Effectiveness of Discrete Trial Training Program for Parents of Children with Autism Spectrum Disorder

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Abstract

Discrete Trial Training (DTT) is one of many scientific based practices used in the education of children with ASD. It is seen that many evidence based practices are limited to the studies conducted by universities and cannot become widespread. Involvement of parents in their children's education processes and utilization of evidence based practices play a very important role in overcoming the problems and achieving the desired results in children with ASD. In this study, the effectiveness of a group of family training programme, which has been developed to upskill parents to present DTT, was investigated on 14 mothers and 14 fathers. The result shows that there is a significant difference between experiment and control groups' DTT scores. On the other hand there is no significant difference between mothers and fathers' DTT performance in experiment group. Also children whose parents in experiment group improved imitation skills during the study. The parent training program has been found effective on teaching parents how to use DTT. All the parents indicated their satisfactions about the program and they also suggested the program to the other parents.

Keywords: Autism spectrum disorder, parent training, discrete trial training, father, mother, evidence based practice

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Introduction

Nowadays, autism spectrum disorder (ASD) is one of the most overemphasized, mentioned and studied disabilities. According to the official figures of the United States, it is the second largest developmental disability class coming after intellectual disability and its prevalence has been increasing expeditiously (Center for Disease Control and Prevention, 2012). Although it has many different definitions, considering common points of these definitions, ASD is defined as a developmental disability characterized by limitations in social and communicational skills, limited interest and repetitive movements (APA, 2012; Heflin and Alaimo, 2007;; Lord and McGee, 2001; World Health Organization, 2008).

Children with ASD have disabilities in many areas such as social skills, language and speech, play skills, academic skills and many others when compared to their peers. These children exhibit low performance in the school and various social environments when compared to their peers depending on the prevalence of autism symptoms. Children with ASD are required to receive early intervention services regularly and systematically to reduce their disabilities (Cowan & Allen, 2007). There is a serious confusion in the field of interventions and therapies which will be used to reduce the disabilities of the children with ASD. It is important that the interventions, which will be used to teach children with ASD the skills they need, are evidence based practices (Simpson, 2005). Discrete trial training (DTT) is one of the interventions included in all classifications of evidence based practices (Wilczynski & Pollack, 2009; NRC, 2001; Wong et. al., 2015) performed by different institutions and organizations, and recommended to be used while working with children with ASD. This method is used in teaching children with ASD various social, language and academic skills (Sturmey & Fitzer, 2007). Although there are some studies in which providing the DTT is taught to teachers, semi-professionals, specialists, undergraduate students and parents, it is seen that the studies involving parents are limited in number. Mostly mothers were involved in the studies in which providing the DTT was taught (Thomson, Martin, Arnal, Fazzio & Yu, 2010). In addition, it was evident in these studies that the numbers of participants were limited, generally single subject researches were conducted as research method, intervention reliability was not calculated mostly (Meadan, Ostrosky, Zaghlawan and Yu, 2009; Thomson et al., 2010) and the numbers of experimental group studies were limited (Anan, Warner, McGillivary, Chong & Hines, 2008).

Evidence based practices such as the DTT are mostly limited to university based clinical interventions and ensuring dissemination of these interventions to many families via community-based models is difficult and expensive (Minjarez, Williams, Mercier & Hardan, 2011). It is impossible or delayed for many children to access evidence based training practices such as the DTT at a recommended age due to long waiting lists (Majnemer, Shevell, Rosenbaum & Abrahamowicz, 2002). Considering that weekly 25-40 hours of training is mentioned for children with ASD in the literature (Love et al., 2009; McEachin, et al., 1993), significant gap between the present situation and recommended situation draws attention. It is seen that parents who are trying to improve the situation are in struggle for increasing weekly training hours of children with ASD by using their own financial resources (Elder et al., 2011). When the families of children with ASD actively participate in their children's training processes, it can be considered that their participation contributes to increasing their children's weekly training hours and decreasing the gap between the ideal weekly training hours and present situation (Elder et al., 2011). Most of the training programs developed for children with ASD are costly and do not include the families, a key component of early intervention of children with ASD, in the intervention sufficiently (NRC, 2001). Participation of the family in the child's training program and their active roles in the process are very important in many aspects and contribute to child's development (Crockett, Fleming, Doepke & Stevens, 2007; Lafasakis & Sturmey, 2007). One of the most important ways of including the families in training programs is to ensure that they recognize and partly practice the program in which their children are involved (Meadan et. al., 2009). Many behavioral interventions focus on family training as an aspect of expanded service range (Koegel, Bimbelo & Schreibman, 1996; NRC, 2001). Family training programs generally aim to teach families strategies to be used in natural environment (Minjarez et al., 2011). Providing training to

families via evidence based practices is seen as an effective method of providing service to children with ASD. The other advantages of family training are permanence and contribution to generalization as well as increasing self-sufficiency of families (Bryson et al., 2007). It is known that parents of children with ASD practice with their children in many issues such as "parent-child interaction", "increasing communication skills" and "reducing problematic behaviors" and obtain good results (Ingersoll & Dvortcsak, 2006). It is also known that training programs for parents of children with ASD have effects as increasing skill levels, ensuring self-confidence and reducing stress level of children and families (McConachie & Diggle, 2007). It is stated that group training given to families has reciprocal advantages (Symon, 2001). Moreover, it is known that effectiveness and productivity interventions that are intended for participation of families provide positive results with regard to developmental progress of children, the interaction way of parent-child, knowledge level of parents, attitudes and stress levels of parents, and relevant cost (McConachie & Diggle, 2007). Studies conducted for the families of children with ASD show that participation of fathers in these studies is very limited and trained family members are mostly mothers (Chiang, 2014; Meadan et al., 2009; Thomson et al., 2010). In addition, clinical experiences reveal that in the event that both parents are trained simultaneously, mothers play the leading role in interventions while fathers remain in the background or do not attend regularly and give participation priority to mothers (Elder et al., 2011). Although family training programs are accepted as one of the main components of successful education and training programs ensuring participation of parents in their children's education processes, (NRC, 2001), it is stated that the number of evidence based family training programs developed for the families of children with ASD is insufficient (Ingersoll & Dvortcsak, 2006). Family training programs developed for children with ASD generally have intensive contents. This is a serious problem due to long waiting lists. For this reason, family training programs which may be completed in a shorter time may provide more positive results for children and families (Coolican, Smith & Bryson, 2010). Considering the requirements related to present situation, it is obvious that more effective group family training models are needed (Minjarez, et al., 2011; Shultz, Schmidt & Stichter, 2011).

This study, which was designed in accordance with the requirements indicated in the literature, was developed for teaching families of children with ASD using the DTT method, which was one of strong methods whose scientific strength was proven in the field of ASD, and aimed to test the effectiveness of a group of family training program. Moreover, the prepared program aimed to teach parents the strategies necessary to be able to use the DTT method with sufficient reliability during interventions in which parents would teach their children various skills. It was investigated in this study whether there was a change in receptive language and imitation skills of the children of participant families.

Method

Participants

14 children with ASD and their parents (14 mothers and 14 fathers) participated in the study. Participation criteria for the parents were as follows; (a) the age of children of the participant parents must be under 8 years, (b) children of the participant parents must be diagnosed with autism spectrum disorder, (c) both mother and father must agree to participate in the study, (d) parents to be included in the study must be volunteers and (e) parents must attend all sessions of the study. Table 1 shows the information about the families participated in the study. 14 children with ASD of participant parents were also included in the study. GARS 2 TV scores of the children participated in the study were calculated. Table 2 shows the information about the children participated in the study.

Measures

Providing DTT behaviors of families: One of the dependent variables of the study was to provide DTT behaviors of parents. Discrete Trial Training Evaluation Form [DTTEF] developed by Fazzio, Arnal and Martin (2007) was used to evaluate providing DTT behaviors of parents. Validity and reliability studies of DTTEF were performed by Babel, Martin, Fazzio, Arnal and Thomson (2008) while Jeanson, Thiessen, Thomson, Vermeulen, Martin and Yu (2010) conducted field testing. This form is composed of five categories including pre-teaching, managing antecedents, managing consequences, time between trials and fading, and it contains 21 items. DTTEF scoring manual developed and revised by Fazzio and Martin (2010) was utilized with regard to use of the form. Relevant evaluation scale was used in pre-training, post-training and follow-up sessions with the families participated in the study.

Children's receptive language levels: Besides the data obtained from the families in the study, Turkish version of Test of Early Language Development (TELD-3) (Güven & Topbaş, 2014) was used to measure the receptive language performances of the children of participant families. This is a self-managed, norm-referenced test that aims to measure receptive and expressive verbal language skills of children aged between 2 years 0 month and 7 years 11 months (Hresko et al., 1999). Test results may be used for various purposes such as diagnosing the children with early language disorders, showing weak and strong aspects of language development, giving information about developmental process and performing investigation. TELD is composed of two parallel forms which are Form A and Form B. Each form includes two subtests so as to be Receptive and Expressive. These subtests are composed of items measuring semantics, morphology and syntax of the language. Each form contains 76 items in total. Receptive Language subtest of Form A used in the study has 24 items for measuring semantics and 13 items for measuring syntax/morphology while Expressive Language subtest has 22 semantics items and 17 syntax/morphology items . The scale was used with participant children to determine their pre-training and post-training receptive language performances.

Imitation skills levels of Children: Imitation Skills Assessment Tool (ISAT) was used in control and experimental groups to measure the imitation skill levels (another dependent variable of the study) of the children with ASD. ISAT was developed by the authors of the study via performing content validity study with nine field experts. In the development of ISAT, items of the scale were determined by analyzing the tools developed to assess the imitation skills of the children with ASD. ISAT is composed of three groups: imitation of actions with objects, imitation of actions without objects imitation and gesture/mimic imitation. Imitation of actions with objects is divided into two parts as imitation of meaningful actions and imitation of meaningless actions. In the tool, the numbers of items were eight in imitation of actions with objects, seven in imitation of actions without objects and six in gesture/mimic imitation, giving a total number of 21. In the instructions for use of the tool, how to use and assess the tool was explained in detail. Every item can be scored as 0 (not done), 1 (partly done) or 2 (done) scores. Maximum total score that can be gained from the tool is 42 while minimum score is zero. Points between the range of 0 and 12 show severe imitation deficiency, 12-24 scores show moderate imitation deficiency and 24-36 scores show mild imitation deficiency while scores 36 and above indicate normal imitation skills.

Procedure

Training Program on Providing Discrete Trial Training (TPPDTT) was developed by analyzing similar programs and their components which was mentioned in the relevant literature and taught providing DTT behaviors to various interventionists. Family training program was composed of eight sessions and families attended two sessions in a week. Each session lasted for approximately 120 minutes. Lectures, written and visual materials, video samples, video assessments, feedback via video, role activities and assessment techniques were used in the program in order to teach parents DTT behavior . The first four sessions of the program were composed of autism spectrum disorder, clues, reinforcement, and pre-training preparation and sessions. The first four sessions mainly aimed to teach

families basic information. In the sessions performed accordingly, lectures given to families via computers, weekly written materials enriched by visual materials, and video samples were utilized. Families were allowed to ask questions at any time during these sessions. In addition, families had a short written exam after finishing each session and subjects of the questions with wrong answers were discussed again in the next lecture. In the fifth session, DTT was introduced to families and intervention examples were shown. The sixth, seventh and eighth sessions were all performed practically. These sessions initiated examining interventions performed in the previous session and analyzing with the families. Then, families watched intervention videos which had been specially prepared. Firstly, families watched good intervention models. After that, intervention videos were presented to families and they were requested to tick true and false behaviors in the video content on the form they were given. After families analyzed the videos they watched, these videos were watched again and discussed together. In the last four sessions, interventions and videos being watched in the previous week were analyzed, and then one-to-one applications were performed with the families. Families played the role of student and teacher in the interventions performed in an intervention via one to one training with families. In the interventions performed by families, simultaneous feedbacks were given by the expert, thus enabled families to correct their mistakes related to the DTT method. After families completed the study, an interactive CD prepared by the researchers and including all family training sessions was given to families for making use of and maintaining the skills they learned.

Reliability

In the study, inter-observer reliability and intervention reliability data were collected. Inter-observer reliability data of the study was collected for assessment sessions conducted for providing DTT behaviors of mothers and children's imitation skills. 30% of the assessments conducted for performance measurements of providing DTT performances of families and children's imitation skills were determined by random assignment. A second expert with master's degree in the field of special education watched and re-coded videos of determined assessment sessions. In inter-observer reliability calculation, i.e. in IOR calculation, formula of [Agreement / (Agreement + disagreement)] * 100 was used.

Intervention reliability was calculated in order to evaluate whether each component of family training program, which was one of the independent variables of the study, had been performed as planned. It was also calculated by means of assessing 30% of all training sessions by a second field expert who was a postgraduate student in the field of special education. Different intervention reliability form was developed for each training session. Expected number of good intervention behaviors was different in each session. This was because the content, subjects addressed in the content and strategies were different in each intervention session. In the calculation of intervention reliability; the formula of (observed good interventionist behavior/ good interventionist behavior required to be observed) x 100" was utilized.

Statistical Analysis

A pre- and post-treatment design was used for this study. DTTEF, TELD and ISAF were administered to parents or children with ASD before and after receiving the program. In order to answer the research questions concerning the study, parametric tests such as ANOVA and Man Whitney U tests and non-parametric tests such as Firedman and Wilcoxon tests were made use of. In all the analyses, significance level was determined as .05. In addition, effect size ($\eta 2$) value was used in all analyses to determine the effect size of independent variable on dependent variable. Effect size, which is also called as eta squared, shows to what degree independent variable or factor explains the total variance of dependent variable, and it ranges between 0.00 and 1.00. Eta squared ($\eta 2$) values between .01 and.06 means small effect size, values .06 and above mean medium, and values .14 and above mean large effect size (Büyüköztürk, 2011, p. 45; Cohen, 1988).

Results

The effect of TPPDTT on providing DTT behaviors of parents

Table 3 shows findings related to t-test results for independent samples performed by post-test scores of participants in experimental and control groups gained from DTTEF. Analyzing post-test scores of the participants in experimental and control groups gained from the DTTEF, it was seen that there was a significant difference between the averages of post-test scores (sig.=0) and this difference had a large effect size (η= .991).

The relationship between pre-test, post-test and follow-up results of the participants to whom TPPDTT was administered

As a result of single factor ANOVA for repeated measures made in order to compare pre-test, post-test and follow-up scores of the participants in experimental group, it was seen that there was a significant difference among the means of pre-test, post-test and follow-up scores in three different time periods (η_p^2=.972) . Table 4 shows the results.

The relationship between pre-test, post-test results of the participants to whom TPPDTT was administered in terms of gender.

"Mixed design ANOVA" analysis was conducted to determine whether there was a difference between pre-test, post-test and follow-up scores of the parents, who participated in the study and were in the experimental group, obtained from the DTTEF in terms of being father and mother. Table 5 shows the results of this analysis. According to the results of the analysis, although there were significant differences between pre-test, post-test and follow-up scores of both groups (sig=.000), there was not any significant difference between pre-test, post-test and follow-up scores in terms of genders (sig= .676).

The analysis of providing DTT behaviors of fathers according to having and not having TPPDTT

"Mann Whitney U" test, which is a non-parametric test, was used to evaluate the presence of a difference between providing DTT behaviors of the fathers in experimental and control groups. Table 6 shows the results of performed analysis. The results of the analysis revealed that there was a significant difference (*z*=-3,134, *p*=.002) between providing DTT behaviors of the fathers (SO=11; *n*=7) in experimental group and providing DTT behaviors of fathers (SO=4, *n*=7) in control group in favor of the fathers in experimental group. It was seen that this significant difference had a large effect size (*r*=.834).

The analysis of providing DTT behaviors of mothers according to having and not having TPPDTT

"Mann Whitney U" test, which is a non-parametric test, was administered in the study to investigate whether there was a significant difference between providing DTT behaviors of the mothers in experimental group and mothers in control group. The reason for preferring a non-parametric test was the fact that group size was insufficient for parametric tests.

Table 7 shows the results of performed analysis. The results of the analysis revealed that there was a significant difference (*z*=-3,134, *p*=.002) between providing DTT behaviors of the mothers (SO= 11, *n*=7) in experimental group and the providing DTT behaviors of mothers (SO=4, *n*=7) in control group in favor of the mothers in experimental group. It was seen that this significant difference had a large effect size (r=.834).

Comparison of receptive language levels of children with ASD of parents in experimental and control groups

"Mann Whitney U" test, which is a non-parametric test, was administered in the study to investigate whether there was a significant difference between receptive language skill levels of the children of parents in experimental and control groups. Table 8 shows TELD conjugate age values (months) of the children with ASD in both groups.

The results of conducted analysis were shown in Table 9. The results of the analysis revealed that there was not any significant difference (*z*=-.577, *p*=.564) between receptive language skills of the children with ASD (SO= 6,86, *n*=7) of the parents in experimental group and receptive language skills of the children with ASD (SO=8,14, *n*=7) of the parents in control groups.

Comparison of imitation skill levels of children with ASD of parents in experimental and control groups

In the study, "Mann Whitney U" test, which is a non-parametric test, examined whether there was a significant difference between imitation skill levels of the children of parents in experimental and control groups.

The results of conducted analysis were shown in Table 10. The results of the analysis revealed that there was not any significant difference (*z*=-.720, *p*=.471) between imitation skills of the children with ASD (SO=6,71, *n*=7) of the parents in experimental group and imitation skills of the children with ASD (SO=8,29, *n*=7) of parents in control groups.

Comparison of receptive language levels of children with ASD of parents in experimental group

Friedman test, which is non-parametric alternative to ANOVA test with repeated measures, was used to determine whether there was a significant difference between imitation skills of children with ASD of parents in experimental group during pre-test, post-test and follow-up sessions. The results of Friedman test suggested that imitation skills of the children with ASD increased in a positive way between pre-test, post-test and follow-up sessions (mean rank 1,5 < 1,92 < 2,58; mean 28,83 < 31,17 < 34, 33), but there was no significant difference between pre-test, post-test and follow-up scores (chi square= 4,05; *p* >.05). Table 11 shows the results of Friedman test.

Comparison of imitation skill levels of children with ASD of parents in experimental group

Friedman test, which is non-parametric alternative to ANOVA test with repeated measures, was used to determine whether there was a significant difference between imitation skills of children with ASD of parents in experimental group during pre-test, post-test and follow-up sessions. The results of Friedman test revealed that there was a significant difference between pre-test, post-test and follow-up scores (chi square= 9,33; *p*< .05). Table 12 shows the results of Friedman test.

"Wilcoxon signed rank test for relevant measures" was used in the study to determine the origin of the significant difference found between pre-test, post-test and follow-up scores of imitation skills of the children with ASD of parents in experimental group. According to the results of conducted analysis, there was a significant difference between pre-test scores and follow-up scores related to imitation skills of the children of parents in experimental group ($z= 2.03$, $p < .05$). Considering mean rank and summation of difference scores, it was evident that this difference was in favor of follow-up scores. According to these results, it is possible to say that the program has a significant influence on developing imitation skills of children.

Generalization findings of the parents in experimental group

Generalization data were not collected from parents in the experimental group after post-test data had been collected. The parents were requested to imitate "maracas shaking" skill with their children in DTT format. Table 13 shows the scores parents gained from generalization study. .

Social Validity

Social validity: Social validity is used as a program strategy to ensure that socially meaningful purposes are chosen, to develop socially accepted programs and to achieve socially important effects (Gül and Vuran, 2010). One of the important measures of study success is the evaluation of its social acceptance or validity. Parent satisfaction questionnaire was used to determine the social validity of the research. This questionnaire is composed of two parts. The first part of the questionnaire includes 25 questions which can be answered as "strongly disagree, disagree, agree, strongly agree" to indicate agreement levels of parents. In the second part, there are two open-ended questions. The questionnaire was filled by the families after completing the study and analyzed by the researchers. Descriptive analysis was performed for 25 questions included in the first part while the answers of the second part were analyzed by the themes developed. A total score of 90.2 gained from parent satisfaction questionnaire indicates that the parents are satisfied with the purpose, process and results of the study and the study is conducted by respecting ethical values. Qualitative data were obtained from open-ended questions which were included in the second part of the parent satisfaction questionnaire and answered in written by parents. It was seen that the answers of the questions in this part were grouped under "*Intervention opportunity and realizing mistakes, Satisfaction, Regards/suggestions, Working with other families/sharing*" themes.

Discussion

The findings related to providing DTT behaviors of parents and their interpretation

This study investigates the effects of TPPDTT, which was developed to teach parents having children with ASD providing DTT skills, on providing DTT behaviors of parents, as well as effects of parents on receptive language and imitation skills of children. The results of the research indicated that TPPDTT was effective in teaching parents providing DTT skills. It was determined that there was not any significant difference in receptive language and imitation skills of the children of parents participated in the study and the findings were discussed.

The first finding obtained in accordance with the purposes of the study indicates that there is a large increase in providing DTT skills of the parents in experimental group following the TPPDTT while there is not any change in providing DTT skills of the parents in control group. This result shows that the program is effective in teaching parents providing DTT skill. In addition, significant difference between providing DTT skills of the parents in experimental and control group has a large effect size. Furthermore, the results reveal that TPPDTT, an independent variable, has a significant

effect on learning of providing DTT skills of parents. Large effect size of the TPPDTT suggests that TPPDTT be primarily preferred in teaching providing DTT skill and used ignoring the cost of program (Brace, Kemp & Snelgar, 2006). Analyzing opinions of participant parents about the study, in parallel with statistical findings, it was seen that all parents in experimental group were benefited from the study and they stated that the program made positive contributions to them.

It is seen in similar studies in the literature that mothers learn providing DTT skills by means of trainings. The findings of the study are consistent with the similar studies which aim to teach mothers providing DTT skill (Crocket et al., 2007; Lafasakis et al., 2007). All these studies, whose results were similar to the results of this study and which taught mothers providing DTT skills, conducted by single subject research methods. Individual education sessions were performed in relevant studies with a limited number of mothers. Moreover, these studies involved only mothers of children with ASD while fathers did not taken place. This study differed from similar studies in terms of performing with group and being an experimental study, as well as including both mothers and fathers equally in the study. It is considered that these differences will increase the importance and contribution of the study to the literature.

Similar to the findings of this study, the studies that aim to teach parents teaching methods other than providing DTT reveal that parents successfully use methods they learned at the end of training programs. In other parent training studies, in which parents of children with ASD are trained on issues other than providing DTT skills, issues such as teaching imitation skills (Elder et al., 2005; Seung, Ashwell, Elder & Valcante, 2006), teaching basic responses (Symon, 2001), teaching natural language (Charlop-Christy & Carpenter, 2000; Kaiser, Hancock & Nietfeld, 2000), relationship based approaches (Karaaslan, Diken & Mahoney, 2011; Mahoney and Perales, 2003), teaching reciprocal imitation (Ingersoll & Gergans, 2007), joint attention (Drew et al., 2002; Jones, Carr & Feeley, 2006), teaching functional communication (Moes & Frea, 2002) and Denver Model (Rogers et al., 2006) are addressed. It was seen in all of these conducted studies that parents learned these methods and approaches satisfactorily. Similar to this study, the studies performed by Drew et al. (2002), Mahoney and Perales (2003), Karaaslan, Diken and Mahoney (2011) were performed with experimental design. The majority of rest of these studies was conducted by single subject research methods.

According to ANOVA result, which was performed to determine whether the parents in experimental group to whom TPPDTT was administered maintained providing DTT skills they learned after completing the study or not, the parents maintained providing DTT skills they gained after study was completed. Considering the results of ANOVA for repeated measures (Table 13), it is seen that there is a very small (sig=.14, p<.17) decrease between post-test and follow-up scores of parents. However, very high η_p^2 value (η_p^2= . 972) obtained from the analysis makes this small decrease insignificant. As it is understood from the result of the analysis, parents satisfactorily exhibit providing DTT skills once they have learned. This situation shows that parents may use DTT in the trainings that will be performed at their home, as their natural environment, with their children and they may perform skill teaching in the long term. In addition, according to answers of parents in the satisfaction questionnaire they began to use providing DTT skill at their homes with their children, and they were satisfied with this situation.

Another question of the study to be answered is whether there is a significant difference between pre-test, post-test and follow-up scores of parents. Since the studies in the literature mostly involve mothers, there is little information on situation of fathers; and whether there is any significant difference between the performances of fathers and mothers or not cannot be revealed.

The studies in the literature suggest that participation and especially active roles of fathers in education and training process make a significant contribution to both child and family. However, it is seen that fathers are not so active in their children's education process due to some factors such as their expected roles in the family, interactions between fathers and their children, children's genders and environmental factors (Dyer, McBride, Santos & Jeans, 2009). The result of ANOVA analysis in the study showed that there was no significant difference between providing DTT skills of parents in

experimental group. This result shows that the performances of fathers and mothers have equal effects on the difference between experimental and control groups in terms of providing DTT skills. In addition, this result is important as it shows that fathers may show performance just as qualified as mothers when their active participation in family training is ensured. This finding is consistent with the results of the studies in the literature (Elder et al., 2011; Jones, et. al., 2006; Laski, Charlop & Schreibman, 1988; Rocha, Schribman & Stahmer, 2007; Seung et. al., 2006). Furthermore, the results obtained from satisfaction questionnaire suggested that parents were pleased with participation of their spouses in the study. It is probable that determination of training hours by considering requests of parents and presence of a staff to take care of children during time periods in which their parents join training have positive effects on full participation of both mothers and fathers in the process. Similar studies also support that such arrangements positively affect parent participation (Dyer, McBride, Santos and Jeans, 2009).

Performances of the mothers for providing DTT in experimental and control groups were compared in the study. The analysis showed that performance of the mothers for providing DTT in experimental group was much better when compared to the mothers in control group. Similarly, comparison of performance of the fathers for providing DTT in experimental and control groups revealed that the fathers in experimental group exhibited much better providing DTT skill when compared to the fathers in control group. In addition, the same effect size of the results of the analysis comparing both the mothers and the fathers in experimental and control groups supports the finding that the mothers and fathers in experimental group are equally effective on the difference between experimental and control groups. Although it is mentioned in the literature that there is a degree of difficulty in participating fathers in their children's education, they participate after they have proper trainings, and this situation is thought to provide very important benefit in the long term.

The findings related to the children of the parents participated in the study and their interpretation

The results of the analysis on receptive language and imitation skills of the children of the parents in experimental and control groups showed that there was no significant difference between receptive language and imitation skills of the children of the parents in experimental and control groups following training. One possible reason for this situation is that AD indexes of the children in experimental group are higher and they are more affected with ASD than the others. Another possible explanation is that most of the children with ASD in experimental group cannot be assessed nor get very high points from communication subfield considering GARS results. In addition, the parents in experimental group started to work with their children after completing the study and follow-up sessions were arranged 5 weeks after completing the study. Considering that learning imitation and receptive language skills is a process and takes a long time, it is reasonable that no difference occurred between the groups during 5 week time period.

Moreover, the result of Friedman test which was performed with the children with ASD in experimental group showed that imitation skills of the children in experimental group significantly differed between pre-test, post-test and follow-up sessions and the origin of this was the difference between pre-test and follow-up sessions. This result suggests that this program is effective on imitation skills of the children. Development in children's imitation skills is considered to be resulted from providing DTT skills learned by the parents. Furthermore, the parents also expressed their positive opinions about the development of their children's imitation skills in social validity form (item 3). It is predicted that the development in imitation skills will positively affect receptive language skills in the long term. In the literature, there are some studies supporting this situation and presenting results suggesting that there is a positive relationship between imitation skills and language skills, and imitation skills predict the development of language skills (Sigman & Ungerer, 1984; Stone, Ousley & Littleford, 1997; Stone & Yoder, 2001).

Although a significant difference was not detected between receptive language skills pre-test, post-test and follow-up scores of the children with ASD in experimental group, the data indicated that there was a statistical increase in receptive language performances of the children. The answers given by the parents in social validity form support the increase in receptive language skills. It is considered that the increase in receptive language performances of children is due to training program given to the parents. Assessment sessions which will be performed 4 to 6 months after completing the program, a time period sufficient for language development, is considered to determine the real impact of the program on receptive language skills.

Components of the program, the findings of the process and their interpretation

There are some similarities and also some differences, in some ways, between this study and other parent training studies in the literature. The studies in the literature, which have aimed to teach parents having children with ASD how to use a teaching technique, have mostly been performed with a limited number of participants (Meadan et al., 2009; Thomson et al., 2010). It is seen that there are only few studies in which the number of participants is large similarly to that of the study conducted. In similar studies, Koegel et al. (2002) conducted family training studies with four fathers, five mothers and one grandmother; Seung, Ashwell, Elder and Valcante (2006) conducted family training studies with eight fathers; and Elder, Valcante, Yarandi, White and Elder (2005) studied with 18 fathers in family training studies. In 20 studies reviewed by Thomson et al. (2010) in which different interventionists learned providing DTT was, it was seen that providing DTT was taught to 77 participants. 57 of these 77 participants were females, 4 of them were males while the gender of other 16 participants was not specified. In addition, it was emphasized that most of the parent training studies in the literature was performed with small groups and studies with broad participation were required (Meadan et al., 2009). Considering that even experimental group of this study includes 14 participants, 7 of which were fathers, it is possible to say that the study is very important with regard to literature and differs from similar studies.

Lectures, written materials, verbal expressions and verbal feedbacks which take part in TPPDTT content are components of most of the parent education studies (Lang, Rispoli & Regester, 2009; Meadan et al., 2009; Thomson et al., 2010). Only a few studies included role activities, video feedbacks and video analysis within the scope of providing TPPDTT to parents. Having these components in the study, parent satisfaction from the study and providing benefits to the study by parents are important in terms of social validity of the study.

It was mentioned in the studies examined in literature reviews that there were some problems about inter-observer reliability, intervention reliability, generalization, follow-up and social validity data. It was stated in more than half of examined studies that data about intervention reliability was not reported, no data was collected for generalization and permanence, and social validity data was not collected (Lang et al., 2009; Meadan et al., 2009; Thomson et al., 2010). This study collected and analyzed reliability and social validity data for dependent variables as well as generalization, follow-up and intervention reliability data. From this aspect, this study may provide a significant contribution to the literature.

In conclusion, TPPDTT, which was prepared and finalized after detailed research and examinations, was found to be an effective program in teaching parents providing DTT skill. Although it was seen that the program provided benefit to the improvement of receptive language and imitation skills of children with ASD of parents in experimental group, statistically significant difference was seen only in imitation skill. It was seen that parents participated in the study were satisfied with the program and stated that the program provided positive contribution to both themselves and their children. The developed program differed from similar education programs and research studies in that it was conducted with broad participation within the ASD field, included the fathers of children with ASD, and involved many components which had taken place in the previous programs. It is considered

that TPPDTT will provide significant contributions to national and international literature, and new studies are planned for its generalization.

Recommendations for further researches

The study was performed as research center focused and the data obtained from parents and children were collected in the center. In similar further studies, parent trainings and data collection from children may be performed at their home as children's natural environment.

Since training was given after completing the study of experimental group, follow-up data could not be collected from control group in the study. Further studies may be planned so as to obtain follow-up data from control group, thus, follow-up performances of both groups can be compared.

The effectiveness of this program on teachers, undergraduate students and experts may be tested. The program may be intervened to different interventionists to teach providing DTT, therefore, the performances of these interventionists may be compared.

This study assessed receptive language and imitation performances of children of participant parents. Further studies may also assess the performances of children in different fields. In addition, the effect of this study on children's relevant skills may be assessed 3 to 6 months after completing the study.

In this study, the effect of the conducted program on psychological factors of parents such as stress, self-sufficiency and attitude was not evaluated. In further studies, various pre-and post-study psychological and sociological characteristics of participant parents may be evaluated to test the effect of the program on these characteristics.

The study investigates the effect of TPPDTT, which is a package program developed by bringing various components together. Although the program was found to be effective as a result of the study, the contributions of program components to the effectiveness of the program were not studied. In further studies, the effects of the program components may be tested enabling the improvement of the program. In addition, the analysis of the program components has not been studied in the literature and it is recommended to conduct such studies.

The effectiveness of training program can be tested on more individuals taking advantage of distance learning techniques.

Recommendations for intervention

Prepared program was conducted as center focused. In further interventions of the program, little homework may be given to parents and whether the parents practice the skills they have learned at home may also be followed up.

The program was intervened to the groups each containing 4 individuals and only one subject was addressed in each session. The program may be arranged so as to be conducted with larger groups and instead of one, two subjects may be addressed in each session. Accordingly, more individuals may be trained and training may take a shorter time. This situation may be effective in increasing the availability and easy utilization of the program.

This program may be intervened to undergraduate students in the department of teaching intellectually disabled students as elective course in order to teach students providing DTT skills.

This program may also be useful in in-service training activities to support understaffed special training field and increase the quality of present staff.

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Table 1. Information about parents

Variables related to parents		Experiment	Control	Total
Age of Mother	25-30	1	2	3
	30-35	2	3	5
	35-40	3	2	5
	40-45	1	-	1
		7	**7**	**14**
Age of Father	25-30	-	1	1
	30-35	2	2	4
	35-40	3	2	5
	40-45	2	1	3
	45-50	-	1	1
		7	**7**	**14**
Education Level of Mother	Primary Education	1	1	2
	High School	2	2	4
	Associate Degree	3	1	4
	Undergraduate	1	3	4
		7	**7**	**14**
Education Level of Father	Primary Education	1	-	1
	High School	1	2	3
	Associate Degree	4	-	4
	Undergraduate	1	5	6
		7	**7**	**14**
Family Income (TRY)	500-1000	1	1	2
	1000-2000	1	1	2
	2000-3000	2	3	5
	3000-4000	2	1	3
	4000-	1	1	2
		7	**7**	**14**

Table 2. Information about children

Variables related to Children			Experimental	Control	Total
Age	3		-	1	1
	4		1	1	2
	5		1	3	4
	6		1	1	2
	7		2	1	3
	8		2	-	2
Total			7	7	14
GARS2 TV	70 -85	OBİ*	1	1	2
	85-100		2	3	5
	100-115		1	3	4
	115-130		3	-	3
Total			7	7	14
Gender	Female		-	-	0
	Male		7	7	14

Table 3. t-test results of the participants for independent samples related to providing DTT performances

Group	n	X	SS	Df	t	p<
Experimental	14	82.57	10.40			
				26	25.91	.001
Control	14	-1.57	6.27			

Table 4. ANOVA results of the participants for repeated measures related to DTTEF pre-test, post-test and follow-up scores

Origin of variance	Df	SS	MS	F	p<	Significant Difference
Time of measure	2	49751,17	24875,58	383,90	.001	
Subjects	11	1473,33	134,03			
Error	22	1425,5	64,795			1-2, 1-3
Total	35					

Df=Degrees of Freedom SS= Sum of squares MS= Mean Square

Table 5. Mixed ANOVA results of the participants having TPPDTT related to pre-test, post-test and follow-up scores

Origin of Variance	SS	Df	MS	F	*p*<
Between-groups					
Gender	40,111	1	40,111	1001,525	.001
Error	1434,222	10	143,422		
Within-groups					
Time of measure	49751,167	2	24875,583	362,765	.000
Measure*Gender	54,056	2	27,028	.394	.679
Error	1371,444	20	68,572		
Total	52651	35			

Table 6. Mann Whitney U test results of the fathers in experimental and control groups related to providing DTT behaviors

Group	n	Mean Rank (MR)	Rank Total (RT)	z	p	R
Experimental	7	11	77			
				-3,134	.002	.837
Control	7	4	28			

Table 7. Mann Whitney U test results of the mothers in experimental and control groups related to providing DTT behaviors

Group	n	Mean Rank (MR)	Rank Total (RT)	z	p	R
Experimental	7	11	77			
				-3,134	.002	.837
Control	7	4	28			

Table 8. TELD scores of children with ASD in experimental and control groups

	TELD Scores			TELD Scores	
	Pre-test	Post-test		Pre-test	Post-test
Experimental	20 Months	26 Months	Control	Below 15 Months	Below 15 Months
	68 Months	68 Months		54 Months	50 Months
	15 Months	17 Months		48 Months	57 Months
	38 Months	35 Months		51 Months	51 Months
	15 Months	16 Months		16 Months	16 Months
	17 Months	26 Months		36 Months	38 Months
	15 Months	15 Months		20 Months	23 Months

Table 9. Mann Whitney U test results of parents in experimental and control groups related to receptive language skills of their children with ASD

Group	n	Mean Rank (MR)	Rank Total (RT)	z	p	R
Experimental	7	6,86	48			
				-.577	.564	
Control	7	8,14	57			

Table 10. Mann Whitney U test results of parents in experimental and control groups related to imitation skills of their children with ASD

Group	n	Mean Rank (MR)	Rank Total (RT)	z	p	r
Experimental	7	6,71	47			
				-.720	.471	
Control	7	8,29	58			

Table 11. Friedman test results of parents in experimental group related to receptive language skills of their children with ASD

	n	Mean	SS	Median	Mean Rank	Chi square	p
1- Pretest	6	28,83	21,06	18,5	1,5		
2-Posttest	6	31,17	19,42	26	1,92	4,095	.129
3- Follow-up	6	34,33	19,57	32	2,58		

Table 12. Friedman test results of parents in experimental group related to imitation skills of their children with ASD

	n	Mean	SS	Median	Mean Rank	Chi square	p	Significant Difference
1- Pretest	6	33,66	8,01	35,0000	1,17			
2-Posttest	6	38,33	3,72	38,5000	2,17	9,33	.009	1 – 3
3- Follow-up	6	39,33	2,94	39,5000	2,67			

Table 13. ANOVA results of the participants for repeated measures related to DTTEF pre-test, post-test and generalization scores

Origin of variance	Df	SS	MS	F	*p*<	Significant Difference
Time of measure	2	61509,33	30754,67	427,91	.001	
Subjects	13	1784,98	137,30	1071,705		1-2, 1-3
Error	26	1868,67	71,87			2-3
Total	41					

Df=Degrees of freedom SS= Sums of Square MS= Mean square