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Effects of Coaching Practices on Children with Autism Spectrum Disorder and Their Mothers*

Koçluk Uygulamalarının Otizm Spektrum Bozukluğu Olan Çocuklar ve Anneleri Üzerindeki Etkileri

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Abstract: The researchers aim to investigate the influence of coaching on mothers of children with autism spectrum disorder (ASD) with the purpose of instructing them in the use of the least-to-most prompting process for teaching their children how to engage in joint attention. In addition, they will examine the impact of the least-to-most prompting procedure on the children's outcomes in relation to their capacity to engage in joint attention. The study deployed a multiple baseline design with mother-child dyads. The study comprised three sets of dyads. All children aged four to seven are diagnosed with ASD in addition to intellectual disability. The results indicate that mothers effectively acquired teaching behaviours by applying the least-to-most prompting technique through coaching, achieving a perfect accuracy rate of 100%. In addition, these learned behaviours were regularly sustained for durations of one, three, and five weeks, and were effectively employed in diverse circumstances and with distinct persons. Moreover, the findings indicated that children with ASD effectively acquired the capacity to react to shared attention, maintained this ability over a period of time, and utilised it in different situations and with different individuals. Overall, the mothers conveyed positive perspectives regarding the social validity of the study.

Keywords: Coaching, mother training, autism spectrum disorders, responding to joint attention skill, least-to-most prompting

Öz: Bu çalışmada, Otizm Spektrum Bozukluğu (OSB) olan çocukların annelerine sunulan koçluğun, annelerin öğretim uygulamaları basamaklarını sunma becerilerini arttırması ve annelerin öğretim uygulamalarının çocukların ortak dikkate tepki verme becerilerini kazanmaları üzerindeki etkilerini incelemek amaçlanmıştır. Araştırmaya, 4 ile 7 yaş arasındaki OSB tanısı almış üç çocuk ve anneleri dâhil edilmiştir. Araştırmanın sonuçlar göstermektedir ki katılımcıların uygulama evresi sonunda hedef becerileri edinme düzeylerinde artış bulunmaktadır. Birinci, üçüncü ve beşinci haftalardaki izleme oturumları sonuçlarına göre katılımcı çiftlerin hedef becerileri edinim düzeylerini koruduklarına ilişkin verilere ulaşılmıştır. Genelleme oturumları öntest-sontest sonuçlarına göre, tüm anneler uygulama basamaklarının tamamını uygulama sonrasında doğru olarak sunmuş oldukları ve çocukların katılım sırasına göre hedef beceriyi %80, %96 ve %85 düzeylerinde sergiledikleri görülmektedir. Ayrıca, araştırmada sosyal geçerlik verileri araştırma öncesi, sırası ve sonrasında toplanmış olup annelerin çocuklarına sunacakları öğretim uygulamalarına yönelik görüşleri bulgular kısmında belirtilmiştir.

Anahtar Kelimeler: Koçluk uygulamaları, aile koçluğu, otizm spektrum bozukluğu, ortak dikkate tepki verme, ipucunun giderek arttırılmasıyla öğretim uygulaması

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Introduction

Autism spectrum disorder (ASD) is a neuro-developmental disorder characterized by challenges in social interaction and communication, as well as repeated interests, behaviors, and activities (American Psychiatric Association, 2013). Children with ASD typically exhibit deficits in social communication skills and may not appropriately respond to cues or prompts from others to engage in communication. Furthermore, they may also abstain from engaging in any verbal communication with anyone in their vicinity (Kırcaali-İftar, 2015). The social challenges individuals experience in their daily lives sometimes stem from a lack of fundamental communication skills, such as eye contact and joint attention (Mundy, 1995). The importance of early intervention should be acknowledged in order to enable children with ASD to acquire and develop social interaction and language abilities at an early stage.

The Center for disease control and prevention (CDC; 2023) reported that approximately one in 36 children is diagnosed with ASD. In the literature, it is seen that in teaching to children with ASD, the instructors can be researchers/teachers (e.g., Isaksen & Holth, 2009; Jones & Feeley, 2006) or family members (e.g., Ferraioli & Harris, 2011; Rocha et al., 2007). The increase in the number of children with ASD and inadequate number of special education teachers have created a growing need for mothers to be a teacher at home and implement evidence-based practices (EBPs) in their daily lives. On the other hand, training mothers and making them educated in their children's lives have also advantages on decreasing mothers' stress level (Stein & Thorkildsen, 1999). The more they are knowledgeable about autism and teaching techniques, the more they feel safer and more confident on account that they can teach and direct their children with ASD, get into their children's lives easily, and show sympathy with strong attachment. Thus, mothers can have a long-term impact on the lives of their children (Ludlow et al., 2012).

Coaching is one of the adult training models that has gained attention in recent years. It is an important way of training mothers using effective teaching procedures to use for children with ASD (Kemp & Turnbull, 2014). It can be described as one-to-one support for mothers by a specialist and mothers are given one-to-one feedback during their delivering of new methods. If necessary, adjustments are made to the mother's practice and the mother is given the opportunity to re-apply (Artman-Meeker et al., 2015). To sum up, coaching contributes mothers to developing skills of using evidence-

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based practices (Lane et al., 2016). Besides, it allows families to specialize in teaching some of the basic skills that their children can generalize in their daily lives (Simpson, 2015). The researchers conducted with coaching model show that studies on providing coaching to mothers (Rocha et al., 2007) and their children with ASD have started to be carried out after 2000s and are still limited in number.

Joint attention (JA) skills are the earliest social behaviors observed in children with typical development and are considered as a primary skill for language development. JA is vital for understanding the feelings and thoughts of individuals and objects in the environment (Adamson & Bakeman, 1985). The lack of JA suggests possibility of autism in children (Adamson & McArthur, 1995; Charman, 2003; Mundy, 1995; Rocha et al., 2007). QA There are many studies suggesting that social and communication skills are caused by a lack of JA in children with ASD (Bono et al., 2004; Carpenter et al., 1998; Paparella et al., 2011; Rocha et al., 2007; Watson et al., 2013). Children with ASD who cannot build JA and cannot use gestures and mimics can be easily distinguished from both individuals with typical development and individuals with other developmental disabilities (Adamson et al., 2009; Paparella et al., 2011; Watson et al., 2013). The sub-skills which are initiating joint attention (IJA) and responding to joint attention (RJA) are among the skills that contribute to the language development of children at an advanced age (Mundy et al., 2007). Since RJA requires sharing of interest with the communication partner, children with ASD have serious problems in social interaction on account of their lack of skills of sharing interest, which is a specific characteristic of ASD (Adamson et al., 2009). Thus, RJA should be primarily taught to children with ASD as it is acquired former than IJA by typically developed children aged about 6-month-old (Lewy & Dawson, 1992; Morales et al., 1998; Rocha et al., 2007). As stated above, inadequacy of RJA in children with ASD may increase tendency of not sharing their thoughts and feelings about the object and even with people around, which makes teaching RJA to children with ASD vital. As researchers consider RJA as an important developmental milestone for social development, language and cognitive development, they argue that children with ASD should definitely be taught systematically using EBP (Adamson & McArthur, 1995; Mundy, 1995; Rocha et al., 2007).

The literature shows various EBPs such as discrete trial teaching (Jones & Feeley, 2007; Whalen & Schreibman, 2003), pivotal response training (Ferraioli & Harris, 2011; Whalen et al., 2006), video modeling (Tuncel, 2017), most-to-least prompting (Isaksen & Holth, 2009), and progressive time delay (Martins & Harris, 2006) are effectively used to teach JA. Last but not least, another effective method is the least-to-most prompting procedure, which is preferably used to teach chain skills such as RJA. In the least-to-most prompting procedure, the interventionist delivered the procedure specifies the two prompts, which are the least intrusive ones and increases the assistance according to prompting hierarchy. The final goal of the procedure of least prompts is for the child to provide a correct response before a prompt is given (Tekin-İftar, 2012). Although it is quite effective and easy to use, there are limited studies conducted in which researchers were delivering the least-to-most prompting procedure to teach RJA to children with ASD (Bilmez et al., 2017; Taylor & Hoch, 2008).

Taking the person who is to teach RJA into consideration, it should be mentioned that the instructor delivering the procedure to teach JA to children with ASD may be caregivers (especially mothers; Ferraioli & Harris, 2011; Jones & Feeley, 2007) in addition to professionals (i.e., researchers, teachers; Bilmez et al., 2017; Isaksen & Holth, 2009; Martins & Harris, 2006; Whalen & Schreibman, 2003). Considering these needs in the literature, the researchers designed a study to investigate whether mothers of children with ASD could learn using EBPs and children in the study could learn RJA skills. Based on these findings, it is understood that there is still a need for studies in which children with ASD are taught RJA by mothers who are coached to learn using the least-to-most prompts procedure.

In general, the purpose of the study is to examine the impact of coaching mothers who have children with ASD on both the mothers' skills of teaching and their children's skills of responding to RJA. This research has three primary objectives. The first objective is to examine the impact of educating mothers on how to use the least-to-maximum prompting technique when instructing their children with ASD, as specified. (a) Will coaching enable mothers to teach RJA skills to their children with ASD using the least-to-most prompting procedure accurately? (b) Will mothers continue to use the least-to-most prompting procedure accurately one, three, and five weeks after implementation? (c) Will mothers generalise the least-to-most prompting procedure when instructing different children with ASD in different settings?

Moreover, the second objective is to examine the impact that mothers who employ the least-to-most prompting technique have on their children who have ASD, as previously specified. (d) Can children diagnosed with ASD acquire RJA skills that their mothers have taught them with minimal to no encouragement? (e) Will RJA skills be maintained by adolescents with ASD one, three, and five weeks after implementation? (f) Are children capable of applying RJA skills to various mothers in diverse settings? In addition, social validity was evaluated in this research, as indicated in the inquiry: (g) What are the mothers' perceptions of social validity prior to, during, and subsequent to the coaching intervention?

Method

Participants

Three mothers and their three children with ASD dyads were the participants of the study. The approval was received from the university board. The first author interviewed the mothers about the participation of the study. The aim and the process of the study were stated, and then volunteer mothers signed an informed consent to accept to participate in the study with their children with ASD. The researchers paired the mothers and their children with ASD as mother-child dyads.

Mothers. Three mothers participated in the study. Other than being a volunteer, the only prerequisite for mothers to participate was not having been trained on any subjects related to ASD. Handan and Olcay, 22 and 35-year-old mothers, were graduate of secondary and primary schools, respectively and both had one more typically developed younger boy. Burcu with a bachelor's degree was 38 years old. All three participant mothers are housewives.

Children. All children received an ASD diagnosis with intellectual disability at a local hospital from a psychiatrist. The researchers used Gilliam Autistic Disorder Rating Scale-2-Turkish Version (GOBDÖ-2-TV; Diken et al., 2011) to confirm their autism diagnoses and main deficiencies. Their

common features of ASD are aggression, having immediate and delayed echolalia, and lack of imitation and social skills. Also, Gazi Early Childhood Development Assessment Scale (GECDAS; Temel et al., 2005), which had been developed for the assessment of developmental areas during early childhood, was used to describe children's developments. The two children have minimally speaking abilities (moderate receptive and very limited expressive language skills) while one is a non-speaking child. Ahmet was a 5-year-old male and student in full time pre-school. He attended 3-hour-individual and 1-hour-group education in a special education center in a week. In terms of receptive language skills, his performance is regarded as satisfied. He listens, understands, and reacts to basic instructions (i.e. get the spoon and start your meal). However, his expressive language skills are limited to about 10 words. Handan, his mother, stated that he could rarely generate "mom, come, give" words, often direct his mother's hands to the things he would like to receive, and keep eye-contact for a short time (i.e., 1-3 seconds). His GOBDÖ-2-TV and GECDAS results indicated that he was not able to initiate a conversation and respond to any interaction bids; however, he could jump with two feet, show body parts on pictures, imitate movements consecutively, get dressed with assistance, and follow simple directions. In terms of RJA skills, he could respond to his name but could not give appropriate reactions to an adult's initiation of JA. To sum up, Ahmet performs like a-24-month child in terms of cognitive and social development, and a-12-month child in terms of language development. Cagan was a 5,5-year-old male and student in full time pre-school. He attended 3-hour-individual and 1-hour-group education in a special education center in a week. Burcu, his mother, stated that he could rarely generate simple words (e.g., give, go, toy) and his receptive language was more developed than expressive one. His GOBDÖ-2-TV and GECDAS results indicated that he was not able to initiate a conversation and respond to any interaction bids; however, he could kick the ball, catch the ball, run on his tiptoes, jump on one feet, show body parts on pictures, distinguish and match the objects, complete a-four-piece puzzle, imitate movements consecutively, get dressed without assistance, and follow simple directions. In terms of RJA skills, he could respond to his name but could not give appropriate reactions to initiation of JA. To conclude, Cagan performs like a-48-month child in terms of cognitive and social development, and a-12-month child in terms of language development. Yagız was a 6-year-old male student. He attended in 4-hour-individual education in special education center in a week. Olcay, his mother, stated that he could understand what was said but did not have the ability to express himself with words. He could not stay in a closed area so he could not be a full-time-student. His GOBDÖ-2-TV and GECDAS results indicated that his expressive language skills are very limited with few gestures and mimics, and his receptive language performance is equal to that of a 12-month child. He was not able to initiate a conversation and respond to any interaction bids; however, he could run, turn the pages of books, catch the ball, match the objects, get dressed and clean his teeth only with assistance, express himself by looking or uttering, and follow simple directions. In terms of RJA skills, he could respond to his name but could not give appropriate reactions to the initiation of JA. Lastly, he performs like a-21-month child in terms of cognitive and social development. The researchers specified the prerequisite criteria for children to be a participant in this study as having receptive language skills and the ability to follow directions (at least 2-word- sentences), to build an eye contact, and to pay attention to visual/audio stimuli for two minutes. The first author assessed these skills.

Research Staff. The primary author, a PhD candidate in Interdisciplinary Disabled Studies (IDS), conducted all sessions, gathered and analysed data, and offered coaching to mothers. The second author, who was the advisor of the PhD student, had the prestigious position of full professor at universities in Turkey. A different PhD student in IDS gathered the dependability data in the role of an observer. Prior to randomly choosing dependability data session videos, the study's objectives and the data collection forms were thoroughly described.

Settings and Materials

Settings and Materials for Mothers. The researchers conducted all experimental sessions except generalizations one in mother-child dyads' houses. The first researcher met the mothers one-to-one in training sessions in mothers' houses. During the training sessions, there were a table, a laptop, a sofa set, chairs, a TV, and a carpet in about 10mx15m rooms. The generalization session was conducted in other participant children's houses, which had similar settings. The initial researcher created Power-Point slides to enable moms to deliver a presentation on data collecting, a summary of the least-to-most prompting technique, and systematic instruction. In addition, mothers were given a guidebook containing physical copies of the presentations, annotated notes, and examples of data sheets. Throughout the entire investigation, a camera, a tripod, and data collection forms were also utilized.

Settings and Materials for Children. The children were assessed in two different settings baseline, intervention, and maintenance sessions were conducted in the children's own houses. Small and simply decorated rooms of the houses were preferred. The rooms, where all experimental sessions were held, contained a sofa set, table, chairs, toy boxes, and tripods with a camera. The generalization sessions were held in other participant mothers' houses. The first researcher chose 25 materials to use in probe sessions for all children and gave them to mothers before sessions. The materials, which could be used in daily life, were not remarkable but ordinary (e.g., colorful juvenile books, a toy car, playdough, lego, and a vase). The materials used in intervention sessions were chosen by mothers regarding children's interests. Notable and interesting 10 materials were used in each session (e.g., a bicycle, a very-big-size doll, and a pet). A camera, a tripod, and data collection forms were also used in all sessions of the study.

Experimental Design

The researchers employed a multiple baseline design to evaluate the efficacy of coaching mothers in using the least-to-most prompting procedure to teach their children with ASD how to engage in Joint RJA skills. Additionally, they examined the impact of mothers implementing the least-to-most prompting procedure on their children's RJA skills. The experimental control was established by guaranteeing that the dependent variable exhibited an increase only after the introduction of the independent variable, with a specific time delay (Tekin-İftar 2012).

Dependent and Independent Variables

The study examined two dependent variables: (a) the mother's proficiency in appropriately employing the least-to-most prompting approach to teach RJA to their children with ASD,

and (b) the children's acquisition of RJA. The initial researcher gathered data on the instructional behaviours of mothers throughout both probing sessions and intervention sessions, as depicted in Table 1. The requirement for moms was to demonstrate 100% accuracy in utilising the least-to-most prompting approach throughout three consecutive teaching sessions. In order to assess the mothers' mastery of the desired behaviours, the initial researcher graphed the rates of accurate responses in educational sessions using the least-to-most prompting technique.

Table 1. Mothers' instructional behaviors during probe and intervention sessions

Probe Sessions	Intervention sessions
1. preparing materials	1. preparing materials
2. delivering attentional cue	2. delivering attentional cue
3. delivering task direction	3. delivering task direction
4. waiting the 4-second response interval	4. presenting controlling prompt
5. delivering appropriate behavioral consequences	5. waiting the 4-second response interval
6. collecting data for the children's behaviors	5. delivering appropriate behavioral consequences
	6. collecting data for the children's behaviors

The initial researcher individually consulted with the mothers and special education teachers of the children to determine specific behaviours to focus on for each child. The desired behaviours for all individuals involved were to respond to the mothers' attempts to establish JA. The mothers gathered data on children's target behaviour, which was defined as a five-step-task analysis of RJA. This analysis was adapted from the Unstructured Joint Attention Assessment Tool developed by Loveland and Landry in 1986. The data collection took place during both probe sessions and intervention sessions. The five steps of the analysis included: (a) responding to having an object handed to them, (b) responding to an object being tapped, (c) responding to an object being shown, (d) following a pointing gesture, and (e) following a gaze. The RJA stages were taught based on the hierarchical proximity position of the items to the youngsters, as indicated above. The standard for each child's desired behaviour was set at 100% accuracy for the initial three stages and 80% accuracy for the final two steps during the probe sessions. The initial researcher graphed the proportions of accurate responses from youngsters during the probe sessions. The study included two independent variables: (a) coaching to instruct mothers on the least-to-most prompting technique, and (b) the implementation of the least-to-most prompting procedure by mothers to teach RJA to children with ASD. The impact of the initial independent variable was evaluated via the actions of mothers, whereas the impact of the second independent variable was evaluated through the actions of children.

General Procedure

Pilot study. The researchers conducted a pilot study before the study to assess the clarity of the content of the mother training session and specify any problems related to data collection forms. The first researcher conducted a pilot study with a mother-child dyad in their house. The participants had similar characteristics such as the real participants in terms of the mother's teaching experience and the child's having ASD. The mother was trained with a pack of training program (e.g., autism, characteristics, intervention programs, evidence based practices, applied behavior analysis, systematic teaching, the least-to-most prompting procedure, JA skills, and sample implementation videos) for two weeks. Then the mother practiced a probe and an intervention session to teach target behavior to her child with ASD. When the pilot study was finalized, the first researcher interviewed the mother regarding her teaching experience and the general procedure of the study. The researchers decided to reduce the content of the pack of training program as it had more information, which prevented the mother from focusing just on target behaviors and the way of teaching them, than needed for the present study. Thus, the training program for mothers was given the final version.

Baseline Sessions

The baseline condition comprised two distinct types of sessions. The initial kind consisted of baseline sessions for the mothers, while the subsequent type involved baseline sessions for the children. Baseline sessions for mothers. The initial researcher evaluated the mothers' proficiency in employing the sequential process of least-to-most prompting technique when instructing their children with ASD in RJA. The initial researchers requested that the moms engage in playing and teaching activities to develop joint attention (JA) skills. Both moms and children lacked prior knowledge or exposure to the goal behaviours during the baseline sessions. Baseline sessions for moms were conducted with a time delay between each session. An example of a task instruction given to the moms was to "engage in a game with your child and construct JA". As the mothers followed the instructions, the initial researcher documented the procedure using a camera and a tripod. The initial researcher evaluated the mothers' behaviours by comparing them to the specified target behaviours for mothers outlined in Table 1. Each session allowed for a maximum of five trials per step. The baseline included three categories of mother responses: accurate response, erroneous response, and no reaction. The initial researcher saw the video-recorded sessions and gathered data on the behaviours of the moms. Correct responses were marked with a plus sign (+), while incorrect and no responses were marked with a minus sign (-). Consequently, the initial researcher computed the proportions of accurate answers relative to the total number of potential answers in order to graphically represent the data. Baseline sessions for children. Mothers administered initial sessions with their children to evaluate the children's pre-intervention performance in RJA. Each session consisted of five trials for each step of RJA. Following a mother's attentional cue, such as "Cagan, let's engage in a game." Mothers provided task instructions for each of the five steps of RJA, and children responded affirmatively. The steps included responding to hand on item, responding to object tapping, responding to the showing of an object, following a point, and following a gaze. Subsequently, they patiently waited for a duration of five seconds to elicit responses from the children, without considering the accuracy of the responses, and proceeded to document the performance data of the youngsters. The session was concluded when the data was gathered, with a plus symbol (+) indicating accurate responses within five seconds and a minus symbol (-) indicating wrong responses or failure to react within five seconds. The definitions of accurate responses for the desired behaviours are provided in Table 3. Prior to administering the subsequent trial after a 1-minute break between trials, the researchers computed the proportion of accurate responses and graphed them.

Instructional Sessions

Mother Training. Following the baseline condition, the initial researcher (referred to as the coach) delivered individualised mother training on the least-to-most prompting process to each of the three moms, with a time delay between each training session. These workshops are sometimes referred to as introductory training sessions. The mother training consisted of the following steps: giving an introduction to systematic instruction, explaining the least-to-most prompting approach, demonstrating the process, facilitating practice with guidance, and giving feedback. The coach conveyed this information through a Power Point presentation, elucidating the fundamental instructional principles of systematic instruction (namely, direction, stimulus, prompt, response, and consequence), the least-to-most prompting procedure (specifically, presenting and gradually increasing the prompt to enhance the likelihood of a correct response), and data collection (specifically, recording probe data to assess if the criterion has been met). Next, the coach presented video examples of probe and training trials, specifically coach-created instructional sessions that utilised the least-to-most prompting process to teach RJA to children with ASD. As the moms observed the videos, the coach provided a detailed explanation of the sequential stages involved in the least-to-most prompting technique. These stages include an attentional cue, task direction, probe trials, prompting trials, and consequences. Subsequently, the coach demonstrated the process of conducting probe and instructive trials for RJA. The coach assumed the role of a mother, while the mother took on the role of a child. The coach discussed the instructional behaviours that they demonstrated. Subsequently, they switched positions. The coach instructed the moms to use the least-to-most prompting process when teaching the coach RJA, while the coach assumed the role of a child. The coach thereafter offered comments to the mothers regarding their performance until they achieved complete precision in executing the least-to-most prompting technique. Each session of maternal instruction lasted for about an hour.

Least-To-Most Prompting Sessions. After attending training sessions, moms utilised the least-to-most prompting approach with their children who have ASD once a day, for five days a week, during instructional sessions. During each educational session, mothers administered ten training trials using the least-to-most prompting approach. Following every two instructional sessions (in every third session), mothers administered probe trials before a training trial in all subsequent sessions.

The mothers conducted the least-to-most prompting training trials to teach RJA to the children five times a week. The mothers first secured the children's attention (e.g., "Ahmet come on, let's play.") and verbally reinforced his affirmative response (e.g., "Great, let's sit down and start.") before delivering the task direction (i.e., the first level of prompting; see Table 2 for prompting levels for five steps of RJA). The mothers waited 5 seconds for a response. A correct response (see Table 3 for correct behaviors for all steps of RJA) resulted in both edible (e.g., food, drink) and verbal reinforcement (e.g., "Great job, super") as the children answered right after the task direction without second and third level of prompts. An incorrect or no response resulted in the mothers repeating the task direction and giving the second level of promptings simultaneously; if needed the last level of prompting until children gave target behavior. The mothers delivered instructional sessions in the same way to teach five steps of target behavior. Then, the mothers thanked their children and terminated the trial. The mothers waited five minutes at most and started a new training trial.

Table 2. Prompting levels for five steps of RJA

Steps of RJA (Target behaviors)	**Levels of Prompting 1st level: Target Stimulus**	**2nd level**	**3rd level**
1. Response to hand on object (e.g. a toy)	Placing the child's hand on an object	**Verbal prompting:** Placing the child's hand on the object and saying an attractive expression (i.e. "Aaa Look")	**Verbal + physical prompting:** Saying an attractive expression (i.e. "Aaa Look") and holding the hand on the object for the child to engage with the object for five seconds.
2. Response to object tapping	Presenting a new object to the child and tapping it	**Verbal prompting:** Presenting a new object, tapping, and stating an attractive expression (i.e. "Wow, how interesting toy it is!"	**Verbal + physical prompting:** Stating an attractive expression (i.e. "Aaa Look") and holding the hand on the object for the child to engage with the object for five seconds.
3. Response to showing of object	Presenting a new object	**Verbal prompting:** Presenting a new object and stating an attractive expression (i.e. "Wow, here is a new toy"	**Verbal + physical prompting**: Saying an attractive expression (i.e. "Aaa Look") and holding the hand on the object for the child to engage with the object for five seconds.
4. Following a point	Establishing eye contact and pointing a new object	**Verbal +Sign prompting:** Pointing a new object by saying an attractive expression (i.e. "Look, what it is over there?)	**Verbal + physical prompting:** Saying an attractive expression (i.e. "Look, what it is over there?), holding gently the child's shoulder and turning him to the new object.
5. Following a gaze	Establishing eye contact and shifting a gaze toward a new object	**Verbal prompting:** Shifting a gaze toward a new object by saying an attractive expression (i.e. "Look, what it is over there?)	**Verbal + physical prompting:** Saying an attractive expression (i.e. "Look, what it is over there?) holding gently the child's shoulder and turning him to the new object.

Table 3. Correct behaviours for five steps of RJA

Steps of RJA (Target behaviors)	Definition of correct behaviors
1. Response to hand on object (e.g. a toy)	The child is expected to engage (i.e. manipulating or looking at the object) with a presented new object for at least five seconds.
2. Response to object tapping	The child is expected to engage (i.e. manipulating or looking at the object) with a presented new object for at least five seconds.
3. Response to showing of object	The child is expected to engage (i.e. manipulating or looking at the object) with a presented new object for at least five seconds.
4. Following a point	The child is expected to follow the point and look in the same direction as the object in five seconds.
5. Following a gaze	The child is expected to follow the gaze and look in the same direction as the object in five seconds.

While the moms did not use prompted replies during training trials for determining the criterion and creating the graph, they nevertheless collected data on the children's behaviours. The moms employed the same data gathering approach as that used in the probing experiments. Throughout the training trials, the coach also gathered data on the maternal behaviours, which may be found in the right column of Table 1. She employed the identical data collection methodology as that used during the baseline sessions for mothers. The criterion for all mothers was to achieve 100% accuracy in their responses throughout three consecutive sessions. After each training trial, the primary researcher offered coaching to the women. For example, they would say, "Handan, you selected appropriate materials for your child that captured his attention, and you performed the session effectively." It would be more advantageous if you positioned the item in closer proximity to your toddler, however. Additionally, it would have been prudent to conceal your disappointment when your child provided an incorrect response. Aside from your performance, it was excellent. Thank you! " Following two training sessions, the moms administered probe sessions to evaluate the acquisition of the desired behaviour in the following manner. The mothers captivated the children's focus (e.g., "Ahmet, would you be interested in playing with this car?") and verbally praised his positive reply (e.g., "Yes, let's play"). Subsequently, the moms provided instructions for the task, such as placing the toy in close proximity to the youngsters. The moms allowed a time frame of 5 seconds for a response. If the response was correct, they provided verbal reinforcement, such as saying "Great, you got it in your hand." In case of erroneous responses or no responses, the mothers expressed gratitude to the children for their participation or attendance. The mothers gathered data on the children's reactions, and the researchers graphed the children's data. The criterion for the first three steps of RJA was set at 100%, while for the last two phases, it was set at 80%. This criterion required all children to provide correct replies in at least three sequential probe sessions. The researchers also gathered data on the mothers' behaviours, employing the identical data collection approach utilised during the baseline sessions for the mothers (refer to the left column in Table 1).

Maintenance

Maintenance Sessions for Mothers. The researchers conducted follow-up sessions at one, three, and five weeks after the intervention. The researchers conducted these sessions in a manner identical to the baseline sessions. The initial researcher instructed the moms to carry out a session of prompting, starting with the least amount of assistance and then increasing it, which included both probing and training trials. The initial researcher expressed gratitude to the mothers for their involvement and refrained from providing any comments.

Maintenance Sessions for Children. The researchers gathered maintenance data on the specific behaviours of the children while the mothers were doing maintenance probing sessions that were similar to the baseline sessions. The mothers expressed gratitude to the youngsters for their active involvement and refrained from providing any feedback.

Generalization

Generalization Sessions for Mothers. The researchers evaluated the mothers' capacity to apply the least-to-most prompting method to different individuals and environments in a pretest-posttest fashion. These sessions consisted of five trials. The researchers instructed the moms to carry out sessions similar to the initial probe sessions, but with a different child in a different location. The researchers expressed their gratitude to the mothers for their active involvement.

Generalization Sessions for Children. Sessions focused on generalisation for children. The researchers also evaluated the children's capacity to apply RJA abilities to different individuals and environments using a pretest-posttest approach. These sessions consisted of five trials. The moms performed sessions similar to baseline probe sessions with a different kid in a different residence. The mothers expressed gratitude to the youngsters for their active involvement.

Inter-Observer Agreement (IOA) and Treatment Integrity

Reliability data was gathered by an independent observer for a minimum of 33% of each experimental condition involving the mothers and children. The researchers computed IOA data using a point-by-point approach, which involved dividing the number of accurate responses by the sum of correct and incorrect responses, and then multiplying the result by 100. Table 4 displays the IOA analyses. The moms in this study were assessed based on the treatment integrity of the least-to-most prompting technique, which served as the dependent variable. A third-party observer gathered reliability data for a minimum of 33% of coaching sessions. The treatment integrity for performing coaching was perfect among all the mothers, as determined by the formula: observed mother behaviours divided by planned mother behaviours, multiplied by 100 (Billingsley et al., 1980). The initial researcher administered baseline and generalisation sessions for Handan and Burcu, achieving a treatment integrity rate of 100%. For Olcay, the treatment integrity rate was 95%.

Table 4. Reliability data for mothers and children

Mothers	**BL (%)**	**Instruction (%)**	**Maintenance (%)**	**Generalization (%)**	**Children**	**BL (%)**	**Probe (%)**	**Maintenance (%)**	**Generalization (%)**
Ms. Handan	96	98	100	100	Ahmet	98	99	100	100
	94-100	95-100	100	100		95-100	97-100	100	100
	33	33	33	33		33	33	33	33
Ms. Burcu	97	99	100	100	Cagan	99	100	100	100
	96-100	98-100	100	100		98-100	100	100	100
	33	33	33	33		33	33	33	33
Ms. Olcay	90	97	100	100	Yagız	95	97	100	100
	85-100	95-100	100	100		93-100	95-100	100	100
	33	33	33	33		33	33	33	33

Note. Each cell includes mean IOA (first row), range of IOA (second row), and percentage of sessions data were collected (shown in parentheses in the third row) across mothers and children. BL═ baseline; IOA═interobserver agreement

Social Validity

The researchers created three distinct types of social validity questionnaires. Prior to, during, and following the intervention, the initial researcher conducted semi-structured interviews with the mothers to gather social validity data. The pre-intervention interview encompassed inquiries regarding the significance of JA skills, the benefits of least-to-most prompting sessions, and mother training sessions. The interview done throughout the intervention consisted of inquiries regarding any seen improvements by the moms, any difficulties encountered in teaching, and the helpfulness of the feedback provided by the coach. The post-intervention interview consisted of inquiries regarding the significance and benefits of the study for both the mothers and children. Additionally, participants were asked to identify the aspects of the coaching that they found most and least favourable. Please note that the social validity questions, due to space limitations, are not included here but can be obtained from the authors upon request. The data was captured through voice recording, converted into written form, and examined using descriptive analysis techniques.

Results

Effectiveness Findings

The efficacy of coaching on the implementation of the least-to-most prompting technique by mothers. Figure 1 illustrates the precise implementation of the least-to-most prompting process in baseline, intervention, maintenance, and generalisation sessions among mothers. It also shows the percentage of correct responses in baseline, intervention, maintenance, and generalisation sessions among the children. Handan employed the least-to-most prompting approach in the baseline condition, achieving an average accuracy of 46.2% (with a range of 42% to 51%). After completing the training with her mother, she successfully met the required standard for using the least-to-most prompting technique in three sessions and maintained a 100% accuracy rate. She achieved a 50% accuracy rate in the pretest and a 100% accuracy rate in the post test for generalisation. During the baseline condition, Burcu employed the least-to-most prompting approach, achieving an average accuracy of 49% (with a range of 47.3% to 50%). After receiving training from her mother, she successfully met the required standard for employing the least-to-most prompting process in four sessions and maintained a perfect accuracy rate of 100%. Her accuracy rate was 48% during the pretest and 100% during the post test for generalisation.

Olcay employed the least-to-most prompting approach in the baseline condition, achieving an average accuracy of 48% (range: 44% - 50.6%). After completing the training with her mother, she successfully met the required standard for employing the least-to-most prompting technique in just five sessions and maintained a perfect accuracy rate of 100%. Her accuracy rate was 50% during the pretest and 100% during the posttest for generalisation.

The efficacy of the least-to-most prompting process on children's target behaviours. Figure 1 also illustrates the process by which youngsters learn and develop specific behaviours. Figure 1 shows that Ahmet exhibited his desired reactions during the initial phase with an average accuracy of 56% (ranging from 52% to 60%), and he continued to display his desired behaviour with an accuracy of 85.3% (ranging from 84% to 88%) after the intervention. He achieved the required standard in 28 sessions. He exhibited accurate responses on the generalisation pretest with a 54% level of accuracy and achieved an 80% level of correctness during the posttest. Cagan exhibited a mean accuracy of 70% (range= 64%-76%) in his target replies during the baseline condition. After the intervention, he maintained his target behaviour with an accuracy of 89.3% (range= 88%-92%). He achieved the required standard in 29 sessions. He demonstrated accurate responses on the generalisation pretest with a 75% success rate and had a 96% success rate during the posttest. Yagız exhibited his target answers during the initial phase with an average accuracy of 48.4% (ranging from 36% to 56%), and he continued to display his target behaviour with an accuracy of 85.3% (ranging from 84% to 88%) after the intervention. He achieved the required standard in 59 sessions. He exhibited accurate responses on the generalisation pretest with an accuracy rate of 48% and had an accuracy rate of 85% during the posttest.

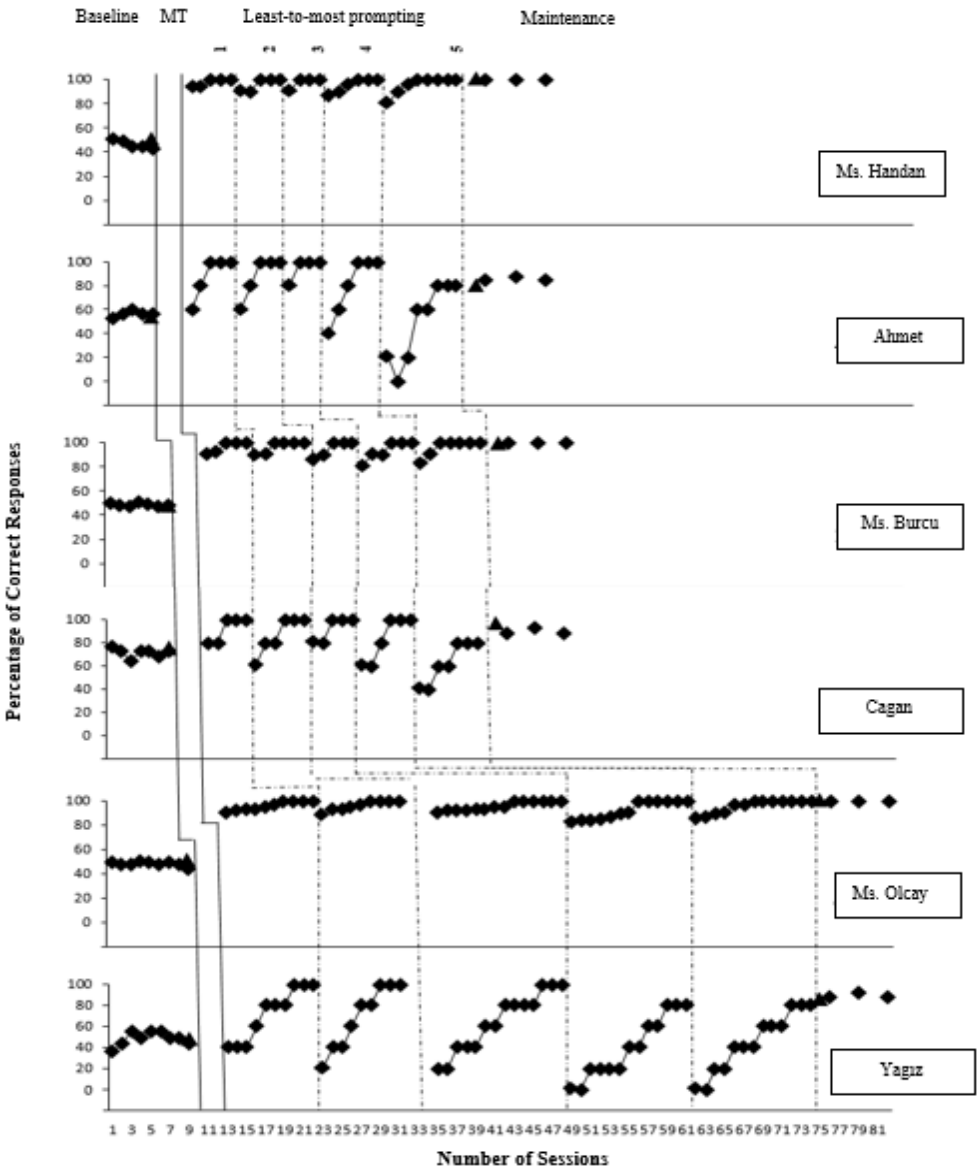

Figure1. The percentage of correct responses of mothers and children during baseline, intervention, and maintenance sessions. The symbol ♦ indicates intervention sessions and the symbol ▲ indicates pre- an post- generalization sessions.
Note. MT = mother training

Data pertaining to the total number of sessions and trials, duration of training sessions, as well as the number and proportion of errors made by the children until they achieved the desired outcome were gathered in the study. Ahmet achieved the desired degree of accuracy, as defined by RJA, after completing 28 training sessions consisting of 140 trials. The cumulative duration of the training sessions done with him amounted to one hour and 21 minutes. Prior to meeting the requirement, Ahmet committed 51 errors, which accounted for 40.4% of his total. Ahmet's training sessions ranged from a minimum duration of four minutes to a maximum duration of 10 minutes. Cagan achieved the desired degree of accuracy, as defined by RJA, after completing 29 training sessions consisting of 145 attempts. The cumulative duration of the training sessions undertaken with him amounted to one hour, 32 minutes, and 10 seconds. Prior to meeting the threshold, Cagan committed 52 errors, which accounted for 41.5% of his total. The duration of the smallest training session with Cagan was 5 minutes and 23 seconds, while the longest training session lasted nine minutes. Yagız achieved the desired degree of accuracy, as defined by RJA, after completing 59 training sessions and doing 295 trials. The cumulative duration of the training sessions completed with him was 2 hours, 41 minutes, and 30 seconds. Prior to meeting the threshold, Yagız committed 146 errors, which accounted for 49.7% of his total. The duration of the shortest training session with Yagız was four minutes and 19 seconds, while the longest training session lasted 13 minutes and 53 seconds.

Social Validity Findings

Mothers' Opinions Before the Intervention. All three mothers expressed that JA is an essential skill to play with peers and is necessary to be taught. They also added that learning JA skills would help them take advantage of special education in classes. When they were asked to comment on the least-to-most prompting, mothers reported that via prompting, they could also teach other skills at home in addition to JA skills. Additionally, they conveyed that they witnessed the efficacy of applying reinforcement in instructing children with autism. Consequently, they expressed a strong desire to acquire the skills necessary for effectively using prompting and reinforcement. Mothers indicated their opinions and

expectations about mother training sessions that they had not participated in any training before, so they were excited about learning how to teach without any mistakes and spending qualified and effective time with their children. Only Olcay was worried about being a teacher of her son.

Mothers' Opinions During the Intervention. Mothers explained that while they were teaching, they observed that their children started to play at home and in classes. They also added children's teachers' opinions that after being exposed to systematic learning environment at home, children started to make and keep eye-contact longer time and be ready to get instruction in classes. When mothers are asked whether they had any difficulties learning and implementing the prompting sessions, they expressed that before mother training session they felt as if they would fail to use prompts and reinforcement. However, thanks to feedback sessions of coaching, mothers stated that they realized systematic teaching was effective in teaching an autistic child. They also expressed that feedback sessions at home helped them realize the most appropriate time and way to give prompts and reinforcement. They reported that, before mother training and feedback sessions, they were unaware of the mistakes they made, however, role-playing and watching their own teaching sessions were playing a vital role of being conscious of implementing the systematic of the least-to-most prompting sessions.

Mothers' Opinions After the Intervention. After the treatment sessions were completed, mothers reported that the target behavior was quite important in many areas. They said that via JA skills, they spend effective time with their children. They also added that knowing when to provide and fade the prompts helped me feel confident. They suggested that organizing more mother-centered training would be more helpful as special education should not be restricted in classes, so that they could be their children's teachers and increase the time of special education that children could be exposed to. With the help of home-training, mothers and children could spend qualified time, which enabled to decrease children's problem behaviors. When questioned about their favorite aspects of the trial, moms expressed that they appreciated being able to remain at home for the entire treatment, as it seamlessly integrated into their everyday routines without requiring any additional time commitment. They also reported the coach was always with them, which helped them feel secure during training sessions and raise their self-confidence. Another point mothers liked about the study was they could spend time with their children playing and teaching at the same time, so children started to be eager to listen and perform mothers' instruction in a daily routine. Otherwise, mothers stated that they were busy with households and didn't realize what children were doing at home (i.e., mostly watching TV, mobile phone or tablet). Mother finished their words with all agreement that they really wanted to attend such trainings.

Discussion and Conclusion

This study aimed to examine the efficacy of coaching mothers in implementing the least-to-most prompting technique for teaching RJA to their children with ASD. Additionally, the study sought to evaluate the effectiveness of mothers delivering the least-to-most prompting procedure in teaching RJA to their children with ASD. The researchers also analysed the maintenance and generalisation of both moms' instruction and the acquisition by the children with ASD. Finally, the researchers evaluated the social acceptability of both the coaching intervention and the least-to-most prompting technique, as perceived by the moms. The coaching successfully trained moms to precisely implement the least-to-most prompting approach, resulting in the children acquiring their desired skills. Furthermore, both the moms and toddlers demonstrated the ability to retain their gained skills over an extended period. In addition, both the mothers and the students were able to apply the abilities they learned in various situations and with different individuals. The study's social validity findings were both exciting and encouraging. Mothers expressed their intention to implement the least-to-most prompting procedure with their children at home in the future. This approach proved to be effective and resulted in maintenance and generalisation of skills. These findings lay the foundation for equipping mothers to employ evidence-based practices as if they were their children's teachers at home. Mothers also concluded that they viewed coaching to be instructive, useful, and beneficial. In addition, they reported that it enhanced their self-assurance and expressed their intention to participate in other training programmes aimed at acquiring novel ways for their children.

There are other aspects that merit discussion regarding the coaching methodology employed in the study. Firstly, it is crucial and unavoidable to provide training to families, particularly mothers who spend the majority of the day with their children, on how to incorporate evidence-based practices into their daily routines. This will enable children diagnosed with ASD to receive more effective special education at home, in addition to their classes or clinical sessions. The study demonstrated that moms may effectively learn how to appropriately implement evidence-based practices through coaching sessions, which included mother training, role acting, and feedback. Following the maternal training sessions, they began executing steps under the guidance of the coach through side-by-side coaching. They required guidance while acquiring the steps of the least-to-most prompting procedure. The corrective feedback that was most commonly given was related to the correct ordering of prompts and waiting for the appropriate response time. On the other hand, the least commonly given corrective feedback was related to preparing the materials, as well as offering reinforcement. In addition, they consistently required correction while presenting the steps of the technique with precision. The findings align with other research (e.g., Bilmez, 2020; Cattık, 2019; Chen, 2014; Fettig et al., 2015; Lane et al., 2016) and contribute to the existing body of knowledge.

It is worth mentioning that in certain literature studies (e.g., Ingersoll & Dvortcsak, 2006; Lee et al., 2015), the mothers only delivered the evidence based practices were not the participants of the study. On the contrary, in this study, data were collected from both the mothers and the children in addition to the fact that the mothers implemented the practices effectively. Researchers designed the study as multiple baseline designs across three dyads in a nested design to investigate the effectiveness of two practices (coaching and the most-to-least prompting procedure). The study showed that both practices were effective. The findings of the study contribute to the literature in terms of both the design and an evidence based practices (i.e., the most-to-least prompting procedure) because there is scarcity of research on using the coaching and the most-to-least prompting procedure with mothers and their children with ASD in one single study building demonstrating control for both mothers and children outcomes. The mothers not only acquired how to plan the

treatment and implement the most-to-least prompting procedure but also maintained it over time and generalize it across setting and persons.

Additional point to be discussed is about the place where the whole coaching procedure was held. The researchers in previous studies implemented their studies where coaching parents mostly took place in clinics or in classes (Ingersoll & Dvortcsak, 2006; Lane et al., 2016). However, in this study, it was the mother-child houses where the study was implemented. The findings and mothers' social validity opinions indicated that participating in mother training and feedback sessions in addition to all treatment sessions made mothers satisfied and gratified as they did not have to spend time and money on the way. As they felt secured and relaxed in their own house and the study didn't affect their daily life any, they did not hesitate to participate in the study or make mistakes about delivering steps of the procedure. Researchers are encouraged with the results that they strongly suggest future researchers in the field to train mothers in their houses to acquire evidence based practices so that they could solve problem behaviors (Koegel et al., 1996) and teach basic skills to their children with ASD. The fact that participant mothers stated they would be eager to participate in another study is encouraging for other family members whose intent is to be effective and helpful for their children with special needs.

Several noteworthy aspects regarding the results of the children merit discussion. The least-to-most prompting procedure, one of the evidence based practices, was effective in teaching joint attention to their children with ASD (Bilmez et al., 2017; Taylor & Hoch, 2008). These results are consistent with previous research in which different evidence-based practices such as discrete trial training (Jones et al., 2006), pivotal response treatment (Rocha et al., 2007), script-fading procedure (MacDuff et al., 2007), and video modeling (Tuncel, 2017) add to the current literature. The majority of previous research, however, were conducted and delivered by endogenous persons such as teachers, researchers. The authors' understanding is that the results of this study have made a valuable contribution to the existing body of literature. This study stands out as the only one in which mothers have taken on the role of teaching RJA to their own children with ASD using the least-to-most prompting approach, while providing coaching. The children not only learned and retained their desired conduct, but also applied it consistently across different situations and with different people.

One more point worth discussing is about the time allocated for mother training. Thanks to a short parent training period, the mothers could spare more time on training their children, seizing teaching opportunities and receiving corrective feedback from the coach. In some researches, mothers were also trained to deliver practices, however, correction by specialists was delayed, which could cause children a possibility to acquire inaccurate behavior (Ingersoll & Dvortcsak, 2006). On the contrary, immediate corrective feedback is vital for children who learn and those who teach (i.e. teachers, family members) (Coulter & Grossen, 1997; Reinke et al., 2007). The side-by-side coaching preferred in the study encouraged mothers to teach with enthusiasm as they were not allowed to make mistakes during teaching to their children and prevented children from being exposed to inaccurate implementation. According to the investigators, this discovery should prompt future researchers to recognize the significance and influence of maternal training, leading them to potentially create studies aimed at reproducing similar effects.

Last but not least, similar to all family trainings, coaching is effective in building a strong mother-child interaction and sharing. The more mothers spend time together during treatments, the more they create opportunities to improve children's communication skills and decrease children's problem behaviors (Lane et al., 2016; McKnight et al., 2016). As Mundy (2016) states JA is such an early skill to be learnt that children with ASD miss the critical time to acquire it on account of symptoms of autism. Thus, in this study, social validity data suggested that mothers' teaching RJA to their children with ASD was really helpful to build interaction and attachment between each other.

Regarding the social validity findings, it is noteworthy that we did not come across any research that collected data from moms before, during, and after therapy with the support of coaching. Hence, this study contributes to the existing body of research by presenting the viewpoints of mothers at three distinct points in time. How their attitudes turned into positive towards being a teacher for their children with ASD was reported obviously from their statements. However, these findings require further studies for verification.

These findings are promising and validate the significance of teaching moms and utilizing the least-to-most prompting approach to teach children with ASD in their everyday activities within a natural setting. Based on these findings, the researchers suggest that future studies should explore the use of coaching to teach mothers and other family members of children with ASD or other disabilities in their homes or in another location, various evidence-based practices. Furthermore, it is essential that future research is structured to investigate the various crucial behaviors exhibited by children, which are essential for both social interaction and language development. In addition to collecting social validity data from mothers via subjective evaluation, we propose to use diverse ways of collecting social validity (i.e., data from children, comparison with peers).

The current study's findings show promise, albeit there are certain drawbacks. Initially, the study involved only three pairs of mothers and children, and the conclusions were restricted due to the data gathered solely from their specific attributes. In addition, the children's target behavior was only responding to joint attention. It is suggested for future researchers to aim children with ASD to acquire initiating joint attention as well. Last but not the least, we obtained mothers' high accurate level of performing the least-to-most prompting procedure during baseline (range=46.2%-49%; see Figure 1 for the mothers' baseline performance on the least-to-most prompting procedure). Before the treatment was started, there were not any pre-requisite skills for the participant mothers, but the only criteria was being volunteer to participate in the study. Although the mothers were realized that they had been familiar with the terms like prompting or reinforcement, any scale was conducted to mothers to test their existing knowledge about the least-to-most prompting procedure before the research were started. Compared to the results of the similar studies conducted with families having children with ASD (Lane et al., 2016; Moore et al., 2014), the findings were not consistent in terms of mothers' performance in baseline. The possible reasons could be the fact that children with ASD were diagnosed in early childhood period and started to be exposed to special education immediately; thus, the mothers' attitudes towards their children and level of knowledge on education

(i.e., how to build quality interaction and spend time, how to train with various training philosophies) were mostly affected in a positive way. The researchers suggest doing future studies to assess the pre-existing knowledge level of moms regarding the intended behavior before they commence.

Author Contributions

All authors took an equal part in all processes of the article. All authors have read and approved the final version of the study.

Ethical Declaration

The purposes and procedure of the current study were granted approval from the Ethical Committee of Trakya University (decision no 20171207 dated 07/12/2017).

Conflict of Interest

The authors declare that there is no conflict of interest with any institution or person within the scope of the study.

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