior change, there is an intense need for future studies to examine change in academic output and academic success as well as behavior change at the classroom level.

To what extent the reviewed studies used rigorous research methods to clearly demonstrate a functional relationship between the intervention and behavior change is critical to drawing conclusions about intervention efficacy. An examination of the experimental integrity of the reviewed studies indicates that several strong experimental methods were employed. First, the high percentage of well-controlled single subject designs (i.e. withdrawal designs) provides a more rigorous demonstration of causation. This type of design fosters clearer conclusions in regards to the understanding of the functional relationship between the classwide treatment events and behavior change. Second, the degree of change or lack of change in classwide behavior following intervention implementation was often based on direct observation of classroom behavior rather than indirect measures of behavior. Indirect measures are based on self-report, which is often a subjective and unreliable measure due to observer biases (Witt, Gresham, & Noell, 1996). Additionally, the studies reviewed utilized *repeated* direct observation, thereby providing a more sensitive measure of behavior change. However, a combined approach, such as the use of behavior scales and observation, may provide a richer understanding by providing a broader description of behavior change that may occur throughout the day as well as the perception of change by relevant intervention participants (student and teacher). None of the studies reviewed utilized a multiple assessments technique; future follow-up studies may choose to utilize this to strengthen the validity of the findings.

There were noteworthy weaknesses in the experimental integrity of these studies. For example, the lack of treatment integrity measures threatens the external validity of many studies. Only seven of the reviewed interventions (30.4%) discussed use of a treatment integrity measure. Without this information, it is difficult to ascertain meaningful conclusions about the relation of

intervention to student outcomes (McInyre, Gresham, DiGennaro, & Reed, 2007). Additionally, knowledge of the intervention integrity across each study provides important information about the degree of flexibility in intervention exposure and intensity that is allowed by teachers to achieve intervention effectiveness (Noell, Gresham, & Gansle, 2002). In general, the studies that reported measurement of treatment integrity showed that the interventions were accurately implemented most of the time (80-100%), thus teachers did not implement the intervention at 100% integrity across all sessions. These results may indicate that there may be some flexibility in intervention implementation allowed to maintain positive behavior change.

Two critical components of a desirable classroom intervention are that teachers in the classroom setting can feasibly implement the intervention and that the intervention results in long-term behavior change over time. Clearly, findings from integrity measures in the reviewed studies indicated that teachers were able to implement the intervention in the classroom with high integrity levels. A regular education classroom teacher successfully implemented all but one of the reviewed interventions with consultant-based services given by a researcher or a school psychologist. Additionally, a classroom aide implemented the single intervention that was not implemented by a teacher, even furthering that an adult in the classroom can successfully implement an intervention. Importantly, when social validity was measured all teachers indicated they favored the intervention. It is also important to note that the majority of studies also indicated that teachers implemented the intervention for twenty days or less. This result suggests the introduction of an intervention was quick to produce successful outcomes but that long term effects and effective fading schedules across a given school year needs to be further examined. Certainly it is important that some level of classwide intervention is in place to maintain appropriate behavior, however, long-term implications of various types of

reinforcement schedules should be considered to ascertain what type of resources (teacher effort, academic time, materials necessary) are necessary to implement a long term effective behavior management program.

A vital aspect of intervention success in the classroom is the initial training provided to teachers and students that leads to high integrity levels. Research on intervention training suggests several effective teaching strategies that result in high treatment fidelity over time. For example, studies on the effects of training on intervention implementation suggest that classroom training on first day with classroom rehearsal and feedback (Sterling-Turner, Watson, & Moore, 2002), immediate and faded delayed feedback during the in-class training sessions (LaFleur, Witt, Naquin, Harwell, & Gilbertson, 1998), and a brief weekly supportive feedback meeting to review implementation barriers, child progress data, and determine intervention modification or fading strategies (Noell et al., 2005) increases and maintains accurate implementation of a classroom intervention. Alternatively, when considering practical implications in the classroom, time spent training on classroom management strategies interferes with academic learning time. Although the majority (86%) of reviewed studies reported some type of student training method, no consistent method was used other than verbal instruction. In contrast, only 26% of the reviewed studies reported what type of training method was utilized with teachers, however again the most consistent and highly utilized reported method was verbal instruction. Providing verbal and written instructions tends to be most frequently utilized, as this is easy to conduct with a group of trainees and is less time consuming. However, these two strategies, when used alone, result in inaccurate or low levels of intervention implementation following this type of training (Sterling-Turner, Watson, & Moore, 2002). More intensive training strategies that effectively increase and maintain treatment integrity include modeling, guided practice,

coaching, and immediate performance feedback (Noell et al., 2005). These strategies potentially address a variety of individual teacher and student needs by providing skills training, practice opportunities, error correction, praise for correct implementation, and problem solving complications that may occur when the intervention is implemented. In the reviewed studies, effective training strategies such as modeling, classroom demonstrations, and guided practice were employed when teaching the students about intervention that targeted the following functions PA + TA, PA + Tangible, and TA + PA + Tangible. However, only one effective teaching strategy was employed per function and unfortunately no study employed the same strategy. Although positive outcomes were reported for all interventions, the degree of behavior change outcomes varied. Thus future studies utilizing effective training methods with teachers and students may reveal that the interventions effects may be even further enhanced when more adequate teacher and student training is used.

With consideration of strengths and weakness of the reviewed studies, the key goal of this review was to examine the extent that proven classwide interventions addressed one or more of the components that commonly maintain problem behaviors: teacher attention, peer attention, obtaining a tangible item, or escape or avoidance of an aversive event. Hypothetically, intervention outcomes would likely be more effective for more students as more functions are addressed as part of the intervention program. When examining the type of function addressed in the reviewed studies, two interventions were coded as targeting a single function and twenty interventions were coded as targeting a combination of functions. In one study, the reward(s) earned was not specified making it difficult to ascertain which function was addressed. The finding that most interventions addressed more than one function suggests that proven interventions do tend to include a functional approach to some extent. Unfortunately, there were

few replications of any one function or combination of functions. Peer attention plus escape was the most frequently utilized combination of functions (30%), PA+ ESC + tangible was the second most utilized combination of functions (21%), and PA + tangible was the third most common combination of functions (13%). Tangible, ESC, TA + ESC, TA + tangible, and TA + ESC + Tangible were the only functions or combination of functions that were not targeted by any of the reviewed interventions. (It is of important note that the articles that fell into the PA + ESC, PA + ESC + tangible, and PA + tangible each had different researchers/authors.) All other functions or combinations of functions were targeted only once in the reviewed studies.

Importantly, regardless of function, all interventions reviewed showed desired behavior change, suggesting a wide variety of supported research based interventions. It is also important to note that most classwide interventions were based on a group contingency where the group behavior earned rewards or a student earned the group reward and thus included PA as a function. Interestingly, for positive behavior change, greater increases in positive behavior change were noted when the PA function was included in the intervention. For change in inappropriate behavior, only one intervention did not include PA, making it difficult to make comparisons with and without PA. Clearly, future studies are needed to replicate findings. Replication studies would be best done in different settings (grade) and are heavily encouraged to include a control classroom, as this was severely lacking in reviewed studies.

Unfortunately, behavioral outcome measurement vastly varied between appropriate (positive) and inappropriate (negative) behavior change. More studies measured negative behaviors than positive behaviors although four studies measured both (Christ & Christ, 2006; Crouch, Gresham, & Wright, 1985; Lannie & McCurdy, 2007; Wilson & Williams, 1973). Only two behaviors were evaluated across multiple functions: on-task and disruptive behaviors.

Interestingly, when considering similar baseline performance, there was a greater effect when more functions were addressed within an intervention for on-task behavior. This pattern was also noted for disruptive behavior but fewer functions were evaluated with a similar level of baseline performance.

Moreover, PA function was addressed in 80% (n = 8) of the studies that measure percentage on task. The other 20% (n=2), addressing tangible only and escape only, showed lower results in positive behavior change of on-task behavior than 75% (n = 6) of the PA only and PA combined interventions examining on-task behavior. This result may be due to the high frequency of PA function across interventions reviewed as many utilized an interdependent or dependent group contingency as a component of the classwide intervention. Alternatively, PA may be the most frequent common function of problems within a classroom setting across many populations or PA as a reward for good behavior may outweigh other contingencies. In addition, the frequency at which each type of reward (PA, TA, ESC, Tangible) is provided contingent upon appropriate behavior may influence results. Perhaps PA was provided at a greater frequency than other rewards in these studies, and this more frequent schedule may have influenced results. Moreover, it is uncertain whether the reinforcement schedule for any function employed in these studies was more frequent or less frequent than would be in a typical classroom.

It is important to discuss, however, the limitations of the comparison of on-task behavior and disruptive behavior across studies. Though direct observation was the primary manner of data collection for all interventions, the manner and frequency of direct observation varied for each intervention. Moreover, the rotation of students in the class that were observed during the observation would influence results when averaging classwide behavior (e.g., one student per

interval rotating until all student per class are observed verses selecting a certain number of random student to observe). Future studies may be more informative as to behavior change of the class by reporting both classwide behavior change as well as individual behavior changes, thus one is able to see specifically how many students per class had behavior change following intervention implementation.

In sum, interventions were effective and many combined functions were evaluated although almost all interventions included PA and were evaluated in only one study. Based on these results, there seemed to be a potential trend in more gains in behavior change in the desired direction when interventions included more functions. However, clear conclusions are not possible given the few replications per functions examined in this study and the variety of behavior measured across studies.

Results of this study tentatively suggests classwide behavior interventions implemented by teachers in the regular education classroom may potentially be improved by adding more functions without substantial increase or more intense allocation of resource such as adults, materials, and time needed to produce the expected level of behavior. In this study, many interventions included more than one function. However, allocation of academic time may be reduced when time is taken to distribute frequent rewards such as time with peers or escape from work. Certainly, scheduling of a number of consequential events would influence the effectiveness of the intervention and outcomes will vary across students. Yet it is important to seek intervention strategies that increase the frequency of appropriate behaviors and/or decrease in the frequency of inappropriate behaviors for all students in the class *in order to increase* time available for the teacher to deliver curriculum by decreasing the time teacher spends managing inappropriate behaviors. Thus, classwide intervention options may need to be examined to

identify tradeoffs between academic and classroom management time and the ultimate effect on academic performance when imposing more time for reinforcing events to occur during a school day.

There are several practical factors relative to reinforcement schedule to consider when implementing a classwide intervention. An intermittent reinforcement schedule that maintains the occurrence of the reinforced behavior over time is more feasible in a busy classroom setting. This type of schedule is more likely to address the motivational needs of a student who is exhibiting a performance deficit rather than a skill deficit (Freeland & Noell, 1999). Alternatively, initiating a classwide intervention using a continuous schedule (reward after every occurrence of a desired behavior) increases initial skill acquisition for students who may be exhibiting behavior problems due to a skill deficit (Skinner, Pappas, & Davis, 2005). Although some students need frequent reinforcement, an intervention that intermittently alters three or four types of functions as a reinforcer would result in a much weaker reinforcement schedule than an intervention that addresses individual needs when only one reward is the function of disruptive behavior. More research needs to be conducted to determine a feasible dosage of rewards that would be implemented in the classroom setting and most likely to reduce disruptive behavior of most students. Consideration of function and intervention scheduling may enable teachers to implement a more powerful classwide behavior management program.

Although further research still needs to be conducted, there are several findings from this review that suggest guidelines that should be considered when selecting interventions for teachers who are struggling with classwide behavior problems. Group contingencies seem to be the most empirically supported classwide interventions, thus based upon the needs of the class the school based problem-solving team can foster a discussion with the teacher regarding the

pros and cons of an interdependent, independent, or dependent group contingency formats. Additionally as discussed, much research needs to be done to better understand the relationship of intervention function(s) and classwide intervention outcomes, however school-based teams may benefit from discussing the function or functions of the classroom behaviors being exhibited and attempt to match intervention reinforcement with the function or functions addressed. School based teams may opt to implement a classwide intervention that includes reinforcement options that serve multiple functions in an effort to match multiple needs. One final area that is critical to any school based problem-solving team and the success of any intervention is utilization of frequent progress monitoring. In these studies, progress was monitored using frequent direct observation, which may not feasible to conduct in a school setting. Currently, office disciple referrals are monitored in schoolwide interventions but these types of measures may or may not adequately gauge the effect of classwide interventions on desired classroom behavior change (Cohen, Kincaid, Childs, & Elfher, 2007). Frequent progress monitoring is not only best practice, but will assist school-based teams to ascertain if the intervention is effective for most students and will thus guide decision making. Additionally, by progress monitoring on a classwide and individualized basis, school-based teams are better able to identify students who may benefit from a more intensive individualized behavior intervention in addition to the classwide behavior intervention.

With the emergence of a Response to Intervention (RTI) framework and the utilization of PBS, the role of the school psychologist is quickly evolving. In this new educational framework, the school psychologist plays a pivotal role in school-based problem solving teams and frequently is called upon to assist with consultation in regards to intervention identification and implementation. As such, school psychologists must stay abreast of research-based interventions

at all tiers, thus this literature review may be a valuable resource of the available literature for classwide behavior interventions. Additionally as consultants, knowledgeable school psychologists need to be able to assist schools be diligent in correctly matching interventions to student need (academic and/or behavioral), one of the core tenets of the PBS process (Ervin, et al., 2007; Lane, & Menzies, 2003; Lassen, et al., 2006; Luiselli, et al., 2002; Sprague, et al., 2001; Walker, et al., 2005).

Given that the effects of functional and non-functional interventions remain unclear (Gresham et al., 2004), in an effort to match interventions to student need a school psychologist may opt to select a classwide behavior intervention that both potentially meets the needs of individual children and has been supported in the literature for classwide behavior change. Based on this literature review, there are several proven intervention options in the literature that consist of three or four functions (Babyak, Luze, & Kamps, 2000; Barrish, Saunders, & Wolf, 1969; Crouch, Gresham, & Wright, 1985; Kelshaw-Levering, Sterling-Turner, Henry, & Skinner, 2000; Koch & Breyer, 1974; Lo & Cartledge, 2004; Solomon & Tyne, 1979). Overall a school psychologist may face challenges when discussing implementation of behavior interventions with educators. Given that many teachers have difficulty implementing individual interventions in the classroom for various reasons (Noell et al., 2005), classwide behavior interventions may appeal to more educators as it serves all students rather than targeting a single student. However, teacher support may be a key factor in increasing teachers acceptability and consistent use of an effective classwide intervention. For example, classwide behavior plans often require a fair amount of preparatory work as well as training. Additionally, some educators may interpret proposal of a classwide behavior intervention as a criticism of their classwide behavior management. Thus, adequate levels of support (i.e., provide materials and problem

solving consultation) and classroom coaching should be considered when designing and implementing a classwide intervention.

Summary

In sum, based on this literature review there is strong evidence to support use of group contingencies to change classwide behavior. Moreover, this type of intervention can be designed to include more than one function. Designing intervention that address common function(s) may expand the degree that a classwide invention addresses all or most students behavioral needs using a positive approach. Future studies are needed to determine the importance of function in classwide behavior interventions and to provide information about the type of classwide intervention process that best meets the goal of a PBS model universal level intervention. For example, more research is needed to investigate the most effective combination of function addressed in an classwide intervention, the reinforcement schedule, the cost and benefits of these types of intervention on academic time as compared to classroom management time for all students, and the feasibility of an effective and efficient classwide intervention process that prevents behavior problems for most students. Additionally, replication studies are needed to better understand how classwide interventions affect different age groups as well as assess if classwide behavior interventions positively affect academic output/product.

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