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Gregory A. Simpson
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TEACHER TREATMENT INTEGRITY IN SCHOOL BASED INTERVENTIONS

by

Gregory A. Simpson

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of the requirements for the degree

of

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UTAH STATE UNIVERSITY
Logan, Utah
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Department of Psychology
Utah State University
UMC 28
Logan, Utah 84322

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Introduction

Identifying effective treatments to address undesirable behaviors is one major goal of research in changing human behavior. Researchers want to demonstrate that it is indeed the treatment that is effecting a change in the target behavior and not some extraneous influence. When researchers examine the effectiveness of an intervention the treatment is implemented with the attempt to decrease the influence of other factors that may explain behavior change that occurs in hopes to see the desired effect of the independent variable (treatment) on the dependent variable (behavior). For this type of research, it is important to keep all variables except for the dependent variable as constant as possible, even if it is impossible to control for all outside influences. One method to increase the level of control within a study is to ensure that the treatment is accurately implemented as planned in order to minimize the effects of outside variables and more accurately determine if the treatment independent variable did effect any changes in the dependent variable. The extent to which a treatment plan is followed is often call treatment integrity, treatment fidelity or procedural reliability (Gresham, 1989). Lack of treatment integrity limits the confidence in treatment research outcomes by calling into question whether a functional relationship exists between the treatment process and behavior outcomes. Until recently few studies have included the evaluation of treatment integrity of the intervention examined (Schlosser, 2002; McIntyre, Gresham, DiGennaro & Reed, 2007).

Ensuring accurate implementation of treatment is not only important when conducting research on treatment effects. Treatment integrity is also important when psychologists set up and evaluate treatment programs in clinical settings to change the

behavior of a client (Sanetti & Kratochwill, 2008). In the same way that it is important for researchers to follow the research plans that were constructed in order to test their hypotheses, it is also important to assess the degree to which devised treatment plans were implemented. Even when an empirically supported intervention is selected individual differences between clients will likely result in different outcomes.

Psychologists evaluate the effect of a recommended treatment plan to gauge if the plan is working as expected and/or can be faded. Psychologists also need to know when an ineffective plan needs to be modified or a different or more intensive plan needs to be devised. A major problem arises when a plan appears to be ineffective and the treatment integrity is not evaluated. For example, a person who is prescribed medication may not improve if they did not receive the medication as intended. Assuming that the medication was appropriately used may lead to the decision to increase the medication dosage, which may or may not be needed. Likewise, a client receiving psychological services may not improve if an intervention plan was not implemented as planned. The assumption that treatment was implemented with high integrity may lead to the development of a new plan that may still not be used effectively and would not support the client's situation. Instead, support and training to get the treatment plan accurately implemented might be of greater benefit to the client. Returning to our example of a person prescribed medication, a person does not necessarily need to follow the prescription exactly in order to receive some benefit. The same is true for clients in a clinical setting, 100% treatment fidelity may not be needed to reach acceptable levels of behavior.

In addition to the field of research and clinical practice, treatment integrity is an important issue for school psychologists working in school settings (Noell & Gansle, 2007). Intervention plans are developed and implemented for students who have a wide range of learning and behavioral needs and therefore require support to help those students acquire and maintain desired behaviors. Utilization of methods that have shown to effect the desired change in students' behavior are key in making adequate gains in educational goals set for the students. If a selected intervention plan is not followed with an adequate level of fidelity, progress towards those goals may be negatively impacted. The main goal for any school-based intervention is to do something that will enable or motivate a student to change in order to increase social and academic functioning in school. School based interventions should also be designed to enable or motivate the teacher to engage in activities that support the student and lead to prevention of student academic failure and mental illness. Research on intervention implementation, however, suggests that a majority of teachers do not implement interventions with acceptable fidelity. Low integrity rates with teachers can occur for various reasons: poor skills, motivation, lack of time to implement complex interventions (Gresham, 1989). Low fidelity occurs even for those teachers who volunteered for or agreed to do the intervention, rated the intervention as acceptable, were trained, and were provided materials (Gilbertson, Witt, Singletary, & VanDerHeyden, 2007; Noell & Gansle 2006; Noell, et al., 2005; Wickstrom, Jones, LaFleur, & Witt, 1998). Given that adequate treatment integrity is a critical factor in influencing educational outcomes for a child, a number of recent studies have been conducted to investigate the effect of various strategies to enhance intervention implementation (Telzrow & Beebe, 2002).

A new use for treatment plans within special education relates to the use of a student's response to intervention in assessing for a Learning Disability Classification. Within this model students who are struggling in an academic area in the general education curriculum are administered multiple levels of intervention in an attempt to increase the students' academic performance. Students who do not respond with positive behavior change to the increasing intensity of the interventions used may be considered for placement in special education. Within the Response to Intervention (RTI) model the use of proven intervention tactics and the integrity with which those intervention strategies are followed can greatly impact educational decisions made based on interventional data. In order to have confidence in the data collected while performing the interventions, a school-based decision-making team must monitor whether or not the intervention program has been implemented and implemented well. Only after determining that the intervention was implemented as intended can the students' response to intervention be evaluated. When accurate implementation of a plan is not ensured, a school-based decision-making team cannot determine that a student did not improve under the conditions intended to be in place when given an intervention plan. Thus, ensuring that empirically supported interventions are actually implemented and implemented correctly is an important part of the RTI process if the use of intervention data are to adequately address children's educational needs (Noell, Gresham, & Gansle, 2002; Witt, VanDerHeyden, & Gilbertson, 2004).

Research findings suggest several antecedent and consequential strategies that may help teachers implement high integrity interventions, in order to help students. For example, several studies have investigated the effect of strategies initiated before the

teacher independently implements an intervention within the classroom including intervention scripts for teacher and students (Barnett et al., 1996), consideration of time, resources and material (Gresham, 1989), and clear and objective data based decision making guidelines (Fuchs & Fuchs, 1992; VanDerHeyden, Witt, & Gilbertson, 2007). Other studies have investigated strategies which are used to follow-up an intervention strategy such as student training and feedback (Dufrene, Noell, Gilbertson, & Duhon, 2005); 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 (Martens, Hiralall, & Bradley, 1997; Mortenson & Witt, 1998, Noell, Witt, LaFleur, Mortenson, Renier, & LaVelle 2000; Noell et al., 2005; Witt et al., 1997). Based on this literature, Kovaleski (2007) suggests that accurate implementation of intervention will most likely occur only when teachers are provided with intensive planning, training, and consultation follow-up support with administrative monitoring for follow through on these supports.

Use of the intervention data when making decisions for a student's educational needs raises many concerns in regards to treatment integrity. Some issues include how to measure treatment integrity, how integrity can be improved, and what level of treatment integrity is required in order for an intervention to be effective in school settings.

Identifying the personnel and resources to support teachers or paraprofessionals who are implementing intervention programs in school settings will not be an easy task for schools to achieve. Due to training and experience with consultation and intervention,

school psychologists have the potential to assist schools with the planning and implementation of the key supportive strategies. A review of this literature on treatment integrity in the school settings may help to identify many of the key factors that may influence poor integrity, the supportive strategies that may adequately increase integrity and how school psychologists can participate in the supportive process. There are several factors that could potentially have an impact on the outcome of a school based intervention plans such as the student's interactions with peers or with his or her parents. In addition, the person performing the intervention could possibly be influenced by the manner in which the consultant interacts during the consultation process. However, this paper will be focusing on behavioral training or supportive strategies that may be employed in the school setting to support teacher implementation of interventions within the classroom setting. Specifically, this paper will address the conceptual background, the importance of treatment integrity in school effective means to increase treatment integrity within school settings, and practical applications of school psychologists in facilitating treatment integrity while working with teachers.

Literature Review

Treatment integrity has been put forth as an essential component to review when conducting and evaluating interventions in both research and practical settings (Gresham, 1989; Sanetti & Kratochwill, 2008). The purpose of this literature review is to provide an overview of the current state of research in the area of treatment integrity as it relates to school based interventions. Thus, the following literature review will first contain a discussion of treatment integrity in research and theory. Treatment integrity within the school setting will come next, followed by a discussion on consultation and treatment integrity support. The main body of the paper will address research on strategies to increase treatment integrity for teachers in school. Empirical research on factors that predict treatment integrity and strategies that have been used to increase the levels of treatment integrity will also be reviewed and discussed. This section will be broken up into two sub sections, one will address antecedent strategies and the second will address strategies to be used during and after implementation. Following the strategies section, limitations of the research conducted will be discussed as well as practical implications. Finally, based on this review, discussion of how a school psychologist or other professional can make certain that high levels of treatment integrity are maintained when implementing and evaluating classroom interventions for students will be presented.

A systematic review of the literature was conducted using electronic databases, ERIC and PSYCInfo, to locate primary research on treatment integrity. The following descriptors were used in the database search: Treatment Integrity, Treatment Fidelity, Consultation, and Response to Intervention. Each abstract that meets the search terms will be reviewed to determine suitability for inclusion in this review. Studies meeting the

following criteria will be reviewed: (1) are from a peer-reviewed journal, (2) involve an empirically supported method to increase treatment integrity utilized in a school setting, and (3) targeted teacher behavior change. The references of the selected studies will then be searched for additional pertinent studies that were not found during the preliminary search.

Relevance of Treatment Integrity in Research

Interventions are selected based on the empirical evidence of intervention effectiveness for a specific problem. The main goal of intervention outcome research is to determine what interventions effectively address a specific problem and evaluate that intervention's feasibility and efficacy. In order to adequately evaluate the effectiveness of an intervention that can be replicated in applied settings, it is imperative that a conclusion can be made determining if the desired behavior change was due to the prescribed intervention plan and to what level the plan needs to be accurately implemented. Assessing the degree to which a treatment is implemented as planned is termed treatment integrity (Gresham, 1989). Poor treatment integrity may pose threats to the internal validity of a study. Internal validity refers to the degree that the change in the behavior of interest (dependent variable) was functionally due to the manipulation of the treatment factor (independent variable) and is not the result of uncontrolled or unknown factors. High levels of internal validity mean that other factors can be ruled out as having an effect on the outcome. If an intervention was not implemented as planned, it is not possible to establish which factors led to an observed behavior change. Without reported measurements of treatment integrity, it is difficult to make a clear conclusion about the

relationship between the intervention (independent variable) and the measured behavior outcome (dependent variable) in a study.

This concern with the empirical foundation for intervention effectiveness was highlighted when results from several studies revealed a lack of treatment integrity data in applied intervention studies in clinical and school-based settings. The majority of studies in intervention make the assumption that the treatment was implemented with fidelity; however, only 16% of studies in the *Journal of Applied Behavior Analysis* from 1968-1980 reported integrity data. From 1980 to 1990 the percentages stayed about the same at 14% (Gresham, Gansle, Noell, & Cohan 1993). That is, few studies systematically assessed whether or not the treatment was fully or partially implemented, if at all. More recent studies have shown an increase in reported treatment integrity; however, only 30% of studies in the same journal from 1991- 2005 reported on treatment integrity results (McIntyre, Gresham, DeGinnero & Reid, 2007). It may be the case that those studies did have an adequate level of treatment integrity within their studies, but without collecting and reporting those data we are unable to make an accurate assessment of whether that is true. Hence, there is little empirical data showing whether or not interventions are implemented accurately, and if different degrees of accuracy influence child behavior and achievement outcomes. Without verification of treatment integrity, intervention research cannot empirically demonstrate that the child behavior change is a function of the intervention process.

Relevance of Treatment Integrity for teachers in School-Based Practice

Researchers have also stressed the need for measuring treatment integrity in applied settings (Galloway & Sheridan 1994; Gresham, 1989; Martens, Hiralall, &

Bradley, 1997; Noell & Witt, 1996; Watson, Sterling, & McDade, 1997; Witt, Gresham, & Noell, 1996). Just as researchers need to be able to have confidence that the independent variable is effecting the change in the dependent variable, so too must school staff who are involved in implementing interventions within a school setting be confident that their efforts are effecting a desired change in a student's behavior. Treatment integrity plays a part in the implementation of interventions in the school setting in a similar fashion as in a research study. If the intervention plan that was devised following an intervention protocol that was shown to be effective in research is not followed with fidelity, the internal validity of the intervention could be compromised. Without knowing whether the intervention or some other factor impacted the student's behavior, information that could be beneficial to the student's school performance may be jeopardized. When interventions are changed in unknown ways, it makes it difficult to accurately evaluate the utility of the originally designed intervention. In addition, without acceptable integrity levels, those implementing the plan may not have adequate information needed to evaluate the intervention. School staffs need to know if the intervention is working and could potentially be faded or if the plan is not working as intended, is it due to the plan not being followed accurately or if the plan is not an effective intervention for that particular situation (Lane, Bocain, MacMillan & Gresham, 2004).

Because the purpose of the intervention process is to remediate an academic or social skill deficit or motivational problem, data on intervention progress must yield reliable and valid data to inform accurate decision-making regarding student progress (Witt & Noell, 1998). Without verification of child behavior change or treatment implementation beyond the subjective report of the teacher, educators may not be able to

make accurate decisions regarding the effectiveness of the intervention and the system can potentially fail to provide the student with adequate services.

One recent change in schools that will demand school personnel to both utilize treatment plans and have a high degree of treatment integrity is the implementation of a Response to Intervention (RTI) model that allows for the identification of individuals with Specific Learning Disabilities based on an individual's response to instruction. This model conceptually organizes school resources to better provide instructional strategies that effectively match each student's needs (Fuchs, Fuchs, & Speece, 2003; Jimerson, Burns, & VanDerHeyden, 2007). To accomplish this goal, RTI models typically suggest allocating school-based resources within a three-tier instructional model that is set up to provide more intensive levels of interventions at each tier. To match students to the appropriate level of instruction that result in adequate learning, all students' learning rates over time and levels of performance are monitored throughout the school year. This progress data is used to make decisions about the effectiveness of interventional support. That is, those students who are not adequately responding to the least intensive tier-level of support will participate in a more intensive tier-level of support.

The core curriculum program provided to all students in a school or class is considered as the first tier of instructional support (Fuchs, Fuchs, McMasters, Yen & Svensen, 2004). At tier one, progress monitoring data is collected several times during the school year to evaluate if most students (about 80%) are performing at or above an expected benchmark criterion. At-risk students are only identified for intervention at the second tier after confirming that the school-wide program is adequately effective. Once the curriculum is deemed effective, scores below benchmark would suggest that those

students performing at this level are not adequately responding to the core curriculum and are in need of additional instructional support at the second tier.

For the second tier of support, identified at-risk students will participate in a more intensive intervention in which the progress of the students continues to be measured and charted on a more frequent basis than those students within the general education curriculum. Supplemental instruction is given several times a week in addition to the core curriculum with progress being monitored several times a month (Marston, 2005). Most identified at-risk students who received the tier two support, if effective, should show an accelerated learning curve that approaches the other students' benchmark performance at their grade level.

Several studies have indicated that there are a small percentage of students (about 7%) that do not show accelerated growth even with the second tier level of intensive intervention (Case, Speece, & Molloy, 2003; Martson, 2005; Speece, Case, & Molloy, 2003). For these students, a third tier of intense ongoing instruction is provided. Problem-solving strategies are used to develop intensive individualized instruction that best matches each student's specific needs. Moreover, student performance is typically evaluated weekly to determine progress toward a specified goal. Given the effective instructional environment in the classroom and the additional intervention support, a poor response at the third tier may be an indication that the student actually has a learning disability and their poor performance is not better explained by some other factor such as low motivation or prior poor instruction (Fuchs, 2003; Mallard, Byrd, Johnson, Tollefson, & Boesche, 2004). Those students who do not adequately respond to several well-

implemented intensive level interventions may be considered for evaluation for Special Education.

A necessary component of RTI is the progress monitoring data of the effect of the intervention provided to the child to make decisions about when an intervention should be changed, and when students should be moved between tiers to promote or maintain student achievement. Thus, using student intervention outcomes as an assessment tool to make decisions within an RTI approach are highly dependent on the implementation of the intervention programs in which the student is participating. In order to have confidence in the data collected while performing the interventions, a school-based decision-making team must also monitor whether or not the intervention program has been implemented and implemented well. Only after confirming that an intervention was implemented as intended can the student's response to intervention be properly evaluated. When accurate implementation of a plan is not ensured a school-based decision-making team cannot determine that a student did not improve under the conditions intended to be in place when given an intervention plan. Thus, ensuring that empirically supported interventions are actually implemented and implemented correctly is an important part of the RTI process if the use of intervention data are to adequately address children's educational needs (Noell, Gresham, & Gansle, 2002; Witt, VanDerHeyden, & Gilbertson, 2004).

Without a system for supporting and monitoring the integrity of implementation of the interventions and instructional programs, prior research suggests school-based decision-making teams risk making decisions about placement of a student in Special Education based on information that is potentially flawed (Lane, Bocian, MacMillan &

Gresham, 2004). Research on intervention implementation in school settings suggests that a majority of teachers do not implement interventions with acceptable fidelity. Low fidelity occurs even for those teachers who volunteered for or agreed to do the intervention, rated the intervention as acceptable, were trained, and provided materials (Gilbertson, Witt, Singletary, & VanDerHeyden, 2007; Noell & Gansle 2006; Noell, et al., 2005; Wickstrom, Jones, LaFleur, & Witt, 1998). Wickstrom, Jones, LaFleur and Witt (1998), for example, measured treatment integrity of teachers who participated in consultation with a school psychologist. The teachers presented their concerns about a student exhibiting behavior problems in his or her class during a consultation interview. A treatment plan was chosen to decrease behavior problems from intervention strategies with empirical evidence to support their use. Each intervention was also designed to track treatment integrity (e.g., documenting behavior change on a behavior chart). Training and materials were provided for the teachers prior to the implementation of the treatment plan.

Wickstrom and colleagues found that the level of integrity varied depending on the type of treatment activity that the teacher was supposed to perform. On teacher self report record keeping, the teacher had a mean of 54%. Activities that generated permanent products such as worksheets or tracking sheets had a mean of 62%. When teachers were supposed to follow a target behavior with a programmed consequence, they demonstrated a mean of 4%. They also found that treatment acceptability, severity of the problem behavior and the level of teacher/consultant collaboration was not factors related to treatment integrity.

School-wide programs are also used to increase positive social and academic behaviors and decrease undesirable behaviors such as discipline problems, fighting or bullying. A few studies investigating the effects of these programs have reported that low treatment integrity is a major problem that influences program effectiveness (Elias, Zins, Graczyk, & Weissberg, 2003; Kincaid, Childs, Blasé, & Wallace, 2007; Smith, Schneider, Smith, 2004.) Given that treatment integrity levels have a substantial impact on the outcome of student performance, a review of the literature on practical measures to increase and maintain levels of integrity is warranted.

Theoretical Factors Related to Treatment Integrity in Schools

In an early paper on the concept of treatment integrity as it relates to the design and implementation of school-based interventions with children, Gresham (1989) proposed several factors that may potentially decrease treatment integrity in school settings. First, selecting a complex intervention that requires an extensive amount of time to implement may be one barrier to implementation. A plan that requires the teacher to spend a large amount of time with just one student and decreases time to teach lessons to the class is unlikely to be implemented with the sufficient level of integrity. A complex intervention may also require intensive training or may be difficult to implement in a busy classroom setting. The number of treatment agents involved in a treatment plan may also increase the complexity of the intervention process and training needs. Second, the likelihood that the plan will be followed correctly decreases when the materials, student earned privileges, or resources needed to implement the plan are not commonly found in the school setting. Third, Gresham proposed several characteristics of the treatment agent (e.g., teacher or parent) that may influence treatment use. For example,

how the treatment agent perceives the potential or actual effectiveness of an intervention may impact treatment integrity. If a treatment agent does not believe that the intervention will be effective, he or she may be less likely to implement the intervention. In addition, if a plan is implemented and results are apparent in a short period of time, it may be more likely that the intervention plan will continue to be followed. Finally, the motivation of the treatment agent may impact the level of integrity with which a plan is followed. If a problem student is the target of the intervention and the treatment agent wishes to have the student placed in another program or classroom, it is unlikely that the treatment agent will put the effort needed into a treatment plan.

Witt and Elliot (1985) designed a theoretical model of treatment integrity that suggests the following four elements are interrelated: acceptability, use, integrity, and effectiveness. This model asserts that a treatment that is more acceptable by a treatment agent will be used and implemented with a greater effort on accurately implementing the intervention as planned. Moreover, if an empirically supported treatment is implemented with full integrity then it is more likely to be effective. Finally, a used intervention that produces the desired effect may influence continued acceptance and use of the treatment over time and in other settings or situations.

Research has not sufficiently supported several aspects of this model. First, results from several studies investigating the effect of treatment acceptability on actual use of treatment have shown that some teachers indicate treatments are acceptable but do not use the interventions at all, or use them with poor integrity. For example, Sterling-Turner and Watson (2002) found that treatment acceptability did not have a significant effect on the level of treatment integrity. In this study, undergraduate students rated the

acceptability of the plan after reading a case description describing an intervention plan for a client exhibiting a facial tic. Following this rating, training of the intervention was conducted, and treatment integrity was measured as participants implemented the plan in an analog setting with a client. Results revealed no significant relationship between pre- and post-treatment acceptability and treatment integrity. Noell et al. (2005) also reported that 45 general education teachers generally reported that a treatment designed during consultation was acceptable both before and after the intervention was implemented in the classroom. In this study, teachers rated treatments as highly acceptable regardless of whether or not the intervention was used as planned by the teacher based on review of permanent products that were produced when an intervention was used.

Calvert and Johnston (1990) reviewed studies that have investigated the relationship between treatment acceptability and treatment integrity. Based on this review, the authors revealed several factors that may influence why teachers choose to use an intervention including: the rationale given for the treatment, the amount of time required by the teacher, the amount of skill required by the teacher, amount of possible risk to the child, side effects of the treatment, and the degree of negative effect on the other children in the class. Interventions that are viewed as positive such as positive and differential reinforcement, positive practice, and response cost were rated as more acceptable than interventions that utilized more punitive measures (Clark & Elliott 1988). Further, more complex intervention techniques were rated as more acceptable by teachers when problem behaviors are severe, or if the more intense intervention has been effective for the student on a previous occasion (Northup et al., 1994; Dietrich, 1999). How well the treatment fits within the school setting is also a factor that impacts treatment

acceptability. When the intervention seems out of place or it does not fit well into the normal classroom routines, the interventionist is less likely to be willing to accept the use of that intervention (Dietrich 1999).

Although the treatment acceptability model proposed by Witt and Elliot (1985) suggests that higher levels of integrity are related to more desirable interventional effects, few studies have examined the direct impact of differing levels of treatment integrity and their effects on treatment outcome. Noell, Gresham and Gansle (2002) showed that increasing the level of treatment integrity impacted the student outcome for students struggling with basic math facts. As the intervention integrity increased, so did the students performance, with the best results occurring when 100% integrity was achieved. Northup, Fisher, Kahang, and Harrell (1997), in contrast, found that even partial success in completing intervention components may still elicit the desired intervention results. In this study, a clinical assessment of the effects of different levels of treatment implementation by an adult caretaker was conducted for a time-out procedure on disruptive behavior three mentally disabled individuals. Treatment components were systematically implemented at 100%, 50%, and 25%. For all three participants, treatment effects were equally maintained when the intervention components were implemented at 50%, when compared to treatment implemented at 100% integrity, and for two of the participants, treatment effects were maintained at the lower level (25%). Given these results, it would appear that the relationship between treatment integrity and positive outcomes when intervention plans are implemented with adequate levels of treatment integrity is unclear. This data may be misleading due to the limited number of studies that actually report data about differing levels of treatment integrity. It may also be the

case that the type of intervention may impact the amount of treatment integrity that is required in order for an intervention to be successful.

Interestingly, the behavior of the target student can have an effect on the likelihood that the intervening agent will implement the intervention plan according to the prescribed design. A study conducted by McConnachie and Carr examined the effect of student behavior on the TI levels of teachers implementing an escape extinction and a functional communication training program with students with severe disabilities and problem behaviors. Three students were assessed as to what type of tasks they would perform without behavior problems and which ones they avoided or refused to perform. The teachers that were assigned to the students had no prior training or experience dealing with students exhibiting similar behaviors. The teachers were given training in discrete-trial-training, which consisted of written instructions, video demonstrations, live modeling, and role-playing of the procedures. They were then placed in a setting in which they worked with similar students during a 2-3 month period before the experimental trial.

The experimental trial began utilizing a multiple baseline design for each student teacher dyad, with the teachers performing the escape extinction (the student is not allowed to escape a task until it is performed regardless of behavior) intervention with the students as a baseline measure. After the completion of the escape extinction phase, the teachers were instructed in how to perform the functional communication training. This consisted of having the teachers train the student to utilize an acceptable means of communication that the student can use to avoid the undesired task. The use of discrete trial was the method by which the students were instructed for both phases of the

experiment. The teachers were then given a list of tasks that the student was supposed to learn and given license on what tasks to train when, but they were instructed to maintain a 50% ratio of preferred and non-preferred tasks for both the escape extinction and functional communication training phases.

Problem behaviors were significantly higher during non-preferred tasks using the escape extinction techniques. The level of problem behaviors decreased significantly during the unprompted sessions using escape extinction; however, the teachers did not adhere to the 50% preference ratio. The time spent on non-preferred tasks dropped below 20% for all dyads and amount of problem behaviors also decreased. While using the functional communication training the problem behaviors decreased in both preferred and non-preferred tasks. Interestingly the amount of time on non-preferred tasks increased during the functional communication phase of the study and yet the amount of problem behaviors decreased.

It would appear that the use of a treatment protocol that correlates to higher behavior problems is less likely to be followed with fidelity. With this lack of fidelity it is unlikely that the intervention will show the desired effects on the student's behaviors. This is likely to be further compounded by the treatment agent disregarding the treatment altogether because it is seen as being ineffectual when the treatment may not have been administered in a way in which the treatment could have been effective. In addition this study lends evidence to the importance of choosing a treatment strategy that is related to the function of the problem behavior (McConnachie & Carr, 1997).

Gresham and others theorized that the acceptability of the treatment to the person implementing the intervention would be a major factor in whether an intervention would be implemented as designed. However, there are very few studies that directly address the effect of treatment acceptability on treatment integrity levels. Sterling-Turner & Watson (2002) found that acceptability levels had no relation to the level of treatment integrity. Other factors such as complexity, time requirement, resources and perceived and actual effectiveness are also thought to increase levels of integrity, but again have few studies to verify the theories (Zins and Erchul; 1995). The use of written instruction or scripts has also been theorized to improve the level of treatment integrity, and also falls in to the category of showing positive results but having few studies (Ehrhardt, Barnett, Lentz, Stollar & Reifin; 1996). Other theories have been researched to a greater degree and therefore offer a more substantial body of information. The use of direct classroom training and performance feedback fall into this category and will be discussed in greater detail.

Consultation Research on Strategies to Increase Treatment Integrity

In addition to theoretical papers on treatment integrity, research has been conducted on applied strategies to improve treatment integrity of teachers in school settings. Research on promotion of treatment integrity has been a major focus in the behavior consultation literature. Working with the teacher as a consultant to formulate, implement, and evaluate an intervention plan is one of the most common ways for school psychologists to assist teachers who have a student with learning or behavior problems. In educational settings, consultation is a problem-solving approach in which a consultant (school psychologist) and consultee (teacher) work together in an attempt to define what

is interfering with the child's educational progress. The consultant and consultee work together to design and implement an intervention that will enable or motivate the child to change behavior so as to enhance academic and social performance. Thus, problem solving within the consultation process may provide support to teachers to help struggling students.

Consultation is an indirect model of service delivery given that the school psychologist serves as a consultant who uses a problem-solving approach to facilitate and evaluate solutions for a student's problem with the teacher and/or parent serving as consultees who administers the plan to the student. The consultation generally begins with the consultant and consultee (usually the student's classroom teacher) discussing what the student's classroom behavior is like. If needed, the consultant conducts further assessment of the student's behavior to formulate a hypothesis of what actions will effectively change the student's behavior. Based on the hypothesis, an intervention plan is formulated and the process of implementing and evaluating the intervention would then take place. The teacher is responsible for implementing the intervention in the classroom setting and targeting behavior. The consultant monitors treatment implementation and provide the teacher with feedback designed to enhance intervention fidelity.

Research on effective consultation procedures is increasingly incorporating and evaluating methods of behavior analysis at each step within the consultation process. Overall, behavioral consultation has been shown to be an effective means to deliver school-based psychological services for children with behavioral and academic difficulties (Bramlett, Murphy, Johnson, & Wallingsford, 2002; Sheridan, Eagle, Cowan, & Mickelson, 2001; Sheridan & Welch, 1996).

Supporting accurate implementation of the intervention has been shown to be an important part of the consultation process that influences child outcomes. Due to the concern with integrity, a number of studies within the consultation literature have emerged that measured the effects of various types of teacher training and support on treatment integrity within a consultation model. In sum, results from this research have shown that various types of support for the teacher, provided before and after a teacher implements the intervention, influences both the teacher's treatment integrity and the remediation of the child's academic or behavioral problem. Thus, the enhancement of treatment integrity depends on the understanding and manipulation of the antecedent events and consequences that potentially influence teacher behavior. The following section reviews ways in which the person implementing the intervention can be supported in order to increase the likelihood of having adequate levels of treatment integrity.

Training Strategies Prior to Implementation to Increase Teacher Use of Effective Intervention

Before implementing the intervention in the classroom, researchers (Gresham, 1989; Noell & Witt, 1996; Telzrow, McNamera & Hollinger, 2000) suggest initial antecedent strategies during intervention planning to enhance the likelihood of the teacher's use of the intervention. Prior to intervention implementation, support should be provided to ensure that the teacher has the knowledge and the skills necessary to properly implement the interventions through training. The purpose of training is to ensure that the teacher knows how to adequately perform an intervention and to enable the teacher to perform the intervention correctly by developing effective skill sets. Several studies in

the consultation literature have investigated the effects of training prior to implementation with teachers who were provided consultation support in the school setting Table 1 presents studies and study outcomes of these studies.

Table 1

Studies investigating Antecedent Strategies to Increase Teacher Treatment Integrity and Summary of Study Outcome

Antecedent Strategy	Study	Outcome summary
Written intervention script	Ehrhardt, Barnett, Lentz, Stollar, & Reifin, (1996).	Two teachers and one parent obtained >80% while one parent obtained 40% treatment integrity level.
Discrete-trial training	McConnachie & Carr, (1997).	Three teachers reached >90% integrity levels. Student problem behaviors cut treatment integrity rates to <20%. Student behavior problems decreased during two treatment phases, but only one phase had the students perform non-preferred tasks.
Direct training methods	Sterling-Turner, Watson & Moore, (2002).	Three teachers reached >90% integrity levels. One teacher improved from 11% to 59% integrity. Student problem behaviors levels appeared to decrease with higher levels of treatment integrity.
Short intensive instruction session	Lerman, Tetreault, Hovanetz, Strobel and Garro (2008)	Eighteen teachers reached 100% integrity levels in training and maintained 80% or better levels on preference acquisition skills after 4 weeks. Only 4 teachers could demonstrate adequate levels of all trained skills after 4 weeks. Student outcome data where not collected.

One simple training method for providing knowledge about intervention procedures is to provide teachers with verbal and written directions. Intervention scripts are means by which a teacher may be given written instructions on how to conduct an intervention. Intervention scripts (Barnett, Ehrhardt, Stollar & Bauer, 1994) give detailed step-by-step instructions about behaviors to perform to the person conducting the intervention. Barnett suggests that the scripts should be prepared with the help of the teacher and should utilize natural language that is comfortable and familiar for both the teacher and student. The intervention scripts should utilize strategies that have been shown to be beneficial and relate to the behavior that is being targeted for intervention. In addition to giving the teacher instructions to follow, scripts set out a framework by which treatment integrity can be evaluated. An observer could easily observe the treatment agent who administers an intervention to a child in the classroom and compare the actions of the intervener to the intervention script.

Ehrhardt, Barnett, Lentz, Stoller and Reifin (1996), for example, conducted a study to investigate the effects of intervention scripts on teacher and parent treatment integrity and acceptability with four students in a preschool setting who were experiencing behavioral difficulties. An intervention was implemented in the classroom by teachers for two students and parents implemented an intervention in the home setting for the remaining two students. An individualized intervention and intervention script was developed for each student and targeted specific problem behaviors related to each individual student. Using the script, the two teachers accurately implemented, on average, 90% and 92% of the listed intervention steps in the script. Problem behavior was reduced to acceptable levels for both students during the intervention implementation

period. Although treatment integrity was directly observed in the classroom setting, treatment integrity was monitored based on parent report in the home setting. One mother reported high levels of integrity as well as a significant decrease in problem behavior. The second mother implemented two interventions due to two distinctly different problem behaviors. Although both interventions showed significant declines in problem behaviors, the mother reported initial high levels of treatment integrity but steps used tapered and were eventually discontinued as the outcome became highly positive.

Each treatment agent's acceptability of the intervention was also evaluated in this study using The Script Acceptability Questionnaire. Initially, one teacher rated the script as poor in the ease of use category but by the end of the treatment period the teacher had rated the script as highly positive. The second teacher consistently endorsed high acceptability ratings throughout the intervention. Likewise, the two parents reported high acceptability levels throughout the course of the intervention. This study indicates that the use of intervention scripts appears to have a favorable acceptability rating with interventionists but may not be enough support to sustain treatment use for some treatment agents.

Providing verbal and written instructions on intervention procedures is the simplest training method, but when given alone, this method is often found to be ineffective in maintaining performance (Noell, Witt, Gilbertson, Rainer & Freeland, 1997; Reitz & Kerr, 1991; Witt, Noell, LaFleur, & Mortenson, 1997). Training outside of the classroom environment prevents identification of any classroom environmental influences that may interfere with proper implementation of the intervention. Responses cannot be corrected or altered until the performer has the opportunity to try the new response in the

appropriate setting. By including training or coaching within the classroom environment, teachers could be trained to carry out the intervention procedures with prompts that provide sufficient information to insure correct responses. Providing multiple opportunities to learn and practice the intervention procedures serves to facilitate skill acquisition and promote fluency.

Sterling-Turner, Watson and Moore (2002) conducted a study, using a multiple baseline across consultees design to compare the effect of direct consultant coaching with verbal instruction on teacher treatment integrity. Four teacher/student dyads participated in this study in regular education classroom within the rural school setting. After a treatment plan was formulated with each teacher, an initial didactic training session was conducted with the consultee that consisted of verbal and written instruction. Following this training, the level of treatment integrity and students' behaviors were directly observed in the classroom setting for a short period of time. Following this phase of the study, a second direct training session and classroom observation phase was conducted with each teacher which included modeling, role-playing and direct feedback (both positive and negative). Following the verbal instruction training session, the four teachers' average levels of treatment integrity were 70%, 46%, 11% and 7%. When the direct classroom instruction was administered to the teachers, three teachers' levels of treatment integrity improved to 97%, 94% and 81%. The fourth teacher's level of treatment integrity increased from a mean of 11% to 59%. Interestingly, student's behaviors also appeared to correlate to the level of adherence to the treatment plan. Three of the four students consistently improved behavior when the teacher accurately implemented the intervention after direct training. The student whose teacher had initially high integrity

rates maintained low levels of problem behaviors throughout the rest of the study. Two other student's levels of problem behaviors increased significantly when integrity levels increased. For the teacher with the lower integrity level after direct training (59%), the student showed less improvement than the other student and more variability within results.

Results of this study indicate that a more involved direct training approach on how to implement a plan is more likely to obtain higher levels of treatment integrity than instructing an individual without direct training. The level of treatment integrity also appears to affect the level of behavioral change exhibited by the client for some students.

Lerman, Tetreault, Hovanetz, Strobel and Garro (2008) also examined the use of brief intensive instructional sessions as a means of training teachers on the use of intervention strategies for students with autism. A multiple baseline across teacher design was utilized to examine the effects of a training program on teacher integrity levels following an intensive training session. Prior to training, baseline treatment integrity data was collected during observations within eighteen special education teacher's classrooms. Following baseline, teachers were administered an intensive intervention program over the course of five days in three areas of reward preference assessment to identify individual reinforcers and three direct teaching strategies to teach new skills. Teachers were trained in the six different strategies using modeling and practice with prompts and feedback. Each teacher was required to achieve 100% fidelity during two consecutive trials in order to demonstrate mastery of the skills. After three months, the teachers were observed within their classrooms during three follow up session with 4 weeks between each session. During each observation session teachers were asked to perform a reward

preference assessment and instruct students on a new skill using a direct teaching method. Following the observation, the teachers were given feedback on skills they received training for during the training portion. The results showed that the teachers that remained in the study ($n = 16$) retained high levels (at or near 100% accuracy) on skills taught during initial training. During the first follow up session (approximately 4 weeks later), all of the remaining teachers demonstrated 80% or better accuracy in using the reward preference acquisition strategies taught. On the direct teaching methods, all the teachers were able to demonstrate one of the 3 strategies, but only 4 were able to do so with all of the strategies. There was a decline in the level of accuracy following the first observation session as only one of the teachers was above 80% accuracy in subsequent observations. Data were not collected on the effect that the instruction had on the student behavior.

This research indicates that brief intensive training can be an effective training method in the short term. Similar to other training methods, a decrease in integrity occurs without follow up. Further research is needed to determine if this training modality is effective with other types of intervention techniques.

Consequence Strategies to Increase Teacher Use of Effective Interventions

After the training outside of the classroom, various consequences can be employed by the consultant to increase teacher use of interventions in the classroom when performance is not maintained. Several studies in the consultation literature have investigated the effects of treatment implementation with teachers who were provided consultation support while teacher implement the intervention in the classroom setting.

Table 2 presents studies and study outcomes of these studies.

Table 2

Studies investigating Consequential Strategies to Increase Teacher Treatment Integrity and

Summary of Study Outcome

Consequence Strategy	Study	Outcome Summary
Follow up meetings and Performance feedback	Noell, Witt, LaFleur, Mortenson, Renier, & LaVelle (2000)	Baseline showed 50% of school days had intervention administered and integrity levels on those days had a mean of 41%. With follow up and performance feedback 92% of school days had intervention with 87% integrity levels. All of the students showed an increased percentage of correct comprehension questions during the intervention.
Weekly performance feedback	Mortenson & Witt (1998)	4 teacher baseline percentages: 43%, 61%, 61% and 86%. Teacher outcomes: 80%, 71%, 71% and the fourth teacher was not administered feedback due to high baseline levels. 4 student baseline percentages: 60%, 54%, 71% and 0%. All but one students increased with Performance feedback: 85%, 69%, 80% and 0% .
Response Dependent Performance Feedback	Gilbertson, Witt, Singletary, & VanDerHeyden (2007)	Teacher baseline: 3 of 5 > 50%, 1 started at 100% but dropped to 0%. 1 started at 100% and student improved rapidly and reached mastery (< 85% performance). Teacher RDPF: 3 of 4 < 85%, 1 teacher 47% initially after follow up consultation 75%. Maintenance: 2 <85%, 2 at or > 50%. Student performed 20% to 50% during baseline and 4 of 5 reached < 85% after Treatment.
Performance interview, commitment emphasis, and performance feedback.	Noel et. al. (2005).	Teacher integrity levels: Interview = 35%, commitment = 52% and feedback = 77%. Student outcome: Interview = 2%, commitment = 37% and feedback = 96%.
Performance feedback	Launsbury & Sharp (1999)	Baseline # teacher interactions: 6.0, 4.6, 7.5 and 1.9. Performance feedback: 32.5, 8.4, 12.8 and 7.5 Maintenance: 8.8, 4.9, 1.9 and 8.5. All students increased with treatment relative to baseline.

Performance feedback/negative reinforcement	Digennaro, Martins & McIntyre (2005)	Teacher baseline: all 4 between 20 % and 30%. Performance feedback/negative reinforcement: 3 reached 100% in less than 7 sessions. 1 reached 70% and with adjustments she reached 100%.
Goal setting with performance feedback.	Martens, Hiralall7 Bradley (1997)	Teacher baseline: 3 praise/ 30min. Treatment: 14 praise/30min. Baseline Student behavior: Student A averaged 48%, student B averaged 60%. Treatment: Student A averaged 81%, student B averaged 85%.
Tactile prompting and self-monitoring.	Petscher & Bailey (2006)	Dramatic increase in treatment integrity during prompting and self-monitoring for all 3 para-educators. Decrease during maintenance, but greater than baseline levels. Student outcomes not collected.

The use of performance feedback is one strategy that has been frequently studied to increase the amount of treatment integrity of an intervention used in a classroom setting. Performance feedback generally consists of several steps in which the consultant informs the teacher how well they did at implementing the intervention, what areas were done well, where components were omitted or performed incorrectly, a review of skills, practice and also what impact the intervention is having on the students performance.

Noell, Witt, LaFleur, Mortenson, Renier, and LaVelle (2000) conducted a multiple baseline design across participants study to ascertain if it was necessary to conduct time-consuming performance feedback sessions in order to reach and maintain high levels of treatment integrity or if a brief formal meetings with the consultant to ask questions or problem solve would have sufficiently improve accurate treatment integrity. In this study five regular education elementary students were referred due to academic concerns in reading. The students were paired with a peer tutor to receive a brief reading

intervention. Each student dyad was trained and demonstrated 100% treatment integrity during the training phase. Each student was given a reading goal based on baseline information and requirements for a passing grade. If during the intervention the student met or passed his goal a reward ticket was presented to the students. Three tickets could be turned in for a 15-minute free time activity session for both tutor and tutee. The teacher's role was to provide the intervention time, monitor peer implementation of the peer tutoring steps, monitor student progress and goal obtainment and provide earned activity time.

On the first day of the intervention the consultant was present to assist the teacher in reaching 100% integrity while independently implementing the intervention. During this session, the consultant provided teacher prompts and discussed implementation of the intervention at the end of the session.

During the baseline phase following this brief training session, the teachers implemented the interventions on 50% of the school days with a mean integrity level of 41%. None of the teachers reported performing any of the treatment procedures during the last two days of this phase. A brief formal review between consultant and teacher was conducted in which the consultant reviewed graphed student and teacher implementation data and answered teacher questions or problem solved missing treatment steps with the teacher. Following this brief review, two of the five teachers showed significant improvement with averages of 84% and 69%, where the other three stayed at 0% integrity. Next, daily performance feedback (PF) was provided to the 5 teachers and showed little impact on those who already reached higher levels of integrity during the follow up meeting phase. Two of the three low performing teachers reached and

maintained high levels of treatment integrity (at or above 80%) during the performance feedback sessions. The teacher who did not show improvement with performance feedback was administered a follow-up meeting in which the teacher was reminded that a meeting was going to be conducted following the intervention with the student's parents and the principal. With this reminder the teacher's integrity rates rose to a mean of 87% following the reminder. In the end, the overall integrity rates during the combined follow up and performance feedback sessions reached implementation of intervention on 92% of school days with 87% integrity rates.

Although the integrity levels varied depending on the teacher, the consultee's students all showed significant improvement in reading, measured by the number of comprehension questions answered correctly, from baseline percentages during the peer-tutoring phase of the intervention. The student's baseline levels ranged from an average of 25% to 59% answers correct. During intervention those percentages jumped with a range from 75% to 91%. 3 of the 5 students maintained the performance gains over a period of several weeks after the intervention was completed. The other 2 students returned to close to baseline levels. The high level of student improvement during the intervention is of interest given that the integrity presented by the teachers was varied. However, the level of treatment integrity of the peer tutors who directly administered the intervention was not collected and may be related to the performance that the students showed.

Daily performance feedback has been shown to enhance teacher integrity but it is time and resource intensive. Additional studies have investigated the effectiveness of more viable, time-efficient techniques for increasing the integrity of plan implementation

by teachers in the classroom. Mortenson and Witt (1998), for example, examined the effectiveness of weekly performance feedback on teacher intervention implementation using a multiple baseline across teacher design. Four teachers who had presented students to the school's multidisciplinary team participated in a behavioral problem solving consultation process. After assessing the problem and formulating an academic intervention, the consultant trained each teacher on a goal-setting intervention to increase student academic performance. Similar to the one day training session conducted in the above Noell et al. study, teachers were provided with verbal and written instructions followed by an in-class direct training session with consultant prompts and performance feedback. Upon reaching 100% integrity, a baseline condition was conducted where the teachers implemented the intervention in the classroom without additional support. During this stage, the student would be presented with a daily work assignment and complete the assignment as quickly and accurately as he/she could. The assignment was then graded by the teacher at some time during that day, recorded in the grade book and on a self-monitoring sheet. If the score was higher than a predetermined level the student received a reward slip which could be used at an appropriate time to access a chosen reward. An additional work assignment was also made available each day and if completed above the required threshold the student would receive a second reward slip. All students' work folders and reward slips were collected and reviewed by the consultant on a weekly basis.

For teachers who had low integrity levels (below 70%) during baseline, weekly performance feedback sessions were provided by the consultant. Each feedback meeting consisted of (a) presenting the teacher with the data on intervention usage and student

academic performance, (b) providing positive feedback for completed intervention steps, (c) providing corrective feedback by reviewing each intervention step omitted or implemented incorrectly, (d) addressing any questions or comments, (e) obtaining a verbal commitment from the teacher to perform the intervention correctly, (f) prompting the teacher to continue faxing the daily summaries and, (g) prompting that the consultant would return in one week.

During baseline condition, only one of the teachers maintained the acceptable level of 70% treatment integrity throughout the intervention and therefore did not require any feedback sessions. The other three teachers showed marked improvement in the level of treatment integrity with the implementation of feedback session (43% to 80%, 61% to 71%, and 61% to 79% respectively). Maintenance data was only available for two of the teachers, both of which showed sustained improvement over baseline (72% and 84%).

Four academic performance grades were collected from each teacher's grade book prior to the start of the study and a mean was used for each student's baseline and all but one student's percentages were reported. The three student's baseline percentages were 60%, 54% and 71% respectively. On average, all of the students showed some improvement over baseline when the teacher implemented the intervention with performance feedback (85%, 69% and 80%) This study lends evidence that weekly performance feedback may be an effective tool in increasing the level of fidelity with which teacher follow intervention plans for some but not all teachers. In addition, there appears that there may be a relationship between treatment integrity levels and student performance outcomes such that in general when treatment integrity improved, so did

student performance. The authors did note that the effect on student behavior was varied and therefore difficult to draw clear conclusions.

Additional adjustments in performance feedback modes and rates that may be more feasible approaches in a school setting have also been investigated for improving teacher implementation. For example, Martens, Hiralall, and Bradley (1997) used brief feedback notes to increase teacher intervention integrity. Specifically, four participating teachers met a self-initiated goal that required a specified number of praise statements to be given when students exhibited appropriate behaviors. The daily note stated whether the teacher did or did not meet the goal based on a classroom observation. When given brief feedback notes, all teachers increased praise levels with a corresponding increase in student desirable behaviors. Unfortunately the study was not set up to determine whether goal setting, performance feedback or both was instrumental in the change in teacher behavior. Likewise, Gilbertson, Witt, Singletary, and VanDerHeyden (2007) examined Response Dependent Performance Feedback (RDPF) with five teachers in an elementary school setting to promote implementation of a peer-tutoring program for general education students experiencing academic difficulties. In this study, teachers were provided with performance feedback support only when integrity response was below 100% integrity levels. Results from this study showed that use response dependent performance feedback, markedly increased teacher integrity for three of the four teachers who exhibited low integrity after a brief training session with coaching in the classroom setting. When the teachers used the intervention, student academic performance generally increased over performance levels observed prior to treatment. The link between teacher integrity and student outcome may be compromised due to the use of peer tutors as an

intermediary. Noell and associates (2005) conducted an extensive study utilizing a 3by3 split plot analysis design to further investigate the use of weekly performance feedback on treatment integrity. In addition, the authors hypothesized that having teachers commit to the process may also be an important factor in teachers' treatment integrity levels. Forty-five teachers, who referred students for consultation for a variety of concerns, including challenging behavior and academic concerns, participated in this study. Teachers were randomly provided one of three levels of support: (1) a weekly performance interview, (2) a discussion emphasizing teacher commitment, and (3) weekly performance feedback. Teachers in the weekly interviews condition simply met with the consultant to discuss student progress. Teachers in the commitment emphasis condition had a weekly interview and received a discussion about making a commitment to the intervention. During this discussion, the consultant and consultee discussed factors that are associated with lack of follow through such as time constraints and the intervention as a commitment to the student and his/her parents. Also addressed were negative implications such as loss of credibility and possible harm to the student, importance of evaluating the effectiveness of the intervention, and what proactive steps could be taken to ensure the intervention was conducted as intended. During the performance feedback condition, teachers were given performance feedback on a weekly basis similar to the procedures used in the above Mortenson and Witt (1998) study.

Results of the statistical analysis of the means of treatment integrity for the three groups revealed that teachers in the weekly performance feedback group had a significant greater integrity level than the other two teacher support conditions. The commitment emphasis group performed slightly better, but not to a significant degree. Teacher

acceptability and teacher report of treatment integrity were high for all groups. The students in the performance feedback group also showed significant levels of behavioral change when compared with the other groups, which did not statistically differ from each other.

The use of performance feedback had a mean integrity level of 77%. The commitment emphasis group and weekly interview groups had mean integrity levels of 52% and 35% respectively. Teacher reports of treatment integrity were high for all 3 treatment conditions (5 or better on a 7 point Likert scale); however, as reported above the actual integrity levels varied across conditions. The students in the performance feedback group also showed significant levels of behavioral change ($M = 96\%$) when compared with the weekly interview and commitment emphasis groups ($M = 2\%$ and 37% respectively), which did not statistically differ from each other.

The authors lend evidence to a positive effect that performance feedback has on both treatment integrity and student outcome. The effect of follow up meetings and commitment emphasis meeting did not show the same level of integrity nor student outcome. The authors also noted that the differences between teachers perceived levels of integrity and those obtained through permanent products may call into question results of studies that rely only upon teacher report of integrity.

Launsbury and Sharp (1999) also examined the effects of sequential feedback on treatment integrity of seventh and eighth grade student and teacher instructional interactions to increase physical education skills using an AB maintenance, single case design. Four physical education preservice teachers were selected as subjects in this training study. The number and duration of instructional interactions between the subject

teachers and the students were collected and also the number of appropriate and inappropriate skill practices by the student. Because the preservice teachers were attending university classes, they were receiving traditional feedback once per week. Following baseline, goals were made in order to increase the number and frequency of training interactions. In addition, a sequential feedback system was introduced that included feedback sessions before and after each observation session in addition to the traditional feedback sessions. During these feedback sessions, the teacher was taken through a specific sequence of instruction for each student interaction. This sequence consisted of the following steps: (1) analyzing and instructionally responding to videotaped student motor skill execution, (2) discussing critical skill elements contributing to performance outcome, (3) explaining and sequentially illustrating the refinement of motor skills, (4) explaining the procedures for providing students with explicit instructions that included specifically how to change the motor skill, why the skill should be changed and specific criteria on which to judge performance, and (5) explaining and illustrating the sequential teaching patterns found to occur around student-appropriate practice in the first phase of the study.

In the maintenance phase, the sequential feedback sessions were removed and the traditional feedback that was present in the baseline phase was continued. During baseline, few instructional interactions occurred (Mean # of interactions: 6.0, 4.6, 7.5 and 1.9) and in general, the majority of these observed interactions consisted of inappropriate student behaviors following instructional interactions. With the introduction of sequential feedback, the number of instructional interactions increased (Mean # of interaction: 32.5, 8.4, 12.8 and 7.5) but continued to be low. The teachers, however, used

a wider variety of instructional sequences and the students increased the number of appropriate skill demonstrations (Mean #: 19.3, 6.5, 8.1 and 3.7) than during baseline (Mean #: 1.0, 0.5, 2.8 and 0.2). The results of the maintenance phase were mixed (interaction Mean #: 8.8, 4.9, 1.9 and 8.5), with some of the teachers returning near baseline and others maintaining near treatment phase levels. The student's performance during maintenance appeared to follow that of the teachers. Those teachers whose interactions decreased also had students that decreased (Mean #: 6.1, 3.7 and 1.5). The teacher who increased the number of interactions during maintenance had students that demonstrated greater numbers of appropriate skill demonstration (Mean #: 6.3).

The authors demonstrated that performance feedback appears to have a positive effect on the number of skill training interactions that a physical education teacher has with his/her students. This increased number of interaction then appears to have a positive effect on the appropriate skill demonstration from the student.

When performance is not maintained after training, various consequences can be employed by the consultant to increase teacher use of interventions. Brief weekly supportive feedback meetings to review implementation barriers, child progress data, and to determine intervention modification or fading strategies have been the most studied and effective when administered daily, weekly, via notes or RDPF. In addition to PF, commitment and brief one time meeting have been studied but seem to be less effective. Consequential meeting with administration and Self-monitoring show promise but have not been studied sufficiently. The way in which individual teachers respond to feedback varies. These results are not surprising given that the function of performance feedback is not known. Some possible explanations for the effect of performance feedback are:

provides information to the teacher on how he or she are actually behaving and how to change when behavior is inaccurate, provides positive social reinforcement during consultant-consultee interactions, or provides negative reinforcement if the teacher is avoiding negative feedback from either the consultant or administrator if the intervention is not used accurately (Digennaro, Martins & McIntyre, 2005).

Digennaro, Martins and McIntyre (2005) investigated the impact that negative reinforcement has on treatment integrity rates of four teachers implementing a behavioral modification plan to increase student on-task behaviors using a multiple baseline design. First, teachers were trained in the classrooms using didactic instruction, modeling, coaching, and immediate corrective feedback until teachers implemented the plan with 100% integrity on two consecutive occasions. Next, the teacher implemented the intervention without additional consultation support and all 4 dropped in treatment integrity from 100% to an average of between 20 and 30 %. Performance feedback with negative reinforcement was implemented following the baseline. This consisted of a meeting with the consultant prior to the next session if the teacher did not achieve 100% accuracy. The teacher was shown the results of the previous session and was coached on how to perform the intervention steps that were missed. The teachers were then informed that the feedback sessions would continue until the teachers completed three consecutive sessions at 100% accuracy. Three of the teachers were able to achieve 100% accuracy for three consecutive sessions in seven sessions or less. The fourth averaged 70% accuracy and refused to continue using the intervention as planned. The consultant then adjusted the number of required steps and the teacher was able to exceed the agreed upon number of steps. As the consultant feedback was faded out over time to two performance

feedback sessions every two weeks, the teachers were all able to achieve 90% or greater accuracy levels.

The students started with high levels of off task behaviors (40%, 67%, 40% and 54%). During the train phase the interventions 3 of 4 students showed decreased levels of off task behaviors though only 2 were significant (exact percentages were not stated but estimates could be gleaned from the available graph. 35%, 20%, <10% and 45%). Upon returning to baseline, the students showed inconsistent results (47%, 47%, 13% and 43%). During the implementation of performance feedback/negative reinforcement 3 of 4 students decreased the amount of off task behaviors to below baseline levels (24%, 34%, 6% and 48%). The gains made did not continue during fading for 3 of the 4 students (15%, 40%, 22% and 33%).

A relationship between teacher integrity levels and student outcome was evaluated for the 4 teacher/student dyads. Resulting in a significant correlation for dyads 1 and 3 ($r = -.41$, $r = -.59$) but not for dyads 2 and 4 ($r = -.10$, $r = -.37$).

These results suggest that consultee behavior related to treatment integrity may be influenced by performance feedback that is paired with negative reinforcement contingencies. In addition, this study lends some evidence that a correlational relationship exists between treatment integrity levels and student outcome in some cases, though is by no means definitive.

Reaction to self-monitoring may also enhance teachers' treatment integrity. When the intervener understands that his or her behavior as well as that of the student is being monitored, there is a greater chance that the treatment will be performed as intended. Martens, Hiralall and Bradley (1997) examined the effectiveness of goal setting with

systematic progress monitoring on the behavior of teachers who were implementing a classroom intervention. Using a multiple baseline across subject design, one teacher implemented an intervention to increase student schoolwork completion, attention to instruction and verbal responses to questions of two 6-year-old male students assigned to a classroom for students with emotional disturbances. During the consultation meeting, an increase in teacher praise for appropriate classroom behaviors was chosen as an intervention to increase student behaviors of schoolwork, attention to teacher and verbal responses, because it has been effective previously. Initially during baseline, the teacher was observed to praise the students an average of three times per 30 minutes and one student averaged 48% appropriate behavior while the second student averaged 60% appropriate behavior. For intervention, the teacher set a personal goal to double her praise rate to six praises given within a 30-minute session. During the intervention sessions, the teacher's behavior was not only monitored, but also reported back to her following the session. The teacher praise rates increased and remained stable at 14 praises per 30 minutes for 30 observed sessions for each student. Both students' behaviors improved to an average greater than 80%. The teacher rated the acceptability of the intervention as moderately-high to high and that she would recommend using the intervention again.

The results from this study suggest that having a teacher set his or her own goal as part of an intervention and including performance feedback may have a positive impact on treatment integrity levels. Though there is no differentiation on which aspect, the feedback or goal setting or both, actually impacted the teachers behavior. It would also appear that the treatment was effective in improving the student's behavior.

Researchers have also investigated the use of self-monitoring of intervention as a means of increasing the treatment integrity of the person tasked with the intervention. This may also serve as a means of recording and tracking the level of treatment integrity. The use of a tactile prompt such as the use of a vibrating pager can be used to elicit a specific behavior from the intervener. Petscher and Bailey (2006) conducted a study using moving-treatments multiple baseline across behaviors design, in which vibrating pagers were used to assist 3 paraprofessionals in proper implementation of a token economy system within a self-contained special education classroom. When a student demonstrated a behavior that would either reduce the student's number of tokens (negative behavior) or increase the student's number of tokens (positive behavior), the pager would be triggered by remote control. The para-educator was not required to wait until the prompt was given in order to respond to a student's behavior. In addition to the researchers collecting data on the outcome of an opportunity to utilize the classroom management system, the interveners were also asked to rate what percentage of behaviors they followed through with the proper response. The two records were then compared against each other. A short feedback session with the intervener was conducted following each session. When the intervener was able to reach 100% treatment accuracy before the external prompt was given over three consecutive sessions, the pager was removed. The use of the external prompt increased the target behaviors from the interveners significantly and rapidly. During the maintenance phase of the study, the level of integrity decreased particularly with the points earned for positive behaviors. However, the level of treatment integrity stayed significantly higher than at baseline. As treatment sessions extended to 60 minutes or more, the treatment integrity also declined

without the external prompt. Unfortunately, the researchers did not collect data on what kind of affect the increase in treatment integrity during the external stimulus phase and maintenance phase had on the behavior of the students.

The use of tactile prompts and self-monitoring appear to have had a positive impact on the integrity levels of the para-educators. It is unclear whether the prompt or the self-monitoring component or both together is responsible for the dramatic change in behavior. Given the rapid initial change and a decrease in fidelity during maintenance in which the prompt was absent, the prompt may have played a major part (Petscher & Bailey, 2006).

This body of research seems to demonstrate some interesting trends. First, maintaining high levels of integrity during implementation of the intervention seems difficult for most teachers. Second, teachers in general have a difficult time implementing a treatment plan with high levels of treatment integrity with only instructions on how to do so. There are some exceptions, but the majority of teachers required a significant amount of training in order to reach 100% integrity levels. It is unrealistic for teachers to be expected to constantly perform an intervention with 100% fidelity and may not be needed to reach desired outcomes. However, for training it ensures that the teacher knows how to implement all of the intervention components correctly. A training method that includes verbal instructions, role-play, provides material components, and practice would appear to be effective components for many teacher to reach 80% or greater levels of integrity. Results of the reviewed studies also reveal that specific performance feedback is effective in either maintaining high levels of integrity following training, or helping to return the teachers behavior to higher levels. It

is unclear as to how often the feedback should be administered, whether it be daily, weekly or have it be dependent on the teachers behaviors.

Since it would appear the teacher reports tend not to be accurate measures of integrity level, the use of permanent products or direct observation may be more reliable means for getting integrity data than relying on the teachers themselves. Thus, in order to increase the likelihood that the plan is followed correctly, steps should be take in the planning stage for adequate monitoring and feedback on adherence to the intervention.

Limitations

Regardless of which strategies are used, it is clear that integrity should be monitored in order to determine when a teacher needs additional support in getting effective academic and behavioral outcomes for children in a busy classroom setting. One of the main limitations that become apparent with treatment integrity in the literature is how to accurately measure whether it has been achieved or not (Sanetti & Kratochwill, 2008). Although this is a critical measure to monitor, currently there is no set standard for what factors to measure or how to measure those factors. In addition, there is little evidence to support the accuracy of many of the measurement methods in use, such as teacher reports, self-monitoring, and interviews (Noell, Gresham, & Duhon, 1998). Direct observation appears to be an effective means of acquiring integrity data, but does require an additional person to monitor the intervention which may not be the most efficient use of resources. In addition, reactivity may influence results when observation is not conducted. To reduce observer reactivity and resources, the use of permanent products allows for a way to track treatment integrity with those types of interventions that allow for their production. The drawback with permanent products is that not all

elements of an intervention may lend themselves to a tangible product. It appears that utilizing several different measures including direct observations and permanent products would be a prudent method until better information on what methods show the most accurate results.

Another major limitation is what level of treatment integrity is needed in order to demonstrate the desired outcome. Northup, Fisher, Kahang and Harrell (1997) for example demonstrated that in some cases high levels of treatment integrity were not needed in order to have adequate student outcomes. Therefore more research should be performed on what intervention strategies require what levels of integrity in order to have a reasonable chance of success.

Several strategies have been shown to effectively promote and support teacher integrity, with performance feedback following direct classroom training appearing to be the most viable supportive option when teachers continue to struggle with implementation after training. However, this strategy was shown to be effective with most but not all teachers in current studies. Moreover, many of these strategies require skillful coaches or consultants to take time to plan and provide the training and follow up support. Thus, additional research in the types of training that demonstrates the best use of time and other resources while still achieving training goals for treatment integrity are needed. Given that performance feedback showed such promising results, additional research should be conducted in order to further understand the components and by what mechanisms they affect change. In addition, understanding what factors contribute in cases in which performance feedback does not increase performance could be useful in decreasing the number of teachers that do not appear to respond to performance feedback.

As this information becomes available consultants can streamline the training process and tailor the training to maximize the level of treatment integrity with the fewest training sessions.

Given the minimal resources in school settings, ultimately a secondary goal of consultation is to have teachers consistently and appropriately use the skills they have learned with high integrity during consultation with children with similar academic or behavior problems. Only one study has investigated the generalization of teacher use of intervention that was designed and used during consultation with other children experiencing similar problems in the classroom. Specifically, Riley-Tillman and Eckert (2001) reported that the use of generalization strategies did not occur with three out of four elementary school teachers who implemented an intervention to increase the level of praise statements given to students experiencing difficulties in staying on task. In this study, poor generalization of teacher praise to other settings with other children experiencing similar problems was observed despite all teachers in this study having participated in two levels of generalization training. The first level of generalization training simply involved a generalization prompt being in which the teacher was asked if there were other students that could benefit from the same intervention. After collection data on the generalization prompt outcome, the teachers were given systematic generalization training. This included a scripted interview in which the consultant reviewed the intervention and discussed other students in the class that might have similar problem behaviors. Thus more research in ways to improve the generalization of treatment to other students should be conducted in order to increase the effective use of skills learned during the consultation process.

Practical Implications

Despite these limitations in the literature, treatment integrity has been shown to be a factor in implementing successful treatment plans in the school setting. In working with students within a school setting, research indicates that treatment integrity is generally poor, resulting in a large majority of well-planned interventions failing to provide support to students because they are never implemented. These interventions fail possibly because often the teachers are asked to do too much which may include: putting together intervention materials, reorganize class and peers, develop and implement a data collection plan, and solve implementation problems without expert support. This research review suggests that there are a number of strategies that can be used by consultants or a school psychologist in the school setting to support teachers who are attempting to accurately implement interventions in the classroom that may serve to remove some or all of these barriers.

Based on this review, there are strategies that can be used throughout the intervention process including intervention planning, training, implementation, and evaluation. For example, during the planning of the intervention consultants can suggest interventions with characteristics that increase the acceptability of the treatment plan such as selecting an intervention that is easy to implement in an efficient manner, does not require a lot of materials, and has a high likelihood of showing the desired behavior change. The research on treatment acceptability is not conclusive on whether the level of acceptability directly affects the level of treatment integrity. Thus, additional supportive strategies throughout the intervention process are likely to be needed.

After planning has taken place, the next step of an intervention is training. The use of training prior to the implementation of the intervention has a positive impact on initial rates of treatment integrity but appears to drop off fairly precipitously for many teachers. Thus, additional support is likely to be needed for most teachers. Adequate training requires some degree of direct coaching by a consultant in the natural setting during initial practice sessions when learning how to use intervention. This allows the teacher to implement the treatment within the actual setting where the intervention is to be administered in order to ensure that the teacher can accurately implement the intervention. Because the amount of coaching needed varies between teachers, teacher progress should be monitored and supported. Some teachers learn to accurately and constantly use an intervention during intensive training sessions of just a few days whereas others respond but tend to show decline in performance over time. Moreover, the behavior of the student can have a significant effect on whether a teacher will implement a treatment plan correctly. If the student demonstrates negative behaviors when a treatment component is implemented, the teacher is less likely to perform that component and also see the intervention as ineffectual. The component becomes aversive to both the student and the teacher due to the student's behaviors.

After classroom training, one efficient strategy, self-monitoring, seems to maintain treatment integrity levels for some teachers as well as provide outcome monitoring of the teacher and student performance. For teachers who continue to struggle, the use of performance feedback following the implementation of a treatment session appears to have a significant effect on integrity rates. Although daily feedback is effective, feedback given on a weekly basis or response specific performance feedback

seems to effectively increase integrity for the majority of teachers on a longer term basis. This is critical for school settings because of a limit in resources such as materials, teacher time and student instructional time.

Based on this review, it is apparent that choosing an appropriate intervention and proper training with a system of performance feedback seem to have the most consistent impact on treatment integrity levels on interventions implemented within school settings. In order to optimize the results, elements of treatment acceptability, self monitoring, outcome tracking and a reward system for the teacher should also be considered as viable teacher support options. One critical aspect of teacher support is the amount of time, expertise, and resources it takes to get teachers to implement effective interventions. Clearly, organizing and sustaining an effective program is not a simple task for education professionals. Thus, schools often organize teacher assistance teams to provide teacher support. However, it is important to have at least one team member who is committed to the program to be more involved than other personnel to guide the team in implementation (Burns, Peters & Noell, 2008). The role of the team leader(s) or school-wide consultant may be required to take on a wide range of responsibilities as well as effectively interact with the other individuals on the team. This role necessitates expertise in problem solving and decision making skills to troubleshoot the inevitable barriers that occur in any extensive systematic change. This team or individual should also have the expressed support from the school administration. With experience and training in consultation and intervention, school psychologists can be invaluable participants in leading the process of planning, coordinating, implementing, and evaluating supportive strategies. For example, school psychologists are in an excellent position to provide

training to faculty and staff as well as provide support for teachers and other staff members during program implementation. The school psychologist can also collect and interpret data in order to provide valuable performance feedback to increase the integrity of implementation.

Conclusion

This paper addressed the importance of treatment integrity implementing when treatment plans in the school setting. All selected interventions are basically a hypothesis that is to be proven correct or incorrect based on student response to an accurately implemented intervention. High levels of treatment integrity allow a researcher, consultant, or other professional to be more confident that the intervention had a functional relationship with a positive change in behavior. It is unclear what level of treatment integrity is an acceptable level in order for an intervention to reach the desired outcome, but in general, higher levels of treatment integrity appear to increase the likelihood that the student's outcome will be favorable. In cases where outcomes are poor, but fidelity is high, steps can be taken to modify the intervention and reevaluate the problem to develop a more appropriate intervention. Moreover, sufficient treatment integrity is an integral part of successful RTI wide-scale adoption. No student will benefit from the system if the system is not used as intended and a student will inaccurately considered a "nonresponder" to an intervention when the student never experiences the intervention. Yet, in working with students within a school setting, the research indicates that generally treatment integrity is poor for many teachers without adequate teacher training and support. There appear to be teachers that require much less in the

way of training and follow up supports, but it appears that those teachers are in the minority.

Given the potential influence of treatment integrity on student outcomes and findings from this review, it is essential that all school psychologists actively take steps to carefully select interventions, provide training support, assess and evaluate the treatment integrity of interventions, and provide ongoing feedback to increase the likelihood of intervention implementation (and hopefully positive client outcomes). Yet, this requires extensive planning and resources to provide and monitor the effects of intervention support. Given the numerous factors that influence integrity (e.g., teacher or consultee skill and motivation, settings, child behavior), identifying reliable ways to increase integrity is proven to be complex and our understanding of treatment integrity is still emerging. Thus, it is essential that researchers continue to investigate important factors that influence treatment integrity and how to measure and promote treatment integrity in ways that are both feasible and result effective intervention services to students.

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