11-2017

USING PEER-MEDIATED SELF-MONITORING TO INCREASE PROCEDURAL INTEGRITY OF NET IMPLEMENTATION IN A CLINIC SETTING

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By

Miranda Johnson

THESIS

Submitted to
Northern Michigan University
In partial fulfillment of the requirements
For the degree of

MASTERS OF SCIENCE

Office of Graduate Education and Research

November 2017

SIGNATURE APPROVAL FORM

USING PEER-MEDIATED SELF-MONITORING TO INCREASE PROCEDURAL
INTEGRITY OF NET IMPLEMENTATION IN A CLINIC SETTING

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ABSTRACT

USING PEER-MEDIATED SELF-MONITORING TO INCREASE PROCEDURAL
INTEGRITY OF NET IMPLEMENTATION IN A CLINIC SETTING

By

Miranda Johnson

Behavioral interventions have been shown to be effective at addressing many of
the core skill deficits and excesses associated with autism spectrum disorder. Natural
Environment Training (NET), developed by Sundberg and Partington (1998), is one such
effective strategy for teaching language to children with autism. Even though effective
interventions have been identified, clients are unlikely to benefit from them unless they
are implemented correctly. A number of effective behavioral techniques for increasing
procedural integrity of interventions have been identified, including the use of self-
monitoring checklists and peer-training. An unpublished thesis by Tenowich (2014) used
video-self monitoring to increase procedural integrity on NET implementation. This
study aimed to replicate the study by Tenowich (2014) and extend the literature by
incorporating a peer-teaching component to the performance management package.
Results showed that all participants increased their level of performance. However, these
increases happened during different phases of the study for each participant, suggesting
that individuals respond differently to giving and receiving feedback. Future research
should implement this procedure with more participants to determine the functional
components of this training package and any possible sequencing effects with regards to
giving and receiving feedback.

Keywords: NET, peer-teaching, self-monitoring, procedural integrity

ACKNOWLEDGEMENTS

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INTRODUCTION

Autism spectrum disorder (ASD) is characterized by persistent deficits in both social communication and interaction and restrictive and repetitive behaviors, interests or activities (American Psychiatric Association, 2013). These characteristics can lead to an impaired ability to learn critical life skills, such as functional communication and appropriate social interactions. Skill deficits in these areas are barriers to independent living. The Center for Disease Control estimates that 1 in 68 children have Autism Spectrum Disorder (Christensen, 2016). Due to the high prevalence rate and the severe impact that autism can have on a person's life, it is particularly important to be able to provide effective interventions for both the people diagnosed with this disorder and their families.

In 1998, the U.S. Surgeon General noted that interventions derived from applied behavioral methods were the most evidence based treatments for Autism (United States Surgeon General, 1998). A meta-analysis conducted by Peters-Scheffer et al. (2011) examined 11 studies that tested the efficacy of a behavioral intervention strategy called Early Intensive Behavior Interventions (EIBI). EIBI typically includes 30-40 hours of behavioral therapy per week for young children and focuses on foundational learning skills such as receptive and expressive language. The studies reviewed in this meta-analysis included 344 children diagnosed with autism that needed services for either behavior reduction, skill acquisition or both. The meta-analysis suggested there was strong evidence of the efficacy of EIBI in the treatment of autism. This conclusion was based on the differences found between the experimental groups and control groups,

where the experimental showed better scores on IQ and non-verbal IQ, expressive and receptive language and adaptive behavior (Peters-Scheffer et al, 2011). A number of specific behavior analytic techniques for treating the behavioral excesses and deficits associated with autism have also been identified. According to Wong and colleagues (2015), evidence based practices for children with autism include antecedent based interventions, differential reinforcement procedures (particularly DRI, DRO and DRA procedures), discrete trial training, extinction, functional communication training, augmentative communication training, functional behavior assessments, modeling, naturalistic intervention (which includes procedures such as natural environment training and incidental teaching), parent implemented intervention, peer-mediated instruction and intervention, picture exchange communication system (PECS), pivotal response training, prompting, reinforcement, scripting, self-management, social narratives, social skills training, task analysis, time delayed prompting and video modeling. It was also noted that the fifteen evidence based practices identified had over ten studies (prompting and reinforcement had more than 25) that provided empirical support for that procedure, with procedures based on behavior analytical principles having the most support.

One of the first studies to utilize and show the efficacy of behavior analytic techniques for the treatment of autism was conducted by Lovaas (1987). Intensive Applied Behavior Analysis (ABA) therapy (40 hours a week with a clinician for up to three years, plus parent training and implementation at home) was compared to less intensive (10 hours a week with a clinician) ABA therapy. The children were not assigned to a specific group by the researchers; it was based on parent choice. The results of this study showed the group receiving intensive behavior intervention made the most

gains in increasing desired behaviors and decreasing undesired behaviors (Lovaas, 1987).

It was also found that 47% of children receiving the intensive intervention achieved

normal educational and intellectual functioning, while only 2% of the group receiving

less intensive therapy achieved the same (Lovaas, 1987). The main procedure utilized in

this study was Discrete Trial Training (DTT). The results not only showed the efficacy of

DTT procedures, but also the importance of the quantity of services the client receives.

DTT is characterized by five components (Smith, 2001). The discriminative

stimulus (S^D) is given first and marks the beginning of each trial. Next is the prompt,

which should be faded out as soon as possible and the function should be transferred to

the intended S^D. Normally this S^D is supported by the natural environment. Third is the

response emitted by the learner, which is then followed by the appropriate consequence

which depends on the response. Reinforcement is provided if the response was correct,

and the teacher indicates in some pre-programmed way if the response was incorrect

(typically correcting the incorrect response). The last component of a DTT trial is the

inter-trial interval, which is the time between the consequence of one trial and the

presentation of the S^D for the next trial, which typically is between 1-5 seconds (Smith,

2001). For example, DTT procedures could be used if you were trying to teach someone

to the say the word "cat" when they are presented with a picture of a cat. The trial would

begin by presenting the S^D which would be the picture. If necessary, the prompt would

then be provided, which would be asking the learner to say "cat". This prompt would

then be faded from use in future trials. If the learner responded by saying "cat" you

would provide verbal praise and provide a reinforcer; if they did not respond within a

pre-determined amount of time, or provided an incorrect response such as "dog" you

would provide them with the correct answer "cat' and repeat this trial later. You then begin the next trial within 1-5 seconds. Another example of how DTT can be utilized is teaching a person to say "moo" when asked what sound a cow makes. A trial would begin by presenting the question, "what sound does a cow make?". The verbal prompt "moo" would be given if necessary, and then faded out. When the child responds correctly, reinforcement is provided, and when they respond incorrectly, correction and another trial at a different time would be administered. After 1-5 seconds elapse, a new trial begins.

DTT has been used to effectively teach a number of different skills, including both motor and vocal imitation, question answering, discriminations and many different aspects of language (Smith, 2001; Sundberg & Partington, 1999; Lovaas, 1977; Koegel, O'Dell, & Dunlap, 1988; Howlin, 1981; Krantz, Zalenski, Hall, Fenske, & McClannahan, 1981). Even though this is an effective procedure for skill acquisition, there are still some drawbacks to this procedure. DTT is highly structured and does not approximate the natural environment which makes it necessary to specifically program for generalization. The nature of the procedure may generate rote responding, interactions during sessions do not necessarily resemble what is seen in natural interactions, and trials are presented in a way that does not present the opportunity to capitalize on current motivations of the child, or expand on responses and mix up verbal operants, as could be done in typical interactions (Sundberg & Partington, 1998).

A procedural approach to address the limitations of traditional DTT is Natural Environment Training (NET). This method was suggested by Sundberg and Partington (1998) based on the principles of verbal behavior described by Skinner. Natural

Language Paradigm (NLP) is the procedure that Sundberg and Partington (1998) claim NET is loosely based on. The traditional structured procedure (DTT) for teaching language was compared to NLP in teaching children with autism functional communication skills by Koegel, O'Dell and Koegel (1987). They found that the NLP increased vocal imitative responses, increased generalization to new settings and was correlated with spontaneous use of functional communication. A feature that sets NET apart from other naturalistic training methods is the emphasis placed on creating specific stimulus control for a particular verbal operant (LeBlanc, Sidener & Firth, 2006). Although the procedure has distinct characteristics, NET shares common features with other naturalistic teaching methods. Snyder et al. (2015) conducted a systematic review of Naturalistic Instruction (NI) being used in a classroom setting for children with disabilities. They found that 207 out of 211 children from 43 studies showed an improvement that correlated with the implementation of NI. This review also listed seven different terms used to refer to NI in the literature. These included activity-based intervention, individualized curriculum sequencing model, milieu teaching, enhanced milieu teaching, naturalistic teaching, transition-based teaching, and embedded instruction. A common feature that is shared amongst these procedures is that they are occurring within the typical activities and routines the child follows. Another is that the teaching is focused on prior learning goals the child is working towards. A third common feature is that each teaching episode is either child initiated, or adult initiated based on the interest of the child at that moment (how they are playing, what they are attending to, etc.) and follows that natural course of play. The last common feature found was that the

adult acting as the teacher in each session was someone who regularly interacts with the child (Snyder et al., 2015). These are all core features of NET.

NET embeds teaching into the natural routine or play of the learner. Teaching is conducted as seamlessly as possible, and places a focus on language acquisition. Learning opportunities are created based on the goals of the individual client within the context of play. It is also typical that the reinforcer is logically connected to the activity. When a child is prompted to say the word "car" in the presence of a toy car, the car would be given as reinforcer instead of food or an arbitrary toy. NET is designed to capitalize on establishing operations (EO's), a stimulus events or contexts that alter the value of a particular reinforcer making it more or less effective. This may facilitate spontaneity of verbal responding (Weiss, 2001). Instructors are able to capitalize on existing EO's by observing what the learner is motivated by during that session. This can be done by observing what the client spends their time doing. EO's can also be contrived by the instructor if none are immediately present. One way to effectively contrive EO's is to set up the environment so that the client needs your help to gain access to a preferred item or activity. The capitalization and contrivance of EO's is one of the main differences between NET and DTT.

DTT and NET are both used to teach mands, which are verbal operants reinforced by a characteristic consequence and are under the control of an EO (Skinner, 2014). Even though both procedures can be used to teach mands, trials for each are conducted differently. NET mand training is conducted within the context of play, with the reinforcer typically involving the continuation of play, while DTT is more structured and is reinforced by giving the child what they asked for (Sundberg and Partington, 1998). An

example of using NET procedures for teaching manding would be the therapist noticing that a child is spending a lot of time playing with dinosaur toys, then when the child is not looking, putting the dinosaurs out of reach but within sight of the child. This creates an environment where the therapist is needed to gain access to a reinforcer, and makes the use of verbal operants a functional method to obtain the reinforcer. This is an example of contriving an EO. When the child says "dinosaur" which may or may not require a prompt, the therapist will then give the child the dinosaur. The therapist could also play with the dinosaur toy in a way that makes it more interesting than when the child plays alone with it, and require the child to say "roar" to mand for the therapist to make noises during play.

Manding is the skill that is typically targeted first, which serves multiple purposes. Manding is a skill that allows the learner to contact reinforcement consistently early on. It also helps to build a rapport between the instructor and the learner because the instructor is delivering the reinforcer that the learner has manded for. The learner pairs the delivery of reinforcement with the instructor, allowing the instructor's presence and interactions to become conditioned reinforcers. The instructional setting itself can become a conditioned reinforcer through the same process (Weiss, 2001). Once this has occurred, the instructor can begin to insert demands into the learning process.

While DTT is an effective and useful teaching procedure, some of the shortcomings include the inadequate emphasis on manding and the limited amount of choice and control the learner has (Weiss, 2001). NET has advantages that can offset these shortcomings of DTT. These include optimal conditions to teach the learner how to mand due to presence of EO's, utilizing S^D's in the natural environment, a reduced need to specifically program

for generalization, verbal interactions in teaching resemble those encountered naturally, the relative ease in teaching intraverbal responding, teaching environment and style resembles what the children will encounter in future learning settings and the fact that learning takes place in the natural environment (Sundberg and Partington, 1998; Weiss, 2001).

Although there is research showing both DTT and NET are effective procedures for the treatment of skill deficits associated with autism, the first step to obtaining these results is to train the people serving as teachers how to properly implement these procedures. Proper implementation of behavioral programming is an important factor as it leads to better outcomes for the clients. Research examining strategies to improve procedural fidelity have focused on enhancing expectations, feedback, and packaged based approaches. For example, a training package consisting of written instruction, video modeling, verbal feedback and modeling was used to train teachers in the correct implementation of behavior modification procedures aimed at individualized targets for different children (Koegel, Russo & Rincover, 1977). This training package was found to be effective in increasing procedural integrity in teachers' implementation of the behavior modification programs. It was also found that as the procedural integrity of the teachers increased, so did student performance. Plavnick, Ferreri and Maupin (2010) used a self-monitoring procedure to increase the procedural integrity of the implementation of a token economy in a classroom setting. It was observed that as the procedural integrity of token economy implementation increased, so did the target appropriate behaviors of the children. Similar results were found when a training package consisting of modeling and video-feedback was used to teach paraprofessionals how to implement pivotal response

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training (PRT) with children with autism in school settings (Robinson, 2011). Procedural integrity increased as did student performance from baseline phase to intervention with no specific intervention in place for the students' behavior. Embedded instructional interactions between teachers and children to enhance the play skills of the children were increased using behavioral interventions. This was accomplished by initially training the teachers using written and verbal instructions, modeling and rehearsal with feedback**.** The teachers were then given self-monitoring cards and feedback on their interactions (Martin, Drasgow & Halle, 2015). The authors found that the instructional interactions increased as did the play skills of the children.

Training and in-situ feedback have also been used to increase procedural integrity of DTT implementation (Downs, Downs & Rau, 2008). The training was given before baseline began and included didactics, modeling of both correct and incorrect responses, and practice with corrective feedback. During the intervention phase, feedback was given both during and after each session. Procedural integrity showed an increase from baseline to treatment phases, and child performance was only seen to increase when fidelity of implementation increased. Another interesting finding in this study was that the participants implemented a larger number of DTT trials in baseline sessions than in either the intervention or follow-up phases, and child performance did not increase until high procedural integrity was reached in the intervention phase. This suggests that although quantity is an important factor in the skill acquisition of children with autism (Lovaas, 1987), quality of implementation is also an important consideration. These studies all suggest the importance of high procedural integrity for the performance of the learner. Making sure the interventions are conducted with high procedural integrity is necessary

for our clients to meet their goals and subsequently live more functional and independent lives.

Strategies for increasing procedural fidelity and the effectiveness of staff training have also been explored more generally within the behavior analytic literature. A literature review on staff training methods revealed the most commonly used interventions to increase procedural integrity were instruction, role-play, modeling, self-monitoring and feedback (Jahr, 1998). In a different literature review the importance of frequent and immediate feedback for effective staff training was emphasized (Arco, 2008). A meta-analysis examining effective staff training methods found that treatment packages tend to be more effective than single interventions (Oorsouw, Embregts, Bosman & Jahoda, 2009). The authors also found that feedback was a very important component, and that verbal feedback seems to be the most effective. These effects were not found to increase when any other type of feedback was combined with verbal feedback. Another method of increasing procedural integrity is the use of a self-instructional manual. This method was used to teach students how to conduct DTT procedures with children with autism, and it was found that procedural integrity was higher in the training and generalization phases (Thiessen, Fazzio, Arnal, Martin, Yu & Keilback, 2009). Another useful aspect of this intervention was the fact it was much more cost and time effective than traditional training procedures because the participant trained themselves.

One method that has been effectively used to increase procedural integrity is self-monitoring. Self-monitoring is an intervention where the subject records data on their own behavior and provides feedback for their own performance. Not only does this

increase procedural integrity, but also requires less time from the supervising clinician. Plavnick, Ferreri and Maupin (2010) used a self-monitoring checklist to increase the procedural integrity of the implementation of a token economy in a classroom setting by teachers. Not only was this effective in increasing the procedural integrity of token economy implementation, but it also reportedly required minimal effort on the part of the researcher. This carries important practical significance. The less time a specific intervention requires, the more time can be delegated to working with other clients or dealing with other issues. Self-monitoring card along with feedback also can increase instructional interactions initiated by teachers with students (Martin, Drasgow & Halle, 2015). Another example of how self-monitoring has been used was demonstrated by Bishop, Snyder and Crow (2015) who employed three different self-monitoring conditions to train teachers how to run embedded instructional learning trials. They found the condition with the most intensive intervention (the intervention including three components rather than one or two) to be the most effective. It should also be noted though that even though this was an effective intervention, when given the choice none of the teachers continued to self-monitor, indicating low levels of social validity. A training package consisting of tactile prompting via a vibrating pager, a self-monitoring checklist and accuracy feedback from the instructor for increasing procedural integrity of implementation of behavioral strategies in a special education classroom was effectively used by Petscher and Bailey (2006). This package was effective at increasing the procedural integrity of implementation, but the authors cannot be sure if it was the tactile prompt of the self-monitoring checklist that was the effective component, or if there was an interaction between the two methods. Another effective application of self-monitoring

techniques to increase procedural integrity was used to enhance procedural integrity of DTT implementation in conjunction with video-feedback (Belfiore, Fritts & Herman, 2008). This study found that the intervention increased procedural integrity, but these results did not maintain without the continuation of the intervention. The authors suggested that while self-monitoring and video-feedback can be effective methods of increasing procedural integrity, they may need to be continued to maintain the gains. Another possibility is that the intervention did not continue for a long enough period of time and the participants did not become fluent in the procedure. A treatment package that was effectively used to increase, generalize and maintain social initiations made by children with autism was a combination of video-feedback and self-monitoring procedures (Deitchman, Reeve, Reeve & Progar, 2010). During and following this intervention social initiations increased in frequency, generalized to new settings and maintained after the intervention was removed.

Other studies utilizing video-feedback found it to be effective at increasing performance. Robinson (2011) utilized a training package consisting of modeling and video-feedback to teach paraprofessionals how to implement pivotal response training (PRT) with children diagnosed with autism in school settings. It was demonstrated that procedural integrity was higher in intervention, maintenance and follow-up phases than in baseline. Another study supporting the efficacy of video-feedback procedures was examining the use of instruction and video-feedback to teach staff correct trainer behavior and prompt sequences while working with children with severe intellectual disabilities (Vonderen, Duker & Didden, 2010). This study utilized both written and verbal instruction along with video-feedback procedures and found low levels of

procedural integrity in baseline with high levels of procedural integrity in the intervention phase. Both video-feedback and self-monitoring techniques (video self-monitoring) was utilized by Pelletier, McNamara, Braga-Kenyon and Ahearn (2010) to increase procedural integrity of the implementation of a students' behavior plan by teachers in a classroom setting. Feedback was already being utilized before the study began, but was not effective in increasing procedural integrity. Researchers observed high levels of procedural integrity in treatment and low levels in baseline.

An unpublished thesis by Tenowich (2014) also examined video self-monitoring, and found it to be an effective procedure for increasing the procedural integrity of NET implementation in a clinic setting. Therapists watched a video of themselves running a ten-minute NET session and scored it using the NET checklist typically used at the clinic the where the study was conducted. After this intervention had been implemented, procedural integrity increased compared to baseline levels. Improvement in client performance was also observed during the intervention, even though there was no change in programming for the individual clients. It should be noted however, that while there was an increase in procedural integrity from baseline phase to the self-monitoring phase, all participants required the researcher to provide feedback based on their recorded sessions to obtain passing scores (the clinic in this study required therapists to maintain a score of 90% correct on the NET procedural integrity checklist for continued employment). The feedback from the researcher was more effective than self-monitoring at increasing procedural integrity in this study. The results found in these studies suggest that the combination of video-feedback and self-monitoring via a checklist can be an effective intervention for increasing procedural integrity.

Although effective methods of training staff in the correct implementation of this procedure have been identified, there is still the issue of access to resources. Training staff can require a significant investment of time and money. This can be offset by using peer-teaching methods. When you are able to train peers to effectively provide feedback and instruction to one another, you can save time and money as well as provide an alternative way for the people to learn (teaching others rather than being directly taught). Because it is a peer providing the training, it is potentially a less aversive situation for those receiving the training and may also result in lowered reactivity than if a supervisor were to provide the training.

One type of peer training used is pyramidal training. Pyramidal training involves training the first tier (grouping of people) how to do something, and then training them to train another tier or group in the same activity. Pyramidal training procedures have been used to teach parents how to implement behavioral programming with their own children, and then later to teach other parents to run behavioral programing with their children (Neef, 1995). There were three tiers with 4-5 parent-child dyads in each tier. The two experimental groups (peer parent training (PPT) and standard parent training (SPT) were compared, and both showed increased procedural integrity of behavioral program implementation. A study by Page, Iwata and Reid (1982) used this method to first train the supervisors of direct care staff to properly implement behavioral programming in a residential facility who then trained the direct care staff in the same procedures. They found that this was effective, but training in one content area (communication) did not generalize to other content areas that were not trained (gross motor skills).

Another similar peer training approach is inter-teaching. Inter-teaching is a behavioral approach to training that involves peers teaching each other, with the instructor only teaching materials that the students report being unable to master on their own (Boyce & Hineline, 2002; Sturmey, Dalfen & Fienup, 2015). Inter-teaching involves a conversation between peers regarding the topic of instruction, often with the aid of a study guide. This method is typically used in academic settings. Inter-teaching was compared to traditional lecture instruction in a university classroom, and while both conditions produced increased scores as compared to the pretest, the inter-teaching condition produced higher test scores than the lecture condition (Saville, Zinn, Neef, Norman & Ferreri, 2006). The review conducted by Sturmey, Dalfen and Fienup (2015) stated that six of the seven studies they reviewed showed better results than traditional teaching, but it should be noted that most of the research was conducted by the same person. Although the results of these studies have been successful, future research should be conducted by others to address this method of instruction.

Summary:

The procedures we use to teach children with autism have been proven to be effective at addressing the behavioral deficits and excesses of Autism Spectrum Disorder, but need to be implemented with fidelity to promote the desired behavior change for clients. Effective methods of staff implementation have been identified, but require time and money that may not always be available. Peer training helps to address the issue of limited resources and has empirical support but has not been utilized to increase procedural integrity of staff running NET procedures. Therefore, the purpose of this study is to extend the literature on effective staff training for NET procedures by systematically

replicating the results of Tenowich (2014) and by including a peer teaching component. According to Tenowich (2014), feedback from a supervisor was more effective than self-monitoring thus the supervisor needs to spend additional time conducting training and giving feedback. Adding a peer-teaching component to this study in conjunction with a self-monitoring procedure could increase efficacy and decrease time and money needed by supervisors. As such, the current study attempted to add to the literature of both self-monitoring and peer-teaching methods by evaluating the effect of peer-mediated self-monitoring as a method for increasing procedural integrity during NET sessions. An additional extension of this research was to determine if there is a difference in staff performance between giving and receiving feedback in regards to procedural integrity. Literature has shown that receiving peer-feedback is effective at increasing procedural integrity of intervention implementation, but it has been overlooked that peer-feedback can serve to reinforce antecedent stimulus control for proper implementation on the part of the peer that is giving the feedback.

METHODS

Participants:

A total of six individuals were recruited and went through the initial training, and four participants completed this study. Participants included in this study were graduate students who had completed at least 1 year of the Master of Science in Applied Behavior Analysis program at a state university in the Mid-western USA. All participants had been placed at an ABA focused clinic as a part of their practicum coursework. Students working in the clinic were asked at the beginning of their practicum semester if they would like to participate in the study. These students were only included in the study if they met the following criteria: (1) Volunteered to be a part of the study; and (2) Demonstrated low levels of procedural integrity when running NET procedures. Participants had little to no prior experience with NET, so all showed low levels of procedural integrity.

Participant 1 was a male who was 26 years old, who had previous experience working in a juvenile psychiatric ward, but had not specifically worked on language acquisition with small children. Participant 2 was a 24-year-old female who had been previously placed in a school for her practicum experience, and her behavior analytic experience was in reducing problematic behavior and increasing academic skills. Participants 3 and 4 did not have any prior experience teaching language to small children. Participant 3 was a 23-year-old female, and participant 4 was a non-traditional female student who was 52 years old.

Participants worked with children receiving services from the ABA clinic addressing previously established individualized skill targets using NET procedures. Data on the children's performance was recorded as per their treatment program, but is not reported in this paper. This is because throughout the study the therapists were working with different children. Even though child performance data is not being reported, consent from the parents of the children for video recording their child was obtained before the onset of this study.

Participants were separated into dyads consisting of two therapists each working with one child. Assignment was randomized within assigned work shifts, i.e. participants were only placed in a dyad if they both were assigned to work during the same time period. These dyads remained consistent throughout the study.

Materials and Setting:

Materials used included a Kodak video camera and a university issued laptop to review video recordings, NET procedural integrity checklist (see Appendix A), Social Validity Survey (see Appendix B), toys and other objects used for playing/teaching. The NET room used contained toys, pictures, puzzles, a table and chairs, books, writing utensils and other teaching materials. All sessions were conducted within the NET room of the clinic and were video recorded. The room was roughly 27' by 33' with beige colored walls and crates filled with toys, books and puzzles.

Measures and Experimental Design:

The dependent variable measured was procedural integrity according to the NET checklist (see Appendix A). This checklist was based on the one used by Tenowich (2014), with criterion measures added to increase precision of data collection. For each

item on the checklist, criterion related to an observable behavior on the part of the therapist were added, and different scores were associated with the criterion based on the quality of the therapist's performance. For example, the skill item "represents the S^D before prompting" changed from "yes or no" to "misses 0 opportunities, misses 1 opportunity, etc." with 5 points being awarded for missing 0 opportunities, 4 points awarded for missing 1 opportunity, and so on.

Performance scores are presented as percent of points earned out of the total points possible on the checklist. The checklist contained 19 items total, but because the sessions were being reviewed by the video recording, 6 items were removed for the purposes of this study. The items removed are skills that would not be able to be discerned from watching a video of the session, such as arranging all materials before the session begins, or cleaning up the room after the session is completed. The checklist included 13 items reviewed as part of this study, each with a rating score of 0-5, allowing for a total possible score of 65 points to be reviewed. The checklist includes items regarding organization of the environment, presentation of reinforcement, NET data collection, error correction procedures, problem behavior data recording, rate of responding and types of verbal operants targeted.

The checklist was reviewed by the researchers by calculating the percent of points the therapist earned during the session based on criterion measures. During a review of the checklist, the researchers realized that it would be possible for a participant to miss all of the skill points related to the critical procedural elements on the checklist, while still receiving enough points for the less critical skill items to meet mastery criterion. Due to this, the checklist was reviewed to determine "critical skills". These are the items from

the procedural integrity checklist that the research team determined were most important

for the correct implementation of NET. Items considered critical skills were: addressing

all verbal operants, using appropriate error correction procedures, representing the S^D

before prompting and hitting the goal rate of responses per minute. After these skills were

determined, the data was analyzed to only include these items. This measure was referred

to as the "critical skills score", and was compared to the original measure, referred to as

"total checklist score" to determine if there was any meaningful difference in the skill

measures. Mastery criterion was determined based on the total checklist measurement, so

that the same skills from the checklist used in previous literature were addressed.

Clients receiving ABA services within this clinic typically came for 2-3-hour

sessions Monday through Friday, and approximately half the total time was spent running

NET procedures. Time spent in NET was broken down into 10-minute sessions before

switching to DTT style instruction for a 10-minute session. Procedural integrity was only

measured during some NET sessions. Procedural integrity was measured during sessions

where both participants were present and available to work with the same client. As

previously noted, child performance was measured according to their previously

established treatment plan.

To determine the social validity of this procedure, a survey was conducted after

the conclusion of the study to determine the acceptability of this training procedure to the

participants who received it (see Appendix B).

A non-concurrent multiple baseline across participants design was used. The

intended duration of the study was 3-4 weeks, but due to circumstances regarding

scheduling the actual duration of the study was 17 weeks, including a 2-week break in

between academic semesters at the university. The availability of the participants as well as the clients did not overlap in the necessary time slots to be able conduct the study within the intended time frame.

During each session, both participants in a dyad conducted NET while under observation. The order in which the participants ran their NET sessions was alternated so that confounds regarding order of participation were limited (a certain child may be more or less easy to work with during the first NET session as opposed to the second, the first participant modeling NET could unintentionally provide prompts for the next participant, etc.). A random number generator was used to determine which participant would be first to run a session that day (if it was an odd number, participants 1 or 3 would go first, and if it was an even number, participants 2 or 4 would go first).

The first phase was baseline, where data was collected while no intervention was implemented. This phase continued until baseline data showed steady state performance or displayed a downward trend and the required number of baseline sessions was met. The peer feedback phase was introduced next, where the first participant in each dyad (participants 1 and 3) was asked to give feedback to their partner (participants 2 and 4) based on the NET checklist. The third phase was dyad reversal, where participants 1 and 3 who had previously been giving feedback received it, and participants 2 and 4 gave feedback but no longer received it. If necessary, the fourth phase consisted of a supervisor providing feedback to each participant whose performance did not meet mastery criterion . The final phase was a maintenance phase where the dyads gave/received feedback from each other every third session they conducted with a client (this is referring to overall sessions clients received, not the 10 minute NET sessions

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within the overall sessions). This was conducted for as long as possible given the availability of time.

Once all phases of the study were complete, a social validity survey was sent to all participants to determine the participants opinions on both how enjoyable and how useful participating in the study was for them.

Sessions were scored by the designated participant during appropriate phases, and by the researcher during each NET session. This was done by indicating a score for each skill item on the checklist based on the participants performance. Each item scored for this study was worth up to either three or five points if the therapist performed that skill accurately. For example, one item on the checklist states the therapist "mixes verbal operants". If the participant is observed to present teaching trials for four of the six targeted verbal operants (such as mands, tacts, echoics and intraverbals) in the teaching session then they would receive three out of five possible points for that checklist item.

The researcher was scoring the videos of participants implementing NET, so due to this format, items that would not be discernable during the video were not considered during the scoring process. These items include those relating to cleaning up after your session, arranging materials appropriately before the session begins, and teaching new targets. During the phase that a participant was designated to receive feedback, the score for each item was reviewed by the dyadic partner with the participant and feedback was given directly following each session.

Inter-observer Agreement:

In order to assure that accurate observational data was collected, Inter-observer reliability (IOR) was conducted between the primary researcher and another researcher

for of 31% of trials, and the between the primary researcher and the participants working at the ABA clinic for all recorded sessions. IOR was assessed by comparing the number of agreements between independent observers. The primary researcher and the researcher assisting with IOR data collection scored the videos at separate times without the knowledge of how the other researcher scored the participants performance. Inter-observer agreement (IOA) was assumed if both observers independently marked the occurrence or non-occurrence of a behavior. IOA was calculated by dividing the number of agreements between the observers and the total number of agreements plus disagreements, and then multiplying the result by 100.

 During the peer feedback phase and dyad reversal phase, a specific participant from each dyad was trained how to use the NET checklist by watching two different videos of the researcher conducting NET and scoring the videos using the checklist. The videos demonstrated both a high and low performance example of NET sessions. These training videos had been previously scored by the researcher. IOR data was collected between the participant and the primary researcher based on these videos. Once IOA reached 90% or above, they were asked to start using the checklist to review their partner's performance after each session during the appropriate phase.

 Procedure:

 At the beginning of the study, participants were provided a 1-hour NET training involving written instruction, modeling, role-play and verbal feedback by the researchers (behavior skills training). Participants were also given the NET checklist and instructions for its correct use. Each item on the checklist was explained, examples were provided and participants were given the opportunity to ask questions during this time. After this initial

training, the baseline phase began. All participants were asked to run NET sessions with the child they were working with and were given no feedback or instructions during this time. This phase continued for 5 and 7 sessions respectively for dyads 1 and 2, and both participants in each dyad showed either steady state or declining performance. The exception was if the level of treatment became a concern for the progress of the client. This occurred in one case, and during sessions 6 and 7, participant 4 was provided with feedback by the researcher. This feedback was specific to the skill items the participant was not performance correctly that caused the concern for the client's progress.

After the baseline phase was complete, the participants selected to give feedback first were shown pre-recorded videos of high and low performance examples of NET implementation. These videos were used to train the participants in the proper use of the procedural integrity checklist and how to properly give feedback. First, each task on the checklist was described to the participant by the researcher, including definitions and examples for each item with the researcher answering any questions the participant had. The participant was then asked to score both the high and low performance examples using the checklist. The checklist consists of criterion scores for each component of NET, and the appropriate score should be given based on performance. If a person receives all the points possible, that shows they ran the session accurately. The participants were instructed to give feedback on the individual's performance in the videos based on the checklist, what they did correctly during the session and what they need to change for future sessions. Agreement was calculated between the participant and the researcher for this training. If IOA was at 90% or above, then the peer-feedback phase began. If it was below 90%, the researcher explained why each incorrectly marked item was incorrect.

The participant was then asked to re-watch the videos, and IOA was calculated again. This continued until IOA was 90% or above, and then the peer feedback phase began.

During this phase, the first participant in each dyad (participants 1 and 3) gave feedback to the second participant (participants 2 and 4) based on the NET procedural integrity checklist, but received no feedback themselves. Levels of procedural integrity were measured for both participants by the researchers throughout the entire study. This was done by having the primary researcher watch the video of the session, and use to NET checklist to score the therapist's performance. This provided a way to see if giving feedback but not receiving it would have an effect on the level of procedural integrity for a participant.

After 3 sessions, the dyad reversal phase began. The partner that had previously been receiving the feedback (participants 2 and 4) were trained how to use the checklist and give feedback in the same way the first participant in each dyad had been trained in the previous phase, and began to give feedback to their partner. The first participant in each dyad ceased giving feedback during this phase.

If during the dyad reversal phase the participants failed to increase performance to mastery, then the instructor feedback phase was implemented. This phase consisted of an instructor (who had a bachelors level behavior analyst certification) providing the participant with feedback based on the checklist in the same way the participants were trained to do, as was done by Tenowich (2014).

The final phase of the study was the maintenance phase. This phase began for a participant after three consecutive sessions where they had 80% or higher on the procedural integrity checklist during the dyad reversal or supervisor feedback phases.

During this phase, the dyads only gave/received feedback every third session. This

continued as long as possible given contextual time constraints (semesters ending, etc.)

RESULTS

Data was analyzed using visual inspection of line graphs (see figure 1), and the

primary dependent variable was participant performance based on the NET procedural

integrity checklist. A total of three sessions were conducted for each dyad for the peer

feedback and dyad reversal phases. For dyad 1, there were five baseline sessions

conducted and for dyad 2 there were seven. There was enough time to conduct two

maintenance sessions for dyad one, but unfortunately there was not enough time to

continue to this phase for dyad 2. Instead, one participant in dyad 2 received four sessions

of instructor feedback before meeting the mastery criterion of three consecutive sessions

at or above 80% on the checklist. Data did not indicate that implementing the

intervention for one dyad of participants resulted in any change in performance for the

other dyad of participants.

Performance was measured as percentage of points earned on the checklist per

session, and mastery criterion was based on the total checklist scores, not critical skills

scores. As expected, low levels of performance (less than 80%) were observed for all

participants during the baseline phase, as well as steady state performance. However,

participant performance was differentiated for each participant during the subsequent

phases. Participants 1 and 3 first gave feedback and then received it, and participants 2

and 4 received feedback and then gave it.

Participant 1 showed variable performance for both total checklist and critical

skills scores, with no trend in the data during baseline. During the peer feedback phase

when he was giving feedback but not receiving it, there was a slight increase in level of

performance for both total checklist and critical skills scores. However, mastery criterion was not met at this time. During the dyad reversal phase, this participant slightly increased their level of performance with regards to total checklist skills and was able to meet mastery criterion. During this phase, they significantly increased their level of critical skill performance. During the maintenance phase, performance for both total checklist and critical skills maintained at steady, high levels. These results may indicate that receiving feedback after first giving it was an effective method to increase the level of performance on critical skills. However, there was a slow steady increase in performance for total checklist skills for this participant, which could indicate a maturation effect given the amount of time the study took to conduct, as well as the fact that there were sessions not part of this study conducted in between the reported sessions. It is not clear whether this training package was effective at increasing the procedural integrity for this participant, or whether there were other variables affecting his performance.

During baseline, participant 2 displayed a downward trend in performance for both total checklist and critical skills scores during the last three sessions. During the peer feedback condition when she was receiving feedback, there was a slight increase in level for both skill measures. In the dyad reversal phase where participant 2 was giving feedback, there was a larger increase in both skill measures, and a significant upward trend in the critical skills scores. Participant 2 also met mastery criterion during this phase. During the maintenance phase, high steady levels for both skill measures were observed. For participant 2, giving feedback made a larger difference in performance

than did receiving it, and the change in performance coincided with the change in the phase of the study.

Participant 3 displayed steady scores that were very close to the mastery criterion during baseline. During the peer feedback phase when she was giving feedback, performance for both measures significantly increased and mastery criterion was met. During the dyad reversal phase when participant 3 was receiving feedback, scores for both skill measures maintained at steady high levels, and mastery criterion continued to be met. It should be noted that for this participant there was very little room to increase performance while receiving feedback (this participant was scoring 95% or higher during this phase), but that while receiving feedback, high scores did maintain. Data indicates that for participant 3, giving feedback was effective at increasing performance, and that receiving it may be an effective strategy to maintain performance.

Finally, participant 4 displayed first a downward trend, and then a steady level of low performance for the total checklist skills. This participant did not receive any points regarding critical skills during this phase. Due to the low levels of performance becoming a treatment issue for the client, a researcher provided feedback during sessions 6 and 7 during baseline. However, this was not seen to improve performance. During the peer feedback phase, this participant was receiving feedback from the peer partner. During this phase, data indicated an increase in level and an upward trend in both measures of skill. During the dyad reversal phase, this participant gave feedback, and both measures of skill plateaued and remained at similar levels to those in the peer feedback phase. Because this participant did not reach mastery criterion during this phase, the instructor feedback phase was introduced. During this time, a researcher provided feedback to her in the same

way as the other participants had been providing feedback. This participant was the only one to require moving into the instructor feedback phase. After four sessions of receiving instructor feedback, this participant was able to meet mastery criterion, with both measures of skill increasing. Results indicate that while receiving feedback was effective for increasing both measures of skill, instructor feedback was required to increase level of performance to meet mastery criterion.

It should be noted that a third dyad was originally recruited and trained, but dropped out early in the baseline phase due to the health complications of one participant.

Results showed that for three of the four participants, examining only the critical skills shows a more drastic change in level of performance. More specifically, it followed the trends listed above for each participant, but the change was more substantial. For future research, this may be a more meaningful measure of performance.

A social validity measure was also taken, to determine the participant's opinion of this training method. This measure was presented in the form of a survey containing 8 questions with a Likert scale (see Appendix B). Questions were counterbalanced and phrased both positively and negatively. Results from this survey indicate that overall, the participants of this study report feeling this training was effective and useful for increasing their skill with NET, and that the style of this training package was acceptable to them (see figure 2a-h). There was some indication that participants felt more comfortable with giving feedback than receiving feedback. This makes sense, considering that three of the four participants made their most substantial increases in performance while giving rather than receiving feedback. Overall, this method of training appears to be socially valid.

DISCUSSION

The purpose of this paper was to add to the literature of both self-monitoring and peer-teaching methods by evaluating the effect of peer-mediated self-monitoring as a method for increasing procedural integrity during NET sessions. An additional extension of this research was to determine if there was a difference in staff performance between giving and receiving feedback in regards to procedural integrity. By the end of the study, all participants were able to reach performance mastery criterion, supporting the literature suggesting that peer-teaching methods are effective (Page, Iwata & Reid, 1982; Neef, 1995; Boyce & Hineline, 2002; Sturmey, Dalfen & Fienup, 2015; Sturmey, Dalfen & Fienup, 2015). The current study also potentially extends the literature by demonstrating that giving feedback can also increase performance. This method was also able to save supervisor time, since only one participant needed to receive feedback from a supervisor to reach the mastery criterion. This aspect of the study is particularly important when taking into account the current contingencies in place for Behavior Analyst's working in the field. The current Medicaid Autism Benefit in Michigan, for example, mandates that 10% of the total time a client receives ABA services must be supervised by a clinician. However, this may not be enough time to observe and modify client programming as well as train staff effectively. The use of peer teaching methods would therefore be useful in a situation where a supervisor may be limited by contextual factors. This training method

would also be useful in other practical situations. When hiring a new therapist, some organizations will have the new therapist shadow a current experienced therapist. This time could be used for the current therapist to provide feedback to the new therapist, and for the new therapist to be trained and practice giving feedback to the current therapist as was done during this study. This would make better use of the time that is typically spent shadowing the therapist, as well as save the supervisor time training the new therapist.

The measurement tool used to track the dependent measure of procedural integrity was the NET checklist. This study modified the measurement tool that was used in the previous study by Tenowich (2014) to create a NET checklist in the form of a performance matrix. The reason the measurement tool was adjusted was because using a performance matrix such as the one used in this study may provide a more sensitive and precise measure of performance, because it allows for the measurement of smaller changes in performance. A comparison was conducted post-hoc to determine if there was any difference between the two measurement tools, and it was found that the yes/no checklist tended to slightly underestimate performance until the participants reached around 80% of items correct (See Figure 2). This may indicate that the performance matrix may be a more accurate measure of performance, because the score is not changed as drastically by missing or receiving a single point. It also allows individuals to still receive some points for partially completing a certain skill, whereas no points would be given for this on the yes/no checklist. This can allow supervisors to provide more specific feedback, as well as to track smaller units of performance change. However, since there are more possible opportunities to earn points for skills within the performance matrix as compared to the yes/no checklist, there is more work required on the part of the

individual who is using this measurement tool. This may make the yes/no checklist more appealing for supervisors to use. It is suggested that future studies look into the difference between the types of measurement tools more thoroughly.

This study also broke the performance matrix down further by identifying and analyzing critical skills. Critical skills are the items that were deemed most essential to the NET procedure by the research team, meaning that these are the skills that make it possible for the clients to learn language within this teaching style. The scores received on the critical skills measure were compared to the total checklist scores, and it was found that the critical scores followed the pattern of the total checklist, but the change in performance was more drastic. This is an important finding, because it shows that the treatment package was effective at increasing performance with regard to the most important procedural skills. Therefore, this intervention should have a positive effect on child performance according to the literature that identified an association between therapist procedural integrity and child performance (Koegel, Russo & Rincover, 1977; Downs, Downs & Rau, 2008; Robinson, 2011; Plavnick, Ferreri & Maupin, 2010; Martin, Drasgow & Halle, 2015).

As the purpose of this study was to evaluate the effectiveness of peer-feedback and to replicate the findings of Tenowich (2014), the checklist items were not modified with respect to their skill content. For its practical use, it would be helpful to know whether including all items on the checklist is necessary for the clients to effectively learn. This should be done in future research by including child performance, and examining the difference between using all of the items on the checklist to provide feedback and only using the critical skills items to give feedback. Although not all items

on the checklist were deemed critical to NET procedures, the items on the checklist are expected to make a difference in the therapists' ability to effectively teach the client. Again, this should be empirically examined to further refine this measurement tool and determine the necessary components.

As a secondary measure, social validity was collected using a survey that was sent out after the conclusion of the study. This survey contained 8 statements that were phrased both positively and negatively, and were counterbalanced to avoid bias. These questions focused on how effective the participants thought this training method was, and how comfortable they felt with this training method. When comparing the opinions stated in the survey with the performance across the study for each participant, there was no noted associations between perceived effectiveness and actual effectiveness, and between how comfortable they reported feeling and actual effectiveness.

Overall, the data indicates that for some individuals, giving feedback first was enough to increase performance, and for others, giving feedback after first receiving it was more effective in improving performance. One participant did not show substantial improvement during any particular phase, but instead displayed a gradual increase across the study, while another participant showed some improvement while first receiving feedback, but required feedback from an instructor to reach the mastery criterion. Even though results were not consistent across individuals, three out of four participants were able to improve their performance to acceptable levels without a supervisor having to spend time training them. This is an important aspect of the study, because this is one of the main potential benefits of utilizing peer-teaching methods.

From the results of this study, it does seem that giving feedback (whether it was before or after receiving it) is more effective than simply receiving it. The current study does not provide a way of determining what aspects of giving feedback to others makes it effective for improving performance. It is possible providing feedback can serve to reinforce antecedent stimulus control for proper implementation on the part of the peer that is giving the feedback. It is also possible that providing feedback based on the checklist more clearly portrays expectations for performance for the individual that is providing the feedback. Replications of this teaching procedure would be required to determine if these results are reliable. If so, this method could be useful for training individuals who will eventually become supervisors in giving feedback to others while increasing their performance in running teaching procedures such as NET.

All participants were able to meet the mastery criterion by the end of this study. There are some individual differences between these participants that may have affected which phase they made their most significant improvement in. Participants 2 and 3 both began the baseline phase at relatively high and consistent levels of performance (75% or higher). These participants were also anecdotally noted to be more receptive to feedback than participants 1 and 4. This means that both dyads contained a participant who started out with a moderately high skill level, and a history of changing their behavior based on feedback. This may have made a difference in the outcome for their partners. From the data, we can see that participant 3 providing feedback to participant 4 made a significant change in participant 4's performance. However, participant 2 providing feedback to participant 1 did not make a significant difference in participant 1's performance.

Another individual difference that may have affected the results was the age of participant 4. NET is a procedure that typically involves a lot of physical activity, including getting up and down off of the ground. The age of the participant may have made it more difficult for her to engage in this physical activity, and explain in part her level of performance. It was also noted that this participant was a non-traditional student who, according to her own anecdotal report, had been struggling academically, which may also help explain in part why the instructor feedback phase may have been necessary for her. These types of individual differences should be taken into consideration when attempting to generalize the results of this study.

For each of the participants, an increase in performance was seen in the first data point of the phase where they were trained to provide feedback (the peer feedback phase for participants 1 and 3, and the dyad reversal phase for participants 2 and 4). This could indicate that just being exposed to and trained on the checklist increased their level of performance. This could be due to either the checklist, the NET example videos, or both acting as a prompt for the participants accurate performance of skills before they conducted their sessions.

Results suggest that this method of training is effective for increasing the procedural integrity of NET implementation. However, the component(s) of this treatment that is/are effective seems to depend on the individual participant. In this study, more participants improved while giving feedback than receiving it. However, due to the limitations listed below and the small sample size, further studies should be conducted before a conclusion is reached. It is also possible that there is a sequencing effect with regards to the order of giving and receiving feedback, but more dyads would be necessary

to determine if that were the case. Without further research, it is difficult to draw conclusions about how applicable this teaching package may be, but it does provide a basis for future studies to expand upon.

Limitations:

While all individuals who participated in this study improved their performance with regards to NET implementation, there were limitations that should be considered. One limitation is the amount of time it took to run the study. While the intention was for the study to be conducted over a 3-4 week time period, the data was collected over 17 weeks due to difficulties with scheduling. Due to the aim and design of the study, data could only be collected when both participants were available, and there was a client to work with during that time. Participants provided the researcher with a limited availability to work in the clinic, and the availability the participants provided did not line up with other participants as often as needed to complete this study within the originally intended time period. The limited availability of therapists, session cancelations by clients and therapists switching sessions caused the intervals between each recorded session to be unequal. The intervals between sessions varied between 1 day and 3 weeks (this included the 2 week semester break). This could present a problem to the internal validity of the study. During the intervals between the sessions, things may have occurred that could have affected the participant's performance instead of the intervention package. This could include unintentional feedback, practicing their skills in other sessions unrelated to this study, and the behavior of the participants being affected by the natural contingencies.

The participants were conducting sessions that were not reported in between the recorded sessions reported in the study. This provided an opportunity for the therapists to

practice the skills being developed during the course of this study, and for performance to be shaped by the natural contingencies during the sessions. While improvement in performance does seem to be associated with the phase changes in the study for three of the four participants, it is difficult to determine a causal relationship between the training package in this study and increased procedural integrity. It is likely that a clinic that hired non-students who were working for a wage rather than a grade would be provided better availability by the therapists and be able to avoid the scheduling and timing problems that occurred during this study. When a person applies for a job as an ABA therapist, it is likely that they would provide a more flexible schedule of availability. This would allow for this intervention package to be utilized while limiting the problems related to internal validity caused by the issues this study had with scheduling and availability. This may be a more effective setting for future replications of this study.

During the outset of this study, it was intended that each dyad would work with one child throughout this study, but due to the above listed limited availability and scheduling difficulties, it was not possible. It was the intention of the research team to include the effects that increased procedural integrity had on the child's performance. However, this was not the main aim of the study, and this is an association that is already supported by the literature (Koegel, Russo & Rincover, 1977; Downs, Downs & Rau, 2008; Robinson, 2011; Plavnick, Ferreri & Maupin, 2010; Martin, Drasgow & Halle, 2015). It was also necessary to omit the third dyad from the study due to one of the participants suffering from unexpected health complications. This is a limitation to the internal validity of the study. Typically, multiple baseline designs have at least three participants (or in the case of this study, dyads), where the intervention is introduced at different times for each

participant. That way, if the change in behavior correlates with the introduction of the intervention, it can be said that there is a causal relation between the intervention and the change. Although we only saw a change in behavior when there was a change in intervention phase for 3 of the 4 participants, missing the third dyad is limiting.

Although this treatment method was utilized to train ABA therapists within a clinic setting, NET is used in many different environments and conducted by many different people. It is difficult to say how generalizable these methods will be without conducting further research. However, there is nothing about this treatment method that would specifically limit it from being used with other individuals who may use NET such as parents and teachers, or from other environments where NET may be used, such as in schools and homes.

Another possible limitation to the internal validity of this study is that there was the potential for the therapists to be receiving or giving feedback outside of the study. Supervisors within the clinic were specifically asked to refrain from providing feedback regarding NET, but there is still the possibility that this occurred without the knowledge of the research team. It is also possible that feedback given by supervisors regarding Discrete Trial Training (DTT) may have influenced NET performance. This is possible because these two teaching styles have procedural elements that overlap.

It was reported that participant 4 was providing feedback based on the NET checklist to other therapists in the clinic not involved in the study during the dyad reversal phase. However, the data does not suggest that this had any effect on her performance.

Conclusion:

Results of this study indicated that all participants were able to increase their procedural integrity of NET implementation by the end of this study. Although there were limitations, therapists improved their performance running NET sessions and reported that this was a socially acceptable method of training. Most of the limitations occurred due to the lack of available time overlapping between therapists. In real world settings, this is something that is not likely to be a problem, and these limitations could potentially be avoided. This teaching package may prove to be an effective method of training in real world settings that will save supervisor time while utilizing the advantages of peer training.

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NET Procedural Fidelity Checklist

Date: _____ **Therapist**: _____ **Observer**: _____

Place a checkmark in the empty box below the appropriate criterion for each target skill.

	0 Points	1 Point	2 Points	3 Points	4 Points	5 Points
Pre-Session						
Prepares all appropriate materials	3+	2	1	0	N/A	N/A
Missing ___ necessary items at the beginning of a session						
During Session						
Begins promptly Presents first SD within ___	> 2.5 min.	2.5 min.	2 min.	1.5 min.	1 min.	30 sec.
Begins session with a mand Yes or no	No	N/A	N/A	N/A	N/A	Yes
Area is neat and clean Objects are in inappropriate spots ___ time(s)	5+	4	3	2	1	0
Appropriate level of enthusiasm Therapist shows differential enthusiasm for correct vs. incorrect responding _____	None			Some		All
Mixes verbal operants Presents trials for __ type(s) of verbal operant(s)	1	2	3	4	5	6
Prompts immediately for unknown skills Therapist prompts immediately for new skills; ___opportunities	Misses 5	Misses 4	Misses 3	Misses 2	Misses 1	All
Uses appropriate error correction procedures	5+	4	3	2	1	0

Uses incorrect error correction procedures ___ time(s)						
SD is represented before each prompt Presents prompt without restating the SD ____ time(s)	**5+**	**4**	**3**	**2**	**1**	**0**
Maintains client safety Client engages in potentially dangerous behaviors	**Yes**	**N/A**	**N/A**	**N/A**	**N/A**	**No**
Taught appropriate targets Presented trials that were inappropriate for client ____ times	**5+**	**4**	**3**	**2**	**1**	**0**
Used an appropriate number of activities Therapist and client engage in ___ different activities	**< 2**	**3**	**4**	**5**	**6**	**7 +**
Taught new targets Therapist introduced ___ new targets	**0**	**1**	**2**	**3**	**4**	**5**
Sr+ reinforcer competes with the Sr- Child worked for escape ___ times	**6+**	**4-5**	**3-4**	**2-3**	**1-2**	**0-1**
Pairs social reinforcement with tangibles Does not provide praise/social reinforcement after a trial ___ time(s)	**6+**	**4-5**	**3-4**	**2-3**	**1-2**	**0-1**
Appropriate number of responses (rate per minute) Rate of responses during time sample ___ of client goal	**Was 50% or less**	**Was 60%**	**Was 70%**	**Was 80%**	**Was 90%**	**Met or exceeded**
Responses across verbal operants: 1 minute sample(s)	**Mands**	**Tacts**	**Receptive ID**	**Intraverbal**	**Imitation**	**Echoic**
Sample 1						
Sample 2						

Post-Session						
Cleans up area at end of session ___ objects/piles left in inappropriate locations	**3+**	**2**	**1**	**0**	**N/A**	**N/A**
Graphs response rate appropriately Therapist omits ___ items while graphing	**3+**	**2**	**1**	**0**	**N/A**	**N/A**
ABC data is recorded/graphed appropriately for each instance of problem behavior Therapist omits ___ items while recording	**3+**	**2**	**1**	**0**	**N/A**	**N/A**

* Highlighted items were not scored during this study due to inability to accurately

determine score from video footage.

APPENDIX B

Effectiveness Survey

Please indicate your answers for each question by circling the number you feel most

represents your opinion of the NET training study you participated in.

This training alone was sufficient to teach me how to run NET accurately

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

I did not enjoy this style of training (giving and receiving feedback from peers)

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

I feel comfortable running NET independent of a supervisor

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

This training did not teach me everything I need to effectively run NET

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

I felt comfortable giving feedback to my peer

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

I would have preferred to receive feedback from a supervisor rather than from my peer

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

I would choose to participate in this style of training (giving and receiving feedback from peers) again

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

I do not feel comfortable running NET procedures independent of a supervisor

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

IRB Approval Form

NORTHERN MICHIGAN UNIVERSITY
Memorandum

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TO:	Miranda Johnson Psychology Department
CC:	Jacob Daar Psychology Department
DATE:	March 17, 2017
FROM:	Rob Winn, Ph.D. Interim Dean of Arts and Sciences/IRB Administrator
SUBJECT:	**IRB Proposal** HS17-835 **IRB Approval Dates: 3/17/2017 - 3/17/2018** Proposed Project Dates: 2/23/2017 - 1/1/2018 "Using Peer-Mediated Self Monitoring to Increase Procedural Integrity of NET Implementation in a Clinic Setting"

The Institutional Review Board (IRB) has reviewed your proposal and has given it final approval. To maintain permission from the Federal government to use human subjects in research, certain reporting processes are required.

A. You must include the statement "Approved by IRB: Project # HS17-835" on all research materials you distribute, as well as on any correspondence concerning this project.

B. If a subject suffers an injury during research, or if there is an incident of non-compliance with IRB policies and procedures, you must take immediate action to assist the subject and notify the IRB chair (dereande@nmu.edu) and NMU's IRB administrator (rwinn@nmu.edu) within 48 hours. Additionally, you must complete an Unanticipated Problem or Adverse Event Form for Research Involving Human Subjects

C. Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding. Informed consent must continue throughout the project via a dialogue between the researcher and research participant.

D. If you find that modifications of methods or procedures are necessary, you must submit a Project Modification Form for Research Involving Human Subjects before collecting data.

E. If you complete your project within 12 months from the date of your approval notification, you must submit a Project Completion Form for Research Involving Human Subjects. If you do not complete your project within 12 months from the date of your approval notification, you must submit a Project Renewal Form for Research Involving Human Subjects. You may apply for a one-year project renewal up to four times.

NOTE: Failure to submit a Project Completion Form or Project Renewal Form within 12 months from the date of your approval notification will result in a suspension of Human Subjects Research privileges for all investigators listed on the application until the form is submitted and approved.

All forms can be found at the NMU Grants and Research website:
http://www.nmu.edu/grantsandresearch/node/102
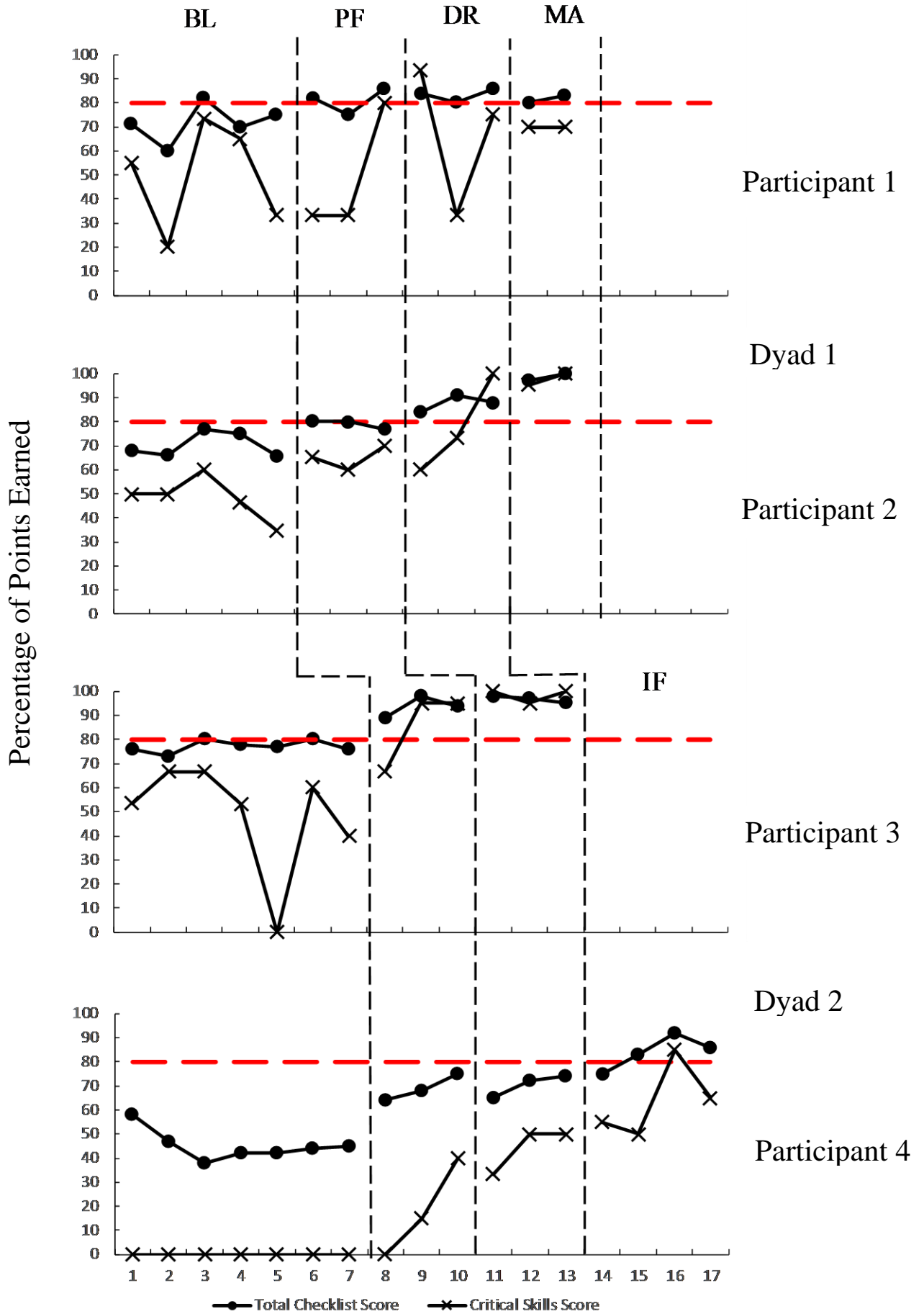
NET Procedural Integrity

Figure 1: Percent of NET checklist points earned. Phase changes denoted by dotted lines; baseline (BL), peer feedback (PF), dyad reversal (DR), instructor feedback (IF) and maintenance (MA). Dotted red line indicates goal performance (80%).
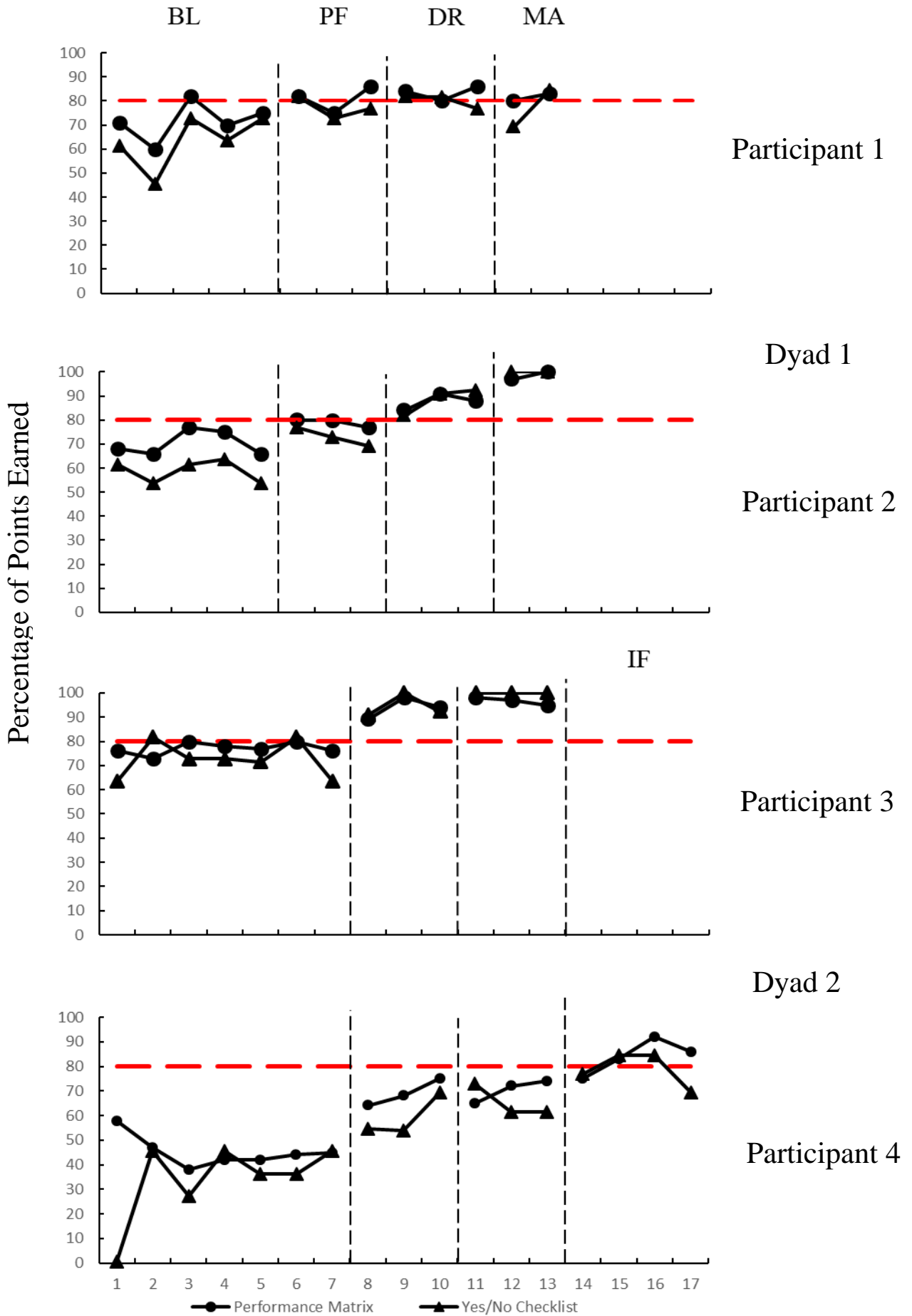
NET Procedural Integrity

Percentage of Points Earned

BL PF DR MA

IF

Participant 1

Dyad 1

Participant 2

Participant 3

Dyad 2

Participant 4

● Performance Matrix ▲ Yes/No Checklist

Figure 2. Percent of NET checklist points earned for the perfomance matrix that was compared to what the scores for the same performance would have been on the yes/no checklist. Phase changes denoted by dotted lines; baseline (BL), peer feedback (PF), dyad reversal (DR), instructor feedback (IF) and maintenance (MA). Dotted red line indicates goal performance (80%). Differences in performance are slight, but there is an underestimation when using the Yes/No checklist until performace hits around 80%.

This training alone was sufficient to teach me how to run NET accurately
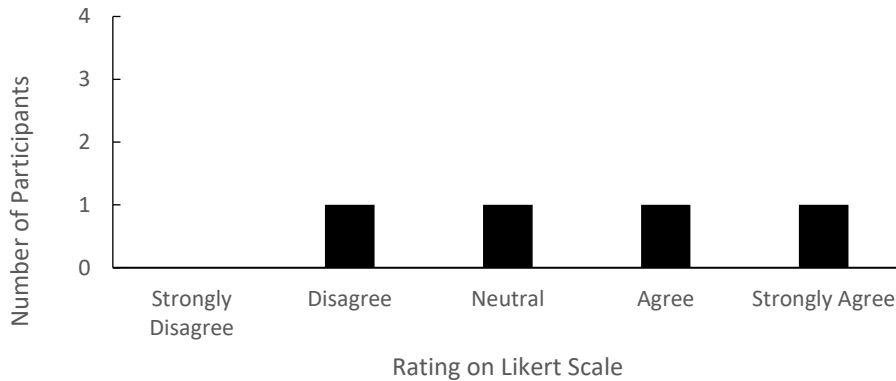
Figure 3a. Results from question 1 on the social validity survey sent to participants after the study was completed. Participants report differing opinions on whether or not this training alone was sufficient to teach NET procedures, ranging from disagreeing to strongly aggreeing to the statement in question 1.

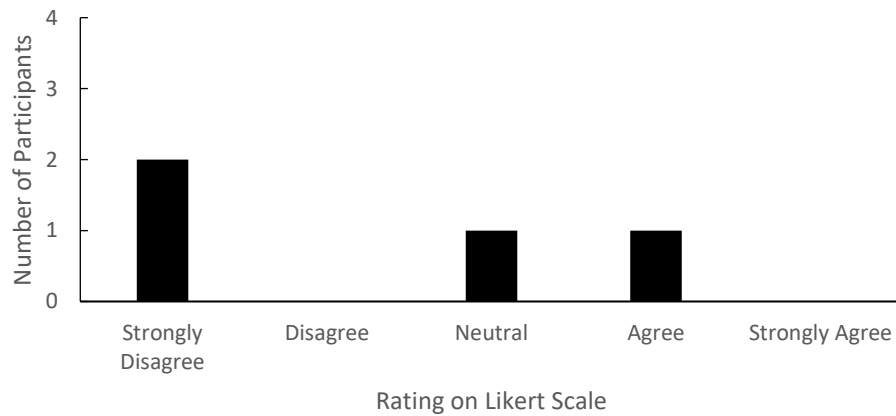## I did not enjoy this style of training (giving and receiving feedback from peers)

Figure 3b. Results from question 2 on the social validity survey sent to participants after the study was completed. Two participants report that they strongly disagreed with the statement in question 2, one reported feeling neutral and one agreed with it.

I feel comfortable running NET independent of a supervisor
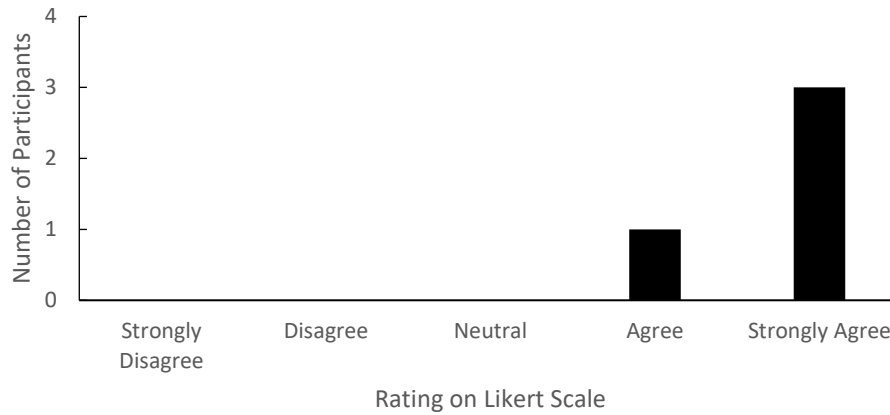
Figure 3c. Results from question 3 on the social validity survey sent to participants after the study was completed. Three participants reported strongly aggreeing that they feel comfortable running NET independent of a supervisor, and one participant agreed.

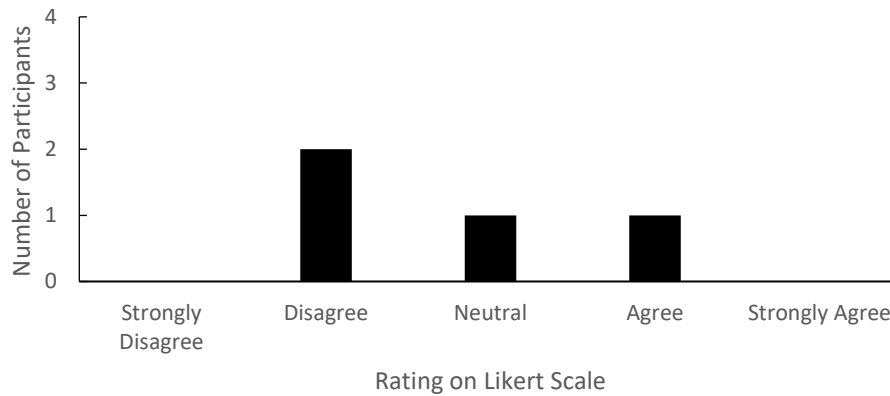## This training did not teach me everything I need to effectively run NET

Figure 3d. Results from question 4 on the social validity survey sent to participants after the study was completed. Two participants reported that they disagreed with the statement in question 4, one was neutral and one reported agreeing.
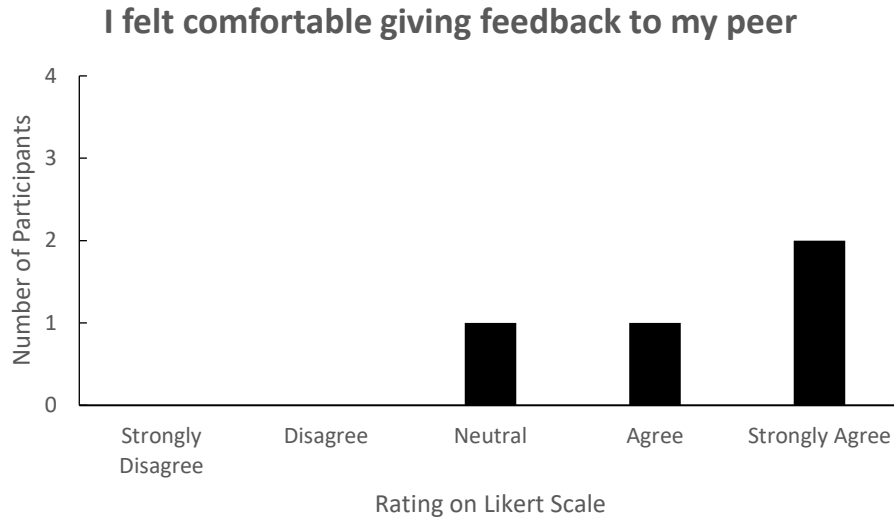
I felt comfortable giving feedback to my peer

Figure 3e. Results from question 5 on the social validity survery sent to participants after the study was completed. Two participants reported that they strongly agreed that they felt comfortable giving feedback to their peer during the study, one agreed and one reported feeling neutral.
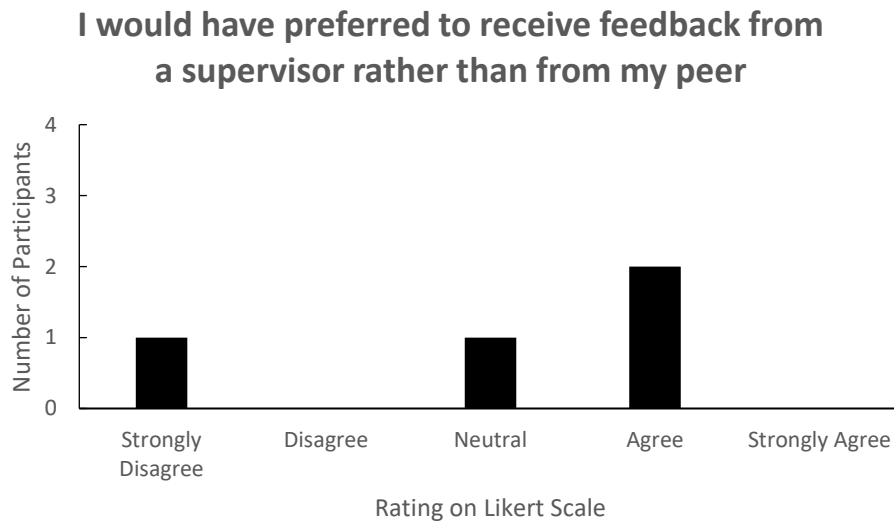
I would have preferred to receive feedback from a supervisor rather than from my peer

Figure 3f. Results from question 6 on the social validity survey sent to participants after the study was completed. Two participants reported that they agreed with the statement in question 6, one reported feeling neutral and one strongly disagreed.

I would choose to participate in this style of training (giving and receiving feedback from peers) again
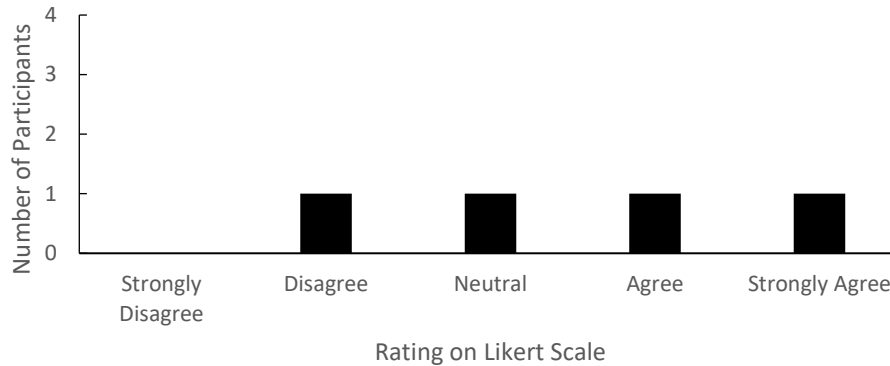

Figure 3g. Results from question 7 on the social validity survey sent to participants after the study was completed. Results indicate that participants had varying opinions on whether they would choose to participate in this style of teaching again, ranging from disagreeing with the statement to strongly agreeing.

I do not feel comfortable running NET procedures independent of a supervisor
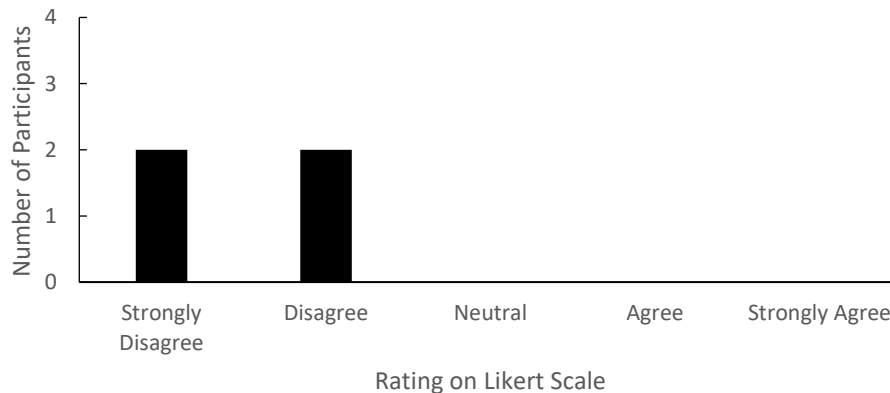

Figure 3h. Results from question 8 on the social validity survey sent to participants after the study was completed. Results show that two participants disagreed with the statement in this question, and two participants strongly disagreed.