Spring 2014

Merge of behavior analysis procedures into a speech-language pathology autism clinic

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A thesis submitted to the Graduate Faculty of

JAMES MADISON UNIVERSITY

In

Partial Fulfillment of the Requirements

for the degree of

Master of Arts

Psychological Sciences

May 2014

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Abstract

This study developed applied behavior analysis skills in a different discipline through training and coaching speech-language pathology graduate students providing therapy services in a program for children diagnosed with autism spectrum disorder. Two graduate students in applied behavior analysis trained 9 graduate students in speech-language pathology in 3 concepts: function of behavior, positive reinforcement and differential reinforcement. These trainings occurred within the framework of a systematic multiple baseline design. After training, each participant received bug-in-the-ear coaching on the use of positive reinforcement daily for 5 days during therapy delivery. At the end of each day therapists developed a list of activities that their clients preferred that day. The following day, coaching encouraged therapists to provide these activities, social praise, and positive touch to the client when the client was on- task. If the client was off-task, these preferred activities were withheld. Coaching focused on differential attention to providing access to preferred activities when the client was on task, as well as a few prompts. If therapists increased the use of these skills by 30 percentage points so that they were using the skills in greater than 60% of intervals, they were likely to maintain a high level of performance after coaching was discontinued.

Introduction

Children diagnosed with autism spectrum disorder often receive services from multiple professional fields; these fields should communicate and collaborate to benefit children as much as possible. From 2000 to 2008 the percentage of American children diagnosed with autism spectrum disorder (ASD) has almost doubled, such that now 1 of every 88 children has a diagnosis (CDC, 2013). As the prevalence of ASD diagnoses rises, demand increases for the most informed, effective, and evidence-based practices available (Blumberg, Bramlett, Kogan, Schieve, Jones & Lu, 2013). Frequently, children diagnosed with ASD receive multiple therapies across multiple disciplines either at home, at school, or in clinics (Kohler, 1999). These venues provide a platform for merged treatment, so that all professionals providing services to a client can be knowledgeable about other services the client receives. Applied behavior analysis (ABA) is an evidence-based, effective, and commonly used treatment for autism (Lovaas, 1987). In 2008, as the demand for evidence-based practices to treat ASD increased, a study was conducted to assess the research of available treatments (Rogers & Vismara, 2008). The results of this study indicate that Lovaas's treatment, or the implementation of applied behavior analysis 40 hours each week, met the criteria for a "well-established" treatment according to empirical evidence.

Recently in Virginia, legislation was adapted to ensure ABA as an insurance-covered therapy for children diagnosed with ASD (General Assembly of Virginia, 2011). ABA therapists do not work in isolation. On the contrary, in 2010 the average child diagnosed with ASD in America received 5.42 services from different fields (McIntyre &

Barton, 2010). For this reason, there should be communication among therapists, particularly across disciplines.

Ethical Considerations

In order to ethically treat clients, behavior analysts should be as informed as possible about the client's other treatments. The supervising board of applied behavior analysts include in their Guidelines for Responsible Conduct for Behavior Analysts,

> *"Behavior analysts are responsible for review and appraisal of likely effects of all alternative treatments, including those provided by other disciplines and no intervention"* (Bailey & Burch, 2005, p. 66).

Practitioners of ABA should be educated about other treatments and disseminate ABA information in a helpful, practical manner to other fields. Often a lack of inter-professional training of key concepts, terms, and implementation strategies creates a barrier for understanding.

Treatment Merge Models and Terms

Merged treatment has existed for years and takes many different forms across a range of disciplines. Inter-professional collaboration for team treatment of clients can be separated into three categories: multidisciplinary, inter-disciplinary, and transdisciplinary (Woodruff & McGonigel, 1988; Korner, 2010).

In multidisciplinary work, professionals from different disciplines implement treatment with clear distinctions between the tasks of each discipline (Woodruff & McGonigel, 1988). Each discipline assesses their clients separately; caregivers meet with professionals from each discipline separately; disciplines develop and implement treatment plans separately and; staff training and development occurs within each

discipline. In this model, the separate teams recognize the importance of the other disciplines, although there may be hierarchies between disciplines. For example, a doctor and a nurse may represent two disciplines in a multidisciplinary team. In this example, the doctor may be considered to have more authority than the nurse; therefore the doctor would rank higher in the hierarchy.

Inter-disciplinary teams conduct separate assessments, develop treatment plans separately, implement their respective parts of the overall treatment plan separately, and train staff within disciplines (Woodruff & McGonigel, 1988). Inter-disciplinary teams meet with caregivers as a whole team, meaning that all disciplines are represented. Team members communicate about treatment plans and combine all separate treatment plans into a large treatment plan. Each discipline implements their parts of the plan and incorporates other disciplines whenever possible. When teams meet, the content of their meetings is client-specific. This model emphasizes team members communicating and sharing responsibility for providing a large treatment plan, but with distinctions between disciplines. For example, if a doctor and nurse were representatives of different disciplines in an inter-disciplinary team, within this model they would each have separate responsibilities to carry out separately. The nurse would complete his/her assigned duties and the doctor would do the same. According to this model they would communicate about their responsibilities and treatment plans.

Transdisciplinary teams implement unified service and educate team members across disciplines (Woodruff & McGonigel, 1988). Transdisciplinary teams conduct assessments together, involve caregivers in therapy, and develop a treatment plan with caregivers and team members from all disciplines. In this model, one designated primary

service provider implements the whole treatment plan with the caregivers. Regular team meetings occur to communicate and educate across disciplines. Staff development occurs through regular team meetings to learn across disciplines and build strong, communicative, equally represented teams.

In a study of workplace teamwork, inter-disciplinary treatment teams have shown to be more effective teams with better teamwork skills than multidisciplary treatment teams (Korner, 2010). In this study hundreds of staff belonging to either multidisciplinary or inter-disciplinary teams completed two psychometrically validated questionnaires: *The Questionnaire on Teamwork* and *The Questionnaire on Staff Satisfaction in Medical Rehabilitation*. The teamwork questionnaire was composed of four subscales: objective orientation, task accomplishment, cohesion, and willingness to accept responsibility. In a statistical analysis, the inter-disciplinary group scored significantly better than the multidisciplinary group on all of these subscales. The questionnaire regarding staff satisfaction showed similar results. It consists of three subscales: workplace atmosphere, leadership, and organization and communication. The inter-disciplinary group scored significantly better in workplace atmosphere and organization and communication. The author infers from the data analysis that those working in inter-disciplinary facilitate better team communication and intensive teamwork to produce more unified service and benefit clients.

To consider a bit more vocabulary, there is a difference between inter-disciplinary and inter-professional collaboration (Abel, Intrevado, & Ozen, 2013; Mu & Royeen, 2004). Disciplines are subfields of professions; therefore inter-disciplinary work may all take place within one profession. For example, within a hospital, a surgeon, physician,

and nurse may engage in inter-disciplinary collaboration as their responsibilities are often different from one another. Inter-professional work includes professionals in different fields collaborating. For example, in a hospital, a nurse, occupational therapist, and music therapist may engage in inter-disciplinary work. Occupational therapists and music therapists are not traditionally considered part of the same profession as other health care providers in hospitals, so this collaboration is inter-professional.

Inter-professional collaboration has existed in American health care for decades and generally occurs at the professional level (Lumague, Morgan, Mak, Hanna, Kwong, Cameron, Zener, & Sinclar, 2006). One can consider how many fields of health care exist and offer services within one hospital or other institution. Traditionally, we think of nurses, doctors, and other medical disciplines collaborating. The benefits of collaboration extend to other professions, such as the relationship between information technology, psychology, and pharmacy management (Abel et al., 2013). Often the collaborative skills develop as part of independent professional development and without formal training in collaborative models. Although, some universities emphasize the importance of training health care professionals in collaborative skills before they enter the workplace through inter-professional education (IPE) programs. The World Health Organization states that IPE occurs when students from different professions work together to learn about one another, and in doing so improve health outcomes (World Health Organization, 2010). Students find these programs very beneficial for their personal and professional repertoires (Lumague et al., 2006). Although inter-professional collaborations have existed for a very long time, there is little American research to

encourage institutions to formally train students in inter-professional models

(Thistlewaite, 2012).

Justifications for Merge

As potential disciplines for merged treatment, Speech-Language Pathology (SLP)

and ABA share many characteristics. First, the qualifications for an ASD diagnosis

according to the Diagnostic and Statistics Manual- 5 include deficits in social

communication and restricted, repetitive patterns of behavior (American Psychiatric

Association, 2013). It seems logical that SLPs are appropriate therapists to address social

communication deficits and ABA practitioners are appropriate therapists to address

restricted, repetitive behaviors. This can be extended, though. ABA practitioners often

address social communication deficits by teaching children verbal behavior and

functional communication (Charlop-Christy, Carpenter, Le, LeBlanc, & Kellet, 2002).

Charlop-Christy and her colleagues taught three children diagnosed with ASD functional

communication, using the picture exchange communication system (PECS). PECS is

commonly used, despite a lack of published research demonstrating the positive effects of

its use. All of the participants in the 2002 study demonstrated increases in social-

communication behaviors and decreases in problem behaviors after the implementation

of PECS training. Additionally, clients often display behaviors that disrupt SLP therapy,

and therapists develop strategies to address these problem behaviors (American Speech-

Language-Hearing Association, 2007). This is not a one-sided push, in which those in

the field of ABA believe that those in the field of SLP would benefit from behavior

management strategies. Individuals in both fields advocate for the understanding and

implementation of the other field's practices. In the *American Journal of Speech-*

Language Pathology in 2004, an article was published highlighting the roles of SLPs in positive behavior support plans for individuals with developmental disabilities (Bopp, Brown, & Mirenda, 2004). In this article, the authors emphasize that SLPs' particular expertise can be an asset in developing a behavior plan including communication training. Many children with ASD have behavior plans including functional communication training and SLPs often carry out parts of these plans. These authors reviewed relevant research to provide suggestions to integrate SLPs into the process of assessing, intervening, and implementing communication programs in the framework of positive behavior support plans.   From the other side, applied behavior analysts assert that in order to manage some problem behaviors, practitioners must understand functional communication (Carr & Durand, 1985). Carr and Durand taught verbal behavior to solicit adult attention or assistance in difficult tasks and demonstrated decreases in problem behaviors. They state that functional communication is often an appropriate replacement behavior. Therefore, beginning with diagnostic criteria, one can see why these fields present potential collaborative efforts to provide comprehensive services to children with ASD.

Furthermore, speech therapy services and behavior management services are listed as two of the three core therapeutic services provided to children in special education classrooms across the country in 2013 (Wei, Wagner, Christiano, Shattuck, & Yu, 2013). In other words, of the many services available, speech services and behavior management services were two of the three most-often-provided and consistently provided across all age groups of children in special education classrooms. With this

prevalence of implementation, there should be a large amount of inter-professional education.

As mentioned above, social communication includes functional communication, a relevant therapeutic dimension of both SLP and ABA. Functional communication is defined in both the SLP and ABA literature. According to the American Speech-Language-Hearing Association, functional communication skills "are forms of behavior that express needs, wants, feelings, and preferences that others can understand" (National Joint Committee for the Communication Needs of Persons with Severe Disabilities, no date). Cooper, Heron, and Heward (2007) define functional communication training as an intervention to teach an appropriate communication behavior to replace a problem behavior. According to behavior analysis, the underlying principles of functional communication are those of verbal behavior, and verbal behavior can be analyzed and modified under the same behavioral principles. Verbal behavior has been regarded as behavior both theoretically and practically for many decades, beginning with the work of Skinner's 1957 his book *Verbal Behavior*. The Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP) applies Skinner's theory in a practical booklet that can be used in any setting by parents, teachers, behavior analysts, SLPs, and others (Sundberg, 2008). This program assesses children's verbal repertoires up to a developmental age of 48 months, and is widely used with children with developmental disabilities. When the author of the VB-MAPP, a behavior analyst, developed the VB-MAPP he consulted with other behavior analysts and speech pathologists, among other professionals. Professionals from the fields of SLP and ABA share assessments, like the

VB-MAPP, and theories, like verbal behavior, as well as intervention strategies, like functional communication training.

Precedent exists for inter-professional research merging the fields of SLP and ABA. *The Journal of Speech and Language Pathology- Applied Behavior Analysis* began in 2006, and promotes practicing SLP using behavioral techniques and assessment procedures (Cautilli & Koenig, 2006). Three to four times a year for eight years, professionals have published findings relevant to merged treatment in this journal online and for free to the public. The presentation of the information is generally in behavior analytic language, although the authors range in professions including board certified behavior analysts, licensed speech-language pathologists, educators, clinical psychologists, and deans of colleges. The articles are a fairly even mix of experimental research, conceptual papers, and literature reviews of both professions. Research topics vary in both behavior analysis, speech-language pathology. For example, there are articles on equivalence relations, functional communication with adults, regulated breathing for stuttering, and multiple exemplar instruction in spelling. Research methodology includes multiple baseline designs across participants, case studies, cumulative record representations of behavior, and statistical analysis, and functional magnetic resonance imaging (fMRI). Although multiple baseline designs are included in this journal, often the phases are composed of less than three data points, making it difficult to determine the trend of the data path. Although there are many studies of children diagnosed with ASD, there is yet to be a published article on inter-professional education at the level of the student in this journal.

From diagnostic criteria to treatment content, SLP and ABA have much in common to facilitate merged treatment. This has already been demonstrated by the development of a merged journal.

Data Analysis in Treatment

Implementing therapies to target verbal communication is not the only similarity that these two fields share, though. In the scopes of practice of both fields, an emphasis is placed on data collection and analysis to monitor and demonstrate effectiveness of treatment (American Speech-Language-Hearing Association, 2007; Baer, Wolf, & Risley, 1968).

Collaboration Dimensions

According to previous literature, overlapping scopes of practice, practical considerations, and ethical responsibilities to clients, it is logical that the fields of SLP and ABA should collaborate when serving clients with ASD. The reasons why to collaborate have been articulated. Now the focus has turned to the explanations of how to accomplish this. The VB-MAPP, behavior management strategies to maintain on-task behavior, and inter-professional training and coaching provide some opportunities for collaboration.

As stated earlier, the VB-MAPP is widely used across many disciplines and in many settings. It comes with a protocol handbook and a manual and does not require expensive training sessions or certifications. For these reasons, among others, the VB-MAPP can be easily used by both SLP and ABA therapists to target the same developmental skills and build client verbal repertoires. Without effortful coordination,

ABA and SLP therapists already use this program in parallel. With written permission, simple conversations about shared clients can assist therapists in optimizing therapy.

A challenge to any practitioner is maintaining client engagement, or in other words, on-task behavior. The first step to determine how to assess and increase on-task behavior is to define it. Goldstein and Goldstein (1990) provided a useful system for classifying on-task and off-task behavior in classroom settings. This system, entitled the TOAD system, classifies off-task behavior into four categories: talking out, out of seat, attention problem, and disruption. The authors define each category of off-task behavior more comprehensively and with examples. Whenever a student is not engaging in any of the TOAD off-task behaviors, then he is on-task. This system can be applied outside of classroom settings and offers a clear, operational definition for on- and off-task behaviors.

Once a practitioner has a reliable definition and measurement system for determining their clients' levels of on- and off-task behavior, she can use behavior management strategies to increase on-task behavior. Increasing on-task behavior means that clients will be more engaged in the therapy activity at hand, and therefore the therapy has an increased chance of being effective and beneficial. In 2007, a review of literature including behavior management strategies for children with ASD in classrooms from the previous decade, authors report that four types of behavior analytic procedures were effective in reducing problem behavior (Machalicek, O, Beretvas, Sigafoos, Lancioni, 2007). One of these procedures, differential reinforcement, has repeatedly demonstrated effective results in reducing problem behaviors and increasing adaptive skill acquisition, as well as increasing engagement in classroom activities (Broden, Bruce, Mitchell,

Carter, & Hall, 1970; Cooper et al., 2007). Differential reinforcement consists of two behavioral components: reinforcement and extinction. Clinically, the practitioner would provide reinforcement when the client engages in one set of behaviors while withholding reinforcement for another set of behaviors. To tie in procedures previously discussed, differential reinforcement is a component of functional communication training (Fisher, Kuhn, & Thompson, 1998). Functional communication training teaches a client to produce an appropriate response to replace a problem behavior response. For example, the client may learn to say, "Toy," instead of hitting the therapist to indicate that he/she wants the toy. In this procedure, the therapist provides reinforcement for the appropriate response and withholds reinforcement for the inappropriate response.

In order for a therapist to understand how to reinforce certain behaviors and withhold reinforcement following other behaviors, the therapist must understand the function of the behavior. Different behaviors serve different functions for different clients, and cannot be judged solely on topography (Iwata, Dorsey, Slifer, Bauman, & Richman, 1994). Treatment decisions in behavior analysis include determining the function of behavior. Based on these considerations, function-based interventions are developed for clients.

Coaching

If therapists from the field of SLP and ABA choose to merge focusing on functional communication using the VB-MAPP, and provide differential reinforcement for on-task behavior, a protocol must be developed to assess how to merge. The therapists must train one another, offer opportunities to practice, provide feedback, provide reinforcement, and fade reinforcement. Training comes in many forms and is

commonly used in consultation work. In the field of ABA, often professionals are called

upon to train those outside of the field to implement ABA technologies. Sharing this

knowledge of behavior management skills is beneficial, but may not always be sufficient.

Instead, training and feedback combined can produce higher levels of adherence to the

plans developed in training (Parsonson, Baer, & Baer, 1974). Parsonson and his

colleagues conducted a study to assess the use of feedback to teachers in arranging

appropriate social contingencies for positive child behavior. In other words, the

researchers recorded when a child engaged in appropriate behavior and was provided

with social attention and vice versa. The teachers received feedback as written notes of

the percent of responses to appropriate child behavior. Both teachers that participated in

the study demonstrated increases in social response to appropriate behavior and

maintained these intervention effects for at least 50 weeks.

Coaching is a commonly used feedback practice in educational settings and many

different models have developed. In a study of teacher adherence to function-based

intervention plans, the coaching was found to be critical to teacher implementation

(Bethune & Wood, 2013). In this study, the researcher held a one-day in-service training

in which the four participating teachers developed intervention plans for specific

students. The researcher observed the implementation of these plans and recorded this as

baseline data. The researcher then coached the teachers, and their adherence to the plan

increased to almost 100% and maintained at high levels. This study used a method of

coaching called side-by-side, one part of which includes the coach staying in close

physical proximity of the teacher and providing feedback immediately. Other studies

extended the use of a particular psychological therapy to classrooms, and the combination

of training and in-vivo coaching resulted in effective implementation (Gershenson, Lyon & Budd, 2010; Lyon, Gershenson, Farahmand, Thaxter, Behling & Budd, 2009)

One type of coaching, named for the physical technology required, is bug-in-the-ear (BITE) coaching. Bug-in-the-ear feedback systems include one transmitting microphone and a separate receiving headpiece. The headpiece is worn by the person receiving coaching, so that only this person can hear the coach's feedback. This system is often used in training situations, in which the trainee must implement new skills in a real-life situation. Literature shows that BITE feedback increases implementation of new skills learned in training workshops for classroom interventions, as compared to training workshops alone (Edwards & Nelson, 1976). Specifically, teachers increased their use of praise and attention contingent on appropriate behavior. Peer coaching models in educational settings have implemented BITE coaching to coach general education teachers working with children with disabilities (Scheeler, Congdon, & Stansbuery, 2010). Social validity measures report that coaching in a peer-to-peer dynamic was beneficial and comfortable.

Autism Clinic

Institutions, such as James Madison University (JMU), encourage research collaboration across disciplines. The Speech-Language Pathology Masters Program and the ABA track in the Psychological Sciences masters program are under the same umbrella of behavioral sciences in the College of Health and Behavioral Studies at JMU (CHBS, 2013). This college emphasizes collaboration in its statement of values, including the importance of searching, "cooperatively for possibilities to engage in interprofessional and interdisciplinary work" (CHBS, 2013). Additionally, this college

values outreach programs to provide service to community members while allowing students to learn in practical settings through inter-disciplinary models. Included in these models are both SLP services and ABA services. One example is the Inter-Professional Autism Clinic, serving children diagnosed with ASD with SLP services, ABA services, and occupational therapy services (Baird Center, 2013). This venue offers students the opportunity to collaborate and learn from one another. Furthermore, all supervising faculty encourage this collaboration. In the future, the clinic plans for a systematic training procedure to exist to determine the effectiveness of students' acquisition of extra-disciplinary knowledge (White & Stokes, 2014).

In addition to fostering inter-professional collaboration, JMU has a task force to assess the quality of inter-professional education (IPE) for JMU students (Akerson, Hammond, Hargens, O'Donoghue, Sanford, Stewart & Stokes 2013). According to this group, one of the recommendations for strengthening IPE at JMU is to

"support interprofessional collaboration in… clinical practice for faculty and students, including student engagement in pre-professional training at JMU community-responsive training clinics" (p.5).

Currently, the Communication Sciences and Disorders program at JMU houses a Summer Autism Clinic, in which nine graduate students are educated and apply training while working with children diagnosed with ASD (The speech-language-hearing applied laboratory, 2013). Due to the value placed on collaboration within this college, the willingness of SLP graduate students and ABA graduate students to work collaboratively, and the available facility and clients, this Summer Autism Clinic provides a unique

opportunity for SLP graduate students and ABA graduate students to learn from one-another about their respective treatments and develop protocol to merge these treatments.

The appropriate term for this model of merge is inter-professional. This was a unique opportunity for the graduate students and also a unique research opportunity, as it branches out from researching collaboration in medical settings.

Because the university encourages merge, not just at the professional level, but also at the student level, and because a group of students and professors were enthusiastic about creating new pathways for collaboration in an applied, therapeutic setting, this project developed. The purpose of this study is to determine the feasibility of merging treatment at the level of the graduate student. Graduate students compose the next group entering the workforce, and this merge is truly part of professional development. The Communication Sciences and Disorders department houses an autism clinic offering one-on-one speech language pathology services from the SLP Master's degree candidates. Nine rising second year students in the SLP Master's program will serve children diagnosed with ASD. The licensed SLP and practicum supervisor in the clinic agree to have two graduate students from the ABA track join their therapy team for the summer. The SLP graduate students develop a treatment program based on the VB-MAPP. The ABA graduate students will learn about SLP therapy through observation and interaction in the clinic. The ABA graduate students plan to hold trainings throughout the summer to discuss behavior management strategies particular to the therapists' clients. The strategies include behavior analysis procedures to increase on-task behavior and decrease problem behavior. These plans include elements of function-based interventions, positive reinforcement, and differential reinforcement. Due to the generosity of the clinical

supervisor, the ABA students are permitted to use a BITE feedback system to coach the

SLP students. James Madison University facilitates an intensive learning opportunity for

ABA students to immerse themselves in an SLP clinic and learn from the graduate

student therapists, as well as SLP students to learn about research methodology and

behavior management procedures from the ABA students.

Method

Participants

Nine graduate students with two semesters of completed graduate coursework in the field of speech-language pathology consented to participate before the study began. All were females between the ages of 22- and 29- years old. Eight of the nine had previous clinical experience through their graduate program. During the course of the study two of the graduate student therapists withdrew participation. One withdrew because she had health issues that necessitated her taking extended time off from the clinic. The other participant withdrew because her client engaged in behaviors that could be dangerous to his peers. We felt that it was unethical to withhold information about behavior management strategies from this therapist. They provided speech and language services under the supervision of two licensed speech-language pathologists and received course credit for their experience. Their voluntary participation in this research project did not influence their course grades in accordance with the approved proposal for research by the Institutional Review Board at JMU.

Nine children participated as clients in this research study at the beginning, although we discontinued collecting data on the clients who worked with the therapists who withdrew. In other words, these clients did not withdraw from the study, but after their therapists' withdrew, we did not collect data on the dyad (therapist and client). All of these children were enrolled in the summer clinic; therefore the researchers did not recruit any of them. If the parents chose to discontinue their child's participation in the study, the clients would still have received services from the same SLP graduate students. All the clients were males between the ages of four and seven diagnosed with ASD.

Their academic and verbal abilities ranged greatly; some clients did not speak any words at the beginning of the clinic, while others were performing at grade level in mostly general education classes in public schools.

The purpose of the study was to analyze the access to preferred activities when the clients engage in on-task behavior. Therefore, the researchers observed interactions between therapists and clients. Each SLP graduate student therapist was assigned one client and did not exceed a one therapist to two clients ratio during the therapy sessions. Two licensed SLPs supervised the graduate student therapists, such that one supervisor had assigned herself to five of the participants and the other to the other four participants. One of these supervisors, Dr. Marsha Longerbeam, is also one of the researchers for this study. The other supervisor was Christine Reeves. Both of the supervisors were kept aware of research related changes daily.

Dr. Trevor Stokes and Dr. Keri Bethune supervised the ABA students responsible for observation, training, coaching, and other aspects of research. Both of these professionals are board certified behavior analysts, and Dr. Trevor Stokes is one of the researchers for this study.

Setting

Therapy took place in a clinical setting within a public university. The clinic has nine therapy rooms and two observation rooms. All rooms are 10 feet wide and 14 feet long. The therapy rooms have one window, carpets, and a camera suspended from the ceiling, enclosed in a plastic container. One observation room contains five computers, equipped with headphones. The other observation room contains two computers equipped with headphones. Camera movement can be controlled from the observation

rooms. All trainings took place in three locations: a department conference room on the same hallway as the clinic, one observation room, and one of the therapy rooms.

Materials

The clinic in which the summer program took place is equipped with a computer system for video-recording and real time viewing of therapy rooms: Cannon Client Viewer for Network Video Recorder VK-64 system. This technological system allows video-recording cameras in each therapy room to transmit a live-feed video to computers in two observation rooms, also within the clinic. In this system, videos may be watched in real-time and are stored for later recalling and viewing, as well. The video system includes both audio and visual recordings and everything is stored on a secure server. The clinic is also equipped with three bug-in-the-ear feedback technology systems: Comfort contego T900 Transmitters and Comfort contego R900 receivers. The clinic houses this autism program annually and agreed to generously provide access to all technological equipment for the use of this study.

In addition, the graduate student therapists completed a form at the end of each therapy session listing the clients' preferred activities and toys. This is called the "Preferred Activities List" (Appendix A). Examples of preferred activities may include toy trains, silly putty, songs, iPad, high fives, M&Ms, and water play.

Dependent Variables

The goal of this study was to increase the percent of intervals in which the graduate student therapists provide access to preferred activities to their clients. Therapists provided access to toys or activities listed on the previous day's "Preferred Activities List," as well as verbal praise and/or positive touch. Positive touch was

counted when a therapist touched a client, with the exception of physical prompts or accidental contact. Examples of positive touch include holding a client's hand, giving high fives, and patting the client on the back.

Although therapeutically the participants were trained to provide access to preferred activities contingent on clients' on-task behavior, for the practicality of observation, the access only needed to occur within the same 15 s interval as on- or off-task behavior. For example, a therapist may have given the client a high five in the first 2 s of the interval, and the observers marked this as access to a preferred activity in that interval. The relationship between the on-task behavior and access to preferred activities was measured as two events that occurred proximal in time.

Data Collection

Both therapist and client behavior was observed using video recall and was coded using a partial interval recording system with 15 s intervals. The clients' behavior was coded either as on-task or off-task for each interval. Off-task behavior was broken down into four categories according to an adapted version of the TOAD system (Goldstein & Goldstein, 1990). Clients could be talking-off-task, meaning they talked about topics irrelevant to their immediate environment and the topics introduced by the therapist for at least a consecutive 5 s (Appendix B). They could also be out-of-seat-off-task, meaning that if a chair was provided for the client, the chair did not support their weight, for at least a consecutive 5 s. Another category was attention-off-task, which was counted when a child looked anywhere other than the therapy materials provided by the therapist or the therapist herself for a minimum of 5 s consecutively. The final category in which off-task behavior occurred was destructive/disruptive-off-task, which was counted when

the child threw, ripped, scribbled over, hid the work, or chewed on the activity unless instructed to do so. This category also included hitting, kicking, biting, scratching with any part of the body to another person or to the client himself.

These explanations determined which behaviors were deemed off-task and which on-. Data were collected in 15 s intervals for this project (Appendix C). In order for an interval to be considered off task, the client must have engaged in off-task behavior for a minimum of 8 s consecutively in an interval. Additionally, an interval was off-task if a consecutive, continuous combination of any off-task behavior occurred. For example: A child was out of his seat for 5 s, returned to his seat, but was inattentive for 3 s.

Experimental Design

Professionals in applied behavior analysis often use single-case designs in research to determine the effectiveness of treatment (Kazdin, 2011). One type of single-case design is a systematic multiple-baseline design. One type of multiple baseline design, is a multiple baseline across participants, meaning that the behavior of multiple participants are compared across time. In this design data collection on participants' behaviors begins at the same time, and systematically one participant or group of participants enter the treatment phase while other participants remain in the baseline phase. The design demonstrates the effectiveness of a treatment when a participant changes from the baseline phase to the treatment phase. One can predict that any participant's behavior will remain consistent with baseline measurements without the introduction of treatment. When a behavior change is demonstrated after the introduction of treatment, it can be interpreted that this change is a result of the treatment. When this

explanation is replicated over multiple clients, the interpretation is stronger, and the treatment is shown to be effective.

This experiment utilized a systematic multiple baseline design across groups of participants. In this design, experimental control was demonstrated by the sequential introduction of training and coaching and observed effects on participants' behaviors (Kazdin, 2011).

Data Analysis

In a multiple baseline design data collected on participants behavior was represented on line graphs. The consumer of the graphs then determined visually whether a noticeable change occurred (Kazdin, 2011; Parsonson, 2003). This was noted in changes in the slope of the data path; the level, indicating high rates or low rates of behavior and; the variability in the data path. This type of analysis is conservative in stating that a meaningful change occurred.

Procedures

At the conclusion of each therapy day, the participants met in a common room and completed lists of the activities and items that their client preferred that day. The researcher compiled these lists into a typed document without identifiable information, for observers to use later, and shredded the original documents with identifiable information.

Daily, three observers watched videos of each participant interacting with her client for 5 min sessions at 9:10 a.m., 9:40 a.m., 10:40 a.m., 11:10 a.m., and 11:40 a.m.. Each client had a snack break out of the therapy rooms that overlapped with one observation time, so observations occurred at either 9:40 or 10:40 depending on the

individual clients' snack times. For each 15 s interval, observers recorded whether the

child was on-task or off-task, and whether the child was given access to a preferred

activity according to the previous day's preferred activities list. Preferred activities also

included social praise, positive touch, and the iPad for all clients.

One of these observation times was assigned each day as the IOA time, indicating

that two observers observed each participant during that time, and used these data to

calculate IOA. These times rotated daily, beginning with 9:10 a.m. on the first day of

data collection. When all data were collected for the day, the researcher analyzed the

average percentage of intervals in which the client was on-task and gained access to

preferred activity.

When the data of participants' use of positive reinforcement were stable showing

no trend or a decreasing trend, the researcher conducted a training for two or three

participants that were implementing these skills (access to preferred activities when client

was on-task) at a low level. This training consisted of a one-hour meeting with the

participants, one researcher, and Coach 2. First, the participants read definitions of

positive reinforcement and differential reinforcement published in 2013 by the National

Professional Development Center on Autism Spectrum Disorders (Appendix D). Next,

they read an excerpt from a textbook regarding behaviors' functions (Cipani & Schock,

2010). This excerpt included examples of hypothetical problem behaviors and the

therapeutic importance of determining the function of behavior in order to develop an

appropriate intervention. Specifically, the authors explain that behaviors provide access

to activities/attention/environments or allow escape from an aversive situation. The

trainers (researcher and Coach 2) then offered examples of each of the procedures and

asked the participants to generate their own examples specific to their clients. Next, the

trainers tried to make the study as transparent as possible in the spirit of integrated

research. The trainers showed the participants the data collection sheets and the

definitions for on- and off-task behavior, as well as describe the use of the preferred

activities lists. Next, the participants watched pre-chosen YouTube videos of speech

therapy with children diagnosed with ASD and were provided practice "preferred

activities list" for these video clients. In this way, the participants had the opportunity to

practice data collection. The same two YouTube videos were shown to each training

group and the websites can be found by contacting the author. After 15 s intervals, the

trainers paused the YouTube video and the participants indicated whether the YouTube

client had been on- or off-task and whether the YouTube therapist had provided access to

a preferred activity. The last part of the training allowed the participants to practice using

the BITE to familiarize themselves with it. The participants and trainers role-played so

that participants could explore BITE feedback systems from the role of coach in another

room, therapist implementing positive reinforcement, and client engaging in therapy.

Trainers welcomed questions and expressed the importance of confidentiality and

discretion, so that these participants would not share the information from training with

the other participants before their training date. Trainers had a training protocol with

them at all time to ensure that all participants received the same training in the same orger

(Appendix E).

  The day following training, the researcher placed a note in each therapy room

stating the time that coaching would occur that day. The notes read, "Good morning! We

will coach at ___ today." At the designated time, the coach walked the BITE receiver to

the participant's therapy room, and then coached remotely. The coach watched and listened on the computer observation system as the participant engaged in therapy. When the client was on-task and the therapist provides access to a preferred activity, the coach praised the therapist, therefore implementing the use of differential attention to the participants. Coaching times rotated throughout the following days so that the participant could experience coaching across a range of activities throughout the therapy session. Rotating coaching times should also have decreased the likelihood of order effects between the participants.

Participants received coaching for 15 min each day following training. After seven days of therapy, the clinic rotated clients so that the participants have an educational and practical experience with multiple clients diagnosed with ASD. All of the same clients and therapists were present, just paired differently.

Baseline began again, and the participants that showed low levels of implementation of these skills participated in training using the modified training protocol and engaged in days of follow-up coaching using the modified coaching content.

Social Validity

Upon completion of the study, each participant completed a social validity questionnaire to rate the appropriateness of procedures, goals, and outcomes (Appendix F). Additionally, the researcher encouraged each participant to write any comments they felt would be beneficial if the study were replicated. Responses to these items and some comments are included in the discussions section of this project.

Results

The goal for this research was that training and coaching would increase therapists' presentation of preferred activities when their clients were on-task. Daily, the data were graphed and visual analysis evaluated the therapists' performances, consistent with the field of applied behavior analysis.

During baseline, the therapists were observed before they had begun training or coaching. After 3 days, three therapists were chosen to participate in training based on a low level of access to preferred activities when the client engaged in on-task behavior: Whitney (pseudonym), Adrianne (pseudonym), and another therapist. The third therapist withdrew from the study due to health issues. Whitney was performing these skills at a stable, low level, with a decreasing trend. Her mean in baseline was 34.01%. Following training she began implementing these skills at a higher level, with a mean of 62.51% for the first four days. During baseline Adrianne was performing these skills at a variable, low level, with a decreasing trend. Her mean in baseline was 35.68%. In the training and coaching phase, the data path representing Adrianne's performance showed more stability, and a slightly upward trend, but no change in level. Her mean during the first four days of the training and coaching phase was 35.25%. Our intervention was not effective enough for Adrianne, therefore we held a second training to review the concepts and get feedback from Whitney and Adrianne. In this training we emphasized providing access to preferred activities for "waiting behaviors" such as attending to a book, waiting while the therapist set up the next activity, and waiting while another client took a turn in a game. In this training, both Whitney and Adrianne requested more directive feedback during coaching.

After the second training and with modified coaching, Whitney increased her use of these skills to a higher level, with some variability, and no trend. Her mean in this phase was 74.99%. After we discontinued coaching Whitney continued performing at a stable, mid level, with no trend. Her mean in the "no coaching" phase was 69.79%. After the second coaching and with modified coaching Adrianne's performance increased to a higher level with some variability, and no trend. Her mean during this phase was 54.42%. After coaching was discontinued, Adrianne's use of these skills did not maintain and her performance decreased to a low, stable, level, with no trend. Her mean during this time decreased to 31.56%, similar to her mean in baseline.

After the therapists changed clients, we analyzed the baseline data of the remaining six therapists. One more therapist withdrew from the study, as well. Her assigned client engaged in some dangerous behaviors and we felt it was unethical to withhold behavior management strategies from her. Therefore, we consulted with her about her client's behavior and discontinued observing her interactions formally for this study. She did opt to come to one training session to understand what her colleagues were learning in training, though. After the client change and three days of baseline, Blair and Christina (pseudonyms) participated in training. The training for Blair and Christina included providing access to preferred activities for "waiting behaviors" and the coaching they received included both differential attention and prompts. During baseline, Blair was performing at a stable, low level, with no trend. Her mean in baseline was 21.93%. In the training and coaching phase, Blair's performance increased to a higher level, with variability, and an increasing trend. Her mean in this phase was 54.47%. After coaching was discontinued, she increased to a higher level, with a mean of 63.79%.

Only 2 days of data were collected after coaching was discontinued so it cannot be determined if there was variability or a trend. During baseline, Christina was performing at a low level, with variability, and a decreasing trend. Her mean during baseline was 42.45%. During the training and coaching phase, her performance increased to a stable, mid-level, with no trend. Her mean during this phase was 65.25%. After coaching was discontinued she maintained a mid-level performance with a mean of 50.11%. This mean was lower than her level during the intervention phase, but higher than her level during the baseline phase.

After a change in clients and six days of baseline, the last three therapists participated in training: Emma, Audrey, and Christie (pseudonyms). Like the second group, they received training that included providing access to preferred activities to "waiting behaviors" and coaching that included prompts. In baseline Emma was performing at a low level, with variability and a decreasing trend. Her mean during baseline was 28.94%. In the training and coaching phase, she increased her performance with a stable data path to a high level and an increasing trend. Her mean during training and coaching was 71.65%. Due to time constraints, this group of participants did not experience a "no coaching" phase. Audrey's performance in baseline was stable, at a high-level, with no trend. Her mean during baseline was 69.92%. In the training and coaching phase her performance was slightly variable, at a high level with no trend. Her mean during this phase was 79.82%. During baseline, Christine performed at a low level with a decreasing trend and variability. Her mean during baseline was 54.76%. In the training and coaching phase, her data became more stable. Her mean during this phase was 65.87%.

According to the means of baseline and intervention data, every therapist increased client access to preferred activities for on-task behavior from the baseline to training and coaching phase. The average increase from baseline to intervention was 23.73 percentage points, with a range of 9.91 to 35.99, and a standard deviation of 13.54 (Table 1). Overall, Whitney, Blair, and Emma showed significant changes in their use of these skills when training and coaching were introduced as demonstrated by changes from a decreasing trend at a low level to an increasing trend at a high level. Christina and Adrianne changed from a decreasing trend during the baseline phase to an increasing trend during the intervention phase. The practical implications of these results, as well as some anecdotal information to support the graphical representation of the data will be explained in the discussion section of this paper.

Although we focused on the therapists providing appropriate consequences to on- and off-task behavior, we also tracked client behavior. Clients were generally on-task at a very high level for most of the study. The average percentage of intervals in which clients were on-task in baseline was 75.68%, and this increased to 81.62% in the intervention phase (Table 2). At the beginning of the study, we tracked the on-task behavior of 9 clients. We discontinued tracking the on-task behavior of one of the clients because after the client change he moved on to work with a therapist who had withdrawn from the study. Therefore, we have the percentage of intervals of on-task behavior for the 8 clients who were observed in both baseline and intervention. Only one of these participants showed a decrease in the mean of on-task behavior after the intervention. Barrett increased his mean on-task performance by 13.76 percentage points, from 67.86% to 81.61%. He worked with Whitney for the first 7 sessions of the clinic, then with

Christina. Chuck worked with Christina for the first 7 sessions then with Whitney for the final 10 sessions, and his mean on-task performance increased 9 percentage points from 69% to 78%.

We also measured our coaching in multiple ways. Overall, Coach 1 coached 32 times total and Coach 2 coached 11 times total. Coaching data were collected every day. Both coaches provided feedback to every therapist. All coaching sessions were scheduled to last 15 min, but sometimes did not last the full 15 min. For example, sometimes during a coaching session a client would be removed from therapy for a hearing assessment or needed to use the restroom. Coaches never discontinued a session for any reason other than the removal of a client from the therapy room. Overall, Coach 1 spent an average of 14.44 during coaching sessions, ranging from 8-15 min. On average, Coach 1 delivered 18.84 praises for the correct use of differential reinforcement and 3.36 prompts to identify an opportunity to the therapist to engage in differential reinforcement (Table 3). Coach 2 coached for an average of 14.09 min, with a range from 5-15 min. She provided an average of 19.27 praises highlighting the correct implementation of differential reinforcement and an average of 2.89 prompts. Coaching data for Coach 1 was collected by Coach 2 and vice versa.

The two coaches in this study were Elizabeth Simons and Heather White, another graduate student studying ABA. Both coaches had previous experience in BITE coaching using differential attention to a participant's use of differential reinforcement with a client diagnosed with ASD. The two coaches also had experience coaching and being coached by peers in their graduate program.

IOA was assessed daily for each therapist. This was arranged so that the IOA of each observer was calculated with the other two observers each day (Appendix G). IOA was observed for 40.87% of the total intervals in the study. Overall, the average IOA across the three observers was 87.58%, with a range from 52.5% to 100%. The IOA of observers 1 and 2 was 88.22%, with a range from 65% to 100%. The IOA of observers 2 and 3 was 85.12% with a range from 52.5% to 100%. The IOA of observers 1 and 3 was 88.9% with a range from 61% to 100%. In each interval, observers could agree on whether the child was on- or off-task and whether the therapist provided a preferred item. Therefore, in each interval there are two opportunities to agree. IOA was calculated by the total number of agreements divided by the total number of opportunities to agree, times 100 to represent the agreement as a percentage.

Discussion

Our experimental goal was to examine whether training and coaching would result in increased use of behavior analysis procedures by the therapists. This study assessed the feasibility of merging ABA and SLP therapies. In other words, was it possible for the SLP graduate students to incorporate behavior management strategies into their therapy? If it was possible, what was the best way to do this in terms of training and coaching? We wanted to develop a protocol for teaching behavior management strategies so that this could be replicated if future SLP graduate students in the autism clinic wanted to learn behavior management strategies. This study fulfilled each of these goals. Overall, therapists were able to incorporate behavior management techniques into their therapy. Every therapist increased her use of these strategies after training. Bug-in-the-ear coaching was very important in acquiring these skills, as demonstrated by the positive maintenance effects after coaching was discontinued for the first four therapists. Also, the therapists requested more prompting in the coaching. We learned that if the therapists increased their use of these skills by 30 percentage points, such that they were using these techniques in approximately 60% of observed intervals, then they were likely to maintain the use of these techniques after coaching discontinued. Having gained this knowledge, we can provide our research protocol and demonstration of its effects to future SLP graduate student therapists and to the clinic so that they may acquire new behavior management strategies to benefit their therapy. One of the researchers for this project, Marsha Longerbeam, is a supervisor in the clinic and will have access to all of our research materials

This project fits in with the current demand for evidence-based practices in the treatment of autism, in that this project collected systematic data regarding the effectiveness of merging ABA and SLP on particular dimensions (Blumberg et al., 2013). Because these are two of three core services provided to children in special education classrooms, we infer that they are commonly applied services and therefore relevant for merge (Wei et al., 2013). Korner found that professionals involved in inter-professional teams reported more effective teamwork (2010). According to the social validity questionnaires administered in this project, the therapists indicated that inter-professional merge benefitted them. In a rating scale, with five possible responses, all participating therapists responded that they strongly agreed that they would "recommend a similar training to other graduate students in [their] field". One therapist wrote a note on her social validity questionnaire that said, "Thanks… for furthering our education towards being great clinicians."

As this was research conducted by graduate students studying the field of ABA it needed to be systematic with the principles of ABA. Baer, Wolf, and Risley (1968) outlined the criteria necessary to qualify a study as one in the field of ABA: applied, behavioral, analytic, technological, conceptually systematic, effective, and having generality. This intervention addressed socially significant variables: facilitating the acquisition of a behavior management skill set by future SLPs and increasing task engagement for children diagnosed with ASD. The researchers designed and utilized clear data collection systems, inter-observer agreement was assessed regularly, and the researchers analyzed the data to determine what variables can be said to have caused behavior change. Because this study was conducted in a multiple-baseline design, we

can see behavior change at each intervention, across people and time. We see a very clear demonstration of experimental control in assessing the behavior change after different amounts of time in baseline with the second and third groups of therapists. Hopefully the written document of this research study is technological, in a behavior analytic sense. This means that the research conditions are outlined clearly enough to allow replication. This study only used behavior management strategies demonstrated to be effective in research literature, and was therefore conceptually systematic. Using visual analysis to analyze data allows the consumer to decide whether the behavior change that occurred was socially relevant, and therefore effective. Lastly, we could not assess generality of these skills outside of the clinic, but we did have the opportunity to assess the generality of the new behavior management skills learned by the therapists when the first two therapists changed clients and when coaching was discontinued. Also, the therapists' maintenance of behavior is generalization across time (Stokes & Baer, 1977). In these ways, we believe that this study is systematic with the principles of ABA and relevant to current social concerns, such as inter-professional merge.

ABA emphasizes the importance of conducting research on socially relevant behaviors and people. Therefore, it was very important to consider the applied relevance of merging these treatments for children diagnosed with ASD. In considering, the criteria for an ASD diagnosis, two major dimensions are restrictive and repetitive behaviors and deficits in social communication. In training the therapists in differential reinforcement, they were able to address restrictive and repetitive behaviors that may contribute to off-task behavior, and therefore disrupt therapy. By addressing on-task behavior, the therapists were able to teach communications skills, and therefore address deficits in

social communication. In these ways, this study looked at the core characteristics of ASD and developed a protocol to attend to those characteristics. This study included participants who were appropriate for the research, as well. All of the clients were diagnosed with ASD and receiving SLP services. The therapists gained a new skill set that they can implement as professionals in the future.

Although precedent exists for professional coordination in applied settings and in research, no published research documents graduate students from the fields of ABA and SLP collaborating with their respective peers in the other professions to educate across disciplines about treatment of ASD. This particular study provided education with an opportunity to apply newly acquired skills in a clinical environment. As these students represent the next group entering the workforce, having this background is valuable both to provide services to children and in professional development. According to the social validity measures, all of the therapists agreed to the strongest extent that "it is important to learn techniques such as these to teach children new skills" and they "will likely use these skills to assist in therapeutic activities in the future".

The fields of both ABA and SLP emphasize the importance of data-collection in treatment, and both the ABA graduate students and the SLP graduate students acted in accordance with these values in this study. The ABA researchers collected data on therapist behaviors and on client behaviors. Independently, the SLP graduate student therapists collected data on their clients' progress daily. As part of their practicum experience, they were required to address deficits in skills according the VB-MAPP, develop lesson plans weekly, gain supervisor approval of these lesson plans, and collect data on the clients' acquisition of skills and the effectiveness of their treatment.

The ABA researchers chose their data collection systems for many different reasons. Before beginning the study, the researchers role-played on- and off-task behaviors to determine at what point the behaviors were disruptive to therapy. In reality, everyone, particularly elementary school aged children, engages in off-task behavior. We did not want our data collection procedures to penalize clients for engaging in typical behavior. After role-playing, we decided that if a client was off-task for more than 5 s, it disrupted therapy. We knew that we wanted to watch every therapist each day and across all times of the day. We chose to observe 5 min during each activity block, because we felt that this was a long enough period of time to assess the use of behavior management strategies. 15 s partial interval recording procedures were used to determine for each 15 s if a client was on- or off-task and if a therapist did or did not provide access to preferred activities. It may seem that response-per-opportunity procedures could have been appropriate, in that if a child was on-task, therapists could provide access to a preferred activity. We wanted to emphasize on-task behaviors other than compliance, such as "in-seat" behavior or "waiting" behaviors. Observers may have disagreed about how many opportunities were available for the therapist to respond to. Instead, according to the system we used, clients were either on- or off-task and therapists did or did not provide access to preferred activities. These variables are incompatible. This measurement allowed us to assess, to a reasonable degree, how many intervals the client engaged in mostly on- or mostly-off task behavior. Because it does not conceptually stand to be both on- and off-task in the same interval, we decided that a client must engage in 8 continuous seconds of off-task behavior in order to be considered "off-task". We used 15 s intervals because, in role-playing, this time limit allowed us to view both client on-task

behavior and access to preferred activities. We thought we would capture more correct sequences in 15 s than in smaller increments of time.

This clinic generously allowed us to use their video-recalling computer programs, which made data-collection a more flexible process for the observers. Observers recalled the videos when they chose to, meaning that they did not need to be present for the actual therapy sessions. This also allowed coaching of one therapist and observations of other therapists to occur at the same time.

Another consideration related to data collection is the experimental design chosen. We chose to use single-case design because we wanted to develop the skills of a small group of people and pay attention to detail each day. Single-case design allows researchers to monitor participant progress each day and assess whether the intervention is effective. This was relevant when we changed the coaching content. The therapists indicated a want for more direct coaching, and we were able to adapt to be more effective and helpful to them. Single-case design allows us to see how each participant performs in the course of the research, as opposed to compiling the results of all the participants. Comparing the means of baseline and intervention, every therapist increased their use of these skills. Therefore, one can determine that overall this intervention package was beneficial to the group. Analyzing the graphs of each participant data helps to determine individual differences and how each therapist performed. This was relevant, because our intervention was more useful to some participants compared to others. We can see that the therapists who verbally indicated that they wanted to be trained, Whitney and Christina, performed very well, as compared to others who had clients who were on-task most of the time or were already performing these skills at a high level.

In order to merge ABA and SLP for this clinic we needed to choose some specific variables on which to focus. We chose the VB-MAPP, on- and off-task behavior, differential reinforcement, functional behavior, and coaching. Each of these was very important to the overall research project. As mentioned before, the graduate students developed their weekly lesson plans according to their individual client's performance on VB-MAPP assessment conducted a few days before the clinic began. Theoretically, increasing on-task behavior should allow clients to progress more in therapy. We found this to be true for all dyads, except for one in which the client showed slightly less on-task behavior after intervention, Will. It should be noted that his therapist's behavior, Christie's, did not show major changes after intervention. Christie's use of these skills was increasing in baseline and continued to increase in the intervention phase. The clients who participated in this study were generally very on-task, though. In baseline, clients were on-task an average of 75.68 intervals and increased to 81.62% after intervention. Being on-task for 75.68% of the time is a high rate of engagement. This is great for the clients, as it is adaptive for elementary school children to know how to engage in teacher-directed activities. This could explain the performance of some therapist participants. For example, Adrianne saw two clients over the summer. The first client was on task 83.66% of intervals in baseline and the second for 77.74%. Realistically, our behavior management strategies may not have been useful to her, as she did not need to increase her client's on-task behavior. In contrast, Whitney's first client, Barrett, was on-task for 67.86% of intervals in baseline and after she was trained, Barrett's on-task behavior increased by 13.76 percentage points to 81.61%. Her second client was on-task for an average of 69% of intervals in baseline and increased by 9

percentage points to 78% in the intervention phase. Her two clients were the two least on-task clients in baseline and made the largest gains in on-task behavior. Christina also worked with the same two clients, and demonstrated behavior changes in increasing access to preferred activities for on-task behavior. Whitney and Christina both verbally expressed that she wanted to learn some techniques to increase on-task behavior. In other words, the two clients who showed the largest increases in percentage of intervals of on-task behavior worked with the two therapists who requested to go through training.

Some may wonder why would we train therapists in the use of behavior management strategies they did not immediately need with their clients. In the spirit of merging therapies, we wanted to be inclusive to all the SLP graduate students. They now have gained new knowledge that may be relevant to them in the future. Even the two therapists who withdrew from the study still participated in training to understand what their peers were learning. Anyone who was willing to participate and learn something new was welcome.

Returning to collaborative dimensions, we trained in the use of differential reinforcement. Due to data collection methods, we cannot state that the therapists used differential reinforcement because we cannot determine contingent access of preferred activities. Although, we do see that after training client on-task behavior increased an average of 5.93 percentage points. Therapists increased their use of behavior management skills by an average of 23.73 percentage points. Therefore, we can state that a relationship is likely to exist between training and coaching the therapists and increasing on-task behavior in the clients. In coaching, we used differential attention to the therapists' use of differential reinforcement. We praised when the therapists provided

access to preferred activities when the clients were on-task, or withheld preferred

activities when the clients were off-task. We withheld praise when the therapists engaged

in the inappropriate sequence: access to preferred activities during off-task behavior or

access to a preferred activity for on-task behavior. Anecdotally, we can report that

therapists demonstrated a use of proper sequencing. We also trained the therapists in

functional behavior. This was included because it is a hallmark of behavior analytic

therapy. In order to accurately explain differential reinforcement, we felt that the

therapists should also have some background in functional behavior.

Coaching was a major element in this project. Previous literature stated that in-

service trainings are often not enough to produce behavior change and that feedback

during an intervention is beneficial to acquiring new skills. We purported to assess

maintenance effects of our intervention after coaching was discontinued. We wanted to

demonstrate the importance of feedback after training, and also to determine at what level

therapists should perform these skills in order to maintain them. In other words, how

fluent should therapists be in providing access to preferred activities for on-task behavior,

such that when coaching ends they continue to implement these skills in their therapy?

According to our data, if therapists increase their use of these skills by 30 percentage

points so that they implement these skills in approximately 60% of intervals during the

training and coaching phase, they will maintain their high rate of behavior after coaching

ends. Very importantly, the therapists provided positive feedback regarding the coaching.

One item on the social validity questionnaire was "my coach understood and

communicated procedures and techniques effectively" to which all participants responded

as strongly as possible that they agreed. On the questionnaires, the therapists wrote

comments, such as, "The coaching was also really helpful to show us how to use your techniques in the moment with real examples," and "The coaches/researchers were very positive, understanding, and gave great advice." We used a bug-in-the-ear feedback system so that we could coach remotely and not disrupt the therapy session. From a technological standpoint, there were no major issues using this system. It was very reliable and user-friendly. The graduate student therapist reported, "The bug-in-the-ear was extremely helpful." One therapist did remark on the BITE system saying, "I think the only problem was the headphones for the bug-in-the-ear system. I had to move around a lot during therapy and sometimes they fell out. Other than that I have no suggestions." Another therapist simply wrote, "Bug-in-the-ear = awesome!"

After intervening, in the training and coaching phase, at least one participant in each training group demonstrated significant behavior change in that they increased providing access to preferred activities when the client was on-task, as assessed by visual analysis. The means of each therapist's performance in baseline and intervention demonstrate that each therapist did increase her use of these skills by at least 10 percentage points. Because intervention occurred after three days for the first and second groups, changes in behavior could be attributed to exposure effects: after three days behavior changes naturally. Also, the change in coaching content occurred at the same time as the client change, therefore the change in behavior in the first group after the coaching content was adjusted may be a result of the client change. Comparing the participants in the second and third groups trained, experimental control can be demonstrated by intervening after different amounts of time in baseline. The first group was in baseline for three days and was chosen for intervention because of their low levels

of providing access to preferred activities when clients were on-task. One can predict that without an intervention their behavior would have continued in the same manner: Blair would have remained at a low, stable level and Christina would have continued decreasing her use of these skills. Behavior change occurred after intervention, and these findings were replicated across the third group. One could predict that Emma would continue decreasing her implementation of these skills and continue at a low level, Audrey would continue to have highly variable data, and Christie would continue in a increasing trend. Instead, after intervening, Emma demonstrated an increasing trend in the use of these skills and very stable data. Audrey's data was stable at a slightly higher level, and Christie's data show more stability than in baseline and a slightly increased level.

We certainly ran into some unexpected findings. Firstly, anecdotal observation concluded that the therapists were very good at praising their clients for complying with commands, but that passive on-task behaviors were not being followed by access to preferred activities. We addressed this in the second training of Whitney and Adrianne. Something very important happened in this second training: both Whitney and Adrianne requested more directive coaching. They had been coached using differential attention to the provision of access to preferred activities for on-task behavior and withholding access to preferred activities for off-task behavior. In other words, the coach would praise them for providing the appropriate consequences. They stated that they would benefit from more verbal prompts as to when to provide or withhold access to preferred. The coaches greatly appreciated this feedback because we wanted this training to be as practical as possible to the therapists. Following this training, they received coaching with both

differential attention and prompts for the following six days. Unfortunately, due to time constraints of the study, this meeting to revise coaching and review training materials coincided with a change in clients. Therefore it cannot be determined that the change in Adrianne's behavior was a result of our experimental manipulations or of the change in clients. Secondly, most of the clients were on-task a majority of the time, so behavior management techniques to increase client on-task behavior were not necessary for the therapists. Thirdly, it was not practical to expect the therapists to be providing access to preferred activities in every 15 s interval when clients were on-task. We hoped to see increases in therapist behaviors compared to their individual baselines. Some of the participants, such as Audrey and Christie, were implementing these procedures at high levels in baseline, and therefore ceiling effects may have limited our ability to see behavior change. These participants did not necessarily need to learn behavior management techniques, but their supervisor wanted all therapists in the clinic to have access to the training to gain professional knowledge, all therapists indicated that they wanted to participate in this training at the onset of the study, and we wanted all therapists to be included in the spirit of merging treatments. Whitney requested to be in the first training group because her client engaged in behaviors that were disruptive to therapy.

As with all studies, we experienced a few limitations. This study occurred in a pre-existing SLP program with a pre-set schedule, so time constraints were inherent. It would be ideal to have more than three days of data in baseline. Not all of the participants in our research would have applied independently for behavior management strategies, as their clients were on task and they were successful in managing behavior.

Due to our data collection methods, we cannot state that access to preferred activities reinforced on-task behavior.

In replication, we would suggest a few changes. Firstly, we found that providing prompts in coaching was not only necessary, but also preferred by the therapists. Secondly, in data collection we used the therapists' reports of preferred activities from the previous day to assess whether the therapists were providing access to items/activities for the client. We rationalized that in applied settings, therapists would likely refer to their notes from the previous therapy session when determining which sorts of activities may be reinforcing for the client. In the future, for more accurate data collection on preferred activities, we recommend using the preferred activities list from the same day when recalling videos, as opposed to using the preferred activities list from the day before.

This study assessed the feasibility of merging treatments at the level of the graduate student. We learned that adding behavior management training and coaching to the therapist workload was feasible. On the social validity questionnaires the therapists wrote comments such as, "This was so helpful," "I am so grateful to have gotten the extra training," "After training the importance of reinforcement was present in my head constantly during therapy and the clients responded really well to it!" Upon determining that this was a feasible task, we developed a protocol for training and coaching so that the same procedures found to be beneficial in this study can be applied in the future, if the clinic so chooses. Coaching was an important element of this study, and we were able to assess the effects of coaching and determine a mastery criterion for the future. This study demonstrated that SLP graduate students were able to incorporate a new skill set for

behavior management into their practicum experience, and that graduate students across

disciplines could educate one another. Both groups, the ABA graduate students involved

and the SLP graduate students involved, expanded their knowledge of other services.

Table 1

The following table shows the mean percentage of intervals in which therapist provided access to preferred activities for client on-task behavior in different phases of the study.

Therapist	Baseline	Intervention	Difference	Maintenance
Whitney	34.01	70.00	35.99	69.79
Adrianne	35.68	46.75	11.06	31.56
Blair	21.93	54.47	32.55	63.79
Christina	42.45	65.25	22.80	50.11
Emma	28.94	71.65	42.70	
Audrey	69.92	79.82	9.91	
Christie	54.76	65.87	11.11	
Average	41.10	64.83	23.73	

Table 2

The following table shows the mean percentage of intervals in which the client was on-task during different phases of the study.

Client	Baseline	Intervention	Difference
Barrett	67.86	81.61	13.76
Chuck	69.00	78.00	9.00
David	75.78	84.06	8.28
Jake	77.74	83.31	5.57
Matt	83.66	87.59	3.93
Patrick	83.32	85.54	2.23
Richard	75.74	77.24	1.51
Will	78.82	75.59	-3.23
Average	75.68	81.62	5.94

Table 3

This table indicates the mean number of comments made during coaching by each of the two coaches during the study.

Coach	Diff. attn.	Prompts	Rate (per min)
1	18.84	3.36	1.48
2	19.27	2.89	1.84

Figure 1
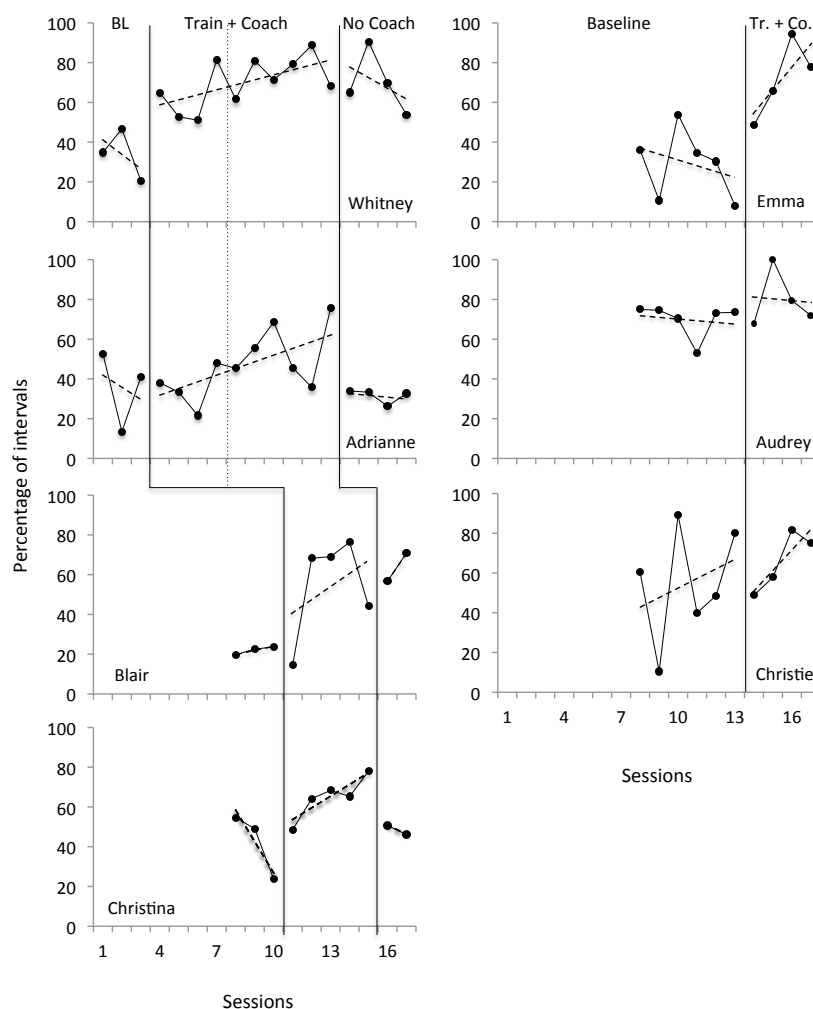
Figure 1. These graphs show the average percentage of intervals from each day of data collection representing whether the therapist provided access to a preferred activity when the client was on-task. The solid line represents the percentage of on-task intervals in which the therapist provided access to a preferred activity. The dotted lines represent trends within each phase of the study for each individual therapist.

Appendix A

Therapist name   Date
Client name
                List/description of preferred items/activities

Appendix B

On/off task definitions adapted from TOAD system:

ON= on task behavior= any behavior that does not include an element of the TOAD system. The student is talking appropriately, in his/her seat, attending to the activity and not causing destruction

T= talking out= Spoken words, either friendly, neutral, or negative in content, that are not in response to therapy activity or verbal content. The child speaks about topics that are unrelated to the activity or verbal content for at least a continuous 5 seconds allowing for brief pauses of 1-2 seconds.

O= out of seat= If a chair is provided for the activity, the child is not supporting his or her weight with the chair for at least 5 seconds. Up on knees does not count as out-of-seat behavior, unless the therapist specifically asks the child to sit with his/her feet on the floor.

A= attention problem= The child is not attending either to an activity presented by the therapist or to the therapist.   The child is therefore engaged in an activity other than that which has been directed. This also includes looking around the room, out a window, at objects not relevant to the therapy activity or verbal content in the environment for at least five continuous seconds.

D= destructive/disruptive= The child engages in destructive/disruptive behavior. These behaviors include throwing, ripping, scribbling over, hiding the work, or chewing the activity unless the client is instructed to do so. This also includes hitting, kicking, biting, scratching with any parts of the body to another person or to the client himself.

An interval is off-task if a consecutive, continuous combination of any off-task behavior occurs. For example: A child is out of his seat for 5 seconds, returns to his seat and is inattentive for 3 seconds.

Appendix C

Instructions: observe each therapy group for 15-second intervals for five minutes. For each interval mark a **/** through the box representing the child's behavior and the therapist's behavior. The interval is considered an "on-task interval" if the child engages in on task behavior for at least eight consecutive seconds within the 15s interval. Otherwise, the interval is marked as an "off-task interval". For each interval include if the child engaged in the target behavior specific to him/her.

	Child behavior		PC?			Target behavior?	
	On	Off	Yes	No		Yes	No
1:1	On	Off	Yes	No		Yes	No
1:2	On	Off	Yes	No		Yes	No
1:3	On	Off	Yes	No		Yes	No
1:4	On	Off	Yes	No		Yes	No
2:1	On	Off	Yes	No		Yes	No
2:2	On	Off	Yes	No		Yes	No
2:3	On	Off	Yes	No		Yes	No
2:4	On	Off	Yes	No		Yes	No
3:1	On	Off	Yes	No		Yes	No
3:2	On	Off	Yes	No		Yes	No
3:3	On	Off	Yes	No		Yes	No
3:4	On	Off	Yes	No		Yes	No
4:1	On	Off	Yes	No		Yes	No
4:2	On	Off	Yes	No		Yes	No
4:3	On	Off	Yes	No		Yes	No
4:4	On	Off	Yes	No		Yes	No
5:1	On	Off	Yes	No		Yes	No
5:2	On	Off	Yes	No		Yes	No
5:3	On	Off	Yes	No		Yes	No
5:4	On	Off	Yes	No		Yes	No
% intervals							

T
C
Time
Room

Before Coach	After Coach

Peer	Independent

Appendix D

Evidence Based Practices

Adapted from NPDC, 2010

Reinforcement

Reinforcement describes a relationship between learner behavior and a consequence that follows the behavior. This relationship is only considered reinforcement if the consequence increases the probability that a behavior will occur in the future, or at least be maintained. For example, children learn to ask for something politely if they want to receive it in return. The ultimate goal of reinforcement is to help learners with ASD learn new skills and maintain their use over time in a variety of settings with many different individuals. As such, teachers and other practitioners must identify the appropriate reinforcers that motivate individual learners with ASD.

Reinforcement is a fundamental practice that is almost always used with other evidence-based practices such as prompting, time delay, functional communication training, and differential reinforcement of other behaviors. As a practice, reinforcement is either positive or negative. Positive reinforcement refers to the presentation of a reinforcer after a learner uses a target skill/behavior. Positive reinforcers can be either primary (e.g., food, liquids, comfort) or secondary (e.g., verbal praise, highly preferred activities, stickers, toys, edibles). Primary reinforcers are often naturally reinforcing to learners with ASD; however, the value of secondary reinforcers must be learned by pairing primary reinforcers with other types of reinforcement (e.g., pairing "Good job" with getting a sticker). *Positive reinforcement* is generally the strategy that teachers/practitioners use first when trying to teach new skills (e.g., teaching a replacement behavior for an interfering behavior) or to increase appropriate behaviors.

Reinforcement is most effective when it is individualized for a particular learner with ASD and when it is presented in response to a learner's use of a target skill/behavior. The goal of this evidence-based practice is to increase skills while gradually fading reinforcement strategies to promote maintenance and generalization.

Differential reinforcement

Differential reinforcement of other behaviors means that reinforcement is provided for desired behaviors, while inappropriate behaviors are ignored. Reinforcement can be provided: (a) when the learner is *not* engaging in the interfering behavior, (b) when the learner is engaging in a specific desired behavior other than the inappropriate behavior, or (c) when the learner is engaging in a behavior that is physically impossible to do while exhibiting the inappropriate behavior. Differential reinforcement (DR) is a special application of reinforcement designed to reduce the occurrence of interfering behaviors (e.g., tantrums, aggression, self-injury, stereotypic behavior). The rationale for DR is that by reinforcing behaviors that are more functional than the interfering behavior or that are incompatible with the interfering behavior, the functional behavior will increase, and the interfering behavior will decrease.

Appendix E

Training protocol

1. Pass out pages with definitions and give ~5 minutes to read over definitions
   a. EBP pages
   b. Copied pages from Cipani
2. Trainers offer examples of each of the concepts
3. Trainers ask for examples from the therapists
4. *Emphasize the importance of providing positive consequences for "waiting" behavior or more passive attention behavior, not just compliance.*
5. Trainers ask if the therapists have any questions
6. Trainers explain what we are watching for in this study
   a. Explain how we take data
      i. On/off task definitions
      ii. How we use the "preferred activities list"
      iii. What we are looking for
7. Watch youtube videos of therapy and practice looking for concepts as a group
   a. Stop every 15 seconds—use data collection sheets we use
8. Bug-in-the-ear! Explain how the system works
   a. Practice using the earpiece with each therapist
9. *Explain the content of the coaching and the end goal (one positive consequence every 30 seconds if the client is on task). Content of the coaching is primarily differential attention with some prompts.*
10. Role play- 2 therapists role play therapy, while a third practices using bug-in-the-ear feedback. Do this from the control room.
11. Ask for any questions.
12. Talk about the importance of confidentiality and discretion in research integrity.

Each morning leave them a note of exactly what time we will coach.

Appendix F

ALVIN V. BAIRD ATTENTION AND LEARNING DISABILITIES CENTER

Appropriateness of Procedures

Name_____   Date: _____

Questions for Participants to Answer	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree
Appropriateness of Procedures	5	4	3	2	1
1. The written materials were easy to read and understand.					
2. My coach understood and communicated procedures and techniques effectively.					
Social Significance of Goals	5	4	3	2	1
3. I would recommend a similar training to other graduate students in my field.					
4. It is important to learn techniques such as these to teach children new skills.					
Social Importance of the Effects	5	4	3	2	1
5. I learned beneficial skills during this training.					
6. I will likely use these skills to assist in therapeutic activities in the future.					

Appendix G

	9:10:00-9:14:59	9:40:00-9:44:59	10:40:00-10:44:59	11:10:00-11:14:59	11:40:00-11:44:59	IOA	IOA-time
T011	**Liz**		Heather	Jen	Liz	**Heather**	9:10
T012	**Heather**	Jen		Liz	Heather	**Jen**	9:10
T013	**Jen**		Liz	Heather	Jen	**Liz**	9:10
T014	**Liz**	Heather		Jen	Liz	**Heather**	9:10
T111	**Heather**		Jen	Liz	Heather	**Jen**	9:10
T112	**Jen**	Liz		Heather	Jen	**Liz**	9:10
T141	**Liz**	Heather		Jen	Liz	**Heather**	9:10
T181	**Heather**	Jen		Liz	Heather	**Jen**	9:10
T191	**Jen**		Liz	Heather	Jen	**Liz**	9:10

	9:10:00-9:14:59	9:40:00-9:44:59	10:40:00-10:44:59	11:10:00-11:14:59	11:40:00-11:44:59	IOA	IOA-time
T011	Jen		**Liz**	Heather	Jen	**Jen**	10:40
T012	Liz	**Heather**		Jen	Liz	**Liz**	9:40
T013	Heather		**Jen**	Liz	Heather	**Heather**	10:40
T014	Jen	**Liz**		Heather	Jen	**Jen**	9:40
T111	Liz		**Heather**	Jen	Liz	**Liz**	10:40
T112	Heather	**Jen**		Liz	Heather	**Heather**	9:40
T141	Jen	**Liz**		Heather	Jen	**Jen**	9:40
T181	Liz	**Heather**		Jen	Liz	**Liz**	9:40
T191	Heather		**Jen**	Liz	Heather	**Heather**	10:40

	9:10:00-9:14:59	9:40:00-9:44:59	10:40:00-10:44:59	11:10:00-11:14:59	11:40:00-11:44:59	IOA	IOA-time
T011	Heather		Jen	**Liz**	Heather	**Heather**	11:10
T012	Jen	Liz		**Heather**	Jen	**Jen**	11:10
T013	Liz		Heather	**Jen**	Liz	**Liz**	11:10
T014	Heather	Jen		**Liz**	Heather	**Heather**	11:10
T111	Jen		Liz	**Heather**	Jen	**Jen**	11:10
T112	Liz	Heather		**Jen**	Liz	**Liz**	11:10
T141	Heather	Jen		**Liz**	Heather	**Heather**	11:10
T181	Jen	Liz		**Heather**	Jen	**Jen**	11:10
T191	Liz		Heather	**Jen**	Liz	**Liz**	11:10

	9:10:00-9:14:59	9:40:00-9:44:59	10:40:00-10:44:59	11:10:00-11:14:59	11:40:00-11:44:59	IOA	IOA-time
T011	Liz		Heather	Jen	**Liz**	**Heather**	11:40
T012	Heather	Jen		Liz	**Heather**	Jen	11:40
T013	Jen		Liz	Heather	**Jen**	Liz	11:40
T014	Liz	Heather		Jen	**Liz**	Heather	11:40
T111	Heather		Jen	Liz	**Heather**	Jen	11:40
T112	Jen	Liz		Heather	**Jen**	Liz	11:40
T141	Liz	Heather		Jen	**Liz**	Heather	11:40
T181	Heather	Jen		Liz	**Heather**	Jen	11:40
T191	Jen		Liz	Heather	**Jen**	Liz	11:40

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