



## International Journal of Progressive Education

Volume 15, Issue 6 December 2019

[ijpe.penpublishing.net](http://ijpe.penpublishing.net)

ISSN: 1554-5210 (Print)

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### To cite this article

Toper, O., Diken, I.H., Vuran, S. & Mahoney, G. (2019). The Effects of Home-based Responsive Teaching Curriculum on Interactional Behaviors of Mothers and Their Children with Autism Spectrum Disorder: A Mixed Design Study in Turkey. *International Journal of Progressive Education*, 15(6), 33-50. doi: 10.29329/ijpe.2019.215.3

Published Online	December 08, 2019
Article Views	3 single - 4 cumulative
Article Download	5 single - 7 cumulative
DOI	<a href="https://doi.org/10.29329/ijpe.2019.215.3">https://doi.org/10.29329/ijpe.2019.215.3</a>

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## **The Effects of Home-based Responsive Teaching Curriculum on Interactional Behaviors of Mothers and Their Children with Autism Spectrum Disorder: A Mixed Design Study in Turkey**

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### **Abstract**

The effectiveness of Responsive Teaching (RT) Early Intervention Program which is one of the relationship-focused interventions (RFI) on five children diagnosed with autism spectrum disorder (ASD) and their mothers was studied. The study was conducted in “Mixed Research Design” in which both quantitative and qualitative data were collected. Quantitative data of the study were collected through single group pretest-posttest model and qualitative data were collected from field notes, diaries, video analyses and interviews. Findings gathered from pretest and posttest quantitative results revealed that the RT program was effective on interactive behaviors of five children with ASD and their mothers. Qualitative results supported the quantitative findings and revealed that mothers stated they became more sensitive and responsive to their children behaviors by using RT strategies.

**Keywords:** Relationship-focused interventions, Responsive teaching, Autism spectrum disorder, Mixed design.

**DOI:** 10.29329/ijpe.2019.215.3

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## INTRODUCTION

Social and interactional deficits are one of the diagnoses criteria of Autism Spectrum Disorder (ASD) (DSM-V, 2013) and this limitation of social and interactional behaviors effect parent-child interaction especially in early childhood years (Diken, 2009). Studies that have been conducted on parent-child interaction for years have showed that interaction types of parents had significant effects on cognitive, communicative and socio-emotional developmental areas of their children in early childhood (Cunningham, Reuler, Blackwell and Deck; 1981; Gutstein, Burgess and Montfort, 2007; Kim, Mahoney and Perales, 2003; Mahoney, Boyce, Fewell, Spiker and Wheeden, 1998; 2005; Mahoney, 2004; Youn-Kong and Carta, 2011). Even some other studies revealed that this effect was particularly related to responsive behaviors of families (Mahoney and Perales, 2003; Kim and Mahoney, 2004). The term “being responsive” usually refers to parents’ suitable and sensitive behaviors regarding developmental level of their children, and their decreasing adult-oriented speeches and instructions (Trivette, 2003; Young-Kong and Carta, 2011). On the other hand, studies showed that when parent-child interaction behaviors were compared between typical developmental children and children with developmental disabilities including ASD, the parents who have children with developmental disabilities are more directive and less responsive to their kids in Turkey (Ceyhun, Özdemir, Töret and Özkubat, 2015; Diken, 2012; Diken and Mahoney, 2013).

The implementations that aim to teach responsive interaction strategies to parents to turn them into responsive individuals to their children are called Relationship Focused Implementations (RFI) (Mahoney *et.al.*, 1998; Mahoney and Perales, 2003). Examining RFI literature, there exist more than 100 defined responsive strategies under various programs and names, and through these strategies, the parents of the children who were affected by disability were aimed to become more responsive towards their children which would contribute to the development of their children (Mahoney, 2009; Young-Kong and Carta, 2011).

One of the RFIs that is used in responsive interaction strategies in parent-child interaction is Relation-Based Intervention Curriculum called Responsive Teaching (RT). RT is a program that particularly aims at supporting development of children aged between 0-6 who was affected by disabilities; teaching responsive interaction strategies to parents or primary caretakers to make them more responsive towards their children during their daily routines; and contributing to children’s developments by this way. RT curriculum is developed by Prof. Gerald Mahoney and Prof. James MacDonald in 2007 and RT includes 66 responsive interaction strategies. The program consists of provide one or two of these strategies to care-giver in one-to-one format at home or school environment in a session at least six months period.

Research conducted on RT showed that the program provided significant differences in interaction behaviors of children diagnosed with ASD, Down syndrome and developmental disorders and their parents; the children participated in this program showed progress in cognitive, communicative and socio-emotional developmental areas; and these progresses were related to high amount of responsive interaction behaviors of parents in United States of America, Korea and Turkey (Karaaslan, Diken and Mahoney, 2011; 2013; Karaaslan and Mahoney, 2013; Kim and Mahoney, 2004; 2005; Mahoney and Perales, 2003; 2005).

The importance of parent-child interaction, the limitations on interactional behaviors in parents who have children with ASD and the positive effect of precious studied including interactional strategies shows us that it is important to support parents if they have problems in interactional behaviors between their kids and it is possible to improve children’s interactional behaviors and developmental behaviors by supporting parent’s interaction behaviors.

Thus, the study primarily aimed to find out how RT affected interaction behaviors of the children diagnosed with ASD and their mothers and to show how the engagement of children changes over the course of a brief relationship focused intervention by assessing quantitative data analyses methods as previous studies. On the other hand, although there are findings related to the effectiveness

of RT in literature, limited information about the strategies and procedures on RFIs is reported to exist. Deriving from these needs, the study secondarily aimed to describe mothers' and implementer's perceptions of their implementing responsive interaction strategies by using qualitative data analysis methods. Around that purpose the study questions are: (1) How are RT effect the interaction behaviors of mothers who have children with ASD, (2) How are RT effect the interaction behaviors of children with ASD (3) Is there any relationship between mothers and children interaction behaviors, (4) Is there any relationship between mothers' interaction behaviors and children's developmental progress (5) Which strategies are commonly used by mothers (6) Which strategies are commonly found difficult to use by mothers and (7) How the RT intervention effect other family members? Findings received from this study are considered to provide a support for scientific justification of the RT; moreover, providing a better comprehension of strategies that are used, the qualitative data gathered from the study are regarded to contribute to the further implementations and research.

## METHOD

### Participants

We looked for some prerequisite features in participants before started the study. First the participants should had diagnosed with ASD, second, they should had been in under 6 years old, and third children and their mothers should need support on parent-child interaction. Finally, after pre-assessment process, five children aged between 34 and 45 months diagnosed with ASD and their mothers who were their primary care takers and had not joined any mother-child interaction program before participated study. During the study, all the participant children were undergoing individual and group education at a private special education and rehabilitation center, and two of them were nursery school students at the same time. We evaluated Autism levels of the children through Gilliam Autism Rating Scale-2-Turkish Version (GARS-2-TV; Diken, Ardiç and Diken, 2011), and developmental levels through Gazi Early Childhood Evaluation Tool- GECET (Temel, Ersoy, Avcı and Turla, 2005) prior to the study. Demographic characteristics of child participants and their autism and developmental levels are shown in Table 1. A special education teacher implemented sessions who had RT implementation certificate from Prof. İbrahim H. Diken who is the authorized person on RT in Turkey. Implementer was a PhD student at Special Education Program at the same time. She had ten years' experience working children with ASD and conducted one pilot study on RT with three participants and their mothers in a group format in one month before started to main study.

**Table 1** Ages and Autism and Developmental Levels of Child Participants

	CP 1	CP 2	CP 3	CP 4	CP 5
Calendar Age	42,5 months	36 months	34 months	45 months	36 months
Psychomotor Development	16-18 months	22-24 months	22-24 months	22-24 months	22-24 months
Cognitive Development	12 months	16-18 months	13-15 months	13-15 months	16-18 months
Language Development	7 months	12 months	11 months	11 months	12 months
Socio-Emotional Development	10 months	19-21 months	19-21 months	19-21 months	19-21 months
Autistic Disorder Index (GARS-2-TV)	97	77	110	90	70
Probability of Autistic Disorder Incidence (GARS-2-TV)	Considerably High probability of Incidence	Probability of Incidence	Considerably High probability of Incidence	Considerably High probability of Incidence	Probability of Incidence

CP: Child Participant

## Research Design

We designed the study with Convergent Parallel Design which is one types of Mixed Research Designs that allows using both quantitative and qualitative data collection methods (Creswell and Plano Clark, 2011). We collected quantitative data of the study through single group pretest –posttest model to examine mother-child interaction, and qualitative data through video analysis, field notes, diaries and interviews.

## Procedures

We conducted implementation sessions individually with each mother-child dyad at their own homes one day a week. Each session lasted on an average of one and a half hour. We used The RT guide Turkish Version during intervention sessions. During the sessions, as suggested in manual of the RT, we used a four-step training procedure. First, researcher explained the targeted strategy and talked on discussion points related pivotal behavior. Secondly, the researcher interacted with the child and used the strategies with the child and at same time commented to mother while mother was observing. Next, mother implemented observed and explained strategies with her child by comments of researcher when needed. The last step was homework step in which researcher talked to mothers on how to transfer strategies focused on the session to daily routines. We planned to transfer two or three strategies for each session, and these strategies were identified in accordance with needs of mothers and their children. Intervention sessions lasted on an average of 10 weeks with each mother-child dyad.

## Data Collection

**Collection of Quantitative Data.** We collected data related to interaction behaviors of mother and child participants who were the first dependent variables of the study through pretest and posttest method. In accordance with this aim, we used Maternal Behavior Rating Scale-Turkish Version (MBRS-TV; Diken, Topbaş and Diken 2009) to evaluate interaction behaviors of mothers, and Child Behavior Rating Scale-Turkish Version (CBRS-TV; Diken, Topbaş and Diken 2009) to evaluate behaviors of child participants.

MBRS-TV consists of three subscales which are “Being Sensitive-Responsive”, “Being Affective Expressive”, and “Being Achievement-Focused and Directive”. These three subscales consist of 12 items that rate parent behaviors. These items are “being sensitive, being responsive, being effective and being creative” under the title of “Being Sensitive-Responsive” subscale; “acceptance, enjoyment, expressiveness, warmth, praise” under the title of “Being Affective Expressive” subscale; and “being achievement oriented, being directive and interaction pace” under the title of “Being Achievement focused and Directive” subscale. Each item is rated with a score between 1 and 5. The aim in the implementation was to increase scores of mothers to (5) for “Being Sensitive-Responsive” and “Being Affective Expressive” subscales whereas to decrease their scores to (3) for “Being Achievement focused and Directive” subscale (Diken, Topbaş and Diken 2009).

CBRS-TV consists of two subscales under the titles of “Attention” and “Initiation”. Totally there are seven items rating interactive behaviors of children in these two subscales. “Attention, persistence, interest, and cooperation” are listed under the title of “Attention” and “initiation, joint attention, and affect” were under “Initiation”. Each item is rated between 1 and 5. The aim in the implementation was to increase the score of the child to (5) for all behaviors (Diken, Topbaş and Diken 2009). We made pre-post evaluations for both scales by recording and observing behaviors of mother and child dyads during free play times that lasted approximately 10 minutes.

**Collection of Qualitative Data.** We used video analyses, field notes, diaries and interviews to collect qualitative data of the study. The implementer observed the interaction between each mother-child dyad prior to each implementation session for five minutes once in two weeks, and then analyzed

mother-child interactions in this process. In addition, the implementer kept diaries and took field notes after each implementation session and kept the record of her own observations including her own ideas about for each implementation session and recorded the situations that were done or told by mothers through a voice recorder as field notes. We conducted semi-structured interviews with each mother and implementer interviewed with each mother at the end of the 10 weeks intervention in face to face. We prepared the interview questions with a second expert on qualitative research methods. Additionally, different questions were added belong to conversation.

### **Data Analysis**

**Analysis of Quantitative Data.** We used Wilcoxon Signed Ranks Test to analyze the quantitative data gathered from pretest and posttests because of the numbers of our participants ( $n: <7$ ) via SPSS software program. As a limitation for group empirical studies when use statistical analysis methods, we can just have the average performances of participants on effectiveness of independent variable and not being able to reflect individual performance of each participants. In order to suppress this limitation, we also showed raw data on interaction behaviors of mothers and children gathered from pretest and posttests with graphical analysis by using column charts.

**Analysis of Qualitative Data.** We itemized in a word document, all video records, field notes, diaries and interviews during the analysis of the qualitative data. We categorized some specific themes for each situation after the itemization. We started the analyses with video analyses and identified the themes “interactive behaviors of mothers”, “interactive behaviors of children”, “relationship between mother-child interaction behaviors”, “developmental behaviors of children”, “strategies that are used by mothers” and “other family members” from these analyses. Then, we divided each one of these themes into subthemes, and the data gathered from field notes, diaries and interviews were analyzed and reported under these themes.

### **Reliability**

**Inter-observer Reliability.** A second special education teacher who had the RT implementation certificate and had also certificates for the scales that were used collected inter-observer reliability data related to quantitative data. We collected data for all pretest and posttest sessions, and we calculated inter-observer reliability by using the formula of “Agreement/Agreement + Disagreement X 100”. Inter-observer reliability average of mother participants was calculated as 85, 6% for pretest scores, and 94, 16% for posttest scores. As for child participants, their inter-observer reliability average was calculated as 81,42% for pretest scores, and 95% for posttest scores.

We used short confirmations and expert examinations provide reliability for qualitative data. With regards to this aim, a second expert on qualitative research methods joined the study as confirmation expert. During this process, the implementer e-mailed all document about themes and subthemes with the written reports of the interview. The implementer also gave verbal information via phone call to second expert. The second expert compared the results of the analysis and original copies, and confirmed the analysis.

**Implementation Reliability.** In order to evaluate whether independent variable was implemented as it was planned or not, we collected implementation reliability data from 30% of implementation sessions that were identified randomly. Second observer watched videos used RT implementation reliability form to collect implementation reliability data, and it was calculated by multiplying “partially” columns which RT guide required with 2 and “yes” columns with three. Following the calculations projected by RT program guide, we observed implementation reliability of the followed sessions at least 60 and above and reliability percentage was calculated as 95 %.

## RESULTS

### Quantitative Results related to Interactive Behaviors of Mothers

Findings related to pretest and posttest results of MBRS-TV subscales, “Being Sensitive-Responsive”, “Being Affective Expressive”, and “Being Achievement focused and Directive” are shown in Table 2, Table 3 and Table 4. Wilcoxon Signed Ranks Test results showed that there was a significant difference between pretest and posttest scores of “Being Sensitive-Responsive” with large effect size (Cohen’s  $d=0,9$ ) and “Being Affective Expressive” with large effect size (Cohen’s  $d=0,9$ ) subscales; however, there was not any significant difference between pretest and posttest scores of “Being Achievement focused and Directive” subscale.

Pretest and Posttest raw scores of MBRS-TV subscales and items in each subscale are shown in Table 5. Examining raw pretest and posttest scores of MBRS-TV, it was seen that five mothers had desired increase in terms of “Being Sensitive-Responsive” and “Being Affective Expressive” subscales. As for “Being Achievement focused and Directive” subscale, three of the mothers were above the desired level whereas two of them were below. On the other hand, posttest results revealed that four of the mothers reached desired level and two had scores which were close to desired level.

**Table 2 Wilcoxon Signed Ranks Test results of MBRS-TV “Sensitive/Responsiveness” Subscale**

Pre Test-Post Test	n	Mean Rank	Sum of Ranks	z	p
Negative Ranks	0	,00	0	-2,032*	,042
Positive Ranks	5	3,00	15		
Ties					

\*Based on negative ranks, ( $z=2,032$ ,  $p < .05$ ).

**Table 3 Wilcoxon Signed Ranks Test results of MBRS-TV “Being Affective Expressive” subscale**

Pre Test-Post Test	n	Mean Rank	Sum of Ranks	z	p
Negative Ranks	0	,00	0	2,023*	,043
Positive Ranks	5	3,00	15,00		
Ties					

\* Based on negative ranks, ( $z=2,2023$ ,  $p < .05$ )

**Table 4 Wilcoxon Signed Ranks Test results of MBRS-TV “Being Achievement-Focused and Directive” subscale**

Pre Test-Post Test	n	Mean Rank	Sum of Ranks	z	p
Negative Ranks	2	4,00	8,00	-,137*	,891
Positive Ranks	3	2,33	7,00		
Ties					

\* Based on positive ranks, ( $z=137$ ,  $p > .05$ ).

**Table 5 Mother Participants’ Pre and Posttest Raw Scores of MBRS-TV Scale**

MBRS-TV	Mother 1		Mother 2		Mother 3		Mother 4		Mother 5	
	PrT	PsT	PrT	PsT	PrT	PsT	PrT	PsT	PrT	PsT
SENSITIVITY/ RESPONSIVENESS										
Sensitivity	3	4	1	5	2	5	3	5	2	4
Responsivity	1	4	1	5	2	5	3	5	3	4
Effectiveness	2	3	1	4	2	4	2	4	3	4
Inventiveness	1	4	2	4	1	5	2	4	2	4
Scale Score	1,75	3,75	1,25	4,5	1,75	4,75	2,5	4,5	2,5	4

AFFECT	PrT	PsT	PrT	PsT	PrT	PsT	PrT	PsT	PrT	PsT
Acceptance	3	5	2	5	3	5	3	5	3	5
Enjoyment	3	5	2	5	3	5	3	5	4	5
Praise	3	4	1	5	3	5	3	5	4	5
Warmth	2	4	1	5	2	5	2	4	3	5
Expressiveness	3	4	2	4	3	5	2	4	4	5
Scale Score	2,8	4,4	1,6	4,8	2,8	5	2,6	4,6	3,6	5
ACHIEVEMENT ORIENTATION/ DIRECTIVENESS	PrT	PsT	PrT	PsT	PrT	PsT	PrT	PsT	PrT	PsT
Achievement	2	3	5	3	2	3	2	3	4	3
Directiveness	2	3	5	3	4	3	2	3	4	3
Pace	2	3	4	3	2	4	2	3	4	3
Sacel Score	2	3	4,66	3	2,66	3,33	2	3	4	3

MBRS-TV: Maternal Behavior Rating Scale-Turkish Version, PrT: Pre Test ; PsT: Post Test

### Quantitative Results Related to Interactive Behaviors of Children

Findings related to the analysis of pretest and posttest results of CBRS-TV subscales, “Attention” and “Initiation”, and overall scale mean scores of CBRS-TV are shown in Table 6, Table 7 and Table 8.

**Table 6 Wilcoxon Signed Ranks Test results of CBRS-TV “Attention” subscale**

Pre Test-Post Test	n	Mean Rank	Sum of Ranks	z	p
Negative Ranks	0	,00	0	2,032*	,042
Positive Ranks	5	3,00	15,00		
Ties					

\* Based on negative ranks, (z=2,032, p < .05).

**Table 7 Wilcoxon Signed Ranks Test results of CBRS-TV “Initiation” subscale**

Pre Test-Post Test	n	Mean Rank	Sum of Ranks	z	p
Negative Ranks	0	00	0	2,060*	,039
Positive Ranks	5	3,00	15,00		
Ties					

\* Based on negative ranks, (z=2,060, p < .05).

**Table 8 Wilcoxon Signed Ranks Test results of Total CBRS-TV scores**

PreTest-Post Test	n	Mean Rank	Sum of Ranks	z	p
Negative Ranks	0	00	00	2,023*	,043
Positive Ranks	5	3,00	15,00		
Ties					

\* Based on negative ranks, (z=2,023, p < .05).

Wilcoxon Signed Ranks Test results revealed that there was significant difference between pretest and posttest scores of “Attention” and “Initiation” subscales and overall score of the scale. Large effect sizes (Cohen’s d=0,9) were found for subscales and over score of the scale.

As to Pretest and Posttest raw scores of CBRS-TV subscales and items in each subscale (Table 9), the results revealed that there was a desired increase in Attention and Initiation behaviors and overall mean scores.

**Table 9 Child Participants' Pre and Posttest Raw Scores of CBRS-TV**

CBRS-TV	Child 1		Child 2		Child 3		Child 4		Child 5	
	PrT	PsT	PrT	PsT	PrT	PsT	PrT	PsT	PrT	PsT
ATTENTION										
Attention	2	5	3	5	3	5	2	4	4	5
Persistence	2	4	3	5	2	4	1	4	3	5
Interest	2	4	3	5	2	4	1	4	4	5
Cooperation	2	4	3	5	2	4	1	3	4	5
Scale Score	2	4,25	3	5	2,25	4,25	1,25	3,75	3,75	5
INITIATION										
Initiation	1	5	4	5	3	4	2	4	2	5
Joint Attention	2	4	2	5	2	5	2	4	3	5
Affect	2	4	4	5	3	5	2	4	4	5
Scale Score	1,66	4,33	3,33	5	2,66	4,66	2	4	3	5
Total Scale Scores	1,85	4,28	3,14	5	2,42	4,42	1,57	3,85	3,42	5

CBRS-TV: Child Behavior Rating Scale-Turkish Version, PrT: Pre Test ; PsT: Post Test

### Qualitative Results Related to Interaction Behaviors of Mothers

We summarized common result for all mother interaction behaviors gathered from interviews, video analysis, field notes and diaries according to MBRS-TV. The common mother interaction behaviors were determined as “*Being Achievement-Focused and Directive*” before the intervention. By the intervention, mothers’ interaction behaviors turned to less achievement-focused and directive. They started to act more *Sensitive-Responsive* and *Affective Expressive*.

In general, mothers stated about their interaction behaviors during interviews that they had all been constantly trying to teach something to their children; they had been director in the interaction; however, as a result of the implementation, they left being teacher and tried to set joyful communication with their children and started to follow games and interests of their children during their interactions. Some examples of mothers’ expressions as below:

*“Before I had homework from my kid’s school to do at home as matching skills but I couldn’t do them cause of didn’t know how I did. After intervention, I knew that it was important to play with my kid instead of trying to teach something” (Mother 1).*

*“Before the intervention I was very insistent to my son to play how he wanted but know I was sensitive my son’s plays” (Mother 3).*

Data gathered from video analysis results of first probe session, field notes and diaries of implementer showed that at the beginning of the implementation:

- The mothers did not pay attention to be at the same height with the child and to set eye contact with their children during their interactions;
- Instead of following the interests of their children to toys, they tried to direct their children in accordance with their own preferences;
- They tried to have children play with toys obeying some rules instead of playing as they wanted;
- They tried to interact with their children through constant questions and instructions; they either did not notice the sounds of their children and stayed nonreactive or did not value them;

- Instead of smiling and using verbal reinforcers they displayed more authoritative behaviors;
- Instead of being lively and friendly and playmates for their children, they tried to be their teachers;
- Instead of continuing repetitive games, they tried to do new activities with their children every time.

Results gathered from video analysis showed that there was positive progress in behaviors of mothers after transferring required strategies. Field notes and diaries of implementer also revealed that transferred the required strategies:

- Mothers started to be careful in terms of being at the same height with their children during interaction; prefer the games their children preferred to play, and in the way the child wanted; they continued the games their children wanted to repeat; they started to react the utterances of their children; and they left interacting through asking questions.

These results on interaction behaviors of mothers are similar with quantitative results of mothers' interaction behaviors obtained by MBRS-TV.

### **Qualitative Findings Related to Interactive Behaviors of Children**

We summarized common result for all children interaction behaviors gathered from interviews, video analysis, field notes and diaries according to CBRS-TV. During the interviews, regarding the interaction behaviors of their children, mothers stated that their children preferred to play alone before; even if they interacted with them, it would not last long; however, the children passed longer time interacting and playing with them, and they were very happy during these plays and obeyed the rules after the implementation. One example of mothers' expressions as below:

*"My daughter always preferred to stay alone and just sit and rocking her body on sofa and but now she was happy to play with me"* (Mother 1). Additionally, Mother 2 and Mother 3 also indicated that their children usually started to play with them for a very short time and left the mothers alone because of their directive behaviors before the intervention but now they can play longer time before, after they started acting as a play friend.

Data gathered from video analyses, field notes and diaries regarding interaction behaviors of child participants showed that at the beginning: *"Children were together with their mothers in short periods during their interaction and they preferred to play alone or ignored the suggestions of their mothers during the interactions. With the help of the implementation, they started to stay with their mothers longer; instead of playing alone, they managed to build joint attention; they obeyed the instructions of their mothers during the interaction and appeared to be happy with the interaction with their smiles"*. These results on interaction behaviors of children are similar with quantitative results of children's interaction behaviors obtained by CBRS-TV.

### **Qualitative Results Related to the Relationship between Interaction Behaviors of Mothers and Children**

Studies states that there is positive relationship between mothers and children interaction behaviors and behaviors styles of caregivers affect children's behaviors (Kim, Mahoney and Perales, 2003; Mahoney etc., 1998; 2005). Thus we wanted to see via interviews, field notes, diaries and video analyses is there any relationship. Mothers stated during the interviews that after they had started following the interests of their children and playing with the their preferred toys with their way, and getting rid of asking questions and giving directions their children started to spend more time on the

same activity and with them instead of playing alone. For example, Mother 2 stated that, “*Before I was always asking something to my kids during the interaction as a teacher and my son left me alone after a while. But I indicated that after I stopped my questions, my kid started to play longer than before and looked more enjoyable*”.

Examining the relationship between interaction strategies used by mothers and interaction behaviors of their children, the results of both video analyses and field notes and diaries showed that after mothers had started following the interests of their children and playing the games they preferred, and leaving asking questions, their children started to play with them longer and did not prefer playing alone and becoming isolated; they obeyed more to the instructions of their mothers; and became more happy and cheerful. Furthermore, the implementer mentioned about a similar situation between herself and children in the field notes and diaries. She stated that child participants started to meet her at the doorstep after a while and they started games on their own. Implementer explained this situation with her being in interaction with children and using RT strategies during those interactions.

### **Qualitative Results Related to Developmental Behaviors of Children**

Data gathered from interview, video analyses, field notes and diaries were examined under the themes of *game quality, imitation, obeying directions, fine motor skills and naming*. Game quality included game, all sound imitations they displayed during the interaction with their mothers, movement imitations, and imitation behaviors with objects. The behavior of obeying directions was defined as children’s fulfilment of demands and desires of their mothers. Video analyses, field notes and diaries showed that all participants displayed a positive progress particularly in terms of these five behavioral areas. Moreover, a student was recorded to have progress in fine motor skills by pushing buttons of some toys, and another participant started to name some objects and colors with similar sounds.

As for developmental behaviors of children, three mothers stated that their children recorded progress in imitation behaviors; four stated that their children improved their naming behaviors; three stated that their children displayed improvement in obeying directions; and two mothers stated that their children showed positive developments related to behavioral problems. For example, Mother 1 and Mother 2 indicated that “*their children started trying to imitate what mothers said verbally*”. Also, Mother 3 reported that “*her son had hit his head before during the play time. Because mom was trying him to do what mom wanted but now he was different and didn’t display that behavior*”.

### **Results Related to Most Frequently Used RT Strategies by Mothers**

As a result of the interviews carried out with mothers, it was understood that the most frequently used strategies by mothers were the same ones. Examining the answers of mothers to this question, all participants stated that “*they respectively played especially with the toys of their children the same as they played; they used to try to teach something to their children but they preferred to communicate with their children for joy after the implementation*”. Moreover, five mothers stated that “*they followed the leadership of their children and became their playfellows rather than teachers*”. Five mothers stated that “*they were more careful about being at the same height with their children and being face to face with their children*”, and five mothers state that “*they gave up asking constant questions to their children*”. Some example of mothers’ expressions as below:

- “I didn’t think before that it is so important to make eye contact but now I know the importance and also it is so easy to do that” (Mother 1).
- “I always asked questions before but I don’t do that now and it is really important and easy” (Mother 2).

- “Before I thought that I should ignore my son’s meaningless vocalization but now I always respond to him as talking functional and it is so easy. I can do that every time even so when I am engaged in with house works” (Mother 5).

Results gathered from video analyses indicated that mothers started using most “get into my child’s world”, “following the leadership of the child” “play with my child with toys”, “following the focus of interest of the child”, “communicate without asking questions”, “responding to sounds and diversifying them”, “responding to the child’s unintentional sounds, mimes and gestures as if they are pieces of a meaningful chat or deliberate communication”, “value that my child is doing”, “being lively”, and “repeat activities my child enjoys” strategies after being taught about these strategies.

Data gathered from field notes and diaries of the implementer revealed that although the implementer taught new strategies according to RT program guide, the most frequently transferred and preferred strategies by mothers were similar to the ones gathered from the data of video analyses. Moreover, it was understood that implementer considered those strategies as the milestones of the program and stated that they had positive contributions to the interactive and developmental behaviors of participants.

### **RT Strategies the Mothers had Difficulty in Using**

Some strategies were found difficult to use for mothers. During the interviews with mothers, four of them stated that for the strategy: **expand the show my child next developmental step** and the strategy: **expand to clarify my child’s intention or develop my child’s topic**, “*it was important to know in which developmental period their children were but they occasionally had problems in behaving appropriate to this and they would need the support of an expert for the following step*”. For example, Mother 2 stated that

*“She usually compared his son with his peers based on calendar age and thinking that he should do same behaviours and she noticed she needed support especially about how she should manage her expectations for her son”.*

Three participant mothers stated that “they were aware of the benefits and importance of playing games with their children; however, they had problems in creating regular game times as in implementation sessions since they could not have spare time due to household chores”. Mother 1 told that “she knew the importance of playing regularly but she also confessed she couldn’t do every time because of other things which she had to do”.

In addition to the explanations of mothers, the implementer stated in her diaries that especially mothers who had severe autistic children needed long-lasting guidance in terms of using strategies against their children, and in order the program to be effective, mothers were recommended to accept and implement these strategies as parts of their lives.

Data gathered from field notes and diaries of the implementer showed that mothers particularly had difficulty in using strategies that required understanding and evaluating the developmental level of their children”, and strategies that required them to behave in accordance with the developmental level of their children to move up to another step, and they stated that they needed support of an expert on these issues. They listed the most difficult strategies as “*helping child to pass to next developmental step*”; “*carrying child’s developmental goals and the things he can do to an upper level*”; and “*waiting for a further level silently*”.

### **Results Related to the Effect of RT on Other Family Members**

The intervention sessions conducted with mothers and children but also for three participants, older sisters or brothers attended some sessions. On the other hand, after sessions it was possible to tell

what they are doing during the intervention to other family members for mothers. Three mothers stated that they informed and guided their husbands, other children and other people, and affected interaction types of them positively. What's more, it was learned during the study that the written notes that were left during the implementation were read together with fathers. For example, in the interview Mother 1 stated that *"her husband read the notes in the evenings which the implementer gave the mother and tried to use the strategies especially about imitation of the words or sounds"*. Also, Mother 4 stated that *"before she couldn't have any idea what she should do for his son most of time but now she told that she could give recommendation to her husband and older daughter"*. She said that *"My husband always said "be quiet" to my son when he displays meaningless sounds or vocalization before. But now I can warn him to act different and he is trying to do what I told"*. Additionally, especially two mothers stated that *"siblings of their participant children wanted to join implementation sessions voluntarily and tried to implement the strategies they learned against their siblings"*. For example, Mother 2 indicated that *"her older daughter didn't play much more with his younger brother and mom always was trying to persuade her to play with her brother. But by the intervention started, mother said that "you see, she is very keen than me about what you are telling us and trying to use the strategies after you left"*. Thus, the program contributed to the behaviours of siblings against their participant siblings. One of the themes that were obtained from field notes, diaries and interviews was the indirect effect of the program on mothers and other family members although it was not aimed at the beginning of the study. It was stated in the diaries of the implementer that siblings of three participants joined the implementation sessions and tried to display appropriate behaviours in accordance with the related strategies.

## DISCUSSION

The first research question of the study was to investigate the effect of RT on parent-child interaction behaviors of five mothers who had children diagnosed with ASD. Results of the analyses revealed that mothers had significant differences at "Being Sensitive-Responsive" and "Being Affective Expressive" subscales; however, "Being Achievement focused and Directive" subscale did not reveal any significant difference. On the other hand, examining pretest scores of mothers for this subscale individually, it was seen that three mothers got scores between 4 and 5 from this subscale which indicated that they behaved extremely success oriented and directive. The notes taken by the implementer in her diaries indicated that it was a common characteristics of mother participants to be teaching oriented and directive. Similarly, all mothers stated during semi-structured interviews that they were too much instruction oriented and they were all in efforts of teaching something to their children during their interactions. Considering as a whole, MBRS-TV pretest results showed that mothers were less responsive and sensitive against their children whereas the data gathered from diaries and interviews revealed that all mothers were success oriented and directive. Mahoney and Perales (2003), stated that these two behavior types were in inverse proportion; the more the mothers were success oriented and directive, the less sensitive and responsive they were; conversely, as they became more sensitive and responsive, they became less success oriented and directive. Deriving from this information and reinterpreting the results gathered in this study, it would be seen that all mothers had low scores for being sensitive and responsive, and being affective expressive behaviours. Thus, the mothers who were less sensitive and responsive against their children were likely to be success oriented and directive at a high level. Difference between pretest and posttest scores of being success-oriented and directive were not significant, and three mothers were found to be success oriented and directive at a high level prior to the implementation. As for the other two mothers, they were below the desired level. For this reason, mean scores of five mothers were close to mid-point, and three mothers had decreasing and three increasing terminal behaviours which caused mean scores become close to mid-point. Examining the data gathered from MBRS-TV, video analyses, field notes and interviews as a whole, it would be seen that they had consistencies among each other. Thus, considering all the findings of the study, it can be said that all mothers became more sensitive and responsive against their children; more sensitive and expressive, and success oriented and directive at an ideal level. These results show resemblance with previous studies on RT in terms of the fact that RT had positive effects on interactive behaviours of mothers who have children diagnosed with ASD in Turkey (Karaaslan; Diken and Mahoney, 2013; Karaaslan and Mahoney, 2013; Mahoney and Perales, 2003).

Second question of the study aimed to find out whether RT had an effect on interaction behaviors of child participants. The findings gathered from pretest and posttest analyses with regards to this aim revealed that there were significant differences in Attention and Initiation subscales and overall mean scores. In addition, common findings related to all children from video analyses showed that children had positive changes in participation, persistence, attention, joint attention, cooperation, initiation and interactive behaviours. Analyses of field notes and observation notes taken by the implementer about children showed that all participant children had positive changes in terms of the items of Attention and Initiation subscales. It was understood from the diaries of the implementer that she had taken notes about cooperative behaviours of two children; and initiative behaviours of two other children. Furthermore, all of the mother participants stated during the interviews that their children had positive changes and improvements in their participatory behaviours, and they stated that they observed their children displaying initiative and cooperative behaviours. All mothers stated that their children were playing to enjoy with their toys, and they had preferred to play alone in the past but after the implementation they were playing together and for long periods. What's more, the children wanted to start a game on their own. Examining the findings gathered from CBRS-TV, video analyses, field notes, diaries and interviews as a whole, it would be seen that they had consistency among each other and had similar results. Thus, within the light of all these findings, it is possible to state that all children had positive changes and improvements in Attention and Initiation behaviours after the implementation. These results show resemblance with previous studies on RT in terms of the fact that RT had positive effects on interactive behaviours of children diagnosed with ASD (Karaaslan, Diken and Mahoney, 2013; Karaaslan and Mahoney, 2013; Mahoney and Perales, 2003).

For the other research questions we just used qualitative data collection tools and third question of the study aimed to find out whether there was a relationship between interactive behaviours of mothers and their children. Similar studies conducted by Kim and Mahoney (2005), Mahoney and Perales (2005) and Mahoney and Perales (2003) showed that there was a relationship between the progress in the interactive behaviours of children and the progress observed in mothers in the same framework. In other words, there was a positive relationship between increase in mothers' being sensitive and responsive, and affective-expressive behaviours and increase in children's attention and initiation behaviours. Hence, the findings of both mothers and children from MBRS-TV and CBRS-TV pretest scores showed that desired behavior types were at lower levels; however, posttest scores displayed a considerably mutual increase. Similarly, findings related to probe sessions showed that mothers starting using strategies contributed to increase in participatory behaviours of children simultaneously. Accordingly, the results of previous studies and findings of the present study showed that there was a relationship between behaviours of mothers and of children. Studying on all common findings related to all participants from field notes it could be seen that mothers had expressions stating that they gave up being achievement oriented and directive; instead, they preferred to be more sensitive and responsive. Similarly, there were implementer observation notes stating that children displayed attention, persistence, cooperation, joint attention and participation behaviours under the title of attention and initiation basic behaviours. It would not be a coincidence for children to display participatory behaviours after the increase in the behaviours of their mothers, and this was thought to be related to the behaviours of mothers. Even the implementer stated in field notes that as the sessions progressed the children started to meet her at the doorstep smiling, and waited for the implementer to take the things in her bag out. The implementer stated the reason for this in her diaries as her using RT strategies as well during the sessions. Considering video analyses, field notes, diaries and interviews as a whole, it could be seen that there was consistency in terms of the relationship between the findings related to the behaviours of both mothers and of their children, and there was a relationship between the behaviors of mothers and their children as it had been stated by Kim and Mahoney (2005), and Mahoney and Perales (2003; 2005).

Studies that focused on effect of RT on developmental behaviours of children, it was stated that children had progress and improvements in terms of cognitive, communicative and socioemotional developmental areas (Karaaslan and Mahoney, 2013; Karaaslan, Diken and Mahoney, 2013; Kim and Mahoney, 2005; Mahoney and Perales, 2005). Qualitative data collection tools were used to find out whether behaviours of mothers had an impact on developmental behaviours of their

children in this study. Overall joint results gathered from video analysis, field notes, and diaries showed that children had improvements especially in imitation, obeying directions (cooperation), naming, game quality and fine motor skills. Mothers gave similar responses to these subjects in interviews. Studying on video analysis, field notes, diaries and interviews, the results of the study had consistency among each other, and all of them indicated improvements in developmental areas even if some of them were limited. These improvements were higher especially in following directions and imitation behaviours. Although these developmental progresses were small scale progresses, previous studies showed that RT was effective with children who were younger than three years, and the studies focusing on the effect of RT on older children at preschool period are still limited (Karaaslan, Diken and Mahoney, 2011; Mahoney and Perales, 2003; 2005). In addition, it was stated in previous studies that no matter which method was tried, its effect would be limited on children with severe disabilities. For this reason, even if they were not at desired level, those small scale developmental progresses were considered significant in this study (Karaaslan, Diken and Mahoney, 2011).

Video analyses, field notes, diaries and interviews related to the most frequently used strategies by mothers, it was found out that these strategies were (1) entering the child's world, (2) following the leadership of child, (3) playing with the toys the child played, (4) following child's focus of interest, (5) setting communication without asking questions, (6) responding the sounds and diversifying them, (7) responding to the child's unintentional sounds, mimics and gestures as if they are parts of a meaningful chat or communication, (8) valuing the things the child does, (9) being lively, and (10) continuing a repetitive game. Deriving from all those findings, it can be concluded that all abovementioned strategies helped mothers become more sensitive and responsive towards their children, and behave more sensitively and responsively against them. They have an important role in RT as well. Young Kong and Carta (2011) who examined the studies that focused on responsive interaction strategies in literature tried to find out which strategies were defined the most in 26 studies they reviewed. They found out that the most frequently defined strategies which were defined in 24 of these studies were the ones that aimed to increase communicative responsiveness including imitating the expressions of children, expanding the expressions of children, taking turns, providing language input, giving opportunity to child to react, and reacting to child's behaviours. Second the most frequently used strategy in the same study was found to be following the leadership of the child and being affectively responsive to the behaviours of the child. Strategies that were used in this study were similar to the ones that were reported to be used frequently in RT. In addition, the implementer of the study stated that these strategies had direct effects on interactive and developmental behaviours of children and they formed the milestones of RT as her opinion on these strategies.

In addition to the findings gathered in the study, the study had some limitations as well. First, the study was limited to five children diagnosed with ASD and their mothers. However, although the implementer planned to include more participants in the study, she couldn't manage this because of either not finding candidates that met her preconditions or some mother's renouncing participating in the study after they had learned that the implementation would be carried in their houses. Similarly, it was stated by Wayner, Spiker, Linn and Genlach-Downie (2003) that it was difficult to find participants for such researches or programs as most people were not volunteer for such studies. Thus, this was a case that had been experienced in studies conducted in other countries as well. Second limitation of the study which was conducted with five mother-child dyads was the study's being designed as single group pretest-posttest model. Since it is not possible to create a control group and compare with it, such studies are considered as weak experimental studies (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz and Demirel, 2008). However, regarding the studies conducted with children with special needs, it has usually been difficult to plan group experimental studies and form groups equivalent to each other. For this reason, the number of group experimental studies is considerably limited in special education. In order to decrease the effect of this limitation to minimum levels in the study, mixed research design was used, and in addition to quantitative data collection tools, qualitative data collection tools were used to provide additional justifications for the data that was collected. Moreover, it was considered unethical to keep children from control group waiting without doing anything at early childhood period which is an important part of development. Furthermore, examining 8 previous studies that were conducted on RT, it was seen that only three of

them were designed as pretest-posttest model with control group (Karaaslan, Diken and Mahoney, 2013; Karaaslan and Mahoney, 2013; Kim and Mahoney, 2005). In addition to deal with this limitation, internal validity of the study was established such as; (1) a short implementation (10 weeks) was carried out to take care of maturation, (2) not receiving a relationship-based intervention such as the RT program was prerequisite for mothers.

Another limitation of the study was not being able to collect data related to developmental behaviours of child participants through a standardized scale. Child participants were evaluated through GECET to compare their calendar ages and developmental levels at the beginning of this study. However, a developmental evaluation scale was unable to be used to find out whether the children displayed any advance in terms of development or not at the end of the study; instead, this was tried to understand through qualitative data collection tools. Implementer listed the reasons for this as (1) developmental evaluation scales such as GECET are not suitable for children with special needs or children effected by a disorder as stated in its manual. they are used to find out whether there is a problem with the children who display normal development or are at risk in terms of development. In other words, they are scanning tests for identification, and are not suggested for advanced evaluations of children affected by a disorder. (Temel, et.al., 2005; Yalaz, Anlar and Bayoğlu, 2011), (2) calendar ages of the children participated in this study were between 34 and 67 months. GECET requires the evaluation of children once in every six months after the age of 24 months (Temel et.al., 2005). However, implementation sessions of this study were completed in 10 weeks, which was approximately three months. Thus, even if the participant children revealed advances in some developmental areas, they were considered to be unable to meet the requirements projected by this evaluation tool in three months. (3) It was stated in the studies focusing on the characteristics of some standard tests that are used in early childhood special education that such tests had some limitations. Especially the content of the standard tests that evaluated development was different from the materials that were used in the curriculum of the related special education program. For this reason, these tests were considered unable to provide insights and realistic information in terms of measuring program goals, and development and level of children, (Ergül, 2009). Due to all these stated reasons, video analyses, field notes, diaries and interviews were used to find out and evaluate whether there were any changes in developmental behaviours of children after the implementation that lasted three months.

Despite all these limitations the study is thought to have significant contributions to the field. Once, it is the only study conducted as a mixed design with both quantitative and qualitative data to find out the most frequently used strategies and effectiveness of RT. In addition, the data gathered from the study include various suggestions for further research. It is primarily suggested that in order to support scientific justification of RT, similar studies should be conducted either with children with ASD or other disabilities and their parents either on a home-centric or institution-centric based implementation. It is possible to observe the effects of an implementation on a group through qualitative data collection techniques as well. Moreover, regarding the studies conducted at natural environments such as homes, implementer is forced to take spontaneous decisions. For this reason, designing such an implementation as an action research would provide better understanding about the process of such programs and participants. Moreover, it would help writing the processes in detail and reach various results in the field, and suggested for further research. In addition, detailed and daily interviews including daily questions related to each strategy with families are suggested for further studies since they would provide the opinions of families about these strategies. RT is a program that should be implemented at least for six months. Implementer of the study stated that in order the program to be effective for parents and their children in terms of their interactions and developments, existing strategies should be turned into their life styles, and especially the individuals with severe disabilities should be supported for a longer period. Deriving from this information, getting into contact with families after a while after the completion of the implementation and asking their opinions on the place of these strategies in their lives is recommended to find out long term effects of RT and collect monitoring data for further research. Some mother participants stated that siblings of their children were indirectly affected from the program. The implementer indicated that fathers were usually not at home as they were working, and mothers were at home dealing with both household

chores and childcare. Usually, while the mother was dealing with housework, elder siblings were taking care of their small siblings. For this reason, having siblings gained interactive behaviours is considered to be positive for children with ASD. Thus, the studies focusing on interactive behaviours of siblings of individuals with ASD or other diagnosis groups, and teaching RT strategies to these siblings and investigating their effectiveness are suggested for further research.

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