OPEN ACCESS

GAVIN PUBLISHERS

International Journal of Autism & Related Disabilities

Kaminski L, et al. Int J Autism & Relat Disabil: IJARD-117.

DOI: 10.29011/IJARD-117. 000017

Research Article

Evaluation of A Self-Instructional Package for Teaching Parents to Conduct Discrete-Trials Teaching with Children with Autism

Lauren Kaminski*, Garry Martin*, Raeesa Mohamed

Department of Psychology, University of Manitoba, Canada

***Corresponding author:** Garry Martin, Department of Psychology, University of Manitoba, Canada. Tel: +12044748589; Email: Garry.Martin@umanitoba.ca

Lauren Kaminski, Department of Psychology, University of Manitoba, Canada. Email: laurenjuliakaminski@gmail.com

Citation: Kaminski L, Martin G, Mohamed R (2018) Evaluation of A Self-Instructional Package for Teaching Parents to Conduct Discrete-Trials Teaching with Children with Autism. Int J Autism & Relat Disabil: IJARD-117. DOI: 10.29011/IJARD-117. 000017

Received Date: 30 August, 2018; **Accepted Date:** 26 October, 2018; **Published Date:** 05 September, 2018

Abstract

Discrete-Trials Teaching (DTT) is commonly used in early intensive behavioral intervention for teaching children with ASD. DTT involves a teacher presenting an antecedent to the child, waiting for the child's response, and then providing a consequence for that response (either a reinforcer for a correct response or non-interaction for an incorrect response). The aim of this study was to assess the effectiveness of the Fazzio and Martin DTT self-instructional manual plus video (2011) with mothers of children with ASD as the participants. A multiple-baseline design across a pair of participants was used, and replicated across a second pair. During the baseline assessment, a participant was asked to teach three tasks (pointing-to-named pictures, identity matching and imitation) to a confederate role-playing a child with ASD. The participant was given one-page summaries for each teaching task and no additional information. Once baseline data was collected, the participant had the opportunity to study the self-instructional package, after which she conducted a post-treatment DTT session with the confederate. If she did not achieve mastery (set at 80%) in post-treatment assessment she was provided with a feedback session on her DTT performance, and then conducted an additional DTT session with the confederate. Three of the participants were available to conduct a generalization session with her child. The treatment package was very effective for training two of the mothers with children with ASD to implement DTT, and somewhat effective for the other two mothers who required a feedback session.

Keywords: Discrete-Trials Teaching; Parents of Children with Autism; Self-Instructional Manual Plus Video

One of the most accredited forms of treatment for children with Autism Spectrum Disorder (ASD) is known as Early Intensive Behavioral Intervention (EIBI), which is an intensive one-to-one treatment lasting approximately 40 hours per week for two or more years [1]. Several studies have documented the effectiveness of EIBI and it is the most well established evidence-based treatment for ASD [2-7]. This type of intervention is applied shortly after a child is diagnosed with ASD and it has resulted in improved cognitive, social, and communication skills and a reduction in problem behaviors. EIBI uses the core principles of Applied Behavior Analysis (ABA) in order to teach skills such as attending, receptive and expressive language, requesting, social and cooperative play, conversation skills, and appropriate classroom behavior [7,8].

A common teaching method in ABA and one of the key components of EIBI is Discrete-Trials Teaching (DTT). DTT involves a teacher presenting an instruction to a child, waiting for the child's response and then providing a consequence for that response (either a reinforcer for a correct response or non-interaction for an incorrect response). According to Smith (2001), each discrete trial has five parts, a cue, a prompt, a response, a consequence, and an inter-trial interval. These steps occur in rapid succession over many trials during a teaching session and can be individualized to each child. Thomson, Martin, Arnal, Fazzio, and Yu (2009) [9] did a meta-analysis on the training procedures available in the literature for teaching participants how to apply DTT. They concluded that it was difficult to draw any conclusion about the effectiveness of the various training methods and that there needed to be a development of a research-based procedure to efficiently and effectively train instructors and parents to conduct

DTT with children with ASD. Based on their familiarity with the research reviewed by Thompson et al., Fazzio and Martin (2006) [10] created the Discrete-Trials Teaching with Children with Autism: A Self-Instructional Manual to address this concern. The manual provided a brief description of autism, and introduced the reader to basic behavioral principles such as positive and negative reinforcement. It then described the process of DTT, some typical teaching tasks, prompting and fading procedures, error correction, and data recording.

A revision of the Fazzio and Martin manual was prepared in 2007 [11], and another revision was prepared in 2009 [12]. Studies of the first three versions of the manual demonstrated that it was somewhat effective for teaching university students how to implement DTT [13,14] and somewhat effective for teaching parents of children with autism how to implement DTT [15]. However, those studies indicated that the manual was not as effective as a self-instructional tool as Fazzio and Martin had hoped that it would be. Therefore, Fazzio and Martin updated the manual once again in 2011. The manual now consists of 65 pages, 12 chapters and 111 study questions. Because of the improved results in previous studies on the manual that incorporated a video demonstration component [16,17] they decided to add a video component to the manual. The self-instructional package now includes a video demonstration of one of the authors conducting a DTT session with a confederate. While studying the manual the reader is prompted, after Chapters 8, 10 and 11, to stop and watch the video demonstration and then engage in self-practice.

Wightman et al. (2012) [18] examined the 2011 version of the manual with 13 newly-hired tutors from the St.Amant ABA Preschool Program for Children with Autism in Manitoba. In Baseline a tutor was required to teach the same three tasks to a confederate role-playing a child with ASD. He/she was then required to study the manual, watch the video demonstrations, engage in self-practice and pass a test on the manual. Once the participant had passed the test with 100% accuracy, his/her DTT skills were assessed. If a participant achieved the mastery criterion on the post-training assessment, he/she then participated in a generalization session with a child with ASD. On average, it took the participants 3 hours and 56 minutes to master the manual and DTT accuracy improved from 46.2% in Baseline to 85.5% in the Post-training assessment. Their study provides good support that the 2011 version of the manual with the added video component is effective in teaching newly-hired tutors to conduct DTT. The study not only demonstrated the manual-video package to be self-instructional, but also required a reasonable period of time to master it (an average of 3 hours and 56 minutes). In the current study, we assessed the effectiveness of the Fazzio and Martin DTT self-instructional manual plus video (2011) for teaching parents of children with ASD to apply DTT to teach their children with ASD. We used a multiple-baseline design across a pair of participants, and replicated across a second pair.

Method

Participants and Setting

Participants were four mothers of children with ASD. The participants were recruited from families on the waitlist for and enrolled in the St.Amant Early Learning Program for Children with Autism in Manitoba, Canada. Letters were mailed out from the Privacy Officer at St.Amant to families who were involved in the program. The letters briefly described the study, its potential benefits, and emphasized that participation was voluntary and would in no way affect the services that the participants would receive from St.Amant. The letters also explained that if a parent completed participation she would be provided with a $50 honorarium. If a parent wished to participate, she mailed the signed consent form back to the first author. For three of the participants, their sessions took place in their homes. For one participant sessions took place in a public cafeteria as per her request.

Materials

In Baseline a participant received three, one-page summaries of the steps to teach each of three tasks: (a) pointing-to-named pictures, (b) identity matching, and (c) motor imitation. For a detailed description of the tasks, see Thiessen et al. (2009) [19]. She also received a data sheet to keep track of the responses of the confederate role-playing a child with autism (example available from the first author). A participant had access to picture flash cards to teach the tasks, a pen, and edibles for reinforcement. All Baseline sessions were videotaped, and a participant's DTT accuracy wasscored on the Discrete-Trials Teaching Evaluation Form [20] see (Figure 1).

Discrete-Trials Teaching Evaluation Form

DTTEF SCORE FORM

SCORING
✓ = performed correctly
X = performed incorrectly
/ = did not apply

INSTRUCTIONS FOR SCORING

- Score "Preparing to Conduct a Session", Components 1-6, using the space below.
- During a DTT session, score the components for conducting DTT trials, Components 7-19, on the other side of this form.
- Following a DTT session, score Component 20 by examining the fading procedure and data sheet used by the teacher and record your results on the other side of this form.

COMPONENTS	SCORE
Part I: Prepare to Conduct a Teaching Session	
1. Determine Teaching Task	
2. Gather Teaching Materials	
3. Select at Least 3 Reinforcers	
4. Arrange the Teaching Setting	
5. Determine the Prompt-Fading Procedure and the Initial Fading Step	
6. Invite Child to the Table and Give a Reinforcer Choice	

RECORDING ON EACH DTT TRIAL

- On Standard Trials, record Components 7, 8, 9, 10, 11, *12, or 13*, 14a, & 15a
- If the child responded correctly on a Standard Trial (e.g., Trial 1), then start recording the next trial (e.g., Trial 2) at Component 7.
- If the child responded incorrectly on a Standard Trial (e.g., Trial 1), then start recording the error correction trial at Step 16 in the column (e.g., Trial 2) after the column of the previous Standard Trial and record Components 16, 17, 18, 19, 14b, & 15b.
- As indicated above, Standard and Error Correction Trials should be recorded in different trial columns

COMPONENTS		TRIALS 1	2	3	4	5	6	7	8	9	10	11	12
Part II: On Standard Trials, Manage Antecedents													
7. Check the data sheet for the arrangement of teaching materials and/or response to be modeled.													
8. Secure the child's attention													
9. Present the teaching materials and/or model response													
10. Present the correct instruction													
11. Present Prompts													
Part III: On Standard Trials, Manage Consequences & Record Data													
On a trial, Score 12 Or 13 Not both	12. Following a **correct response**, praise & present an additional reinforcer												
	13. Following an **incorrect response**, block gently if possible, remove materials or stop gesturing & show a neutral expression for 2 or 3 seconds												
14a. Record the response immediately/accurately													
15a. Allow brief intertrial interval of 3-5 seconds													

Part IV: An Error Correction Trial Following An Error (record in the next column following the preceding standard trial)	
16. Secure the child's attention	
17. Re-present the materials	
18. Re-present the instruction & prompt immediately to guarantee correct response	
19. Praise only	
14b. Record the response immediately/ accurately	
15b. Allow brief intertrial interval of 3-5 seconds.	

Part IV: Prompt Fading	20. Fade prompts across trials as described on the data sheet.	

Figure 1. The 21 components of the Discrete-Trials Teaching Evaluation Rating Form.

During the training phase, a participant received the 65-page self-instructional manual [1] and a sheet to track her study time in minutes. A participant was required to complete two mastery tests on the manual. The first was based on Part I of the manual (chapters 1-6) and the second was based on Part II of the manual (chapters 7-12). The tests were comprised of 10 randomly selected study questions from the manual. Questions for the tests were selected by placing all numbers representing the potential questions into a hat and then picking out 10. This was done for each participant, first for the Part I mastery test, and then again (with the questions from Part II) for the Part II mastery test. Once a participant passed the Part I mastery Test, she was provided with the four video demonstrations on a USB stick to be watched when prompted in the manual. The four parts of the video are as follows: Part A demonstrates how to set up the teaching session; Part B demonstrates how to manage the antecedents and consequences for a correct response on a DTT trial; Part C demonstrates most-to-least prompt fading procedures; and Part D demonstrates how to manage the antecedents and consequences for an incorrect response on a DTT trial.

During the Post-training assessments, a participant was given access to pages 73-74 of the manual, which outlines the components of the DTTEF see (Figure 1). The same data sheets used to record the confederate's responses for each task that were used in Baseline were once again available. A participant also had access to the same picture flash cards to teach the tasks, edibles for reinforcement, and a pen. Post-training sessions were videotaped and a participant's DTT performance was scored on the DTTEF. In the Generalization phase, a participant received the same outline of the DTTEF components as provided in the Post-training assessment. She also had access to a pen, edibles for reinforcement and whatever stimuli that were needed in order to teach the task.

Procedure

A multiple-baseline design across a pair of participants was used, and replicated with a second pair, to evaluate the effectiveness of the current edition of the Fazzio and Martin DTT self-instructional package with parents of children with ASD. The baseline phase occurred concurrently across a pair of participants and treatment was introduced sequentially to each one of the pair. This was replicated with a second pair. Except in the second pair, due to participant cancellation and scheduling complications, participant 4 started receiving treatment shortly before participant 3 had her post-treatment session.

Phase 1: Baseline

During the Baseline phase a participant was provided with a brief introduction to the study. Next, she was asked to read three, one-page summaries of procedural steps to teach the tasks to the confederate role-playing the child with autism. The three tasks were: a) pointing-to-named pictures; b) identity matching; and c) motor imitation. The tasks were selected from the curriculum for the St.Amant Early Learning Program for Children with Autism. Once a participant indicated that she had finished reading the provided materials, she attempted to teach 12 trials of the first task to the confederate. The confederate, an appropriately trained university student, followed a predetermined script that indicated how to respond to each instruction given by the participant, which prompting level was required in order to respond, and whether or not he/she should be attending to the instructor. Once a parent completed teaching 12 trials of the first task to the confederate, this process was carried out in the same way for the second task, and then for the third task. The order of the tasks were randomized for each participant and across sessions. This was done by putting the three tasks in a hat and randomly picking one out prior to each session. A participant's DTT accuracy was scored on the DTTEF.

Phase 2: Training

Once a participant completed her Baseline of the three tasks, the self-instructional manual was provided to the participant and she was asked to study it and record the amount of time spent studying. A participant started by studying Part I (Chapters 1-6).

Part I provides the reader with an introduction to autism, and the basic learning principles (e.g., positive reinforcement, common teaching tasks, antecedents for responses, and fading prompts). The manual has two types of study questions that the participant was required to respond to. The first type prompts the participant to learn the background information about ABA. The second type, which are bold-faced in the manual, are there to assist a reader to learn the material that is essential for correctly implementing DTT. While studying the manual a participant would be prompted in the manual to learn the bold-faced questions as they were encountered, because she would be tested on them upon completion of Part I. At the end of each chapter a participant was prompted in the manual to go back and test herself on the bold-faced questions. When a participant indicated that she was finished studying Part I, she would contact the researcher and a session was set up where she was given a test of 10 randomly selected bold-faced questions (there are 40 in total from Chapters 1-6). The test was graded upon completion and a participant was required to score 100% in order to move on. If a score of 100% was not obtained, the participant was required to go back and restudy the material and re-answer the incorrect questions. For the Part I Mastery Test, Participants 1 and 2 were both required to restudy 4 questions, Participant 3 was required to restudy 5 questions, and Participant 4 was required to restudy 2 questions.

Upon completion and mastery of Part I, a participant was provided with the video portion of the self-instructional package at which point she was required to study and master Part II of the manual (Chapters 7-12). Participants were required to continue to track their study time. Part II covers the specific steps for teaching

DTT (e.g., taking data, managing consequences and antecedents, and error correction), and reviews some strategies for decreasing challenging behavior during a training session. A participant was once again prompted in the manual, at the end of each chapter, to be able to answer the bold-faced questions with 100% accuracy before moving on.

Part II of the manual includes four video demonstrations. A participant was prompted in the manual upon completion of certain chapters, to stop, watch the video demonstration, and engage in self-practice exercises for the material viewed on the video. For example, after mastering the study questions for Chapter 8, a participant would be prompted to watch Part A of the video demonstrations. In this video a trained professional demonstrated the six components to prepare a DTT teaching session. After watching the video, the participant was prompted in the manual to engage in self-practice on the material that she learned. This same procedure was repeated again after the participant mastered Chapter 10 of the manual. This time she was prompted in the manual to watch Part B of the video on managing antecedents and consequences for correct responses, and then Part C of the video, which was a demonstration of most-to-least prompt fading.

After watching the videos, the manual prompted the participant to complete a self-practice role-playing exercise, which involved the components of the DTTEF, and to score her performance on the DTTEF. A participant was prompted in the manual to continue this strategy until she had mastered the components. After a participant had mastered Chapter 11 of the manual she was once again prompted to watch a video demonstration. Part D of the video demonstrated managing antecedents and consequences for incorrect responses. The manual prompted a participant to stop and role-play a DTT self-practice session of teaching a pointing-to-named pictures task, practice the components of the DTTEF and score her performance. After she had mastered role-playing the pointing-to-named pictures task a participant was prompted in the manual to do the same thing for teaching imitation. Once a participant had mastered role-playing those two tasks she would continue on to Chapter 12 in the manual.

Once a participant had finished studying and mastering the study questions in Chapter 12 she contacted the first author to set up a session where she was tested on Part II of the manual. Ten of the bold-faced questions (there are 35 in total) were randomly selected from Chapters 7-12. A participant was required to achieve 100% accuracy on the test before moving on to the next phase of the study. If a participant got any questions incorrect, she was asked to re-study the chapters and retake those questions. For the Part II Mastery test, Participant 1 was required to restudy 3 questions, Participant 2 was required to restudy 5 questions, Participant 3 was required to restudy 1 question, and Participant 4 was required to restudy 2 questions.

Phase 3: Post-Training Assessment

After a participant mastered Part II of the manual, her DTT accuracy was evaluated once again with the confederate role-playing a child with autism. A participant attempted to teach the confederate the same three tasks that she attempted to teach in Baseline (pointing-to-named pictures, identity matching, and motor imitation). A participant was provided with data sheets to score the confederate's responses, a pen, edibles for reinforcement, picture flash cards, and a summary of the 20 components of the DTTEF. A participant's DTT performance was scored once again on the DTTEF.

Post-Training Assessment Plus Feedback Session

If a participant did not master all three teaching tasks after studying the self-instructional package they received a brief (approximately 15 minutes) feedback session on their DTT performance. The feedback session involved the first author instructing the participant on things they did well and things they needed to improve on. Together we would practice a few trials of each task before moving onto the second post-training assessment. The second post-training assessment followed the exact same procedure as described above. Upon completion of either the post-training assessment or the post-training assessment plus feedback assessment a participant was given the $50 honorarium and thanked for her participation.

Phase 4: Generalization

If a participant achieved 80% DTT accuracy in the Post-training assessment, then she was asked to implement her DTT skills in a Generalization session with her child with autism. The first author attempted to conduct a Generalization assessment with a participant within one week of her Post-training assessment. However, because of participant availability, this was not always possible. During a generalization session a participant would teach the same three tasks that were taught in Baseline and the Post-training assessment and the participant's DTT performance was scored on the DTTEF. If a child was showing signs of unwillingness to participate the session was ended.

Inter-Observer Agreement (IOA)

To ensure all participants were being scored accurately, the first author used the DTTEF to score their performance during each session and a trained observer scored approximately 50% of the sessions also using the DTTEF. An agreement was recorded if the observer and the first author scored an item in the same way (e.g., both scored a participant as correct or both scored her as incorrect). A disagreement was if the observer and the first author scored a participant differently on one of the DTTEF components (e.g., one scored the participant as correct whereas the other scored her as incorrect on the same item). IOA was computed for each scored session by dividing the number of agreements by the number of agreements plus disagreements, and multiplying by 100% [21]. The average IOA across all the sessions was 92% (Baseline,

93.7%; Post-treatment, 94.3%; and Generalization, 88.1%).

Procedural Integrity

Procedural integrity (PI) was assessed during every phase of the study. There was a separate, specific script for Baseline, Intervention, Post-training assessment, and Generalization phases. A trained observer was either present at the sessions or watched video recordings of the sessions to see whether the confederate role-playing a child with autism and the first author followed the procedure as planned.

The observer recorded the confederate's and the first author's behaviors on the procedural reliability data sheet for each phase of the study. PI was calculated by adding up the percentage of steps that were administered correctly during each scored session. PI to determine how the procedure was carried out as planned was completed for 40% of the sessions, and averaged 100%. PI for the confederate's behavior was completed for 50% of the sessions, and averaged 98.12%, ranging from 86% to 100%.

Results

Self-Instructional Package

A participant's performance for each DTT task was scored on the DTTEF. Her average score on each of the teaching tasks was compared across the phases of the study (Baseline to Post-training to Generalization). All the average scores were then plotted into a graph see (Figure 2) for visual inspection, as per the guidelines described by Martin and Pear (2015).

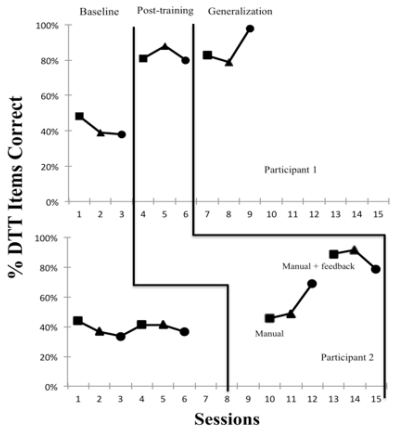

Figure 2: Percent correct of DTT components performed correct on the 21-item DTTEF (□ matching task, ▲ pointing-to-named pictures task, and • motor imitation task) for Participants 1 and 2.

As seen (Figure 2), Participant 1 showed considerable improvement in DTT accuracy on all three tasks from the Baseline assessment to the Post-training assessment. In the Baseline assessment completed by Participant 1, she scored an average of 41.7% (Baseline 1: matching, 48%; pointing, 38%; and imitation, 39%) across all three tasks. DTT accuracy improved for Participant 1 in the Post-training assessment to an average of 83% (matching, 81%; pointing, 88%; and imitation, 80%). There was an increase of 41.3% in DTT accuracy, and the participant reached mastery criterion (set at 80%) on all three tasks.

Participant 2 also showed improvement in DTT accuracy from Baseline to Post-training assessment see (Figure 2). During her two baseline assessments her average score across all three tasks was 39% (Baseline 1: matching, 44%; pointing, 37%; imitation, 34%, and Baseline 2: matching, 41%; pointing, 41%; imitation, 37%). After studying the self-instructional package Participant 2's scores increased to an average of 54.6% (matching, 46%; pointing, 49%; imitation, 69%), demonstrating an increase of only 15.6%. Because Participant 2 did not achieve mastery after studying the self-instructional package, she was given a brief feedback session. After the feedback session Participant 2's score increased to an average of 86.3%(matching, 89%; pointing, 91%; imitation, 79%), and she mastered two out of the three tasks. In total Participant 2's score increased an average of 47.3% from Baseline to the Post-Treatment plus Feedback phase. It is important to note that, due to time constraints, only 6 trials of the matching and the pointing task were assessed in the post-treatment plus feedback phase.

As (Figure 3) demonstrates, Participant 3 showed a sizeable increase in DTT accuracy from Baseline to the Post-training assessment. In the Baseline assessment she scored an average of 37.6% (matching, 38%; pointing, 35%; imitation, 40%), DTT accuracy improved to an average 86.3% in the Post-training assessment (matching, 83%; pointing, 85%; imitation, 91%), an increase of 51.3% from Baseline, which is the largest increase of the four participants. Participant 3 also achieved the mastery criterion on all three tasks.

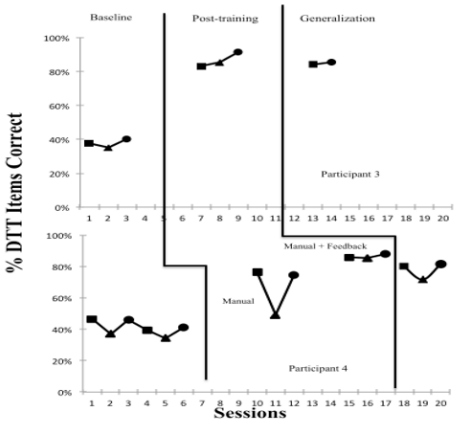

Figure 3: Percent correct of DTT components performed correct on the 21-item DTTEF (□ matching task, ▲ pointing-to-named pictures task, and • motor imitation task) for Participants 3 and 4.

Finally, Participant 4 demonstrated an increase in DTT accuracy from Baseline to the Post-treatment assessment, but didn't quite achieve the mastery criterion see (Figure 3). Across both Baseline assessments her average score was 40.8% (Baseline 1: matching, 47%; pointing, 37%; imitation, 46%, and Baseline 2: matching, 40%; pointing, 34%; imitation, 41%), and improved to 66.33% (matching, 76%; pointing, 49%; imitation, 74%) in the Post-treatment assessment. Participant 4 only improved 25.53% in DTT accuracy and because of this she was given a feedback session. After the feedback session Participant 4's average score increased to 86.3% (matching, 86%; pointing, 85%; imitation, 88%) with an average increase of 45.5% from Baseline to the Post-Treatment plus Feedback phase. Participant 4 ended up achieving mastery on all three tasks after the feedback session.

After studying the self-instructional package, the average increase in DTT performance was 32.78% and increased further to 52.7% after two of the participants received the feedback session (39.78% in Baseline; 72.56% in Post-treatment; and 85.48% in Post-treatment plus feedback). A paired samples *t*-test was conducted to determine if the increase in scores from the Baseline phase (M = 40, SD = 1.83) and Post-training plus feedback phase (M = 85.5, SD = 1.73) were statistically significant. The results indicated that the improvement in DTT scores from Baseline to Post-treatment plus feedback across the four participants were statistically significant, $t(3) = -26.64$, $p < .001$.

Of the four participants, three of them reached the mastery criterion of 80% DTT accuracy for all three tasks. The only exception was Participant 3 who failed to achieve mastery on the imitation task. In Baseline the average scores for the three tasks were as follows: 43% for the matching task; 37% for pointing task; and 40% for the imitation task (SD = 3.00). During the Post-Treatment Assessment, the average scores for the three tasks were: 72% for the matching task; 68% for the pointing task; and 79% for the imitation task (SD = 5.57). After Participants 2 and 4 received a feedback session average scores on the three tasks further increased to: 85% for the matching task; 87% for the pointing task; and 85% for the imitation task (SD = 1.15). There was a larger variation in average scores across the three tasks following the Post-treatment assessment (SD = 5.57). A reason for this could be that Participants 2 had very low scores on the matching and the pointing-to-named pictures tasks creating a larger range in scores for that phase. However, when DTT skills were assessed following the feedback session for Participant 2 her scores increased for those two tasks, and resulted is less variation in average scores across the three tasks (SD = 1.15). Thus, mean scores across the three tasks appear to be similar, which suggests that the difficulty of each task was similar.

On average it took the participants 8 hours and 45 minutes to study the self-instructional package. The study time ranged from only 2 hours up to 21 hours and40 minutes (Participant 1, 360 minutes; Participant 2, 158 minutes; Participant 3, 1300 minutes; and Participant 4, 120 minutes). Study time was self-reported by the participant and included how long it took each of them to read through the chapters, complete the self-practice activities, and watch the videos.

Generalization

Three of the four participants conducted generalization sessions with their child with autism. Participant 1 was successful in generalizing her skills, scoring on average 86.6% (matching, 83%; pointing, 79%; imitation, 98%), maintaining mastery criterion on two out of the three tasks. Participant 3 was able to generalize her DTT skills, scoring an average of 85% (matching, 84%; imitation, 86%), maintaining mastery across the two tasks that were assessed. It is important to note that only a limited number of trials for each task (5 trials for matching and 7 trials for imitate) were assessed in Participant 3's generalization session. The session was ended because the child was demonstrating signs of unwillingness to participate. Finally, Participant 4came very close to generalizing her DTT skills to her child with autism. On average she scored 77.8% across the three tasks (matching, 80%; imitation, 82%; pointing, 72%) and maintained mastery criterion for two of three the tasks. Participant 2 declined to conduct a generalization session with her child with ASD.

Social Validity

A social validity questionnaire (available from the first author upon request) was administered to each participant upon completion of the study. The questionnaire included 10 items that gave the participant the opportunity to provide feedback on the goals, procedures, and effects of the study. Each item was rated on a scale of 1-5.

With 1 representing "disagree" and 5 representing "agree". Items 1-4 on the goals of the study's importance were rated extremely high, with an average rating of 5. Item 5, which stated "I found the self-instructional format of the manual easy to understand" was rated less favorably with an average rating of 3. The average score for Item 4 was 4.67, which suggests that participants found the video demonstrations to be helpful. Participants were neutral in their responses to how enjoyable they found the study material as Item 7 had an average score of 3.4. The participants tended to agree that they had learned to conduct DTT with their own children with ASD and children with ASD in general. The average ratings for those questions were 4.75 (Item 9) and 4 (Item 8) respectively. The average rating for Item 10 was 4.25, suggesting that participants would recommend this training method to other parents with children with ASD.

Discussion

The results of the study demonstrate that the Fazzio and Martin DTT Self-Instructional Package was very effective for

improving DTT accuracy in two of the four mothers of children with ASD, and the package plus a brief feedback session was effective for the other two mothers. These findings are not quite as strong as the Wightman et al. (2012) study, in which 12 of the 13 newly-hired ABA tutors mastered all three tasks after studying the self-instructional package. In the current study, all four participants' DTT accuracy improved from the Baseline assessment to the Post-treatment assessment. Participant 1's DTT accuracy improved, on average, a total of 41.3%. Participant 2's accuracy improved, on average, a total of 15.6% after studying the self-instructional package, with a further increase of 31.7% after the feedback session (47.3% in total from Baseline to Post-Treatment plus Feedback). Participant 3's DTT accuracy improved, on average, a total of 51.3%. Participant 4's accuracy improved, on average, a total of 25.53% after studying the self-instructional package, with an additional improvement of 19.97% following the feedback session (45.5% in total from Baseline to Post-Treatment plus feedback). The four participants reached the Mastery criterion (80%) for all tasks in the Post-treatment assessment phase or the Post-treatment assessment plus feedback phase with the exception for Participant 2 on the imitation task (79% accuracy). Furthermore, three of the four participants were able to conduct a generalization session with their child with ASD, and were able to successfully teach the three tasks at an average of 83% DTT accuracy.

The current study had high IOA scores at 92%. It also had high PI scores, which were 100% across all phases of the study, and high confederate PI scores at 98.12%. The results of the study suggest that the modifications made to the 4th edition of the Fazzio and Martin Self-Instructional Package, including the additional chapters, study questions, and video demonstrations, were helpful for teaching mothers with children with ASD to implement DTT. Although two participants needed a feedback session, this is an improvement from the Young et al. (2012) study in which all parent participants needed a feedback session with the researcher, providing evidence that 4th edition of the self-instructional package is an effective tool for teaching parents with children with ASD.

Limitations

The current study has several limitations, the first being its small sample size. Due to an extremely high dropout rate, out of the 12 parents who returned consent forms only 2 pairs of participants completed the study. Therefore, the results should be interpreted with caution, and replication across additional pairs of parents is suggested. Second, due to parent availability, scheduling sessions at the appropriate times to fit with the study's design was extremely difficult. Specifically, Participant 4 was administered the self-instructional package before Participant 3 had her post-treatment session because of a last-minute cancellation. Therefore, it is not an ideal multiple-baseline design across a pair of participants because Participant 4 should not have received treatment until Participant 3 had completed the Post-treatment assessment phase of the study. However, it is unlikely that this would have affected the results as the participants did not know one another and lived in different areas of the city.

Third, because the self-instructional package was left with participants to study on their own time, it was not possible to monitor how they studied, if they completed all of the study questions, if they participated in the self-practice exercises, or if their self-reported study time was accurate. These items were monitored in the Wightman et al. (2012) study in which all sessions and studying took place in a private testing room at St.Amant, but they were not monitored in this study due to the fact that the participants were not coming to a laboratory setting. This limitation should be addressed in future studies with parents with children with ASD.

In summary, the Fazzio and Martin Self-Instructional Package (2011) alone was found to be effective in improving participants DTT average accuracy to the mastery criterion for two out of the four participants across all three tasks (83% and 86.3% respectively). With only a brief feedback session Participants 2 and 4 were also able to achieve mastery criterion scores across all three tasks (86.3% and 86.3% respectively). In addition, all three of the participants who participated in generalization sessions were able to successfully generalize their skills to their child with ASD. Although two of the four participants did need a feedback session, defeating the purpose of the package being self-instructional, it is suggested that additional time spent studying could eliminate the need for the feedback session. In conclusion, the results of this study suggest that with efficient time spent studying, the self-instructional package is effective for teaching parents with children with ASD to implement DTT.

References

1. Fazzio D, Martin GL (2011) Discrete-trials teaching with children with autism: A self-instructional manual. Winnipeg, Manitoba: Hugo Science Press.
2. Eldevik S, Hastings RP, Hughes C, Jahr E, Elkeseth S, et al. (2009) Meta-analysis of early intensive behavioral intervention for children with autism. Journal of Clinical Child and Adolescent Psychology 38: 439-450.
3. Makrygianni MK, Reed P (2010) A meta-analytic review of the effectiveness of behavioral early intervention programs for children with autistic spectrum disorder. Research in Autism Spectrum Disorders 4: 577-593.
4. Lovaas I (1987) Behavioural treatment and normal educational and intellectual functioning in young autistic children. Journal of Consulting and Clinical Psychology 55: 3-9.
5. Lovaas I, Smith T, McEachin J (1989) Clarifying comments of the young autism study: Reply to Schopler, Short, and Mesibov. Journal of Consulting and Clinical Psychology 57: 165-167.

6. Reichow B (2012) Overview of meta-analyses on early intensive behavioral intervention for young children with autism spectrum disorders. Journal of Autism and Developmental Disorders 42: 512-520.

7. Sallows GO, Graupner TD (2005) Intensive behavioral treatment for children with autism: Four-year outcome and predictors. American Journal on Mental Retardation 110: 417-438.

8. Smith T (2001) Discrete trial training in the treatment of autism. Focus on Autism and Developmental Disabilities 16: 86-92.

9. Thomson K, Martin GL, Arnal L, Fazzio D, Yu CT (2009) Instructing individuals to deliver discrete-trials teaching to children with autism spectrum disorder: A review. Research in Autism Spectrum Disorders 3: 590-606.

10. Fazzio D, Martin GL (2006) Using discrete-trials teaching to teach children with autism: An introduction. Version 1, unpublished manuscript, Department of Psychology, University of Manitoba, Winnipeg, Canada.

11. Fazzio D, Martin GL (2007) Using discrete-trials teaching to teach children with autism: An introduction. Version 2, unpublished manuscript, Department of Psychology, University of Manitoba, Winnipeg, Canada.

12. Fazzio D, Martin GL (2009) Discrete-trials teaching with children with autism: A self-instructional manual. Version 3, unpublished manuscript, Department of Psychology, University of Manitoba, Winnipeg, Canada.

13. Arnal L, Fazzio D, Martin G L, Yu CT, Keilback L, et al. (2007) Instructing university students to conduct discrete-trials teaching with confederates simulating children with autism. Developmental Disabilities Bulletin 35: 131-147.

14. Fazzio D, Martin GL, Arnal L, Yu D (2009) Instructing university students to conduct discrete-trials teaching with children with autism. Research in Autism Spectrum Disorders 3: 57-66.

15. Young KL, Boris AL, Thomson KM, Martin GL, Yu CT (2012) Evaluation of a self-instructional package on discrete-trials teaching to parents of children with autism. Research in Autism Spectrum Disorders 6: 1321-1330.

16. Thomson K, Salem S, Campbell K, Fazzio D, Martin GL, et al. (2012) Evaluation of a self-instructional package for teaching tutors to conduct discrete-trials teaching with children with autism. Research in Autism Spectrum Disorders 6: 1073-1082.

17. Salem S, Fazzio D, Arnal L, Fregeau P, Thomson K, et al. (2009) A self-instructional package for teaching university students to conduct discrete trials-teaching with children with autism. Journal on Developmental Disabilities 15: 21-29.

18. Wightman J, Boris A, Thomson K, Martin GL, Fazzio D, et al. (2012) Evaluation of a self-instructional package for teaching tutors to conduct discrete-trials teaching with children with autism. Journal on Developmental Disabilities 18: 33-44.

19. Theissen C, Fazzio D, Arnal L, Martin GL, Yu CT et al. (2009) Evaluation of a self-instructional manual for conducting discrete-trials teaching with children with autism. Behavior Modification 33: 360-373.

20. Fazzio D, Arnal L, Martin GL (2010) Discrete-Trials Teaching Evaluation Form (DTTEF) Scoring Manual. Unpublished manuscript, Department of Psychology, University of Manitoba, Winnipeg, Canada.

21. Martin GL, Pear JJ (2015) Behavior Modification: What it is and how to do it. (10th edition), Upper Saddle River, NJ: Pearson Education.