



RESEARCH ARTICLE

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MOTHERS OF CHILDREN WITH AUTISM SPECTRUM DISORDER SHOW MORE DEMONSTRATIVE AND DIRECTIVE AND LESS IMITATIVE AND PLAYFUL BEHAVIOR WITH THEIR CHILDREN

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ARTICLE INFO

Article History:

Received 25th August, 2019
Received in revised form
20th September, 2019
Accepted 10th October, 2019
Published online 30th November, 2019

Key Words:

Imitation, Directing, Demonstrating,
Play interaction, Children with ASD.

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ABSTRACT

In this study, videotapes of play interactions were coded for the behaviors of 4- to 6-year-old nonverbal children with autism spectrum disorder (ASD)(i.e., looking at the adult, initiating, imitating, and being playful) and their mothers' and an imitative examiner's behaviors (i.e. demonstrating, directing, imitating and being playful). ANOVAs revealed that the mothers spent more time demonstrating and directing versus the experimenter who spent more time being playful and imitating the child. The children spent more time looking at their mothers and more time imitating the experimenter. Positive correlations were noted between the adult demonstrating and the child looking, and the adult imitating and the child imitating. Negative correlations were noted between the adult demonstrating and the child imitating, and the adult imitating and the child looking at the adult. These results are consistent with previous research on the enhancing effects of adult imitation on the imitation behavior of children with ASD.

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Citation: Ava Grace, Tiffany Field, Debra Bendell and Martha Pelaez, 2019. "Quadro atual dos estudos sobre atraso de fala/linguagem na clínica fonoaudiológica: revisão de literatura", *International Journal of Development Research*, 09, (11), 31964-31968.

INTRODUCTION

Children with ASD exhibit imitation deficits that represent a risk factor for later development (Nadel, Martini, Field, Escalona & Lundy *et al.*, 2008). Several studies on adult-child interactions have shown that children with ASD respond based on the adult's behavior (Field, 2017). For example, approach behavior in high approach versus low approach children with ASD has related to the behavior of the adult (Nadel, *et al.*, 2008). In this study, an adult who frequently imitated the child's behavior or was playful elicited increased approach behaviors from the child such as looking or touching the adult. After repeated imitation sessions, children with ASD have shown both more distal social behaviors (e.g., looking, vocalizing) and more proximal social behaviors (e.g., moving close to and touching the adult) (Field, Sanders & Nadel, 2001). Children with ASD have been more imitative with an imitative adult than with their parents (Field, Nadel, Diego, Hernandez-Reif & Russo 2010). In that study, 20 nonverbal children with ASD were videotaped interacting with their parent and with an imitative experimenter. The experimenter spent more time imitating the children (17%) than the parents (8%) and being more playful with the child than their parents were (60 versus 33% time).

Although the children spent a greater percent of the interaction time touching their parents, they displayed imitative behavior a greater percent of time with the experimenter. Parents who have been trained to imitate their children with ASD have increased their interaction time with those children versus parents who directed their child's behavior (Freeman & Kasari, 2013). Studies on behavioral interventions support the conclusion that spontaneous imitation, rather than imitation on command enhances communicative behavior in children with ASD (Ingersoll & Gergans, 2007; Nadel, 2014). Parents who directed less, imitated more, and played at or just above the ASD child's "zone of development" have experienced longer periods of play interaction (Oono, Honey, & McConachie, 2013). Imitation has also affected other social behaviors in children with ASD including increasing joint attention (Ezell, Field, Nadel, Newton, Murrey, 2012; Rogers & Pennington, 1991) and decreasing repetitive/stereotypic behavior (Field, Hernandez-Reif, Diego, Corbin, Stutzman *et al.*, 2014). Similarly, after being imitated, children with ASD have displayed significantly less perseverative play with toys (Nadel *et al.*, 2000). The present study partially replicates the Field *et al.* (2010) findings and focuses more specifically on analyzing the mothers' behavior and its effect on their children. In the Field *et al.* (2010) study, the researchers coded the adult behaviors (i.e., parent and experimenter) and the child

behaviors during play interactions. The results of that study showed that children with ASD were more imitative when playing with an imitative adult than with their parents. In the present study, the videotapes taken from the Field *et al* (2010) study were coded for the mothers' and the experimenter's demonstrating, directing, playing, and imitating the behaviors of the children with ASD including and the children behaviors including looking at the adult, playing, imitating, and initiating new behaviors.

MATERIALS AND METHODS

Participants: In the Field *et al* 2010 study, children with ASD were recruited from a developmental clinic and were videotaped during two different play sessions including one with an untrained parent (i.e. their mother), and one with an unfamiliar imitative-trained adult called the 'experimenter' (i.e. a female researcher). The videotapes from that study included interactions of 20 non-verbal children with ASD (16 males, 4 females), ranging in age from 3 to 9 ($M = 6$ years), and their mothers. The children were diagnosed with ASD by the age of three by the clinic's psychologists using DSM-IV criteria (American Psychiatric Association [APA], 2000). The children's PEP-R scores averaged 18.8 (imitation=17.9, perception= 22.6, cognitive performance=18.2, cognitive verbal=16.7). The children were middle socio-economic status (mean = 2.8 on the Hollingshead Index), and their ethnic composition was distributed as follows: 58% Non-Hispanic White, 22% Hispanic, and 20% Black.

Procedures: After informed consent was received from the parents, the children were videotaped by the Field *et al* (2010) researchers during their play sessions. The play sessions were conducted in a small room that featured a sofa, two chairs and a table. Two sets of identical toys were placed on the table, including two of the following: balls, dolls, slinkies (metal spring toys), hats, sunglasses, stuffed animals, cups, plates, balloons and umbrellas. None of the children were familiar with the room, the experimenter or the procedure. The data collection procedure consisted of two interactions, with each interaction being 5 minutes. In the first interaction, the child entered the room with his or her mother to play together. During the second phase, an unfamiliar trained imitative-trained adult (a female researcher) entered the room to interact with the child. The sessions were videotaped behind a two-way mirror and, an auditory signal indicated the end of each 5-minute interaction. For the purposes of the present study, the videotapes of the 20 non-verbal children with ASD were coded for the children's behaviors with their mother and the experimenter including looking at the adult, initiation, playfulness and imitation behaviors and the adults' demonstrative, directive, playful, and imitative behaviors. The videotapes we recoded at 10-second intervals. The tallied counts were divided by the total number of time sample units to determine the percentage time that the behaviors occurred. Two psychology students coded the videotapes for research credit. The coders were blind to the hypotheses of the study. Each student separately coded the adult behavior and the child's behavior. The coders were trained on the coding procedures and the tapes were randomly assigned to them.

RESULTS

ANOVAs were conducted to determine any mother/experimenter differences on adult and child behaviors. All data

analyses were performed using SPSS version 22.0. As can be seen in Table 1, the mothers spent more time demonstrating and directing whereas the experimenter spent more time being playful and imitating the child. The effect sizes, as calculated by eta-squared methods, were large for all the adult behaviors: 1) demonstrating ($F[1, 27] = 35.46, p < .000, \eta^2 = .57$); 2) directing ($F[1,27] = 36.12, p < .000, \eta^2 = .57$); 3) being playful with the child ($F[1,27] = 19.83, p < .000, \eta^2 = .42$); and 4) imitating the child ($F[1,27] = 154.82, p < .000, \eta^2 = .85$). As noted in Table 2, the children spent more time imitating the experimenter than their mother and more time looking at their mother than the experimenter: 1) looking at the adult ($F[1, 27] = 4.94, p < .04, \eta^2 = .16$) and 2) imitating the adult ($F[1,27] = 22.80, p < .00, \eta^2 = .34$). A correlation analysis on the proportion of time the child and adult behaviors occurred appears in Table 3. As can be seen in Table 3, the adult demonstrating and the child looking at the adult were positively correlated ($r=0.41, p < 0.03$), and the adult demonstrating and the child imitating the adult were negatively correlated ($r = -0.46, p < 0.01$). The adult being playful was positively correlated with the child imitating the adult ($r=0.38, p < 0.04$). The adult imitating the child was negatively correlated with the child looking at the adult ($r = -0.42, p < 0.02$) and was positively correlated with the child imitating the adult ($r = 0.41, p < 0.03$).

Table 1. Mean proportion interaction time that the (and standard deviations) mothers' and experimenter's behaviors occurred

	Mother	Experimenter	F	p	n2
Demonstrating	41.43(17.24)	13.87(6.73)	35.46	.000	0.57
Directing	43.29(23.86)	11.07(6.19)	36.12	.000	0.57
Playful	32.21(10.10)	48.80(16.24)	19.83	.000	0.42
Imitating	6.79(2.75)	34.00(9.9)	154.82	.000	0.85

Table 2. Means (and standard deviations) for child's behaviors with mother and experimenter

	Mother	Experimenter	F	p	n2
Looking at adult	23.00(12.52)	19.87(13.07)	4.94	.04	0.16
Initiating	19.64(15.00)	27.73(12.14)	0.60	.44	0.02
Playful	30.43(6.72)	35.67(20.81)	1.62	.21	0.06
Imitating	6.00(5.20)	22.80(14.91)	22.80	.00	0.34

Table 3. Pearson's Product Moment Correlations for the proportion of time child behaviors (c) and adult behaviors occurred (a)

	ademonstrating	adirecting	aplayful	aimitating
clock	0.41	0.24	-0.24	-0.42
	0.03	0.21	0.20	0.02
cinitiate	-0.20	-0.11	0.15	0.17
	0.30	0.58	0.45	0.38
cplayful	0.18	0.13	-0.22	-0.10
	0.36	0.52	0.26	0.62
cimitate	-0.46	-0.31	0.38	0.41
	0.01	0.10	0.04	0.03

In summary, the mothers spent a greater proportion of time demonstrating (41% time for the mother versus 14% for the experimenter) and directing the child (43% time for the mother versus 11% for the experimenter), and a lesser proportion of time being playful (32% time for the mother versus 49% for the experimenter) and imitating the child (7% time for the mother versus 34% for the experimenter). The child spent a greater proportion of time looking at the mother (23% for the mother versus 20% for the experimenter) The child spent a greater proportion of time imitating the experimenter (23% for the experimenter versus 6% for the

mother). A positive relationship was noted between the adult demonstrating and the child looking at the adult and a negative relationship between the adult demonstrating and the child imitating the adult. A negative correlation was noted between the adult imitating and the child looking at the adult. Positive correlations were noted between the adult imitating and being playful with the child and the child imitating. And a negative correlation was noted between the adult demonstrating and the child imitating.

DISCUSSION

These data support previous research suggesting that parents tend to show demonstratively and directing behavior more than playful and imitative behavior when interacting with their children with ASD (Freeman *et al.*, 2013). Demonstrating and directing the child's behavior are typical behaviors of parents and teachers when interacting with non-ASD children. These techniques have also been used in many evidence-based behavior intervention programs for children with ASD (Reichow & Wolery, 2009; Rogers & Vismara, 2008). The focus on demonstrating and directing children's behavior has been criticized for poor imitation spontaneity and for the inability of the behaviors to generalize to other environments (Ingersoll, 2008). The low levels of parent imitation (7% for the mother versus 34% for the experimenter) and being playful (32% for the mother versus 49% for the experimenter) with their child are consistent with the literature suggesting that parents are less imitative and playful with their children who have ASD than a trained imitative experimenter (Field *et al.*, 2010; Nadel *et al.*, 2000). This suggests that parents may be unaware that imitating the child's familiar behavior may increase their imitative behavior. When the experimenter imitated the child's behavior, the child responded in a more socially responsive way through imitating the adult's behavior which was actually a mirror of the child's behavior.

These findings support the findings that the imitation of the child's familiar action ("being imitated") is an important strategy to increase imitation by the child (Dawson, Rogers, Munson, Smith, Winter *et al.*, 2010; Pelaez, Borroto, & Carrow, 2018; Rogers, Estes, Lord, Vismara, Winter, Fitzpatrick, *et al.*, 2012) and improve both recognition and self-production skills necessary for imitation in children with ASD (Contaldo, Colombi, Narzisi & Muratori, 2016; Ingersoll, 2008). Imitating (matching) the behavior that the child has already performed is simpler for the child to recognize and self-produce (Contaldo *et al.*, 2016; Nadel, 2002). In the present study, the experimenter followed the children's self-initiation of object play thereby meeting the children at their developmental level. By imitating their children's familiar behavior, the children could perceive the adult actions as their own. The focus on object play likely required less processing since it was already familiar or learned behavior (Bertone, Mottron, Jelenic & Faubert, 2005; Mottron, Dawson, Soulieres, Hubert & Burack, 2006; Qian & Lipkin, 2011).

In keeping sensory inputs to a minimum by imitating the familiar behavior with a second set of duplicate toys, the child was able to "be with another" and recognize the other as being "like me" (Meltzoff, 2007; Meltzoff *et al.*, 2001). This dyadic simulation can provide greater opportunity to connect to another and translate the visually perceived action of the other into motor movements of the self (Metzinger, 2003). In the present study, the experimenter imitated the child, and the

child, in turn, spent a greater proportion time imitating the experimenter (21%) as opposed to imitating their mother (8%). This further supports that children with ASD are not impaired in imitative behavior and can recognize being imitated and display social imitation in response to being imitated (Field, *et al.*, 2001; Nadel & Perez, 1993; Vivanti & Hamilton, 2013), and they can recognize "being imitated" and can be socially responsive (Dawson & Adams, 1984). These findings are consistent with others showing that children with ASD are more socially responsive to being imitated by an adult, highlighting the effectiveness of adult imitative behavior (Field, *et al.*, 2010). In previous studies, when an experimenter imitated the behavior of children with ASD, this facilitated increases in social attention (Field *et al.*, 2013; Nadel, 2002), and the child initiating close interaction with the adult including touching and engaging in eye contact (Escolona, Field, Lundy & Nadel, 2000; Field *et al.*, 2010; and Nadel, Croué, Mattinger, Canet, Hudelot *et al.*, 2000). The children were also more socially responsive and played with toys in a less perseverative manner (Dawson & Adams, 1984; Field *et al.*, 2010). Over repeated imitation sessions, children continued to increase their distal (e.g., looking at the adult, vocalizing and smiling) and proximal social behavior (e.g., touching the adult, being closer and sitting next to the adult), (Field *et al.*, 2001).

In addition to the positive social behavior effects, being imitated has also shown positive effects on nonsocial behaviors. Being imitated decreased motor activity and stereotypes (Escalona *et al.*, 2002; Field *et al.*, 2001), and reduced repetitive behaviors (Field *et al.*, 2001). Others have found a decrease in inactivity and playing alone, and an increase in play (Dawson & Adams, 1984; Field *et al.*, 2001, 2013). By "being imitated" children develop an understanding of the self-other similarity that others can act "like me" and I can act like them (Meltzoff, 2007) that may lead to increases in social reciprocity. In an effort to be "like me" the children were more socially responsive, and, in turn, self-produced the familiar behavior. When the children are imitated, they respond more socially and share in the experience when approached with simple, less complex input (i.e., object play) matched to their developmental level (i.e., "being imitated") as opposed to more complex demands (i.e., demonstrating and directing) that may be beyond their repertoire of skills. In reducing sensory inputs, creating a predictable task, focusing on simple familiar (object play) behavior, the child was able to recognize the other being "like me" (Meltzoff, 2007). Imitating familiar actions of the child is simpler, since the action is already part of the child's repertoire, and has a greater effect on spontaneous imitation compared to elicited imitations (Contaldo *et al.*, 2016; Sanefuji & Ohgami, 2013).

Playful behavior in adults has been effective in eliciting social behavior in children with ASD as it is usually considered a less complicated social interaction (Field *et al.*, 2011). However, as discussed in Field *et al.* (2010) playful adult behavior may confound the experimenter's imitative behavior, as the mother spent less time being playful (32% versus 49% of the experimenter), and also less time imitating (7% versus 34% of the experimenter). As with the previous example, play may be a more complicated and complex scenario for children with ASD. Replications of this study should include parents and/or primary caregivers playing with both typical and other developmentally delayed children matched at their developmental level to understand the effects of intervention.

A younger and larger sample should be included in order to understand the differing developmental levels. Future studies should occur in a naturalistic setting to better understand how natural environments may affect both parental and child behavior. In line with the natural setting, it might be beneficial to study peer interactions in order to evaluate the effectiveness of the intervention for peer interactions. Additional behaviors should be considered including both social and nonsocial behaviors and other social communication skills (i.e., joint attention and reciprocity). Nonetheless, these data highlight the effect of adults' imitation on the imitation behavior of children with ASD.

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