BEHAVIOR SKILLS TRAINING OF DIFFERENTIAL REINFORCEMENT OF ALTERNATIVE BEHAVIOR FOR THREE PARAPROFESSIONALS WORKING IN INCLUSIVE CLASSROOMS

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There is a growing trend of using paraprofessionals to augment the education of students with disabilities. Paraprofessionals are often the least educated and trained member in a classroom, yet can be asked to provide assistance to students with complex needs. Students with disabilities require the use of practices that are grounded in scientific research in order to be included as much as possible in the regular education curriculum. This study sought to examine the effects of a multi-component training package, behavior skills training, on three paraprofessionals' use of a positive behavior support strategy. A single-subject research design was used to measure the effects of the training as well as the effects of differential reinforcement of alternative behavior on students' rates of challenging and alternative behaviors. Results indicated that behavior skills training had a positive impact on the paraprofessionals' use of the strategy. All three paraprofessionals rated their experience with the training and the strategy as favorable.

Keywords: paraprofessional training, behavior skills training, differential reinforcement of alternative behavior

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PREFACE

This dissertation would not have been possible without the support of my family, friends, colleagues, and the Special Education faculty members at the University of Pittsburgh.

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1.0 INTRODUCTION

The topography of classrooms in the United States has changed significantly over the past 15 years (Giangreco, Suter, & Doyle 2010). Students with disabilities are increasingly included in regular education classrooms, and, as a result, paraprofessionals are often seen working in regular education classrooms. Students with special needs, especially those with significant needs, tend to be accompanied by a paraprofessional. For example, and according to the *38th Annual Report to Congress on the Implementation of the Individuals with Education Act* (IDEA, 2016), in 2013 there were nearly 464,000 paraprofessionals employed throughout the country. In comparison, in 2013 there were 419,000 special education teachers employed throughout the country. As such, there is an increasing need for the training of paraprofessionals in evidence-based practices (Brock & Carter, 2015). Additionally, Eschiedt (2007) conducted a study in which she evaluated the administrative and legal cases where parents sought legal justification for the use of paraprofessionals to augment their child's education. More often than not, when parents have asked that their child receive extra assistance via a paraprofessional, school districts and the court systems have complied (Eschiedt, 2007).

Paraprofessionals can serve any number of roles in the classroom. For example, the federal government defines a paraprofessional as those who provide one-to-one tutoring; assist with classroom management; provide instructional assistance in a computer laboratory; conduct parental involvement activities; provide support in a library or media center; act as a translator;

or provide instructional support services under the direct supervision of a teacher (Department of Education, 2015). Despite this long list of roles and responsibilities, paraprofessionals are often ill-trained to complete their duties (Giangreco, Suter, & Doyle, 2010; Brock & Carter, 2015).

There are several problems related to ineffective and insufficient paraprofessional training. To begin, paraprofessionals are often the least trained individuals in the classroom, yet are often tasked with providing assistance to students with the most complex needs (Giangreco, et al., 2010). Paraprofessionals can be asked to provide instruction on both academic and adaptive skills; they can be tasked with intervening on and preventing problem behavior; and they are also asked to maintain the already-developed skills of students with disabilities (Giangreco, Edelman, Luiselli, & MacFarland, 1997). Even the greatest, most educated instructor would find these duties to be difficult. To complete these duties, one would have to be highly educated, thoroughly trained in both pedagogy and behavior management, and be able to effectively collaborate with a number of different professionals (e.g., regular education teachers, speech and language pathologists, occupational therapists, physical therapists). Paraprofessionals continue to receive insufficient training, yet are expected to act as the proverbial bridge between students with disabilities and the regular education curriculum. Even more so, when training is provided, little attention has been paid to the effects of the training on student outcomes.

Paraprofessionals often lack appropriate training and have ill-defined roles (Giangreco, et al., 1997). Both problems can combine to affect organizational management in a negative way. Additionally, there has been a paucity of research into the ways in which paraprofessional training results in positive outcomes for students with disabilities. Most recently, research into paraprofessionals has largely focused on: hiring and retaining paraprofessionals, paraprofessional

training, paraprofessional roles and responsibilities, respect and acknowledgement of paraprofessionals, interactions of paraprofessionals with students and staff, supervision and directing the work of paraprofessionals, student perspective on paraprofessionals, paraprofessionals as part of school change, and alternatives to the employment of paraprofessionals (Giangreco et al., 2010). There have been few efforts to measure the effects of paraprofessional training using single-subject research designs.

1.1 STATEMENT OF THE PROBLEM

With the ever-changing landscape of delivering instruction to students with disabilities in inclusive settings, it is imperative that special educators, including paraprofessionals, have access to frequent and evidence-based training opportunities. As such, there as been little attention paid to topography, rate, and effectiveness of paraprofessional training in inclusive settings. Furthermore, there continues to be a lack of research and practice dedicated to training paraprofessionals who work with students with disabilities who engage in challenging behavior.

Students with disabilities who engage in challenging behavior are often accompanied by a paraprofessional. Additionally, students with disabilities that engage in challenging behavior tend to have limited access to the general education curriculum. The tendency toward placing a paraprofessional with students with disabilities is logical. That is, more and better prompting to engage in more social appropriate behavior from a trained paraprofessional, should, in theory, lead to more inclusive practices regarding the education of students with disabilities. Logic aside, however, rarely has research demonstrated a sturdy method for training and maintaining skills that paraprofessionals ought to have to complete their duties with fidelity.

2.0 REVIEW OF THE LITERATURE

Research into paraprofessional training is a growing field of study. As the number of paraprofessionals in the field continues to increase (McCulloch & Noonan, 2013), so too must the study of paraprofessionals, including training practices and the effect of those practices on student outcomes. In 2010, Ginagreco et al. conducted review of paraprofessional literature and identified thirty-two articles that studied paraprofessionals. The literature review covered a broad range of topics, including paraprofessional training. However, most of the articles that were identified centered on topics other than paraprofessional training. Additionally, even when training practices for paraprofessionals were studied, few studies incorporated the effects of that training on student outcomes. Last, there is a longstanding empirical database of studies that focused on training paraprofessionals in other settings such as group homes and hospitals (see Reid & Parsons, 1995). The focus of this literature review will be those studies that took place in a public school or school-based program.

Single-subject research designs have long been a "guidepost" for demonstrating the functional relationship between an organism's behavior and environment (Sidman, 1960, p. 1). Single-subject research designs provide researchers and practitioners with the ability to compare the *individual's* response to an educational intervention with him or herself. As such, researchers that employ single-subject research designs can provide to fellow researchers and practitioners a clear demonstration of the efficacy of an intervention.

Recent educational legislation such as *No Child Left Behind* (NCLB, 2001), and its most current reauthorization (*Every Student Succeeds Act*, ESSA, 2015), includes language that required scientifically validated interventions be used in classrooms. Scientifically validated interventions are most often referred to as *evidence-based practices* (EPBs). Horner, Carr, Halle, McGee, Odom, and Wolery (2005) provided researchers and practitioners 21 quality indicators to consider when designing, conducting, and evaluating single-subject research for the purpose of identifying EBPs in special education.

The purpose of this literature review was to identify and evaluate single-subject research studies on paraprofessional training and the resulting effects on student behavior. Specifically, the quality of the research was examined using Horner et al.'s (2005) 21 quality indicators. Additionally, the graphic displays of data were evaluated and critiqued using the characteristics outlined by Kubina, Kostewicz, Brennan, and King (2015).

2.1 SEARCH METHOD

2.1.1 Search procedures

The studies included in this review were systematically identified through two methods. An electronic search was conducted using two databases: ERIC and PyscInfo. The search terms were: *paraprofessional training* or *paraeducator training* and *single subject research design*. Additionally, an ancestral search of the studies that resulted from the electronic search was conducted.

2.1.2 Inclusion criteria

For inclusion in the literature review, the following five criteria had to be met:

1. The article was published in an English language, peer-reviewed journal.
2. The article was an empirical study using single-subject design to determine student and/or paraprofessional behavioral outcomes.
3. The article included students, children, or adolescents with disabilities as participants.
4. The study was conducted as part of a school or school-based program.
5. The independent variable included some level of paraprofessional training to affect student outcomes.

2.2 RESULTING STUDIES

The electronic searches yielded 43 results, of which 10 articles met criteria for inclusion in the literature review (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel, Kim, & Koegel, 2014; Licciardello, Harchik, & Luiselli, 2008; Malmgren, Causton-Theoharis, & Trezek, 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011; Russel, Allday, & Duhon, 2015; Toelken & Miltenberger, 2012). The articles were published in 9 different peer-reviewed journals. A list summarizing the resulting studies is shown in Table 1.

Table 1. Summary of the ten studies included in the review.

Table 1.
Summary of the ten studies included in the review.

Study	Setting	Design
Causton-Theoharis & Malmgren. 2005	2 elementary schools; 2 general education elementary classrooms	Multiple-baseline across participants
Feldman & Matos, 2012	3 general education elementary classrooms	Multiple-baseline across participants
Koegel, Kim, & Koegel, 2014	3 elementary schools; 3 school playgrounds	Multiple-baseline across participants
Licciardello, Harchik, & Luiselli, 2008	1 elementary school; play-period	Multiple-baseline across participants
Malmgren, Causton-Theoharis, & Trezek, 2005	2 schools; 3 general education classrooms	Multiple-baseline across participants
McCulloch & Noonan, 2013	Special education classroom	Multiple-baseline across participants!
Quilty, 2007	Autism resource room	Multiple-baseline across participants
Robinson, 2011	Playground, activity room, or classroom!	Withdrawal design with a nested changing criterion design!
Russel, Allday, & Duhon, 2015	Inclusive classroom setting	Multiple-baseline across behaviors
Toelken & Miltenberger, 2012	Inclusive classroom setting	Multiple-baseline across participants

2.2.1 Method for analyses and critiques of identified studies

Studies included in this review were analyzed and critiqued using the 21 quality indicators for single-subject research designs to determine evidence-based practice in special education

outlined by Horner et al. (2005). The author used the 21 quality indicators to subjectively determine whether, with enough expertise, additional researchers could replicate the studies' findings with the information provided. Additionally, the author used the 21 quality indicators to subjectively determine whether, with enough expertise, practitioners would be able to implement the interventions with the information provided.

The graphic displays of quantitative data included in the studies in this review were also critiqued. Graphic displays of quantitative data were critiqued by analyzing the essential structures and several of quality features (see results) of line graphs provided by Kubina et al. (2015).

2.3 RESULTS

2.3.1 Student participants

All of the studies included in the review used students as participants. A total of 30 students were used as participants in the studies. The majority of the participants were identified as male. For example, six out of the 10 studies exclusively included male students as participants (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Malmgren et al., 2005; Robinson, 2011; Russel, et al., 2015; Toelken & Miltenberger, 2012). Alternatively, only four studies included both male and female students as participants (Koegel et al., 2014; Licciardello et al., 2008; McCulloch & Noonan, 2013; Quilty, 2007). No studies included only female students as participants. In sum, 26 of the student participants were identified as male; four student participants were identified as female. Ages of the participants ranged from three to 11

years. Additionally, one study included grade levels rather than ages of the student participants (i.e., kindergarten – 5th grade; Malmgen et al., 2005).

All of the studies included students with disabilities as participants. Seven studies included students with a diagnosis of ASD (Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; McCulloch & Noonan, 2013; Quilty, 2007; Robinson; 2011; Toelken & Miltenberger, 2012). One study included two participants diagnosed with ASD and two participants diagnosed with Cerebral Palsy (Causton-Theoharis & Malmgen, 2005). One study included students diagnosed with emotional-behavioral disorder (EBD, Malmgren et al., 2005). Lastly, one study included a student diagnosed with developmental disability (Russel, et al., 2015). Table 2 lists a summary of the range of participant characteristics included in the studies.

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Table 2.

Summary of the student participant characteristics included in the review.

Study	Student Participant Characteristics
Causton-Theoharis & Malmgren. 2005	4 male students (2 w/ ASD, 2 w/ CP); Age range: 6-11yrs
Feldman & Matos, 2012	3 male students with ASD; Age range 5-8yrs
Koegel, Kim, & Koegel, 2014	2 male and 1 female students with ASD; Age range 8-10yrs
Licciardello, Harchik, & Luiselli, 2008	3 male and 1 female students with ASD; Age range 6-8yrs
Malmgren, Causton-Theoharis, & Trezek, 2005	3 male students with EBD; Kindergarten – 5th grade
McCulloch & Noonan, 2013	2 male and 1 female students with ASD or developmental delay; Age range: 6-10yrs
Quilty, 2007	4 male students (2 w/ ASD, 2 w/ CP); Age range: 6-11yrs
Robinson, 2011	3 male students with ASD; Age range 5-8yrs
Russel, Allday, & Duhon, 2015	2 male and 1 female students with ASD; Age range 8-10yrs
Toelken & Miltenberger, 2012	3 male and 1 female students with ASD; Age range 6-8yrs

2.3.2 Paraprofessional participants

All the studies included paraprofessionals as participants. A total of 29 paraprofessionals participated in the studies. Six studies exclusively used female paraprofessionals as participants (Feldman & Matos, 2012; Koegel et al., 2014; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011; Russel et al., 2015). Two studies included both male and female

paraprofessionals as participants (Causton-Theoharis & Malmgren, 2005; Malmgren et al., 2005). Two studies did not include the gender of the paraprofessional participants (Licciardello et al., 2008; Toelken & Miltenberger, 2012). The ages of the paraprofessional participants ranged from 18 to 60 years old. The experience levels of paraprofessional participants ranged from eight months to 20 years. Lastly, the previous training levels and levels of educational training varied significantly across the studies. Table 2 lists a summary of the characteristics of the paraprofessional participants.

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Table 3.

Summary of the paraprofessional participant characteristics included in the review.

Study	Paraprofessional Participant Characteristics
Causton-Theoharis & Malmgren. 2005	3 female & 1 male paraprofessionals Age range: 35-53yrs; Experience level: 3.5-7yrs
Feldman & Matos, 2012 !	3 female paraprofessionals; Age range: 23-50yrs; Experience level: 8-18mos.
Koegel, Kim, & Koegel, 2014 !	3 female paraprofessionals; Age range: late 40s-early 50s; Experience level: 5-19yrs
Licciardello, Harchik, & Luiselli, 2008 !	3 paraprofessionals; Demographics not provided
Malmgren, Causton-Theoharis, & Trezek, 2005 !	2 female and 1 male paraprofessionals; Age range: 20-55yrs; Experience level: 1-20yrs
McCulloch & Noonan, 2013 !	3 female paraprofessionals; Age range: 26-46yrs; Experience level not provided
Quilty, 2007 !	3 female paraprofessionals; Ages not provided; Experience level: 3-7yrs
Robinson, 2011	4 female paraprofessionals; Age range: 18-60; Experience level 3mos-17yrs
Russel, Allday, & Duhon, 2015	1 female paraprofessional, experience level not provided
Toelken & Miltenberger, 2012	2 paraprofessionals; Ages 22 & 25

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2.3.3 Settings

The settings in which the studies took place varied. Two sets of authors conducted studies in dedicated special education classrooms (McCulloch & Noonan, 2013; Quilty, 2007). McCulloch and Noonan (2013) conducted a study in a special education classroom; Quilty (2007) conducted a study in an autism resource room. Five sets of authors conducted studies in inclusive classrooms (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Malmgren et al., 2005; Russel et al., 2015; Toelken & Miltenberger, 2012). Koegel et al. (2014) and Licciardello et al. (2008) conducted studies on school playgrounds. Robinson (2011) conducted a study in three different settings: a school playground, an activity room, or a classroom. Table 1 summarizes the settings of the studies included in the review.

2.3.4 Experimental designs

Authors of eight studies employed a multiple-baseline across participants experimental design (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014 Licciardello et al., 2008; Malmgren et al., 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011). One set of authors employed a multiple baseline across behaviors experimental design (Toelken & Miltenberger, 2012). Additionally, six sets of authors included a maintenance, generalization, or follow-up phase as part of their study (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011). Russel, et al. (2015) employed a withdrawal design with a nested changing criterion design. This design involved two withdrawal and return to baseline phases.

After the second introduction of the independent variable (i.e., hand cueing), the researchers introduced a changing criterion design in order to increase the proximity between the student and the paraprofessional. Table 1 summarizes the experimental designs of the studies included in this review.

2.3.5 Student independent variables

The interventions varied for each study. Two sets of authors used unit seven of the curriculum titled *Supporting Students with Disabilities in Inclusive Classes* (Causton-Theoharis & Malmgren, 2005; Malmgren et al., 2005). Two set of authors used components of Pivotal Response Training (PRT) as an independent variable (Feldman & Matos, 2012; Robinson, 2011). Koegel et al. (2014) used three strategies: appropriate proximity, cooperative arrangements, and the use of child-preferred items as independent variables. Licciardello et al. (2008) and Quilty (2007) used a social skill intervention and Social Stories©, respectively. One set of authors used mand training as the independent variable aimed at changing student behavior (McCulloch & Noonan, 2013). Russel et al. (2015) conducted a study that included hand cueing and subsequent shaping and fading to change student behavior. Lastly, one set of authors used a modified Say, Wait and watch, Act out, Touch-to-guide procedure (SWAT, Toelken & Miltenberger, 2012). Table 4 summarizes the student independent variables that were included in the studies identified in this review.

Table 4.
Summary of the Student Independent Variables characteristics included in the review.

Study	Student Independent Variables
Causton-Theoharis & Malmgren. 2005	Unit seven of the curriculum titled *Supporting Students with Disabilities in Inclusive Classes*
Feldman & Matos, 2012	Components of Pivotal Response Training
Koegel, Kim, & Koegel, 2014	Appropriate proximity, cooperative arrangements, and the use of child-preferred items
Licciardello, Harchik, & Luiselli, 2008	Social skill intervention
Malmgren, Causton-Theoharis, & Trezek, 2005	Unit seven of the curriculum titled *Supporting Students with Disabilities in Inclusive Classes*
McCulloch & Noonan, 2013	Mand Training
Quilty, 2007	Social Stories ©
Robinson, 2011	Components of Pivotal Response Training
Russel, Allday, & Duhon, 2015	Hand cueing and subsequent shaping and fading to change student behavior
Toelken & Miltenberger, 2012	Modified Say, Wait and watch, Act out, Touch-to-guide procedure

!

2.3.6 Paraprofessional independent variables

Two sets of authors conducted a four-hour in-service training with paraprofessional participants that focused on unit seven of the curriculum titled *Supporting Students with Disabilities in Inclusive Classes* (Causton-Theoharis & Malmgren, 2005; Malmgren et al., 2005). Feldman and Matos (2012) conducted a one-and-a-half-hour didactic training session on PRT-based social facilitation procedures along with an additional three days of 15-20 minute in vivo trainings.

One set of authors used a one-hour workshop, including a PowerPoint© presentation with videos, that focused on 3 strategies for increasing initiation and engagement with typical peers (Koegel et al., 2014). Licciardello et al. (2008) used 5-10 minutes of social skill intervention training. McCulloch and Noonan (2013) provided paraprofessionals with online training modules that focused on mand training procedures. Additionally, McCulloch and Noonan (2013) included a pre- and post-test as part of the trainings. One author used two 1 ½ hour training sessions that focused on the creation and implementation of Social Stories© (Quilty, 2007). Robinson (2011) used three 15-minute modeling sessions of PRT and video feedback sessions that lasted 15 minutes. Russel et al. (2015) used in vivo hand cueing as well as subsequent shaping and fading to train paraprofessionals to lesson proximity to students. Lastly, one set of authors used 10-minute training sessions across three behaviors to instruct paraprofessionals on the use of a modified SWAT procedure (Toelken & Miltenberger, 2012). Table 5 summarizes the paraprofessional independent variables that were used in the studies included in the review.

Table 5.
Summary of the paraprofessional independent variables included in the review.

Study	Paraprofessional Independent Variables
Causton-Theoharis & Malmgren. 2005	4 hour in-service training with paraprofessional participants that focused on unit seven of the curriculum titled *Supporting Students with Disabilities in Inclusive Classes*
Feldman & Matos, 2012	One 1 ½ hour didactic training session on PRT-based social facilitation procedures along with an additional three days of 15-20 minute in vivo trainings
Koegel, Kim, & Koegel, 2014	One 1 hour workshop, including a PowerPoint© presentation with videos
Licciardello, Harchik, & Luiselli, 2008	5-10 minutes of social skill intervention training
Malmgren, Causton-Theoharis, & Trezek, 2005	4 hour in-service training with paraprofessional participants that focused on unit seven of the curriculum titled *Supporting Students with Disabilities in Inclusive Classes*
McCulloch & Noonan, 2013	Online training modules that focused on mand training procedures; pre- and post-test administration
Quilty, 2007	Two 1 ½ hour training sessions that focused on the creation and implementation of Social Stories©
Robinson, 2011	Three 15-minute modeling sessions of PRT and video feedback sessions
Russel, Allday, & Duhon, 2015	In-vivo hand cueing as well as subsequent shaping and fading
Toelken & Miltenberger, 2012	10-minute training sessions across three behaviors

2.3.7 Student dependent variables

Two sets of authors measured the rate per minute of student participant and peer interactions (Causton-Theoharis & Malmgren, 2005; Malmgren et al., 2005). Feldman and Matos (2005) measured the percent of intervals student participants were engaged in social reciprocal behavior. One set of authors measured the percent of intervals student participants initiated and engaged in social interactions with their peers (Koegel et al., 2014). Licciardello et al. (2008) measured the percent of intervals in which student participants engaged in social initiations and social responses. McCulloch and Noonan (2013) included spontaneous mands as a dependent variable for student participants; although they failed to explain how spontaneous mands were measured. One author measured effects of Social Stories© on the frequency of three target behaviors (i.e., escape statements, aggressive behavior, and inappropriate behavior, Quilty, 2007). Robinson (2011) measured the frequency of spontaneous peer-directed verbalizations, verbal requests, word combinations, and reciprocal verbal interactions with peers. Russel et al. (2015) measured the percent of intervals student participants were engaged in various classroom tasks. Lastly, one set of authors measured the level of prompting required for two student participants to engage in various classroom tasks (Toelken & Miltenberger, 2012). Table 6 lists a summary of the student dependent variables that were measured in the studies included in the review.

Table 6.
Summary of the student dependent variables included in the review.

Study	Student Dependent Variables
Causton-Theoharis & Malmgren. 2005	Rate per minute of student interactions !
Feldman & Matos, 2012 !	Percentage of intervals child is engaged in reciprocal social behavior !
Koegel, Kim, & Koegel, 2014 !	Percentage intervals with engagement with typical peers & rate of initiations !
Licciardello, Harchik, & Luiselli, 2008 !	Percentage of intervals with social initiations & social responses!
Malmgren, Causton-Theoharis, & Trezek, 2005 !	Rate per minute of peer interaction !
McCulloch & Noonan, 2013 !	Spontaneous mands !
Quilty, 2007 !	Frequency of target behaviors !
Robinson, 2011	Frequency of various target behaviors & affect rating !
Russel, Allday, & Duhon, 2015	Percentage of intervals engaged in task !
Toelken & Miltenberger, 2012	Prompting level required for each target behavior !

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2.3.8 Paraprofessional dependent variables

Two sets of authors measured the rate per minute of paraprofessional behaviors that facilitated student interactions (Causton-Theoharis & Malmgen, 2005; Malmgren et al., 2005). Feldman and Matos (2012) measured the percentage of correct steps paraprofessionals completed within PRT-based social facilitation procedures. Koegel et al. (2014) measured the percentage of intervals that paraprofessionals engaged with fidelity in appropriate proximity, the use of

cooperative arrangements, and the use of child-preferred items. One set of authors informally assessed the fidelity with which paraprofessionals engaged in prompting and praise and reward delivery (Licciardello et al., 2008). McCulloch and Noonan (2013) measured the percentage of correct mand intervention components completed. Quilty (2007) measured the percentage of accurate steps completed in regards to creating and implementing Social Stories©. One set of authors measured the percentage of intervals paraprofessionals engaged in close or distant proximity to a target student (Russel et al., 2015). Toelken and Miltenberger (2012) measured paraprofessionals' levels of prompting required for student participants to engage in various classroom tasks. Table 7 summarizes the paraprofessional dependent variables that were measured in the studies included in the review.

Table 7.
Summary of the paraprofessional dependent variables included in the review.

Study	Paraprofessional Dependent Variables
Causton-Theoharis & Malmgren. 2005	Rate per min. of facilitative behaviors !
Feldman & Matos, 2012 !	Percentage correct of on fidelity of implementation !
Koegel, Kim, & Koegel, 2014 !	Percentage intervals with fidelity of implementation !
Licciardello, Harchik, & Luiselli, 2008 !	Informal assessment of the fidelity with which paraprofessionals engaged in prompting and praise and reward delivery
Malmgren, Causton-Theoharis, & Trezek, 2005 !	Rate per 5 min. of facilitative behaviors !
McCulloch & Noonan, 2013 !	Percentage correct of mand intervention components completed correctly !
Quilty, 2007 !	Percentage accuracy of fidelity of treatment !
Robinson, 2011	Percentage correct PRT implementation & mean % of time spent hovering or implementing !
Russel, Allday, & Duhon, 2015	Percentage or intervals in close or distant proximity !
Toelken & Miltenberger, 2012	Prompting level required for each target behavior !

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2.3.9 Study outcomes

Two sets of authors found that student/peer interactions, generally, increased following paraprofessional training, although results indicated a low-level and variable change in student behavior (Causton-Theoharis & Malmgren, 2005; Malmgren et al., 2005). Feldman and Matos (2012) and Robinson (2011) showed that increasing the fidelity of implementation of PRT-based

social facilitation procedures increased the rate in which students engaged in reciprocal social behavior; results indicated a favorable change in level of behavior that lasted across 7 weeks of generalization and follow-up and a favorable change in level of behavior and student affect, respectively.

Koegel et al. (2014) trained paraprofessionals to be aware of their proximity to students, use of cooperative arrangements, and use of child-preferred items and found that increasing fidelity of these strategies increased the percentage of intervals student participants engaged with their typical peers as well as the rate of initiations made to typical peers. Results indicated a minimal change in level of rate of initiations made to typical peers but a large change in level of percentage with engagement with typical peers. One set of authors failed to include measurement of a dependent variable related to paraprofessional training, however described that fidelity of trained procedures increased following training (Licciardello et al., 2008). Additionally, Licciardello et al. (2008) found that paraprofessional training increased the percentage of intervals with social initiations and social responses. Results indicated an increased, yet variable, level of responding across four student participants.

McCulloch and Noonan (2013) found that online training modules related to mand training increased the percentage of correct mand training components completed by paraprofessionals; student participant outcomes were unclear. Quilty (2007) found that increased accuracy of creating and delivering Social Stories© resulted in decreases of challenging student behavior. Authors of one study found that training a paraprofessional to be aware of her proximity to a student affected the percentage of intervals that the student was engaged in on-task behavior (Russel et al., 2015). Finally, Toelken and Miltenberger (2012) found that training paraprofessionals to increase fidelity of treatment of a modified SWAT procedure resulted in

decreased prompting levels required for students to engage in various classroom tasks (i.e., opening a lunch box, wiping a table, rubbing hands, putting papers in a backpack, putting on a backpack, and opening a door). Table 8 summarizes the outcomes of the studies included in the review.

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Table 8.

Summary of paraprofessional and student outcomes included in the review.

Study	Paraprofessional Outcomes	Student Outcomes
Causton-Theoharis & Malmgren. 2005	Minimal increase of facilitation	Increase of peer interaction
Feldman & Matos, 2012 !	Increase of fidelity of implementation	Increase of reciprocal social behavior
Koegel, Kim, & Koegel, 2014 !	Increase of fidelity of implementation	Increase of percentage of intervals with engagement with typical peers & increase in rate of initiation
Licciardello, Harchik, & Luiselli, 2008 !	Not formally assessed	Increase of percentage of intervals with social initiations & social responses
Malmgren, Causton-Theoharis, & Trezek, 2005 !	Minimal increase of facilitation	Increase of peer interaction
McCulloch & Noonan, 2013 !	Increase of mand intervention components completed correctly	Unclear
Quilty, 2007 !	Unclear results for percentage of accuracy of fidelity of treatment	Decrease of frequency of target behaviors
Robinson, 2011	Increase of percentage of correct PRT implementation & mean time implementing	Increase of target behaviors & affect
Russel, Allday, & Duhon, 2015	Decrease of percentage of intervals in close proximity	Increase of percentage of intervals of task engagement
Toelken & Miltenberger, 2012	Decrease of prompting level for all target behaviors	Increase of independent engagement of target behaviors

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2.4 ADHERANCE TO QUALITY INDICATORS FOR SINGLE-SUBJECT RESEARCH

2.4.1 Description of participants

Eight authors described participants in a manner that would allow for replication of their studies (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Malmgen et al., 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011; Russel et al., 2015). Licciardello et al. (2008) and Toelken and Miltenberger (2012) failed to include a description of the participants that would allow for replication of the studies. Table nine summarizes the adherence to Horner et al., (2005) quality indicators for single-subject research for the descriptions of participants of the studies included in the review.

2.4.2 Process for participant selection

Authors of five studies included a description of the participant selection process (Causton-Theoharis & Malmgren, 2005; Feldman & Matos. 2012; Koegel et al., 2014; Malmgren et al., 2005; Quilty, 2007). Five sets of authors failed to include a participant selection process (Licciardello et al., 2008; McCulloch & Noonan, 2013; Robinson, 2011; Russel et al., 2015; Toelken & Miltenberger, 2012). Table nine summarizes the adherence to Horner et al., (2005) quality indicators for single-subject research for the descriptions of participants of the studies included in the review.

2.4.3 Description of settings

Koegel et al. (2014) and McCulloch and Noonan (2013) described study settings with enough detail to allow for replication. Eight sets of authors did not describe the settings of the studies with enough detail to allow for replication (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Licciardello et al., 2008; Malmgren et al., 2005; Quilty, 2007; Robinson, 2011; Russel et al., 2015; Toelken & Miltenberger, 2012). Table nine summarizes the adherence to Horner et al., (2005) quality indicators for single-subject research for the descriptions of settings of the studies included in the review.

2.4.4 Description of dependent variables

Authors of 9 studies described the dependent variable with sufficient detail to allow for replication (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Malmgren, Causton-Theoharis, & Trezek, 2005; Quilty, 2007; Robinson, 2011; Russel et al., 2015; Toelken & Miltenberger, 2012). McCulloch and Noonan (2013) provided a vague description of the dependent variable, minimizing replication of the study. Table nine summarizes the descriptions of the dependent variables of the studies included in the review. Table nine summarizes the adherence to Horner et al., (2005) quality indicators for single-subject research for the descriptions of dependent variables of the studies included in the review.

2.4.5 Quantifiable index

Eight sets of authors used a quantifiable index to measure the effects the independent variable(s) had on the dependent variable(s) (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Malmgren et al., 2005; Quilty, 2007; Robinson, 2011; Russel et al., 2015). McCulloch and Noonan (2013) failed to include any quantifiable index for student outcomes, despite providing data points related to student behavior (for further explanation, see Discussion Section). Toelken and Miltenberger (2012) used level of prompting, rather than number of prompts, to report student and paraprofessional outcomes. Table nine summarizes the adherence to Horner et al., (2005) quality indicators for single-subject research for the quantifiable indices of the studies included in the review.

2.4.6 Description of measurements

Authors of 9 studies described a valid and replicable dependent variable measurement process (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Malmgren et al., 2005; Quilty, 2007; Robinson, 2011; Russel et al., 2015; Toelken & Miltenberger, 2012). McCulloch and Noonan (2013) did not include a valid and replicable dependent measurement process. Table nine summarizes the adherence to Horner et al., (2005) quality indicators for single-subject research for the descriptions of measurements of the studies included in the review.

2.4.7 Repeatedly measured dependent variables

All 10 sets of authors repeatedly measured dependent variables over time (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Malmgren et al., 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011; Russel et al., 2015; Toelken & Miltenberger, 2012). Table nine summarizes the adherence to Horner et al., (2005) quality indicators for single-subject research for the repeated measurement of dependent variables of the studies included in the review.

2.4.8 Inter-observer agreement

Seven sets of authors conducted and measured IOA resulting in at least 80% agreement for at least 30% of all phases of the studies (Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Quilty, 2007; Robinson, 2011; Russel et al., 2015; Toelken & Miltenberger, 2012). Causton-Theoharis and Malmgen (2005) and Malmgren et al. (2005) measured only 18% of sessions that resulted in 100% IOA and 94% IOA, respectively. Russel et al. (2015) calculated 79% IOA across only 26% of observations of student participant behavior. Additionally, Russel et al. (2015) did not conduct nor calculate IOA on paraprofessional proximity to students. Table nine summarizes the adherence to Horner et al., (2005) quality indicators for single-subject research for conducting of IOA of the studies included in the review.

2.4.9 Description of independent variables

Authors of three studies described independent variables with enough detail to allow for replication (Koegel et al., 20014; Malmgren et al., 2005; McCulloch & Noonan, 2013). Seven sets of authors did not describe independent variables (i.e., paraprofessional training procedures) with enough detail to allow for replication (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Licciardello et al., 2008; Quilty, 2007; Robinson, 2011; Russel et al., 2015; Toelken & Miltenberger, 2012). Table nine summarizes the adherence to Horner et al., (2005) quality indicators for single-subject research for the descriptions of the independent variables of the studies included in the review.

2.4.10 Systematic manipulation of independent variables

All 10 sets of authors systematically manipulated the independent variables that were included as part of the studies. All 10 sets of authors repeatedly measured independent variables over time (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Malmgren et al., 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011; Russel et al., 2015; Toelken & Miltenberger, 2012). Table nine summarizes the adherence to Horner et al., (2005) quality indicators for single-subject research for the systematic manipulation of the independent variables of the studies included in the review.

2.4.11 Inclusion of fidelity measures

Five sets of authors included a treatment and/or procedural fidelity measure (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Malmgren et al., 2005; Robinson, 2011). Authors of four studies failed to include any fidelity measure (McCulloch & Noonan, 2013; Quilty, 2007; Russel et al., 2015; Toelken & Miltenberger, 2012). Licciardello et al. (2008) informally assessed treatment fidelity. Table nine summarizes the adherence to Horner et al., (2005) quality indicators for single-subject research for the inclusion of fidelity measures of the studies included in the review.

2.4.12 Collection of baseline data

All 10 sets of authors collected baseline data (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Malmgren et al., 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011; Russel et al., 2015; Toelken & Miltenberger, 2012). Table nine summarizes the adherence to Horner et al., (2005) quality indicators for single-subject research for the collection of baseline data of the studies included in the review.

2.4.13 Description of baseline

Authors of eight studies described baseline conditions with sufficient detail to allow for replication (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Malmgren et al., 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011). Russel et al. (2015) and Toelken and Miltenberger (2012) did not

describe baseline conditions with enough detail to allow for replication. Table nine summarizes the adherence to Horner et al., (2005) quality indicators for single-subject research for the descriptions of baseline conditions of the studies included in the review.

2.4.14 Replications of effect

Nine sets of authors showed three replications of the effects of the independent variable(s) on the dependent variable(s) (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Malmgren et al., 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011; Toelken & Miltenberger, 2012). Russel et al. (2015), the only set of authors to use a withdrawal design with a nested changing criterion design, did not show 3 replications of effect related to both paraprofessional and student behavior. Table nine summarizes the adherence to Horner et al., (2005) quality indicators for single-subject research for the replicating of effect of the studies included in the review.

2.4.15 Control for internal validity

All 10 provided sufficient detail to allow for ruling-out of rival hypotheses related to the effects of the independent variable(s) on the dependent variable(s) (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Malmgren et al., 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011; Russel et al., 2015; Toelken & Miltenberger, 2012). Table nine summarizes the adherence to Horner et al., (2005) quality indicators for single-subject research for the controlling for internal validity of the studies included in the review.

2.4.16 Demonstration of experimental control

Nine sets of authors provided results that demonstrated experimental control (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Malmgren et al., 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 201; Toelken & Miltenberger, 2012). Russel et al. (2015) did not provide results that demonstrated experimental control to a degree that allows for a conclusion to be made about the efficacy of the independent variable. Table nine summarizes the adherence to Horner et al., (2005) quality indicators for single-subject research for the demonstrating of experimental control of the studies included in the review.

2.4.17 Demonstration of external validity

Nine sets of authors provided experimental effects that demonstrated external validity (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Malmgren et al., 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 201; Toelken & Miltenberger, 2012). Russel et al. (2015) used only one paraprofessional participant and one student participant and did not show three replications of effect. Table nine summarizes the adherence to Horner et al., (2005) quality indicators for single-subject research for the demonstrating of external validity of the studies included in the review.

2.4.18 Social validity

All 10 sets of authors included socially important dependent variables (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Malmgren et al., 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011; Russel et al., 2015; Toelken & Miltenberger, 2012).

All 10 sets of authors included socially important results (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Malmgren et al., 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011; Russel et al., 2015; Toelken & Miltenberger, 2012).

All 10 sets of authors implemented a practical and cost effective independent variable (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Malmgren et al., 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011; Russel et al., 2015; Toelken & Miltenberger, 2012).

All 10 sets of authors included socially important independent variables (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Malmgren et al., 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011; Russel et al., 2015; Toelken & Miltenberger, 2012). Table nine summarizes the adherence to Horner et al., (2005) quality indicators for single-subject research for the social validness of the studies included in the review.

Table 2.
Summary of the quality indicators of the studies included in the review.

Study	Participant Description	Selection Process	DV Description	Quantifiable Index	Measurement Description
Causton-Theoharis & Malmgrem, 2005	Y	Y	N	Y	Y
Feldman & Matos, 2012	Y	Y	N	Y	Y
Koegel, Kim, & Koegel, 2014	Y	Y	Y	Y	Y
Licciardello, Harchik, & Luiselli, 2008	N	N	N	Y	Y
Malmgrem, Causton-Theoharis, & Trezek, 2005	Y	Y	N	Y	Y
McCulloch & Noonan, 2013	Y	N	Y	N	Y
Quilty, 2005	Y	Y	N	Y	N
Robinson, 2011	Y	N	N	Y	Y
Russel, Allday, & Dubon, 2015	Y	N	N	Y	Y
Toelken & Miltenberger, 2012	N	N	N	Y	N

Study	DV Measured Repeatedly	IOA	IV Description	IV Systematically Manipulated	Fidelity Measure
Causton-Theoharis & Malmgrem, 2005	Y	Y 18%	N	Y	Y
Feldman & Matos, 2012	Y	Y	N	Y	Y
Koegel, Kim, & Koegel, 2014	Y	Y	Y	Y	Y
Licciardello, Harchik, & Luiselli, 2008	Y	Y	N	Y	N
Malmgrem, Causton-Theoharis, & Trezek, 2005	Y	Y 18%	Y	Y	Y
McCulloch & Noonan, 2013	Y	Y	Y	Y	N
Quilty, 2005	Y	Y	Y	Y	N
Robinson, 2011	Y	Y	N	Y	Y
Russel, Allday, & Dubon, 2015	Y	Y	N	Y	N
Toelken & Miltenberger, 2012	Y	Y	N	Y	N

Study	Baseline Data	Baseline Description	3 Replications of Effect	Control for Internal Validity	Demonstration of Control
Causton-Theoharis & Malmgrem, 2005	Y	Y	Y	Y	Y
Feldman & Matos, 2012	Y	Y	Y	Y	Y
Koegel, Kim, & Koegel, 2014	Y	Y	Y	Y	Y
Licciardello, Harchik, & Luiselli, 2008	Y	Y	Y	Y	Y
Malmgrem, Causton-Theoharis, & Trezek, 2005	Y	Y	Y	Y	Y
McCulloch & Noonan, 2013	Y	Y	Y	Y	Y
Quilty, 2005	Y	Y	Y	Y	Y
Robinson, 2011	Y	Y	Y	Y	Y
Russel, Allday, & Dubon, 2015	Y	N	N	Y	N
Toelken & Miltenberger, 2012	Y	N	Y	Y	Y

Study	Demonstration of External Validity	Social Validity
Causton-Theoharis & Malmgrem, 2005	Y	Y
Feldman & Matos, 2012	Y	Y
Koegel, Kim, & Koegel, 2014	Y	Y
Licciardello, Harchik, & Luiselli, 2008	Y	Y
Malmgrem, Causton-Theoharis, & Trezek, 2005	Y	Y
McCulloch & Noonan, 2013	Y	Y
Quilty, 2005	Y	Y
Robinson, 2011	Y	Y
Russel, Allday, & Dubon, 2015	N	Y
Toelken & Miltenberger, 2012	Y	Y

2.5 QUALITY OF GRAPHIC DISPLAYS OF QUANTITATIVE DATA

2.5.1 Essential structure

All 10 sets of authors provided line graphs that included vertical and horizontal axes (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Malmgren et al., 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011; Russel et al., 2015; Toelken & Miltenberger, 2012). Table 10 summarizes whether the studies included in this review adhered to the essential structure features of graphic displays of quantitative data outlined by Kubina, et al. (2015).

2.5.1.1 Vertical axes labels

Authors of three studies labeled vertical axes as percent of intervals (Feldman & Matos, 2012; Licciardello et al., 2008; Russel, et al., 2015). Two sets of authors labeled vertical axes as rate per minute (Causton-Theoharis & Malmgren, 2005; Malmgren et al., 2005). McCulloch and Noonan (2013) plotted both paraprofessional data points and student data points on the same graph, yet only included a label for paraprofessional data (i.e., percent of components completed correctly). Koegel et al. (2014) included 2 separate graphs; one with a vertical axis labeled as percent intervals with engagement with typical peers and another with rate of initiations made to typical peers. One author labeled the vertical axes using frequency counts across three separate behaviors (Quilty, 2007). Lastly, Toelken and Miltenberger (2012) labeled the vertical axes as levels of prompting.

2.5.1.2 Horizontal axes labels

Four sets of authors labeled the horizontal axes as sessions (Koegel, et al., 2014; McCulloch & Noonan, 2013; Robinson, 2011; Toelken & Miltenberger, 2012). Another four sets of authors labeled the horizontal axes as either observations or observation probes (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Malmgren et al., 2005; Russel et al., 2015). Licciardello et al. (2008) and Quilty (2007) labeled the horizontal axes as days.

2.5.2 Quality features

Table 10 summarizes whether the studies included in this review adhered to the quality structure features of graphic displays of quantitative data outlined by Kubina, et al. (2015).

2.5.2.1 Figure caption

All 10 sets of authors included a figure caption (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Malmgren et al., 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011; Russel et al., 2015; Toelken & Miltenberger, 2012).

2.5.2.2 Ratio of vertical to horizontal axes length 5:8 to 3:4

Licciardello et al. (2008) displayed a line graph that included a ratio of vertical to horizontal axis length of .68. The remaining 9 sets of authors failed to display a line graph(s) that fell within a range of .68 to .75 in relation to the ratio of vertical to horizontal axis length (range = .32-.58; mean = .43) (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al.,

2014; Malmgren et al., 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011; Russel et al., 2015; Toelken & Miltenberger, 2012).

Table 10.

Summary of the quality indicators for graphic representation of quantitative data.

Study	Graphic Representation of Data Meets Kubina, et al., Criteria
Causton-Theoharis & Malmgren. 2005	No
Feldman & Matos, 2012	No
Koegel, Kim, & Koegel, 2014	No
Licciardello, Harchik, & Luiselli, 2008	Yes
Malmgren, Causton-Theoharis, & Trezek, 2005	No
McCulloch & Noonan, 2013	No
Quilty, 2007	No
Robinson, 2011	No
Russel, Allday, & Duhon, 2015	No
Toelken & Miltenberger, 2012	No

2.6 DISCUSSION

The use of paraprofessionals to augment students' with disabilities educational experience is an increasing trend (*38th Annual Report to Congress on the Implementation of the Individuals with Education Act*, 2014). However, the use of paraprofessionals is a complex problem. Paraprofessionals are often the least trained individuals in the classroom, yet often asked to provide the bulk of students' with disabilities day-to-day educational experience (Giangreco, et al., (1997). Paraprofessionals can be asked to engage in a variety of activities with a student; not the least of which is academic instruction. Even more so, students' with severe disabilities, such as ASD, may require constant attention and instruction in a variety of areas, not just academics. Those areas include: social skills development, reduction of challenging behaviors, and activities of daily living.

Lack of appropriate paraprofessional training only adds to this already complex issue. Researchers who conduct investigations into paraprofessional training have often relied on qualitative and mixed-methods (i.e., qualitative and statistical analyses) designs to measure and describe the effects of training. There has been little research on paraprofessional training using single-subject research design. Additionally, research on paraprofessional training often lacks inclusion of student outcomes as part of the results.

The purpose of this literature review was to identify and evaluate single-subject research studies of paraprofessional training and the resulting effects on student behaviors. Specifically, the quality of the research was examined using the Horner et al. (2005) 21 quality indicators. Additionally, the graphic displays of data were evaluated and critiqued using the characteristics outlined by Kubina et al. (2015).

Ten studies were identified that met criteria for inclusion in the study (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel et al., 2014; Licciardello et al., 2008; Malmgren et al., 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011; Russel et al., 2015; Toelken & Miltenberger, 2012). The ten studies incorporated both paraprofessional training and the resulting effects of that training on student behavior.

2.6.1 Student participants

A total of 30 students were included as participants in the studies. Eighty-seven percent of the student participants were male. Additionally, 24 of the students included in the studies were diagnosed with ASD. Of those 24, only four were female. This percentage closely mirrors current incidence research which estimates that 88 percent of all children identified with ASD are male (Centers for Disease Control, 2014). Furthermore, two studies were conducted that included students with EBD and CP (Malmgren, Causton-Theoharis, & Trezek, 2005; Causton-Theoharis & Malmgen, 2005). Thus, highlighting the importance of training paraprofessionals who work with students across many different disability categories.

There was also a wide range of races and ethnicities represented in the student participants. Among the ethnicities represented were: Hawaiian ancestry, European American, Caucasian, African American, Iranian, Mexican American, and Hispanic. Although the majority of the participants were identified as Caucasian or European American, the wide range of ethnicities and races is a positive aspect of these studies, increasing social validity.

However, there was a limited age range of student participants represented in the studies. No studies included a student who was older than 11 years old, limiting the conclusions that can be made about paraprofessional training efforts and the effects on older students. Additionally,

most of the students included in the studies were less than eight years old, further limiting conclusions.

2.6.2 Paraprofessional participants

The paraprofessional participants were overwhelmingly female. Only two out of the 29 paraprofessional participants were male. Carson, Brauen, Klein, Shroll, and Willig (2002) reported that 98 percent of paraprofessionals are female. Despite this, the lack of male paraprofessional participants is a potential limiting factor when considering the generalizability of results. Additionally, Carson et al. (2002) reported that 78 percent of paraprofessionals were identified as white. Nearly all of the paraprofessional participants were identified in this review as either white, Caucasian, or European American. Only one study included paraprofessional participants that were non-white (i.e., Hawaiian ancestry, McCulloch & Noonan, 2013).

Alternatively, age ranges, experience levels, and levels of educational attainment greatly varied across paraprofessional participants. This is a potentially important aspect, considering all of the training methods resulted in an increase in positive student behavior. Thus, one may conclude that regardless of age, level of experience, and level of educational attainment of a paraprofessional, training can be effective and useful. However, no analyses were conducted that specifically highlighted an "ideal paraprofessional" for training. Despite this, most, if not all paraprofessional research indicated that the need for paraprofessional training is strong.

2.6.3 Settings

The studies were conducted in a variety of settings including regular education classrooms, special education classroom, playgrounds, and activity rooms. Considering paraprofessionals are likely to work across settings (i.e., following a student throughout the school day), the variety of settings in which the studies were conducted adds to the efficacy of paraprofessional training cited in this review.

2.6.4 Interventions for student participants

Paraprofessionals were trained in the use of a variety of interventions across all of the studies. However, the majority of the interventions were implemented in order to increase some form of communicative or social behavior. Only two sets of researchers incorporated a systematic or behaviorally based intervention (i.e., mand training and a modified SWAT procedure; McCulloch & Noonan, 2013; Toelken & Miltenberger, 2012). Although social skill training is an important area, especially considering the high number of student participants who were diagnosed with ASD, there are a multitude of other interventions to be considered. The list of effective interventions for students with disabilities is exhaustive, leading one to question the reasons for the high number of interventions that focused solely on social skill building.

2.6.5 Paraprofessional training

Training methods varied in all aspects. For example, training duration ranged from ten minutes to four hours. Several studies only included extended in-service trainings; one study included

only internet modules; one study used hand cueing, shaping, and subsequent fading. All of the training methods were found to increase student target behaviors. Of the studies that also measured paraprofessional behavior after training (i.e., treatment fidelity or frequency), all training methods were found to increase both frequency of use of the interventions and treatment fidelity, thus highlighting the importance and need for paraprofessional training.

2.6.6 Implications for practice

Overwhelmingly, researchers have suggested that there is a strong need for paraprofessional training. The current study only further supported this notion, suggesting that when instituted, paraprofessional training can positively affect student behavior in a variety of areas. Additionally, increasing the effectiveness of paraprofessionals can have collateral effects such as an increased understanding of the roles and responsibilities of paraprofessionals, thereby reducing the negative effects of using paraprofessionals such as increased dependency, decreased interactions with peers, loss of gender identity, and the interference with instruction of other students. (see Giangreco, et al., 1997).

The studies in this review were conducted in a variety of settings and included a variety of student participants, training methods, and student interventions. Also, all of the studies resulted in an increase in positive paraprofessional and student behavior. Through the results of this study, school administrators, classroom teachers, and paraprofessionals are warranted in assuming that the training of paraprofessionals can have a positive impact across school culture, classroom practices, and staff and student behavior.

2.6.7 Implications for research

Despite the positive findings of these studies, the results of the studies should be interpreted with caution. The critique of the studies using the 21 quality indicators showed that only one study met all of the criteria discussed by Horner et al. (2005) (Licciardello et al., 2008). Further, Russel et al. (2015) and Toelken and Miltenberger (2012) met criteria on only 57 and 67 percent of the quality indicators, respectively. The majority of the authors did not sufficiently describe the setting, thereby limiting replication. Perhaps most importantly, only two sets of authors described the independent variables with enough detail to allow for replication. This presents a problem for researchers, as it limits the future possibility of researchers replicating the study with fidelity. Additionally, it limits the ability of determining whether the practice (i.e., paraprofessional training) qualifies as evidence based.

Nine out of ten studies did not meet criteria for properly displaying graphic data as put forth by Kubina, et al. (2015). In fact, only one study displayed an appropriate vertical to horizontal axes ratio (Licciardello, et al., 2008). This finding is especially important for future directions of paraprofessional training research, special education research in general, and any area where a training technology might be employed. If researchers and practitioners are to rely on graphic displays of data to interpret and understand results, then close attention should be paid to how that data is *displayed*. Standardization of line graphs reduces the need for subjective analysis of results, and thus, may lead to better clinical decisions.

2.6.8 Future directions for research

Of the ten studies identified in this literature review, not one focused on training paraprofessionals to use scientifically grounded practices that are aimed at reducing challenging behavior. However, previous research has showed that paraprofessionals are often asked to engage in various behavior management strategies without proper training (Giangreco, et al. 2010). Training is often delivered through standard "in-service" practices (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Malmgren et al., 2005). That is, training takes place during days that the students are not in attendance, is delivered in a room other than the classroom, and is didactic in format. Additionally, paraprofessionals are often not provided further guidance and training after this type of professional development takes place (i.e., there is an absence of immediate feedback, follow-up or on the job coaching). As such, paraprofessionals are often ill equipped to properly engage in behavior reduction strategies. However, "If support personnel do not implement treatment plans proficiently, then in essence there is no treatment for challenging behavior" (Reid & Parsons, 2002, p. 6).

There has been a lack of single-subject research on the effects of paraprofessional training on the reduction of challenging behavior. The majority of studies in this review focused on training that was meant to increase some level of skill building for students with disabilities. However, no substantive research has been conducted that addressed paraprofessional training aimed at teaching support staff how to appropriately reduce the rates of challenging behavior in students with disabilities. Students who engage in high rates of challenging behavior are often accompanied by a paraprofessional. Additionally, students who engage in challenging behavior that impedes their learning or the learning of their peers can have difficulty across a number of social, academic, and adaptive domains (Matson, Mahan, Hess, Fodstad, & Neal, 2010).

Therefore, reducing the challenging behavior(s) of students with disabilities can have multiple positive effects.

One training strategy for paraprofessionals that has yet to be substantively researched is Behavioral Skills Training (BST). BST is a training package that has four major components: instructions, modeling, rehearsal, and feedback. BST has been shown to be an effective training strategy for implementing a variety of behavior interventions including: conducting functional analyses (Ward-Horner & Sturmey, 2012), mand training (Nigro-Bruzzi & Sturmey, 2010), discrete-trial (Sarokoff & Sturmey, 2004), and food selectivity procedures (Seiverling, Williams, Sturmey, & Hart, 2012). These are just four out of a large menu of scientifically grounded behavior interventions. Another behavior intervention that has been shown to have generality across contexts is differential reinforcement of alternative behavior (DRA).

Differential reinforcement of alternative behavior is behavior reduction strategy that paraprofessionals can employ in inclusive settings. It's use by paraprofessionals working in inclusive settings is it yet to be objectively examined. DRA is a behavior reduction strategy where a consequence (reinforcer) is delivered for a more socially appropriate behavior, and the challenging behavior is not reinforced (i.e., extinction, Cooper, Heron, & Heward, 2007). Once the function of the behavior has been determined, a functionally equivalent consequence is delivered contingent upon the student emitting the alternative response (Cooper, Heron, & Heward, 2007). DRA has been found to effectively reduce a variety of problem behaviors such as screaming behavior (Roan, Lerman, & Vorndan, 2001), disruptive behavior such as throwing objects (Lerman, Kelley, Vorndan, Kuhn, & LaRue, 2002),), self-injury (Kerth, Progar, & Sabrina, 2009), and object mouthing (Carr, Dozier, Patel, Adams, & Martin, 2002). Therefore,

training paraprofessionals in the use of DRA through BST is a practical direction for future research. What follows is a proposal for answering the following research questions:

1. What are the effects of BST on paraprofessionals' use of DRA in inclusive education settings?
2. What are the effects of paraprofessionals delivering DRA on students' with disabilities rate of challenging behavior?
3. How socially valid is BST for training paraprofessionals in the use of DRA?
4. How socially valid is DRA for the reduction of challenging behaviors?

3.0 METHODS

The purpose of the following study was to evaluate the effectiveness of behavioral skills training (BST) on the correct implementation of a differential reinforcement of alternative behavior procedure (DRA) for three paraprofessional/student dyads. An additional purpose of the study was to measure the effects of DRA on students' rate of challenging behavior. The social validity of BST and DRA was also measured.

3.1 SETTING

The setting for the study was a mid-sized, semi-urban school district located in Southwestern Pennsylvania. Tables 11, 12, 13, and 14 contain the school district's demographic information including: enrollment, race/ethnicity, and educational placements. Specifically, the study took place in three classrooms within one elementary school.

For dyad 1 (Barry and Dale) the setting was an autistic support classroom where regular education students were included throughout the day. The classroom was approximately 15' x 25' in size, contained 8 additional special education students and regularly included regular education students. Inside the classroom were spaces for instruction that contained desks and chairs, as well as typical academic work materials such as curricula workbooks, flashcards, and pens and pencils. Additional personnel in the classroom included: 1 dually certified special

education teacher, 3 additional paraprofessionals, and 1 behavior specialist. A descriptive functional behavior assessment (FBA) for Dale was conducted in this classroom, as well as the modeling and feedback components of BST for Barry and Dale.

For dyad 2 (Val and Scott) the setting was a full inclusion fourth grade reading classroom. This classroom was approximately 20' x 20' in size and, in addition to Val and Scott, contained 23 regular education students. The classroom contained 24 student desks and 1 teacher desk. A certified regular education teacher was the only other additional personnel in the classroom. A descriptive FBA for Scott was also conducted in this classroom, as well as the modeling and feedback components of BST for Val and Scott.

For dyad 3 (Tina and Brenda) the setting was a life skills support classroom where regular education students were included throughout the day. The classroom was approximately 20' x 20' in size and, in addition to Tina and Brenda, contained 5 additional special education students and regularly included education students. In addition to desks for each student and academic work materials, the classroom also contained a sink. Additional personnel in this classroom included: 1 dually certified special education/regular education teacher and 3 additional paraprofessionals. A descriptive FBA for Brenda was also conducted in this classroom, as well as the modeling and feedback components of BST for Tina and Brenda.

Lastly, implementation of the instruction and rehearsal components of BST was conducted at a desk in the back of the school's auditorium.

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Table 11.

Summary of total enrollment demographic information.

Enrollment	Count/Percentage
Total	2,595
Total Special Education !	430
Percent Special Education !	16.6%

!

Table 12.

Summary of Percent Special Education Enrollment by Disability Category.

Category	Percent of Enrollment
Autism	12.8%
Deaf-Blindness	--%
Emotional Disturbance	11.9%
Hearing Impairment Including Deafness	--%
Intellectual Disability	7.4%
Multiple Disabilities	--%
Orthopedic Impairment	--%
Other Health Impairment	11.6%
Specific Learning Disability	33.7%
Speech or Language Impairment	18.6%
Traumatic Brain Injury	--%
Visual Impairment Including Blindness	--%

Source: Pennsylvania Department of Education, 2016

-- Denotes data not being reported to guard against improper statistical comparisons due to small sample sizes (n=10 or less)

Table 13.
Summary of Total Percent and Total Special Education Percent by Ethnicity/Race.

Ethnicity/Race	Percent of Total Enrollment	Percent of Special Education
American Indian/Alaska Native	--%	--%
Asian	0.7%	--%
Black or African American	8.5%	10.2%
Hispanic	1.3%	--%
Multiracial	6.0%	5.6%
Native Hawaiian/Other Pacific Islander	--%	--%
White	83.0%	80.9%

Source: Pennsylvania Department of Education, 2016
-- Denotes data not being reported to guard against improper statistical comparisons due to small sample sizes (n=10 or less)

Table 14.
Summary of Percent of Time Special Education Students Spend in Regular Education.

Category	Percentage
Inside Regular Education Classrooms 80% or More	72.5%
Inside Regular Education Classrooms 40% or Less	12.6%
Other Settings	3.6%

3.2 PARTICIPANTS

3.2.1 Paraprofessional participants

Following IRB approval, four paraprofessionals were recruited for participation in the study. The PI asked the school district's special education director to nominate four paraprofessionals who were assigned one-to-one with a specific student. For inclusion in the study, the PI asked that the paraprofessionals met the following criteria: (a) the paraprofessionals worked in the same school building, (b) the paraprofessional was assigned to a student who also met the criteria for inclusion in the study, and (c) the paraprofessional must not have been previously exposed to BST or DRA. Following nominations from the special education director, the PI held a meeting with the four paraprofessionals. The meeting consisted of a brief introduction of the PI, a brief introduction of the study, including the timeline and requirements for participation, and a request to participate. All four paraprofessionals agreed to participate, however three paraprofessionals were eventually selected for inclusion in the study. (See Appendix A for a general description of the meeting.)

Barry was a white 37-year-old man who had worked as paraprofessional in the district for the past six years. He held a Bachelor of Arts degree in elementary education. Additionally, he was assigned as a one-to-one paraprofessional with Dale who was a student participant selected for the study. Barry had worked with Dale as a one-to-one paraprofessional for the past five years. Barry had never been previously exposed to BST and was not observed to engage in DRA throughout the initial observations (see Procedures section for information about the initial observations).

The second paraprofessional participant, Val, was a 69 year-old woman who had been working as a paraprofessional in the district for the past 13 years. Her highest level of education was a high school diploma. Val had worked with Scott, a student who met the requirements for inclusion in the study, for the past four years. She had never been previously exposed to BST and was not observed to engage in DRA throughout the initial observations (see Procedures section for information about the initial observations).

Tina, the third paraprofessional participant, was a 54 year-old woman who had worked in the district as a paraprofessional for the past eight years. Tina's highest level of education was a G.E.D. She was assigned as a one-to-one paraprofessional with Brenda, a student who met the requirements for inclusion in the study. Tina had been assigned to work with Brenda for the past four years. Similar to Barry and Val, Tina had never been previously exposed to BST and was not observed to engage in DRA (see section 3.2.3 for information about the initial observations). Table 16 provides a summary on each of the paraprofessionals.

Table 15.
Summary of Paraprofessional Participant Characteristics.

Paraprofessional Participant	Gender	Age	Yrs. Experience	Yrs. Working with Student	Highest Level of Education	Ethnicity
Barry	Male	37	6	6	B.A. (El. Ed.)	White
Val	Female	69	13	5	High School	White
Tina	Female	54	8	4	G.E.D.	White

3.2.2 Student participants

Following Institutional Review Board (IRB) approval, 4 student participants were recruited for participation in the study. The Principal Investigator (PI) asked the school district's special education director to nominate as many as four students who met the following criteria for inclusion in the study: (a) were diagnosed with autism spectrum disorder or intellectual disability, (b) were previously described as engaging in challenging behavior that impeded their learning and/or the learning of others, and (c) were accompanied one-to-one by a paraprofessional for that also met the inclusion criteria for participation in the study. Once four students had been nominated, the PI sent letters home to the parents of the students explaining the details of the study. In the end, three students were selected to participate. (One student did not participate because she did not engage in challenging behavior at rates that required intervention.) Table 15 includes specific details on the participants selected for inclusion in the study.

At the time of the study, Dale was a white eleven-year-old boy who was diagnosed with autism spectrum disorder (ASD). Dale was in the fifth grade. He had a limited vocal verbal repertoire in that he used short utterances and gestures to obtain his wants and needs. The vocal verbal speech that Dale used was idiosyncratic. That is, only experienced staff members and those familiar with him were able to understand his speech. Novel listeners required an interpretation as to what Dale was trying to say. Dale was partially included in the regular education curriculum throughout the day. For example, when not in his autistic support classroom, Dale attended "specials", such as gym, art, and music with his typically developing peers. Dale was reported by his teachers and paraprofessional (Barry) to engage in frequent challenging behavior that impeded his learning or the learning of others.

Scott was a white nine-year-old boy who was in fourth grade at the time of the study. Scott was diagnosed with intellectual disability and had a fully functional vocal verbal repertoire. He was fully included in a regular education classroom throughout the school day. Reports from his paraprofessional (Val) indicated that Scott frequently engaged in challenging behavior that was detrimental to his and, occasionally, others' learning.

Brenda was a ten-year-old African American girl who was in fourth grade at the time of the study. She was also diagnosed with intellectual disability and had a fully functional vocal verbal repertoire. In addition to her life skills support classroom, Brenda participated in "specials", such as gym, art, and music with her typically developing peers. She was also reported by her teachers to engage in higher rates of challenging behavior that negatively impacted her learning and occasionally the learning of others.

Table 16.
Summary of Student Participant Characteristics.

Student Participant	Gender	Age	Grade	Ethnicity	Disability Category
Dale	Male	11	5th	White	ASD
Scott	Male	10	4th	White	ID
Brenda	Female	10	4th	African American	ID

3.3 DATA COLLECTION ASSISTANCE

3.3.1 Data collection assistance and training

A graduate student researcher (GSR) who is also a Board Certified Behavior Analyst (BCBA) assisted in collecting interobserver agreement data (IOA) through the in-vivo observation of the 30% of all phases of the study. Additionally, the graduate student researcher collected procedural fidelity data. The GSR received training from the PI, via in-vivo didactic instruction, on the specifics of the study; including data collection procedures. The didactic training consisted of a brief PowerPoint that included the purpose and procedures of the study. Additionally, the GSR was provided with videos that depicted a DRA procedure being delivered to a student, operational definitions for the challenging behavior depicted in the video, and data sheets in order to code the video. During the initial observations that were conducted, the PI and GSR observed the students and paraprofessionals in-vivo to train for reliability. The criterion for reliability was 80% across instances of delivery of DRA and challenging behavior. (See Appendix B for a copy of the data collection tool that was used.)

3.4 PARAPROFESSIONAL DEPENDENT VARIABLES

Each paraprofessional was assessed on their ability to correctly complete the steps of the DRA strategy. Appendix B provides a list of the steps required for correctly completing the DRA strategy. The paraprofessional completed three initial steps at the onset of each observation session and three subsequent steps in a specific order to correctly complete the DRA strategy *per*

delivery of a reinforcer (i.e., the paraprofessional had multiple opportunities per observation session to conduct the DRA strategy, based on the student emitting a more socially appropriate behavior). For example, if the paraprofessional failed to complete the steps of the DRA strategy in order, the behavior was recorded as incorrect. A frequency count of the number of times the paraprofessional correctly completed the DRA sequence was collected and recorded per each approximately 30-minute session. Data was collected and displayed on Standard Celeration Charts.

3.4.1 Form of reinforcement matched with functional relation

The form of reinforcement (e.g., a "break" card, a student preferred toy, social praise, food, etc.) was matched with the function of the student participant's challenging behavior (i.e., escape, tangible, or social attention). The function of the student participants' challenging behavior was determined using a functional behavior assessment procedure (FBA). The FBA is described in further detail in the procedures section of this paper. Following the baseline sessions of the study, the form of reinforcement was pre-determined at the beginning of each session. The form varied according to the preference assessment that was conducted at the beginning of each intervention session.

3.4.2 Pre-teaching of alternative behavior

Following the FBA, the student was taught to engage in an alternative behavior. The pre-teaching sessions were brief (i.e., less than 5 minutes in duration) and were made up of modeling, rehearsal, feedback, and a brief generalization probe. Initially (i.e., the first session

after BST has been introduced to the paraprofessional), the paraprofessional sat in front of the student at the student's desk, modeled the alternative response, prompted the student to engage in the alternative response, reinforced the student's alternative response with the functionally equivalent consequence, and then immediately moved away from the student and prompted the student to engage in the alternative behavior (i.e., a generalization probe). Pre-teaching sessions occurred immediately before the start of each class period, or at the beginning of each class period per session. The PI prompted the paraprofessional to engage in the pre-teaching session if he or she did not do so in the beginning of each session.

3.4.3 Challenging behavior is ignored

During DRA sessions, the paraprofessional was instructed to ignore the occurrence of the previously identified student's challenging behavior. For example, if the student's challenging behavior was vocal outbursts, and the paraprofessional observed the student engaging in a vocal outburst; the paraprofessional was instructed to not engage with the student in any way for 5 seconds (e.g.. provide social attention, provide a tangible item, or comply with the student's request).

3.4.4 Prompting of alternative behavior

Following the pre-teaching procedure per each session, the paraprofessional was instructed to verbally or gesturally prompt the student to engage in the alternative behavior following the occurrence of challenging behavior and after ignoring the challenging behavior for 5 seconds. Forms of alternative behavior included: communicative behavior (i.e., raising one's hand to gain

attention, socially appropriate requesting of activity or object), engaging in academic tasks, sitting up and placing one's hands on the desk to get ready for instruction, or compliance with requests (Athens & Vollmer, 2010; Petscher, Rey, & Bailey, 2009). If the student engaged in the alternative behavior within 5 seconds, the paraprofessional was instructed to immediately provide a reinforcer.

3.4.5 Reinforcement delivered immediately following appropriate behavior

The paraprofessional delivered the pre-determined and functionally equivalent reinforcer *immediately* after the student was observed engaging in the alternative and more socially appropriate response. When the paraprofessional failed to deliver the correct consequnce, of if the paraprofessional failed to deliver the reinforcer within 2-4 seconds of the student engaging in the alternative behavior, the behavior chain was marked as incorrect.

3.5 STUDENT BEHAVIOR MEASURES

3.5.1 Challenging behavior

Each student participant was assessed on the rate in which they engaged in challenging behavior. The challenging behavior was previously determined as part of the student participant recruitment process. Data was collected and displayed on Standard Celeration Charts. A more detailed description of the procedures for collecting student behavior measures is offered in the procedures section of the paper.

Dale's challenging behavior(s) were operationally defined as: leaning back in his chair, and/or hitting any part of his body with a closed or open hand. Scott's challenging behavior(s) were operationally defined as laying his head down on the desk, lightly hitting himself in his head with a book, or putting the collar of his shirt in his mouth. Brenda's challenging behavior was operationally defined as calling out to her paraprofessional. Table 17 summarizes the student participants' challenging and alternative behaviors.

3.5.2 Alternative behavior

Each student was also assessed on the rate in which they engaged in an alternative behavior. Dale's alternative behavior was operationally defined as: sitting forward in his chair and placing his hands on the desk. Scott's alternative behavior was operationally defined as sitting up straight in his chair and placing his hands on his desk. Lastly, Brenda's alternative behavior was defined as raising her hand, calling her teacher's name, and waiting to be called upon. Table 17 summarizes the student participants' challenging and alternative behaviors.

Table 17.
Summary of Student Participants' Challenging and Alternative Behaviors.

Student	Challenging Behavior(s)	Alternative Behavior(s)
Dale	Leaning back in his chair and/or hitting himself with a closed or open fist	Leaning forward in his chair and placing his hands on his desk
Scott	Laying his head down on his desk, lightly hitting his head with a book, or placing the collar of his shirt in his mouth	Lifting his head up and placing his hands on his desk
Brenda !	Calling out	Raising her hand and calling her paraprofessional's name

!

3.5.3 Function of student behavior

In addition to the rate in which the students engaged in challenging behavior, the function of the students' behavior was determined through an FBA process. A more detailed description of the FBA process is offered in the procedures section of this paper.

3.6 SOCIAL VALIDITY

The social validity of BST and DRA was assessed through an opinion questionnaire that was given to the paraprofessionals and teachers of the classrooms where the study took place. The opinion questionnaire focused on three main themes: (a) the social significance of the goals of the study (i.e., increasing paraprofessional behavior and decreasing student challenging behavior); (b) the social appropriateness of the procedures; and (c) the social importance of the effects (Wolf, 1978). The questionnaire contained questions that were answered using a 0-11 Likert-type scale where a score of zero indicated strong disagreement, a score of six indicated neutral, and a score of eleven indicated strong agreement. Additionally, the PI interviewed the paraprofessionals and teachers in an attempt to garner any further subjective information that they might wish to share. Finally, the PI interviewed one of the student participants to assess social validity. The interview question was designed in a manner that was at the appropriate age and cognitive level of the student. For example, the PI asked the student, "Did you like how PARAPROFESSIONAL X gave you a high five after each time you kept your head up during math class?" (See Appendices C, D, and E for the surveys and interview questions.)

3.7 INDEPENDENT VARIABLES

There were two independent variables included in this study: BST and DRA. BST was broken down into its four components: instructions, rehearsal, modeling, and feedback (Gianoumis, Seiverling, & Sturmey, 2012l Sarokoff & Sturmey, 2004, Nigro-Bruzzi & Sturmey, 2010). The

paraprofessionals delivered a DRA strategy (Cooper, Heron, & Heward, 2007) aimed at reducing the rate at which the student participants engaged in challenging behavior.

3.7.1 Behavior skills training

Behavior skills training consisted of four components: instruction, rehearsal, modeling and feedback. The following sections describe each component in more detail.

3.7.2 Instruction

Instruction was defined as the mode in which the PI briefly explained the steps and purpose of the DRA strategy. A more detailed explanation of the instruction component of BST is offered in the procedure section of this paper.

3.7.3 Rehearsal

Rehearsal was defined as the act of practicing the DRA strategy in the absence of the real-world context (i.e., outside of the classroom, without the student present) 5-10 minutes before the intervention session. A more detailed explanation of the rehearsal component in offered in the procedures section of this paper.

3.7.4 Modeling

Modeling was defined as the act of the PI performing the DRA strategy in front of the paraprofessional in a real world context (i.e., inside of the classroom, with the student present

and engaged in the intervention immediately [i.e., within 5-10 minutes]) before the intervention session. A more detailed explanation of the modeling component of BST is offered in the procedures section of this paper.

3.7.5 Feedback

Feedback was defined as the act of providing verbal and visually-represented graphic feedback (i.e., a line graph) to the paraprofessional throughout the intervention/observation session. A more detailed explanation of the feedback component is offered in the procedure section of this paper.

3.7.6 Differential reinforcement of alternative behavior

A DRA procedure (Cooper, Heron, & Heward, 2007) was used with the intent of reducing the challenging behavior of the student participants and increasing a more socially appropriate behavior. The steps involved in correctly completing DRA are explained in further detail in both the dependent variable and procedure sections of this paper.

3.8 EXPERIMENTAL DESIGN

A single-subject research methodology was employed in order to demonstrate the effects of BST on three paraprofessionals' delivery of DRA. Specifically, a multiple baseline across participants design (Kennedy, 2007) was used in order to determine the effects of BST on three

paraprofessionals' delivery of DRA. Additionally, a multiple baseline across participants design was used in order to determine the effects of DRA on the students' rate of challenging behavior.

3.8.1 Paraprofessionals' delivery of DRA

A multiple baseline across participants design (MBAP, Kennedy, 2005) replicated across three paraprofessional/student dyads was used in order to determine effects of BST on three paraprofessionals' use of DRA. The use of a multiple baseline across participants design demonstrated whether a functional relationship existed between the independent variable (BST) and the rate or level change of implementation with which the paraprofessionals' delivered DRA. Baseline conditions remained in effect for the remaining two paraprofessionals (i.e., the withholding of BST). As the first paraprofessional began to engage in an increased rate at which he or she engaged in the delivery of DRA, BST was introduced to the second paraprofessional. The process was repeated for the third paraprofessional.

3.8.2 Decision rule for introducing BST across tiers

A decision rule was created and implemented in order to determine when BST was introduced to the paraprofessionals. Once stable responding in baseline related to implementation of DRA was observed for Barry, BST was implemented. In order for BST to be implemented for Val, Barry had to be observed engaging in DRA correctly 60% of opportunities for three consecutive sessions across five sessions. This rule was applied for the subsequent paraprofessionals, as well.

3.8.3 Challenging behavior

A multiple baseline across participants design (MBAP, Kennedy, 2005) was used in order to demonstrate the effects of DRA on the rate in which the student participants engaged in challenging behavior. In an MBAP design, introduction of the independent variable is withheld across participants in order to replicate the effects of the IV on the DV. In the case of this study, the introduction of BST, and thus DRA, was introduced sequentially according to paraprofessional delivery of DRA across participants to replicate the effects of DRA on the rate in which the student participants engaged in challenging behavior.

3.9 PROCEDURE

3.9.1 Functional Behavior Assessment

An FBA was completed for each student participant to determine a functionally equivalent reinforcer. In DRA, the reinforcer that was delivered at the end of each interval matched the function of the challenging behavior.

Each FBA incorporated indirect assessments (Appendix F, i.e., interviews with teachers and paraprofessionals) and direct assessments (Appendix G, i.e., narrative note taking during direct observation, antecedent-behavior-consequence observation). The PI, a board certified behavior analyst, conducted the assessments. As opposed to the standard full functional analysis described by Iwata, Dorsey, Slifer, Bauman, and Richman (1994), in this procedure, data from

previous direct and indirect assessments was used to determine the *most* likely maintaining consequences. Results from the FBA's are included in the results section of this paper.

3.9.2 Baseline

During baseline sessions, each paraprofessional/student dyad was observed for approximately 30 minutes per session in their respective classrooms. No instruction from the PI was given. At this time, the paraprofessional was not privy to the exact interventions that were to be used. The PI watched and recorded the paraprofessionals' rate of using DRA. Additionally, the PI watched and recorded the rate at which students were engaging in challenging behavior. The PI and, when applicable, GSR, sat five to ten feet away from the paraprofessional and student to observe, yet not interfere with "business as usual". To determine the effects of DRA on students' rates of challenging behavior, the IV (i.e., individual and combined components of BST) was introduced sequentially across the paraprofessionals.

For Tina and Brenda, the PI asked the teacher in the classroom to arrange the daily schedule to increase the Tina and Brenda's proximity to each other.

3.9.3 Interventions

During the intervention phases of the study, BST was implemented. All the paraprofessionals were taught to engage in DRA using BST.

3.9.4 Didactic instruction

During the didactic sessions, the PI provided the paraprofessional with a one-page description of DRA (See Appendix H for a one-page description of DRA). Additionally, the PI delivered a brief PowerPoint © presentation with the paraprofessional. The presentation included information regarding the rationale for using DRA, procedures for and a description of DRA, and a 3 minute video that depicted a teacher and student modeling the delivery of DRA. The didactic session averaged 13 minutes in duration across all three paraprofessionals. In order to mimic more standard paraprofessional training procedures, the didactic sessions took place in a close, but separate area of the school building (i.e., at a desk in the back of the school's auditorium). Additionally, the didactic instruction sessions were conducted with the PI, a graduate assistant, and only *one* paraprofessional. The graduate assistant recorded treatment fidelity through the use of a checklist for all three didactic instruction sessions.

3.9.5 Rehearsal

The rehearsal component of BST immediately followed the didactic instruction component. During the rehearsal component, the PI, graduate assistant, and paraprofessional practiced the DRA strategy for approximately 4 minutes per paraprofessional. The graduate student acted as the student participant, while the PI verbally prompted the paraprofessional through the steps of DRA. For all three rehearsal sessions, treatment fidelity was assessed by the graduate assistant through the use of a checklist.

3.9.6 Modeling

The modeling component of BST immediately followed the rehearsal component. The modeling sessions took place in each respective classroom. The PI entered the classroom and conducted the steps of DRA with the student participant while the paraprofessional observed. The modeling session lasted approximately 5 minutes per dyad. After the modeling component was completed, the PI verbally instructed the paraprofessional to begin conducting the DRA on their own.

3.9.7 Feedback

The feedback component of BST was implemented throughout each dyad's 30-minute DRA session. The PI entered the classroom at the beginning of the session and observed the paraprofessional attempting to engage DRA. Throughout the 30-minute session, the PI observed the paraprofessional and consistently offered both positive and corrective feedback related to the use of DRA. The feedback sessions occurred two to three times per week. During the feedback component, the PI verbally provided feedback regarding the paraprofessionals' delivery of DRA. Additionally, the PI showed each paraprofessional a line graph of their performance following the conclusion of each observation/feedback session.

3.9.8 Interobserver agreement

Point-by-point interobserver agreement was collected for 30% of all sessions. Interobserver agreement was calculated by dividing the total number of agreements by the total number of

agreements plus disagreements multiplied by 100. A trained graduate assistant collected IOA data by observing the paraprofessionals delivering the DRA procedure in-vivo. The criterion of 80% or above was used to determine agreement. IOA was 94% across 30% of both baseline and intervention sessions. Table 18 summarizes the IOA results.

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Table 18.

Summary of Mean Interobserver Agreement Across All Study Conditions and DVs.

Dyad		Baseline	Intervention	
	DRA	100%	85%	
Barry and Dale	Ch. Beh.	86%	85%	
	Alt. Beh.	92%	96%	
	DRA	100%	100%	
Val and Scott	Ch. Beh.	95%	90%	
	Alt. Beh.	90%	100%	
	DRA	100%	100%	
Tina and Brenda	Ch. Beh.	92%	90%	
!	Alt. Beh.	100%	90%	
				Mean Total IOA
Totals IOA		95%	93%	94%

!

3.9.9 Procedural fidelity

Procedural fidelity data was collected for 30% of all procedural sessions components. Procedural fidelity was reported as a percentage of steps correctly completed. A graduate assistant collected procedural fidelity data by observing the PI delivering BST and the paraprofessionals delivering the DRA procedure. Procedural fidelity across all conditions and steps of the study was 94%. (See Appendix I for the Procedural Fidelity Checklist.)

3.10 DATA ANALYSIS

3.10.1 Functional Behavior Assessment

For the descriptive FBA procedure, observational and subjective data were analyzed by looking for a common maintaining consequence.

3.10.2 Paraprofessional behavior

Paraprofessional behavior data was analyzed through visual inspection of graphically represented data. As typical of MBAP designs, the effect of DRA on students' challenging behavior was analyzed across the three tiers for demonstration of experimental control. The data was analyzed for differentiation of the data paths once DRA was introduced. In addition, paraprofessional data was analyzed for five effects: median level, celeration, celeration multiplier, median level change, and frequency multiplier. The median level refers to the numerical value that is the middle of a range of rates per minute. Median level change is a numerical value that describes the difference in the median level of behavior after a behavior change intervention has been implemented. Celeration refers to the rate at which a behavior is accelerating or decelerating (per minute). Celeration lines were calculated using a regression analysis. The celeration multiplier allows for a comparison of two or more celerations and shows the relative effectiveness of a behavior change intervention (Pennypacker, Guiterrez, & Lindsley, 2003). Last, frequency multipliers or frequency jumps are the change in frequency of a behavior once a behavior change intervention has been implemented (i.e., a comparison between the last data point in baseline with the first data point in intervention, Kubina & Yurich, 2012).

3.10.3 Student behavior

Student behavior data was analyzed through visual inspection of graphically represented data. As typical of MBAP designs, the effect of DRA on students' challenging behavior was analyzed across the three tiers for demonstration of experimental control. The data was analyzed for differentiation of the data paths once the DRA was introduced.

Student behavior was also analyzed for the following effects: median level, celeration, improvement indices, median level change, celeration multiplier, and improvement indices change. Improvement indices are composite measures used to determine the change in behavior between two behaviors within a condition. As an accuracy measure, it is defined as, "the ratio of the celeration of correct frequency to the celeration of the incorrect frequencies" (Pennypacker, et al., p. 7, 1972). In this study, improvement indexes were used to determine the rate at which the students were engaging in alternative behavior compared to challenging behavior in both baseline and intervention. Improvement index change is a composite measure that describes the overall accuracy change in behavior between conditions. In subjective terms, improvement index change allows one to measurably describe the positive or negative change in behavior that occurred following the introduction of a behavior change intervention. Improvement index changes are calculated by comparing the improvement indices that were calculated within each condition.

3.10.4 The Standard Celeration Chart

The Standard Celeration Chart (SCC) is a semi-logarithmic data display that aids practitioners and researchers in making sound judgments in regards to treatment, education, and research.

Each line on an SCC represents consecutive days, including Sundays and Saturdays. Data points on an SCC refer to rate of behavior for a particular day. Generally, three to five consecutive data points are considered a trend. These trends are then analyzed for various characteristics including celeration frequency change, celeration change, median level, and median level change.

On the left side of an SCC are numbers ranging from 0 to 10000. This range of numbers refers to the frequency of behaviors per minute (i.e., rate). The numbers on the right side of an SCC refer to the duration in which the behavior was counted. For example, and as in this study, each observation session lasted approximately thirty minutes. Therefore, if a student were observed engaging in a particular behavior 100 times per thirty minutes, the rate per minute of engaging in the behavior would be 3.33 times per minute.

4.0 RESULTS

4.1 FUNCTIONAL BEHAVIOR ASSESSMENT

A descriptive functional behavior assessment was conducted for each student participant in order to determine the likely maintaining consequences of each student participant's challenging behavior.

4.1.1 Function of Dale's challenging behavior

Dale's challenging behaviors were leaning back in his chair with force and/or hitting any part of his body with a closed or open hand. Dale's paraprofessional and teacher were each interviewed using Hanley's (2012) open-ended functional assessment interview format. The exact questions that were asked are listed in Appendix F. Reported results from the interviews suggested that Dale engaged in challenging behavior for multiple functions or for sensory reinforcement. Dale had been engaging in this challenging behavior as long as both his paraprofessional and teacher had known him. Additionally, Dale's teacher and paraprofessional reported that he engaged in the challenging behavior across all contexts and activities. Both his teacher and paraprofessional reported that Dale tended to engage in the challenging behavior during times of increased activity in the classroom (i.e., "When the classroom was busy."). As reported by his teacher and paraprofessional, Dale engaged in the behavior at seemingly steady rates across all contexts.

Results from a direct assessment, antecedent-behavior-consequence (ABC) data collection, also suggested that Dale engaged in the challenging behavior for multiple functions, or to receive a back rub and/or arm rub from his paraprofessional. ABC data collection was conducted for three 1-hour sessions prior to baseline data collection. During this assessment, Dale was most often observed engaged in one-to-one or group work with his paraprofessional. On almost every occurrence (i.e., 98% of occurrences) of Dale engaging in challenging behavior, his paraprofessional would immediately rub Dale's back and/or arms and ask him to, "try and stay calm". Thus, it was determined that rubbing Dale's back and arm, as well as saying, "Good job staying forward and keeping your hands on the table" would be a functionally equivalent consequence for when Dale engaged in the alternative behavior of leaning forward and placing his hands on his desk.

4.1.2 Function of Scott's challenging behavior

Scott's challenging behaviors were laying his head on his desk, and/or putting his shirt in his mouth, or lightly hitting his head with a book. Scott's teacher and paraprofessional were interviewed using the same format as Dale's staff members. Reported results from the interview suggested that Scott engaged in challenging behavior in order to receive attention from his classmates, the teacher, or his paraprofessional (Val). Like Dale, Scott was reported to engage in challenging behavior regardless of context or activity. Additionally, both his teacher and paraprofessional reported that he had been engaging in the challenging behaviors for at least the entire school year (i.e., the last nine months). The behaviors were not reported to range in intensity, nor did they ever escalate past the point of needing constant redirection toward the task at hand.

Results from an ABC data collection procedure mirrored the reported results of the open-ended functional assessment interview. That is, on all occasions of Scott engaging in his challenging behavior, his teacher, paraprofessional, or a fellow classmate would provide near immediate social positive reinforcement in the form of a statement such as “lift your head up”, “take your shirt out of your mouth”, “don’t do that”, or “Scott’s doing it again”. Based on these results, it was determined that Scott’s most likely function for engaging in the challenging behaviors was socially mediated positive reinforcement in the form of attention. As such, Val was trained to provide behavior specific praise and high-fives for engaging in the alternative behavior of lifting his head up and placing his hands on his desk.

4.1.3 Function of Brenda’s challenging behavior

Brenda’s challenging behavior was calling out without first gaining attention in a socially appropriate way. Following the open-ended functional assessment interview, reported results suggested that the function of Brenda’s challenging behavior was to gain socially mediated positive reinforcement in the form of vocal attention. Brenda’s paraprofessional (Tina) and her teacher both reported that Brenda consistently engaged in challenging behavior regardless of context or activity. The rate at which Brenda called out was reported to vary from high to low. In addition, Brenda had been engaging in calling out for as long as her paraprofessional and teacher had known her.

Results from an ABC data collection procedure closely matched the interview results. As such, on nearly every occasion following Brenda calling out, her teacher or paraprofessional would immediately respond by saying, “How do we get my attention”, “You know my name”, or “How about we raise our hand instead”. Due to these results, it was determined that the likely

maintaining consequence of Brenda's challenging behavior was socially mediated positive reinforcement in the form of attention. Thus, Brenda was given attention in the form of praise and attention to her request as a consequence for engaging in the alternate behavior (i.e., raising her hand and saying a name).

4.2 PARAPROFESSIONAL USE OF DRA AND STUDENT BEHAVIOR RESULTS

Figure 1 graphically displays paraprofessionals' use of DRA and student challenging and alternative behaviors on Standard Celeration Charts. There are a total of six charts. The connected charts on the left display paraprofessionals' use of DRA per minute. Solid dots represent paraprofessional use of DRA. The connected charts on the right display student challenging and alternative behaviors per minute. For these charts, solid dots represent student alternative behavior and Xs represent challenging behavior. Thicker black lines near the bottom of each chart represent the duration of each observation/session. The lines that are laid over the data paths indicate the celeration (i.e., trend) for each dependent variable, per condition. Celeration lines were calculated via regression analysis.

4.2.1 Barry and Dale's results

Throughout the baseline condition, Barry engaged in DRA at zero levels (X1.0 celeration, i.e., "times 1 celeration", Figure 1). Once BST was introduced, however, Barry began implementing DRA at a median level of .85 per minute (range .43 – 1.29, Table 20.). Therefore, Barry displayed an overall median level change of DRA from 0 to .85 per minute (Table 20.).

Additionally, the frequency multiplier for Barry's use of DRA was a X32 (i.e., "times 32"). That is, the last data point before intervention indicates a frequency of 0 instances of DRA – following introduction of BST, Barry immediately engaged in a 32 instances of DRA (per 30 minutes). Despite this, Barry's rate of DRA decelerated at a ÷1.22 (see Discussion section for an explanation of this result).

Dale's median level of challenging behavior per minute during baseline was 1.85 (range 1.19 – 2.71, Table 21.). Following the introduction of DRA, Dale's median level of challenging behavior per minute decreased to 1.58 (range .495 – 2.84). Thus, Dale's overall median level change was ÷.53 (i.e., divide .53). Additionally, Dale's challenging behavior during baseline was accelerating at a X1.70. Once DRA was introduced Dale's rate of challenging behavior slowed to a celeration of ÷1.31.

Conversely, Dale's median level of alternative behavior throughout baseline was 0 (Table 21.). However, following the introduction of DRA, his median level of alternative behavior improved to 1.39 instances per minute (range .92 – 1.85). These results indicate an overall median level change of X1.39. Dale's baseline celeration of alternative behavior was a X1 (at zero levels). After introduction of DRA, Dale's alternative behavior accelerated to a X1.13. Celeration multipliers between baseline and intervention conditions were also calculated for Dale's challenging and alternative behaviors. For his challenging behavior the celeration multiplier was ÷2.23, and his alternative celeration multiplier was X1.13. Improvement indices were also calculated to describe the difference in Dale's rates of challenging and alternative behavior during baseline and intervention. During baseline, Dale's improvement index was a ÷1.70, indicating a deterioration in performance. Once DRA was introduced, however, Dale's improvement index was a X1.48. This indicates an overall improvement in performance. Lastly,

Dale's improvement index change from baseline to intervention was a X2.52 (i.e., a 152% improvement in behavior).

4.2.2 Val and Scott's results

Throughout the baseline condition, Val was observed engaging in DRA at zero levels (X1.0, Figure 1). Following the introduction of BST, Val began to implement DRA at a median level of .2 per minute (range .033 - .33 Table 20.). As such, Val displayed an overall median level change of DRA from 0 to .2 per minute. The frequency multiplier for Val using DRA was a X10 (i.e., from 0 in baseline to 10 following BST. Val's performance during intervention decelerated at a rate of ÷1.01 (see Discussion section for an explanation of these results).

During baseline, Scott's median level of engaging in challenging behavior was .45 per minute (range .03 - .79, Table 21). His median level of engaging in challenging behavior fell to .2 (range 0 - .40) per minute after Val began implementing DRA (Table 21.). As such, Dale displayed an overall level change of a ÷.25, indicating that he engaged in less challenging behavior, on average, once DRA was implemented. Throughout baseline, Scott engaged in challenging behavior at a celeration of X1.29 (i.e., during baseline instances of challenging behavior were increasing). Accordingly, Scott's improvement index during baseline was a ÷1.29, indicating an overall deterioration in performance regarding the rates in which he was engaging in challenging and alternative behavior.

Scott's median level of engaging in alternative behavior during baseline was zero (X1.0 celeration). However, once Val began implementing DRA (i.e., intervention), Scott's median level of alternative behavior rose to .28 (range .07 - .5) times per minute – indicating an overall median level change of X.28. Additionally, once DRA was implemented, Scott's rate of

alternative behavior increased to a X1.39. His improvement index, which indicated an improvement in behavior, was a X2.5.

From baseline to intervention, Scott displayed a decrease in challenging behavior and an increase in alternative behavior. His celeration multiplier for challenging behavior was a ÷2.32, while his celeration multiplier for alternative behavior was a X1.39 (Table 22.). Lastly, his improvement index change from baseline to intervention was a X3.23 (i.e., a 223% improvement in behavior).

4.2.3 Tina and Brenda's results

Tina, who was in the baseline condition for the longest duration, did not engage in any instances of DRA (i.e., zero levels, X1.0, Table 20.). After BST was implemented, Tina increased her median level of engaging in DRA to .20 (range .07 - .33), indicating a median level change of X.20 (Tables 20 & 21.). The frequency multiplier for Tina was X2. Therefore, once BST was introduced, Tina immediately increased her use of DRA from 0 instances to 2 instances. Tina's performance following BST accelerated to a X1.45. Additionally, her celeration multiplier from baseline to intervention was a X1.45, indicating an improvement in the use of DRA (Table 20).

Brenda's baseline median level of engaging in challenging behavior was .61 per minute (range .3 - .92). The celeration rate for her challenging behavior during baseline was a X1.0. After Tina began implementing DRA, Brenda displayed an overall median level change of ÷.20, indicating that her rate of challenging behavior decreased. However, during baseline, Brenda's improvement index was a X1.04. This value represents an improvement in behavior during baseline. Additionally, Brenda's rate of challenging behavior accelerated to a X1.83 following the introduction of DRA, indicating an increase in challenging behavior.

During baseline, Brenda's median level of alternative behavior was .05 (range 0 - .1) times per minute (X1.04, Table 21). Although for most baseline observations Brenda engaged in zero instances of alternative behavior, she did engage in alternative behavior for three instances on one occasion (Figure 1.). Following the introduction of DRA, Brenda's median level of alternative behavior increased to .26 per minute (range .17 - .36). Her overall median level change was a X.21 (Table 22.), indicating an overall increase in alternative behavior. However, Brenda's alternative behavior during intervention slowed to a X1.02. Additionally, Brenda's improvement index while DRA was being implemented was a ÷1.79. Therefore, her behavior was deteriorating.

From baseline to intervention, Brenda's celeration multiplier for challenging behavior was a X1.83; her celeration multiplier for alternative behavior was a ÷1.02. Her improvement index change was a ÷1.86. Put another way, Brenda decreased her performance in regards to behaving better by 86%.

Table 19. *Summary of Paraprofessional Use of DRA Within and Between Conditions*

	Baseline		Intervention		Baseline to Intervention		
Paraprofessional	Level	Celeration	Level	Celeration	FM*	Level Change	CM**
Barry	0	X1.0	.85	÷1.22	X32 (0 to 32)	X.85	÷1.22
Val	0	X1.0	.20	÷1.01	X10 (0 to 10)	X.20	÷1.01
Tina	0	X1.0	.20	X1.45	X2 (0 to 2)	X.20	X1.45

Note: *Indicates Frequency Multiplier **Indicates Celeration Multiplier

Table 20. *Summary of Student Behavior Results Within Conditions*

Student	Behavior	Baseline			Intervention		
		Level	Celeration	Imp. Index*	Level	Celeration	Imp. Index*
Dale	Challenging	1.85	X1.70	÷1.70	1.58	÷1.31	X1.48
	Alternative	0	X1.0		1.39	X1.13	
Scott	Challenging	.45	X1.29	÷1.29	.20	÷1.80	X2.5
	Alternative	0	X1.0		.28	X1.39	
Brenda	Challenging	.61	X1.00	X1.04	.41	X1.83	÷1.79
	Alternative	.05	X1.04		.26	X1.02	

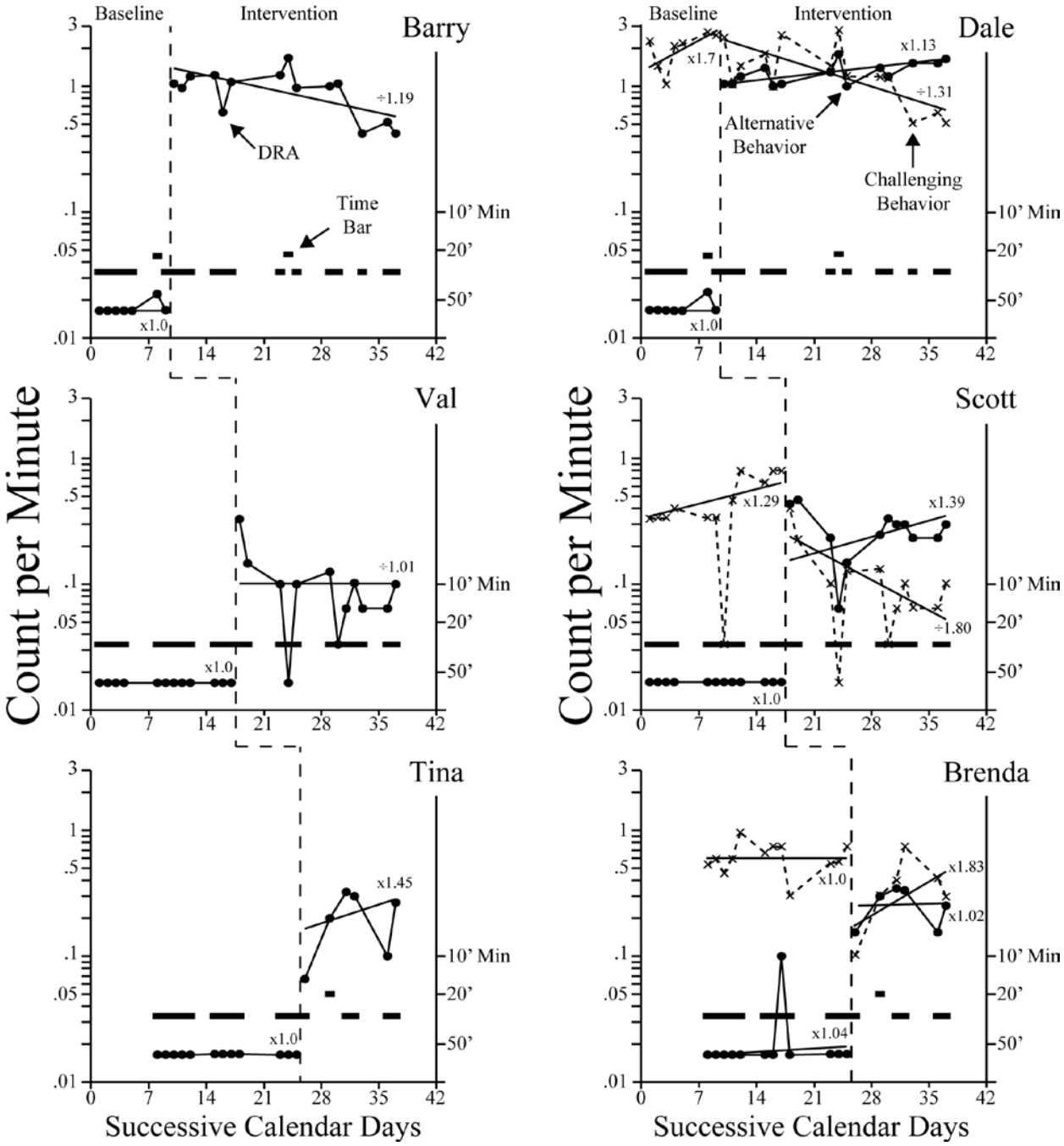
Note: *Indicates Improvement Index

Table 21. *Summary of Student Behavior Results Between Conditions*

Student	Behavior	Baseline to Intervention		
		Level Change	Celeration Multiplier	Imp. Index Change*
Dale	Challenging	÷.53	÷2.23	X2.52
	Alternative	X1.39	X1.13	
Scott	Challenging	÷.25	÷2.32	X3.23
	Alternative	X.28	X1.39	
Brenda	Challenging	÷.20	X1.83	÷1.86
	Alternative	X.21	÷1.02	

Note: *Indicates Improvement Index Change

Figure 1.
Paraprofessional and Student Behavior



4.3 SOCIAL VALIDITY RESULTS

4.3.1 Paraprofessional surveys and interviews

The PI conducted surveys and interviews with the paraprofessional participants. Overwhelmingly, the paraprofessionals indicated that they found both BST and DRA highly socially valid. For example, on a scale of zero to eleven, zero indicating strong disagreement and eleven indicating strong agreement, all three of the paraprofessionals indicated that they found BST an effective strategy for teaching them how to engage in DRA (mean 10.67, range 10-11). All three paraprofessionals strongly agreed that BST would be beneficial for other paraprofessionals, was not intrusive, and was brief (mean 11, range 11-11). Last, all three paraprofessionals strongly agreed that DRA was effective in changing their students' behavior for the better and that DRA helped them interact better with their student (mean 10.76, range 10-11).

Interview data also suggested that the paraprofessionals found BST and DRA socially valid. For example, when given the chance to add any other comments, Val stated, "I looked forward to you coming into the class every day. In my thirteen years of being a paraprofessional, this was the first time anyone ever gave me this type of instruction and feedback." Tina said, "I really did start to feel like a different sort of bond was developing with (Brenda). Although I have known and worked with her for while now, it seemed like she was listening a little bit more." Lastly, Barry commented, "When I thought about it, we did try things like this when (Dale) was a lot younger – but we did see results."

4.3.2 Teacher interviews

Scott's and Brenda's teachers were also interviewed to gauge the social validity of DRA and BST. Both of the teachers found BST and DRA to be unobtrusive. For example, Scott's teacher commented, "I'm used to people coming in and out of my classroom all of the time, so I hardly noticed you after a while." Brenda's teacher responded similarly, "There are constantly consultants and other people coming into (the classroom) to observe." She added, "You are the first person I can remember to come in and directly train the paraprofessionals."

4.3.3 Student interviews

Results from the social validity student interview was mixed. Only one student, Scott, was able to be interviewed. When Scott was asked how he liked Val saying good job and giving him more "High-5s", he responded by saying, "I guess so."

5.0 DISCUSSION

Paraprofessionals are increasingly being used to augment students with disabilities' educational experience (U.S. Department of Education, 2016). As such, paraprofessionals who work one to one with students with disabilities frequently encounter situations that require intense, systematic, and evidence-based practices (Giangrecco, et al., 1997). However, paraprofessionals often lack appropriate training and supervision in regards to such evidence-based practices (Giangrecco, Suter, & Doyle, 2010). Paraprofessional training often occurs as part of longer "in-service" trainings that occur outside of the classroom without a provision for immediate feedback. Additionally, recent research into training paraprofessionals has centered on more broad concepts such as role and responsibilities and job satisfaction (Giangrecco, Suter, & Doyle, 2010). Only ten studies were identified that sought to train paraprofessionals on systematic behavioral interventions *and* showed the effects of the training and interventions on student behavior (Causton-Theoharis & Malmgren, 2005; Feldman & Matos, 2012; Koegel, Kim, & Koegel, 2014; Licciardello, Harchik, & Luiselli, 2008; Malmgren, Causton-Theoharis, & Trezek, 2005; McCulloch & Noonan, 2013; Quilty, 2007; Robinson, 2011; Russel, Allday, & Duhon, 2015; Toelken & Miltenberger, 2012). To date, no studies have been conducted that used behavior skills training as a training method to teach paraprofessionals to engage in differential reinforcement of alternative behavior.

Behavior skills training is a research-based, multi-component training package that incorporates instruction, rehearsal, modeling, and feedback (Sarokoff & Sturmey, 2012). As such, behavior skills training provides for the three basic principles that Markle (1990) deemed essential when attempting to teach someone to do something: active responding, errorless learning, and immediate feedback. Differential reinforcement of alternative behavior is a research-based intervention that has been shown effective for reducing challenging behavior and increasing alternative and more socially appropriate behavior (Cooper, Heron, & Heward, 2007).

The current study attempted to add to the paraprofessional training literature base by employing a single-subject research design. Specifically, the purpose of the study was to answer the following research questions: What are the effects of BST on paraprofessionals' use of DRA in inclusive education settings? And, what are the effects of paraprofessionals delivering DRA on students' with disabilities rate of challenging behavior? The social validity of BST and DRA was also assessed.

5.1 EFFECTS OF BST AND DRA

Results from the study were positive. That is, all three paraprofessionals engaged in more instances of DRA following the introduction of BST. Additionally, all three students decreased their median level of engaging in challenging behavior and increased their median level of engaging in alternative behavior. Lastly, BST and DRA were subjectively reported to be socially valid interventions by all three paraprofessionals, two teachers, and one student participant.

Barry, Val, and Tina increased their use of DRA once BST was implemented. However, Barry and Val slowed their rate of delivering DRA as the study moved forward. The reason for

this result is tied to student behavior. Once DRA began to be implemented, the rate at which Dale and Scott engaged in challenging behavior slowed. As such, the opportunities for Barry and Val to engage in DRA became fewer. Thus, although Barry and Val continued to implement DRA at appropriate levels, results (see Figure 1) indicated an overall deterioration in performance. These results, however, were expected and welcomed. If, for example, Dale and Scott began engaging in more challenging behavior once DRA was implemented it could be said that DRA was an *ineffective* procedure for reducing their challenging behavior. This did not happen. Alternatively, Tina's rate of using DRA increased and accelerated once BST was implemented. However, although Brenda began engaging in more alternative behavior (i.e., an increase in her median level) and began engaging in less challenging behavior (i.e., a decrease in her median level), her overall performance deteriorated. Put another way, her rate of challenging behavior continued to increase following intervention, despite an increasing rate of alternative behavior. One possible explanation for this result is the duration Brenda spent in intervention. Dale and Scott spent twelve and six more days, respectively, in intervention than did Brenda. Therefore, it is possible that more time was needed for the application of DRA to positively affect Brenda's behavior.

5.2 LIMITATIONS

There are several limitations in this study. First, and although true for nearly all studies that use a single-subject research design, the low number of participants limits external validity (i.e., generalizability). Another limiting factor related to external validity is the lack of a generalization, maintenance, or follow-up condition. Unfortunately, there was not enough time

for any of these conditions due to the ending of the school year. Therefore, any conclusions drawn about the lasting effects and generalizability of BST and/or DRA should be made with caution.

Another potentially limiting factor is the fact that only one of the classrooms in this study would be considered a true "full inclusion" educational setting. Only Val and Scott were permanently placed in a classroom where most the students were regular education students. Barry and Dale and Tina and Brenda did spend some part of their days in inclusive settings (e.g., "specials" such as gym, music, etc.). However, for these participants, the feedback component of BST and DRA was implemented in a classroom that was mostly made up of students with disabilities. Therefore, it is difficult to draw any conclusions about the effects of the intervention(s) in more inclusive settings.

Last, for Barry, the PI engaged in several instances of pre-corrections during the early intervention sessions. The PI would verbally instruct Barry not rub Dale's back following the occurrence of challenging behavior. This was done in order to avoid reinforcing Dale's challenging behavior. Although this happened only in the first few sessions following the implementation of BST, it is a limiting factor when considering the role that "coaching" as opposed to "feedback-only" may play when training paraprofessional's in the use of evidence-based practices.

5.3 IMPLICATIONS FOR RESEARCH

Research on training paraprofessional appears to be a growing field. As the numbers of paraprofessionals being used in special education continues to rise, so too must research into effective training methods. In this study, behavior skills training (BST) was used to train paraprofessionals in the use of differential reinforcement of alternative behavior. To date, this study appears to be the only study that has sought to examine the effects of BST for DRA for paraprofessionals who work in public school settings. Given the limited generalizability of this study, further investigation is required to study or replicate the results. Further studies may also focus on using BST to train paraprofessionals in other systematic, behavioral interventions. DRA is just one positive reinforcement strategy that has been found to be effective for reducing challenging behavior and increasing more socially appropriate behavior. Other positive reinforcement strategies, such as non-contingent reinforcement, differential reinforcement of other behaviors, and token economy systems, may also be trained using behavior skills training. There are also other evidence-based practices where behavior skills training may play a role. Other interventions, such as those that focus on skill acquisition (e.g., mand and intraverbal training, fluency based practice, and match-to-sample procedures), should also be a focus of future behavior skills training research.

Another avenue of research into training paraprofessionals would be the role that certified classroom teachers might have. For example, although the results from this study are promising, it was the PI that ultimately implemented BST. The teachers in the classroom were not directly involved in the study; ideally, they would be the ones that would more distally maintain a paraprofessional's skill set. In this way, future paraprofessional training research should focus

on the roles that teachers can play in developing and maintaining the skill sets of the paraprofessionals who work in their classrooms.

Similarly, the roles that administrators such as principals and special education supervisors should play in training paraprofessionals may also be examined. School administrators are tasked with overseeing the entirety of the inner workings of their schools. With the increase in numbers of paraprofessionals working with students with disabilities, there is an increased need for paraprofessional supervision at all levels. School administrators may be keenly interested in training packages that can affect behavior at the individual level (i.e., the relationship between a student and paraprofessional). Finding efficient and effective ways to train teachers to train paraprofessionals would benefit teachers and administrators alike.

Finding ways to incorporate paraprofessional input into training practices may also be a future direction for research. All three paraprofessionals involved in this study reported that they would recommend BST to train other colleagues in similar positions. Increasing their involvement in their own training would likely lead to more socially valid and effective training practices. Future researchers would do well by finding ways to incorporate paraprofessional opinions into experimental research studies.

Lastly, a component analysis of BST may yield more effective and efficient training practices. For example, Ward-Horner and Sturmey (2012) conducted a component analysis of BST for teaching a functional analysis (FA) procedure. They found that modeling and feedback were the most effective and necessary components of BST when training staff members to implement the different conditions of an FA. Further component analyses would add to their conclusions.

5.4 IMPLICATIONS FOR PRACTICE

BST, although more rigorous than other training methods (e.g., longer in-service didactic trainings, webinars), offers an alternative, yet effective training method that requires little to no previous exposure to the intervention that is to be learned. Behavior skills training involves four components that aid the trainer in assuring positive outcomes when developing and maintaining the skill sets of staff members who work with students with disabilities. The following paragraphs break down the implications of each component of behavior skills training and their implications for practice.

5.4.1 Instruction

The instruction component of behavior skills training in this study involved a brief PowerPoint presentation, a one-page description of DRA, and time for questions following the presentation. The presentation required few skills to create (i.e., knowledge of PowerPoint, Word, and knowledge of the intervention). The average time of the instruction component was thirteen to fifteen minutes. In comparison to other, more standard in-service trainings, instruction in BST is concise yet comprehensive. Teachers and administrators could potentially create a "bank" of instructional presentations to be used at any time they see fit. Additionally, although only one paraprofessional at a time was given instruction, it would be possible to give the instruction to more than one staff member at a time. Increasing the numbers of staff members who participate in the instruction phase would add to its already efficient nature.

5.4.2 Rehearsal

The second component of BST was rehearsal. Directly following the instruction component, the PI and a graduate assistant practiced (i.e. rehearsed) the DRA strategy with the paraprofessional. Rehearsing the strategy served as an example of what the paraprofessional was expected to do. Additionally, it served as a "primer" prior to engage in the DRA strategy on their own.

Practicing any strategy in the presence of someone who has experience with the skill sets the stage for a reinforcement contingency. That is, during rehearsal, the trainer can begin to give corrective and positive feedback in the absence of a real-world context. Therefore, rehearsing the strategy minimizes the chance that the staff member will implement the strategy incorrectly in the initial stages of skill development.

5.4.3 Modeling

Modeling is another component of behavior skills training. This component involves the trainer modeling the strategy in a real-world context (i.e., with the student during class time). The modeling component in this study was completed directly following the rehearsal and instruction components. Modeling allows the staff member to witness the strategy being used.

For the current study, the PI modeled all the components of the DRA strategy, including pre-teaching, the SWAT procedure, ignoring the challenging behavior, and giving positive reinforcement for the alterative behavior. Modeling has long been a part of behavioral and systematic instruction (Cooper, Heron, & Heward, 2007). If you walk into any classroom, you would likely see a teacher or paraprofessional modeling a skill that they want a student to

display. Therefore, modeling of skills for staff members has a similar effect (i.e., witnessing the skill to be displayed).

5.4.4 Feedback

Feedback is the fourth, and possibly most important, component of behavior skills training. In this study, the PI offered positive and corrective statements throughout the thirty-minute observation. Feedback sessions occurred two to three times per week.

It has long been known that the consequences that follow our behavior can strengthen or weaken the future probability that the behavior will occur again in the future (Ferster & Skinner, 1957). Providing consequences is a hallmark of direct/explicit instructional techniques. Feedback that directly follows a behavior is essential for developing and maintaining the skill sets of any professional. Although it may be difficult, it is imperative that consultants, teachers, or other administrators find time to observe a paraprofessional and provide corrective and positive feedback on their performance.

5.5 CONCLUSIONS

The most recent reauthorization of the Individuals with Disabilities Education Act (2004) mandates that all paraprofessionals working with students with disabilities receive at least twenty hours of training per year to be considered highly qualified. However, IDEA provides little guidance into the method in which paraprofessionals should be trained. Additionally, paraprofessionals are often the least educated and trained members of any instructional support

team, yet are commonly tasked with providing instructional assistance to students with the most complex needs. Paraprofessionals can benefit students with disabilities educational experience in a variety of ways. For example, paraprofessionals may free-up time for teachers by completing clerical tasks; they may provide follow-up instruction or help with homework; and they can assist in implementing both academic and positive behavior support strategies to increase a student's skill set (Giangreco, Yuan, McKenzie, Cameron, & Fialka, 2005). However, without the proper design and delivery of training opportunities, paraprofessionals may also be a detriment to students. Paraprofessionals may inadvertently decrease independence; they may increase a separation from classmates; they may interfere with teacher instruction; and may inadvertently increase the rate at which students engage in challenging behavior (Giangreco, et al., 2005). For these reasons, researchers, teachers, and school administrators ought to seek out effective and efficient methods to train paraprofessionals.

As opposed to standard paraprofessional training practices (e.g., all-day inservice trainings, webinars), BST offers an alternative, effective, and efficient method for training paraprofessionals. This study objectively examined BST of DRA for three paraprofessionals who work one-to-one with students who engage in challenging behavior that prohibits them from spending maximum time engaging with academic material and their peers. The results of this study were promising. All three paraprofessionals increased their use of DRA and all three students increased their use of an alternative and more socially appropriate behavior. Two of the students also decreased their rate of engaging in challenging behavior. As such, BST may be an alternative and more effective method for training paraprofessionals to engage in evidence-based practices that may have a positive effect on a student's educational experience, as well as increase work satisfaction of paraprofessionals.

APPENDIX A

SCRIPT FOR PARAPROFESSIONAL PARTICIPANT RECRUITMENT INTERVIEW

Script for Paraprofessional Participant Recruitment Interview

First, I want to thank you for agreeing to sit with me and talk about your potential participation in my research study. As you may or may not know, I am a special education doctoral student at Pitt and this research study would be my final requirement for graduating. I also happen to live within the district – right across the street as a matter of fact. To begin, I'd like to say a little bit about myself, ask you some questions, and then talk briefly about what the study involves.

Prior returning to school to pursue my doctorate degree I was a teacher and support staff (paraprofessional) at a school that worked with children with severe disabilities in Wilkinsburg. I am married and have a 2-year-old daughter at home.

I am interested in positive behavior support strategies that will increase the inclusion of students with severe disabilities in regular education classrooms. Specifically, I am interested in finding ways to effectively train paraprofessionals in how to use these positive support strategies.

Without going into too much detail about my study – I can't let you in to too much information until the training piece of the study actually begins – I wanted to briefly say that hopefully you participation in the study will help you better manage your student's challenging behavior. Your involvement would include being videotaped and mic'd in order to track the effects of the research study. I will provide you with any technical training as far as using the videotape and microphone may involve, including uploading videos to a website – that only I and research partner will be able to view. The duration of your participation would range 7 to 9 weeks. However, you would only have to meet with me for about ½ hours in the very beginning, and then about 5 minutes a day for about 3 weeks.

If you'll allow, I have some questions for you:

1. How long have you been employed as a paraprofessional?
2. What is your highest level of educational achievement?
3. How often have you received training that pertains to positive behavior support strategies?
4. How familiar are you with Applied Behavior Analytic procedures such as differential reinforcement?
5. How often do you receive feedback, both positive and corrective, on your performance as a paraprofessional?

Thanks again for your time. Do you have any questions for me?

APPENDIX B

DRA DATA COLLECTION SHEET

PARAPROFESSIONAL SOCIAL VALIDITY INTERVIEW

Paraprofessional Social Validity Survey

Please rate your response on a scale of 0 - 11 for each of the following statements:
(A rating of 0 indicates strong disagreement; A rating of 11 indicates strong agreement)

The training was effective in teaching me how to deliver a positive reinforcement strategy.

Rating: _____

I feel that the training would be beneficial for other paraprofessionals.

Rating: _____

The training was simple and brief enough as to not take up too much of my time.

Rating: _____

The positive reinforcement strategy helped me better interact with my student.

Rating: _____

The positive reinforcement strategy was effective for helping my student behave better in class.

Rating: _____

APPENDIX C

TEACHER INTERVIEW QUESTIONS

Teacher Interview Questions

1.! Did you find the training intrusive?
2.! Has anyone ever came into your classroom to train paraprofessionals in a similar manner?
3.! How often do you have other professionals observe and/or work in your classroom?

APPENDIX D

STUDENT INTERVIEW QUESTION

Student Interview Question

1.! Did you like how Ms. Val gave you more high-fives and said good job when you sat up and placed your hands on the table?

APPENDIX E

OPEN-ENDED FUNCTIONAL ASSESSMENT INTERVIEW

Open-Ended Functional Assessment Interview Date of Interview: _____

Child/Client: Respondent:

Respondent's relation to child/client: _____ Interviewer: _____

RELEVANT BACKGROUND INFORMATION

1. **His/her date of birth and current age: ____-_____-_____ ____yrs ____mos**
   Male/Female
2. **Describe his/her language abilities.**
3. **Describe his/her play skills and preferred toys or leisure activities.**
4. **What else does he/she prefer?**

QUESTIONS TO INFORM THE DESIGN OF A FUNCTIONAL ANALYSIS

To develop objective definitions of observable problem behaviors:

5. **What are the problem behaviors? What do they look like?**

To determine which problem behavior(s) will be targeted in the functional analysis:

6. **What is the single-most concerning problem behavior?**
7. **What are the top 3 most concerning problem behaviors? Are there other behaviors of concern?**

To determine the precautions required when conducting the functional analysis:

8. **Describe the range of intensities of the problem behaviors and the extent to which he/she or others may be hurt or injured from the problem behavior.**

To assist in identifying precursors to dangerous problem behaviors that may be targeted in the functional analysis instead of more dangerous problem behaviors:

9. **Do the different types of problem behavior tend to occur in bursts or clusters and/or does any type of problem behavior typically precede another type of problem behavior (e.g., yelling preceding hitting)?**

To determine the antecedent conditions that may be incorporated into the functional analysis test conditions:

10. **Under what conditions or situations are the problem behaviors most likely to occur?**
11. **Do the problem behaviors reliably occur during any particular activities?**
12. **What seems to trigger the problem behavior?**
13. **Does problem behavior occur when you break routines or interrupt activities? If so, describe.**
14. **Does the problem behavior occur when it appears that he/she won't get his/her way? If so, describe the things that the child often attempts to control.**

To determine the test condition(s) that should be conducted and the specific type(s) of consequences that may be incorporated into the test condition(s):

15. **How do you and others react or respond to the problem behavior?**
16. **What do you and others do to calm him/her down once he/she engaged in the problem behavior?**
17. **What do you and others do to distract him/her from engaging in the problem behavior?**

In addition to the above information, to assist in developing a hunch as to why problem behavior is occurring and to assist in determining the test condition(s) to be conducted:

18. **What do you think he/she is trying to communicate with his/her problem behavior, if anything?**
19. **Do you think this problem behavior is a form of self stimulation? If so, what gives you that impression?**
20. **Why do you think he/she is engaging in the problem behavior?**

APPENDIX F

ABC/NARRATIVE NOTE DATA COLLECTION FORM

ABC/Narrative Note Data Collection Form		
Date:	**Time/Duration:**	**Student:**
Antecedent	**Behavior**	**Consequence**
Narrative Notes:		

!

APPENDIX G

DRA CHEAT SHEET GIVEN TO PARAPROFESSIONALS

Differential Reinforcement of Alternative or Incompatible Behaviors Cheat Sheet

Definition

- Definition: Pre-teaching an alternative (or other) behavior, ignoring the challenging behavior (if possible), prompting the alternative behavior, and reinforcing the alternative behavior.
- DRA has been shown to be an effective strategy for decreasing the rate at which students with disabilities engage in challenging behavior and increasing the rate at which students engage in appropriate behavior.

Procedure

Pre-teaching:

- At the beginning of each 30 minute session:
- My turn – "Student, my turn – watch me put my hand on the table"
- Our turn – "Student, our turn – let's put our hands on the table together."
  - Assuming Student puts his hands on the table, *immediately* provide Student with positive reinforcement (praise + a back rub)
- Your turn – "Student, your turn – put your hands on the table."
  - Assuming Student puts his hands on the table, *immediately* provide Student with positive reinforcement (praise + a back rub)

Ignoring and SWAT:

- If Student engages in challenging behavior, ignore until the behavior stops (if possible)
- S – Say (Verbally prompt Student to engage in putting his hands on the table)
- W – Wait and Watch (Wait to see if he does)
- A – Ask Again (If he doesn't, ask again)
- T – Touch (If he doesn't, provide Student with a light "touch prompt")
- **** If throughout any point in the procedure Student engages in the alternative behavior, immediately provide him with positive reinforcement. "

Challenging Behavior	Alternative Behavior
Leaning Back in his chair with force	Sitting forward in his chair
Hitting his head with an open hand or closed fist	Keeping his hands on the table
Slapping his cheat and or stomach	Keeping his hands on the table
Hitting others (you!) with an open hand or closed fist	Keeping his hands on the table or engaged in the task at hand
Stomping on the floor	Keeping his feet in the floor
Picking his face	Keeping his hands on the table
Closing his eyes (sleeping)	Opening his eyes

APPENDIX H

TREATMENT FIDELITY CHECKLIST

Date: Para: &

Procedural Fidelity: Instruction*	
One Page Description given	Y/N
PowerPoint shown	Y/N
Time for Questions Provided	Y/N
Length of Session	

Procedural Fidelity: Rehearsal*	
PI Acted as Para	Y/N
SI Acted as Student	Y/N
DRA Completed	Y/N
Time for Questions Provided	Y/N
Length of Session	

Procedural Fidelity: Modeling*	
Para given Data sheet	Y/N
PI in Classroom with Student	Y/N
PI engaged in DRA w/ Student	Y/N
Time for Questions Provided	Y/N
Length of Session	

Procedural Fidelity: Feedback**	
FB given immediately following	Y/N
At least 2 Positive Statements	Y/N
At least 2 Corrective statements	Y/N
Para shown Graph	Y/N
Length of Session	

Procedural Fidelity: Feedback*	
FB given immediately following	Y/N
At least 2 Positive Statements	Y/N
At least 2 Corrective statements	Y/N
Para shown Graph	Y/N
Length of Session	0:00

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