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ORIGINAL PAPER

In-Home Training for Fathers of Children with Autism: A Follow up Study and Evaluation of Four Individual Training Components

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Abstract Literature regarding fathers of children with autism remains sparse, and because mothers are the more common intervening parent, few training methods have focused on fathers. Thus, we sought to evaluate effects of in-home training directed at fathers and their ability to train mothers in the same manner in which they were trained. Fathers were taught four skills commonly associated with in-home training interventions for parents of children with autism: following the child's lead, imitation with animation, commenting on the child, and expectant waiting. Father skills were evaluated twice a week for 12 weeks during videotaped in-home father–child play sessions. Analyses included visual inspection of graphed data and statistical analyses of father skill acquisition, mother skill acquisition, and child behaviors with both parents. A multivariate repeated measures analysis of 18 dyads revealed significant increases in frequencies of fathers' imitation with animation, expectant waiting, and commenting on the child. Child initiating rates increased significantly as did frequencies of child non-speech vocalizations. Analysis of mothers revealed significant increases in frequencies of imitation with animation, expectant waiting, and following the child's lead. Child behaviors had similar results for father and mother sessions. Findings are consistent with those from our first study indicating that fathers can effectively implement skills that promote father–child social interactions and that children respond positively to this approach.

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Introduction

Recent estimates from Centers for Disease Control and Prevention (CDC) indicate that as many as 1 in 110 US children are diagnosed with autism or an autism spectrum disorder (ASD) (CDC 2009). While debate continues as to whether this reflects more public awareness and/or better diagnostic measures, a 57% increase from 2002 to 2006, and a 600% increase in the last 20 years warrants intensified efforts to address this population's needs (CDC Morbidity and Mortality Weekly Report [MMWR], 2009). Particularly important is determining ways to effectively treat children with autism and improve quality of life for them and their families, now one of the top priorities listed by NIH and congressionally mandated research programs (NIH retrieved October 5, 2009).

Among the various professionals who work with children with autism, it has long been thought that training parents to educate and manage their children can be an effective, cost-efficient measure. Cost saving is particularly important as these families are often faced with enormous financial burdens associated with a variety of specialist evaluations and autism-related treatments. Interestingly, literature regarding fathers of children with autism remains sparse, and because mothers are the more common intervening parent, few training methods have focused on fathers. Our clinical experience has also shown that when parents are trained simultaneously, mothers often take lead roles while fathers assume background positions or become absent, leaving training primarily to mothers. This can result in inconsistent intervention implementation, which may be very confusing to children with autism who have

difficulty generalizing across different individuals or settings. Moreover, mothers who are primary caretakers often report extreme stress and a desire for more involvement from the father.

Results from our first father training study revealed that fathers could be trained to use two theoretically-derived child training skills, *imitating with animation* and *expectant waiting*, and that they, in turn, were empowered in this role and could effectively train mothers to use these skills (Elder et al. 2005). We also made several important methodological discoveries that were incorporated into our recently completed follow-up study, which, in addition to replicating our protocol with 18 additional families, evaluated effects of two new training components, *following the child's lead* and *commenting on the child*. Both of these new components, derived from social interaction theory and research (Dawson and Galpert 1990; Duchan 1989; Donnellan et al. 1984; Stahmer 1995), are designed to promote parent–child social reciprocity.

Theoretical Framework

First, and still most often used to describe the bi-directionality of mother-infant interactions, *social reciprocity* is described as the ongoing interactional process between two individuals (Calhoun et al. 1991). Maternal responsiveness has been examined over several decades by a number of researchers (Ainsworth et al. 1978; Barnard 1983; Belsky et al. 1984; Brazelton et al. 1974; Mundy et al. 1994; Siller and Sigman 2008), and found by all to correlate significantly with positive child outcomes (e.g., language development, cognitive and social competence). Parent–child turn-taking, another component of social reciprocity, is described in several classic works as essential in child language development (Bruner 1973; Furrow et al. 1979; Snow 1983), and it may be particularly important for children with autism, who typically have severe language delays (Wetherby and Prizant 2000). Others hypothesized that parents of children with autism may not engage in parent–child turn-taking because the child does not respond (take his turn) and thus, the parent is not reinforced to continue the interaction (Cunningham et al. 1981). Researchers note that training programs for children with autism are most effective when they are tailored for the particular child, address communicative intent of child behaviors, and promote social reciprocity between children and individuals with whom they have regular contact (Elder 2002; Schopler 1996; Koegel et al. 1987; Mudford et al. 2001; Mundy et al. 1994).

Parent Training Interventions

Over the past 30 years, training parents to intervene with their children with autism has become an integral part of most effective comprehensive intervention plans. Parents, once viewed as the cause of their children's problems, are now recognized for the key roles they can play in ongoing child training and skill generalization over time (Elder 2002; Marcus et al. 1997; Schreibman 1997). Interventions targeting pivotal skills like joint attention may produce positive, sustained developmental effects (Mundy et al. 1990), and it may be possible to train parents to effectively teach these important skills (Koegel et al. 1999) during everyday interactions. In our work we closely examined four individual parent-training intervention components thought to be linked with these core constructs: imitating with animation, expectant waiting, following the child's lead, and commenting on the child.

In a review of parent-training literature, we found few empirical studies evaluating parent-training methods that addressed theoretically-linked pivotal skills described above. With the exception of Lovaas' (1987) work, there was also little systematic replication of in-home parent-training approaches. Clearly, a need exists for well-designed parent-training studies that employ appropriate data-collection strategies. Many studies use complicated procedures that discourage replication and "intervention packages" that make it difficult to assess effects of specific intervention components on target behaviors. Since most studies reported are professional-directed interventions, these are costly, time consuming, intermittent and take place outside the home. The intervention we developed and replicated addresses these problems. It is parent-directed and can be continuously implemented in the home setting.

Fathers as In-Home Trainers and Generalization of Training within Families

Interest in the father's role in child development has markedly increased over the past two decades, with research expanding on Lamb's seminal work (1987). Tiedge and Darling-Fisher (1996) reported that healthy father–child interactions positively affected child development. However, Booth and Crouter (1998) and Damon (1998) noted that while some studies supported this positive view, others showed no clearly discernible paternal effects on child development. These conflicting findings are further complicated in the case of fathers of autistic children, about whom even less is known (Elder et al. 2003). Thus, the purpose of our prior and recently completed studies was to evaluate effects of in-home training directed at fathers and their ability to train mothers in the same manner in which they were trained. In our second study, reported here, we enrolled 18 additional families, and examined in more detail two previously tested and two new intervention components thought to promote parent–child social reciprocity. Specific research questions were:

1. Can fathers be taught to effectively use four skill components (imitating with animation, expectant waiting, following the child's lead, and commenting on the child) during in-home play sessions?
2. Does father implementation of these skill components result in significant differences in the frequency of child initiating, child responding, child non-speech vocal, and child intelligible words during play sessions?
3. Can fathers effectively train mothers to use these skill components and does implementation of these skills by mothers result in significant differences in the designated child behaviors?

Methods

Participants and Setting

Children were included if they met the following criteria: (a) a diagnosis of "autistic disorder" according to DSM IV TR criteria (American Psychiatric Association 2000), (b) scores above cut-off in each subscale of the Autism Diagnostic Interview Revised (ADI-R) and Autism Diagnostic Observation Schedule (ADOS), and (c) residence within 150 miles of the University of Florida. Children were excluded if their medical histories and/or physical examinations indicated they had physical or sensory impairments or significant medical problems (e.g., seizure disorders, chronic otitis media). After written informed consent was provided by parents, children ($N = 24$) were randomly assigned to either the standard intervention or a 6-week wait list control group. Eighteen children (nine per group) completed the entire protocol. Children ranged in age at enrollment from 3.07 to 7.07 (mean 4.41 $\pm$ 1.36) years, and there were 17 males and 1 female. Thirteen (72%) were Caucasian, 2 (11%) were African American, and 1 (6%) each Latin American, Hispanic, and Asian, reflective of demographics of the north central Florida region. Fathers and mothers also provided informed consent for themselves and were included if they expressed willingness to be videotaped with their children and to engage in the training process. Exclusion criteria for parents consisted of any physical, major psychiatric, or sensory problems (e.g., speech and language disorders, hearing loss), as noted in the intake evaluation that might affect their ability to conduct training and/or interact with children.

All training and videotaping sessions took place in participants' homes. Videotaping of the child and one participating parent occurred in a room where children were most often exposed to informal family interactions. Videographers followed procedures developed in our previous studies to minimize obtrusiveness and participant reactivity. If child or parent left the play area, videotaping and timing ceased and resumed after they returned. If they did not return, data were considered unusable and a later session was scheduled. While this did occur, it was rare and usually associated with the child being ill. As in our earlier work, study participation was generally well maintained in home settings. Participants were more likely to keep scheduled appointments and participate regularly at home (compared to a clinic) because it was convenient and required less expenditure of family resources. Home-based training and observations also provided essential in-depth data about individual participants in naturalistic settings.

Instruments

After obtaining parent consent, each child was screened with the Autism Diagnostic Interview-Revised (ADI-R) and Autism Diagnostic Observation Schedule (ADOS). If initial criteria were met, additional child data were obtained with the Vineland Adaptive Behavior Scales. Information regarding family income and parental education was also gathered to describe overall family socioeconomic status.

Autism Diagnostic Interview-Revised

The ADI-R (Lord et al. 1994) is a standardized parent interview for assessing presence and severity of symptoms. A diagnosis of autism is established if an individual scores at or above the cutoff score in the three ICD-10 symptom domains. A trained certified member of the research team administered the ADI-R to the primary caregiver (parent who reported spending the most time with the child).

Autism Diagnostic Observation Schedule

The ADOS (Lord et al. 2002) is a semi-structured observational assessment administered directly to the child. Like the ADI-R, instrument validity is based on diagnostic criteria for autism in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-R 1994) and ICD-10 symptom domains. ADOS modules were administered by team members trained and certified in its use.

Vineland Adaptive Behavior Scales-Survey Form (Vineland)

The Vineland (Sparrow et al. 1984) is a widely used measure of adaptive behaviors from birth to age 18. This semi-structured interview with a parent or a caregiver

assesses adaptive (real life) skills in communication, daily living, maladaptive behavior, and socialization. It is commonly used in autism research because it offers overall areas of deficits in individuals with autism and dimensional metrification of a hallmark deficit, socialization (social competence; Volkmar et al. 1997). All instruments described above have well-established psychometric properties.

Measurement of Dependent Variables

Direct Observation of Parent and Child Behavior

Research Assistants (RAs), who successfully completed extensive behavioral coding training, videotaped 15 min each of father–child and mother–child in-home play sessions. The first 5 min were "settling in" and not coded; in the following 10 min, coders videotaped occurrences of parent and child reciprocity behaviors. Coders worked independently and behavioral frequency counts were determined by number of occurrences counted during the 10-min session. Coding and analysis of target behaviors were facilitated with the widely used computerized Observer Program, which allowed data to be entered into computers, labeled and organized, and stored in a larger desktop computer with network access. Throughout the research protocol the PI, who taught the interventions, was not involved in the coding process, and coders were not told which interventions were being taught. To evaluate for possible rater drift, a second rater coded 20% of randomly selected videotaped sessions. Interrater scores ranged from 0.71 to 1.0, with a mean of 0.83. First, the team coded frequencies of the four father skill components: imitating with animation, expectant waiting, following the child's lead, and commenting on the child. The team also coded frequency of the same skill components for the mothers. Child initiating, child responding, child non-speech vocalizations, and intelligible words were also coded for both the father–child and mother–child session.

Description of Independent Variable (Father-Training Intervention)

Rationale for Specific Training Components

In earlier research and clinical work, many parents verbalized they did not know how to play with their children during play sessions. Parents either sat passively or aggressively tried to direct interactions, not allowing children sufficient time to respond (Elder 1995). The first intervention, "imitating/animating," was designed to address these concerns by promoting basic turn-taking play interactions. Enhanced with specific videotaped examples and written directions about following the child's lead in play, fathers were instructed to attend to and imitate their children's vocalizations and/or actions in an animated manner. As in our earlier work, parents reported that imitating the children was "fun" and helped them relax during play sessions. "Expectant waiting" continued to be more difficult to employ, as it requires waiting for child responses. Thus, we continued to teach "imitating/animating" first, followed by "expectant waiting." In our prior study we also observed that even with instruction emphasizing waiting for the child to initiate, father and mother initiating did not decrease significantly across conditions and that many parents relied on directive questioning. To address this in the current study, we added another component to specifically teach fathers to comment on the child's verbalizations and actions, rather than question.

Figure 1 provides an overview of PI-father training sessions, father-conducted training sessions, and videotaping data collection sequence. As noted, there were three PI-father training sessions: introducing and teaching "imitating/animating" and "following the child's lead" in play interventions (Session 1), introducing and teaching "expectant waiting" and "commenting on the child" (Session 2), and combining the four strategies (Session 3). Following PI-father training, fathers implemented what they learned. Each time an intervention was introduced by fathers, a new condition was established (I-III).

Condition I: Fathers Use Intervention I to Teach Imitating/Animating

Once pre-evaluation data were analyzed for father–child dyads, the first author (PI) used father–child videotaped

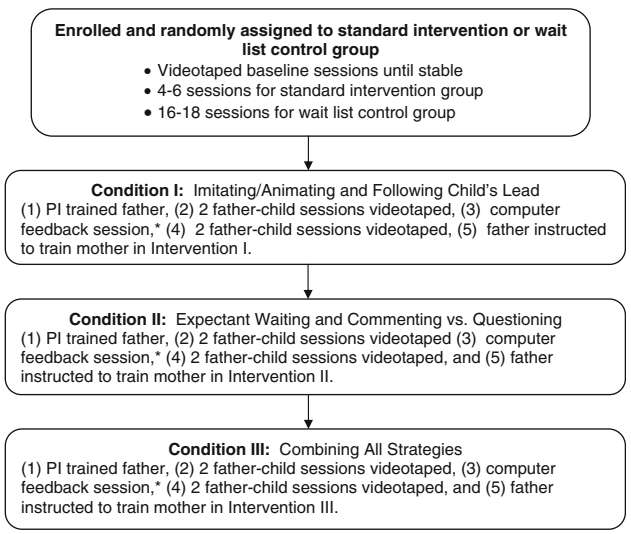

Fig. 1 Sequence of experimental conditions*

baseline sessions to teach fathers to recognize child initiations, follow child's lead in play, and apply the intervention "imitating/animating." Mothers were not present during father training. After training, fathers were instructed to immediately begin using Intervention I in everyday interactions with their autistic children. Skill acquisition was assessed via videotape during father–child play sessions two times a week for two consecutive weeks. Fathers were instructed to use the intervention component with their child for 3–4 days before being videotaped again. The research team used data from these sessions to determine number of opportunities for using the intervention and how often fathers responded to these opportunities. The PI discussed these findings with fathers and determined if they were ready to advance to the next condition or if remediation was indicated. Mothers were videotaped during each home visit as well. Father–child and mother–child sessions remained separate, and order of videotaping was counterbalanced across sessions. As in the baseline phase, children were given breaks between all sessions.

At the end of each intervention condition, fathers were instructed to teach mothers in the same manner they were taught. This included use of written materials and videotaped parent–child sessions. The PI *was not* directly involved in the mother training process but remained available to fathers for telephone and/or web-based consultation. Each parent was given access to a web-based discussion forum for private consultation with a researcher as needed.

Condition II: Fathers Use Intervention II to Teach Commenting and Expectant Waiting

Prior to collecting data in Condition II, fathers were asked to train mothers in Intervention I and to begin using Intervention II, themselves. Data collection methods of child/parent behaviors were identical to Condition I. PI-father training of Intervention II involved two strategies: "expectant waiting" (signaling child for a desired action or word and waiting expectantly a minimum of 3-s for a response) and "commenting on the child," instead of asking questions, a more common parental behavior. From our previous work we noted that even when instructed to discontinue Intervention I, some fathers had already incorporated it into their daily father–child interactions, and it was unrealistic to expect them to "unlearn" the skills set. Therefore, in the current study fathers decided whether to continue using Intervention I without overt instruction, and Intervention I use was documented throughout all conditions. As in Condition I, the research team used data obtained from the first two videotaped sessions in Condition II to determine number of opportunities for using the intervention and how often fathers responded to these opportunities. The parent trainer (PI) discussed findings with fathers to determine if they were ready to advance to the next condition or if booster training was indicated. If videotapes showed a father was not using the strategies as instructed, a team member made one subsequent home visit to provide additional instruction and encouragement, and to answer questions. At least two more video sessions were then conducted to ensure the father was using the strategies before asking him to instruct the mother and move to the next intervention.

Condition III: Fathers Use Combined Interventions I and II

In this training session fathers viewed father–child videotapes and data, and received additional instruction regarding combining both previously learned strategies. Training was individualized, based on assessment data, the child's progress, and expressed needs of fathers. Data collection was identical to Conditions I and II.

In summary, each family was videotaped twice a week for 8–12 weeks. The range in weeks reflects each family's uniqueness regarding need for training, family illness, and/or last-minute filming session cancellations. Variation was accounted for in statistical analysis of grouped data.

Data Analysis

Two types of analyses were used. The first involved visually analyzing individual parent–child graphs to determine if baseline data were stable prior to implementing intervention components. This is a customary approach used in single-subject experimental research designs (Hersen and Barlow 1987). Baselines of standard intervention and wait list control groups were evaluated to determine if there were changes in levels and trends that could be attributable to factors other than specific training interventions. The second and main analysis involved repeated measures ANOVA to study potential group wise changes in behaviors over the conditions of interest; SAS version 9.1.3 (SAS Institute, Cary, NC) was used. To reduce variability, individual session frequencies were first aggregated by condition, with aggregate values used in the analysis. The single group approach uses the participant's mean baseline behavior scores as his/her own controls and determines whether, on average, there is a change over the chronological conditions of interest. Advantages of the design are that issues such as participant selection and matching become irrelevant, and every participating family receives the intervention.

At Condition I, fathers were taught "imitating/animating" and "following the child's lead." The multivariate test

of interest was whether there was a change from baseline, on average, at any follow-up period (all Conditions). At Condition II, fathers were taught "expectant waiting" and "commenting on child." Hence, the multivariate test of interest was whether there was a change from baseline, on average, at II or III. Tests for mother behavior mirrored those used for fathers. Multivariate tests for child responses looked for a change from baseline to any follow-up period in the study. In order to further examine locations and magnitudes of change, follow-up *t*-tests examining change from baseline to specific conditions were also performed.

Results

Visual analyses of baseline data for both the standard intervention ($n = 9$) and wait list control groups ($n = 9$) revealed no discernable trends indicating the influence of confounds (e.g., participant reactivity to data collectors, environmental factors) prior to the intervention.

The main analysis involved grouped data across 18 children and their parents. Repeated measures ANOVA results for father sessions are presented in Table 1 and visually depicted in Fig. 2; results for mother sessions are presented in Table 2 and visually depicted in Fig. 3.

Father Behaviors

Significant changes in father *imitating/animating* rates were found from baseline to the three conditions (overall $p < 0.001$). Follow-up analysis confirmed the mean rate for *imitating/animating* increased from baseline to each follow-up condition ($p < 0.001$ at each condition). No significant overall change occurred from baseline for *following the child's lead* (overall $p = 0.089$); however, follow-up exploratory analysis showed a possible increase from baseline to Condition I ($p = 0.015$). Significant changes in fathers' *expectant waiting* rates were found from baseline to the final two conditions (overall $p = 0.013$). Follow-up analysis confirmed the mean rate

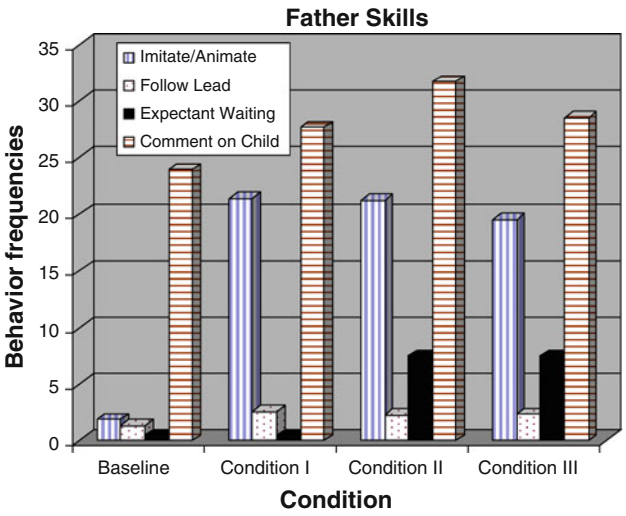

Fig. 2 Father skill acquisition and child behaviors from baseline through condition III

Table 1 Father–child dyad frequencies ($n = 18$)

Behavior	Variables	Baseline	Condition I	Condition II	Condition III	*F*	*p*
Imitate with animation	M	1.9	21.4	21.3	19.5	19.72	<0.001
	SD	0.4	3.8	2.7	2.6		
Follow child's lead	M	1.3	2.5	2.2	2.3	2.62	0.089
	SD	0.3	0.5	0.4	0.6		
Expectant waiting	M	0.5	0.5	7.5	7.5	5.74	0.013
	SD	0.3	0.2	2.4	2.0		
Comment on child	M	24.0	27.6	31.7	28.5	4.90	0.022
	SD	2.7	2.9	3.0	3.2		
Child initiating	M	16.0	22.7	28.1	29.8	4.15	0.025
	SD	2.2	3.5	5.5	5.5		
Child responding	M	21.2	18.5	21.7	21.5	0.33	>0.2
	SD	4.4	5.3	5.1	4.5		
Child non-speech vocals	M	23.4	29.8	33.3	30.5	4.24	0.023
	SD	2.3	3.7	3.2	2.4		
Child intelligible words	M	40.9	51.8	46.8	44.5	0.65	>0.2
	SD	11.0	15.2	11.3	12.6		

Imitate with Animation, Follow Child's Lead, and child behavior frequencies were tested as change from Baseline to any of the three Conditions; Expectant Waiting and Commenting on Child were tested as change from Baseline to either Condition II or Condition III

Table 2 Mother-child dyad frequencies ($n = 18$)

Response	Variables	Baseline	Condition I	Condition II	Condition III	F	p
Imitate with animation	M	3.5	9.8	13.7	13.2	11.77	<0.001
	SD	0.9	1.6	1.5	1.6		
Follow lead	M	1.5	1.3	2.3	3.9	6.17	0.006
	SD	0.3	0.2	0.3	0.5		
Expectant waiting	M	1.0	0.9	2.3	3.9	7.70	0.005
	SD	0.4	0.3	0.7	1.1		
Comment on child	M	26.2	28.5	32.3	32.5	0.91	>0.2
	SD	3.5	2.8	3.3	4.5		
Child initiating	M	16.3	22.0	26.7	27.5	5.62	0.009
	SD	2.4	3.7	4.2	4.3		
Child responding	M	20.3	20.3	15.8	17.2	2.14	0.107
	SD	3.3	3.0	3.0	3.2		
Child non-speech vocals	M	22.7	31.0	31.4	28.2	5.43	0.010
	SD	2.2	2.5	2.9	3.1		
Child intelligible words	M	45.1	54.2	51.3	48.6	1.35	>0.2
	SD	12.8	13.5	14.8	13.6		

Imitate with Animation, Follow Child's Lead, and child behavior frequencies were tested as change from Baseline to any of the three Conditions; Expectant Waiting and Commenting on Child were tested as change from Baseline to either Condition II or Condition III

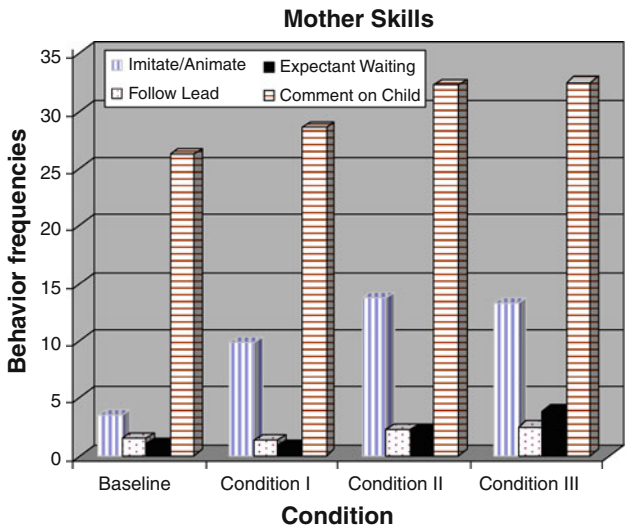

Fig. 3 Mother skill acquisition and child behaviors from baseline through condition III

for *expectant waiting* increases from baseline to each of the two final conditions ($p = 0.011$ and $p = 0.003$, for II and III, respectively). Significant changes were also found for fathers' *commenting on the child* rates from baseline to the final two conditions (overall $p = 0.022$). Follow-up analysis confirmed that the mean rate for *commenting on the child* increases from baseline to Condition II ($p = 0.005$) and that the effect is possibly diminished in Condition III ($p = 0.11$).

Mother Behaviors

Significant changes in mother *imitating/animating* rates were found from baseline to the three conditions (overall $p < 0.001$). Follow-up analysis confirmed that the mean rate for *imitating/animating* increased from baseline to each of the conditions ($p < 0.001$ at each). There was also a significant overall change from baseline for *following the child's lead* (overall $p = 0.006$). Follow-up analysis showed a significant increase from baseline to Condition II ($p = 0.034$) but did not show significant changes to the other two conditions ($p > 0.2$ and $p = 0.068$ for I and III, respectively). Significant changes in mothers' *expectant waiting* rates were found from baseline to the final two conditions (overall $p = 0.005$). Follow-up analysis confirmed the mean rate for *expectant waiting* increased from baseline to each of the two final conditions ($p = 0.007$ and $p = 0.008$ for II and III, respectively). Significant changes were not found for mothers' *commenting on the child* rates from baseline to the final two conditions (overall $p > 0.2$). Follow-up exploratory analysis did not find potentially significant changes from baseline to either Condition II or III.

Child Behaviors, Father and Mother Sessions

Child behavior frequencies were analyzed for both father and mother sessions, with similar results. Significant overall changes from baseline were found in *child initiating* (overall $p = 0.025$ for father sessions and $p = 0.009$

for mother sessions) and *child non-speech vocalizations* (overall $p = 0.023$ for father sessions and $p = 0.010$ for mothers). Follow-up analysis for child initiating showed significant increases from baseline to all three conditions for father/mother sessions (all $p < 0.03$). Follow-up analysis for *non-speech vocalizations* showed significant increases from baseline to each of the three conditions for father sessions (all $p < 0.03$) and the first two conditions for mother sessions (both $p < 0.01$ for I and II, $p = 0.08$ for III). Overall changes from baseline were not significant for child response ($p > 0.2$ for fathers; $p = 0.11$ for mothers) or for *intelligible words* (both $p > 0.2$). Exploratory follow-up analysis found only one potential change from baseline for these two measures across mother/father sessions: child use of intelligible words from baseline to Condition I increased by 9.2 on average ($p = 0.047$) in mother sessions.

Discussion

As discussed in the introductory section, the four individual training components are linked to social interaction theory and designed to promote social reciprocity between parents and children with autism. As in our previous work, we noted that prior to in-home training, fathers and mothers infrequently, and in some cases never, used strategies of *imitating the child with animation* and *expectantly waiting* for a child response. After fathers were trained by the PI and mothers were trained by fathers, both groups effectively used these strategies and demonstrated significant increases in frequency. Anecdotal reports indicated that parents viewed the first strategy as "fun" and were able to incorporate it into their daily parent–child interactions. While parents were able to learn and use the *expectant waiting* strategy, they reported it was sometimes difficult to wait for child responses for the instructed minimum of 3 s. Differences occurred in how often fathers and mothers used the other two strategies, *following the child's lead* and *commenting on the child*. Mothers used *commenting on the child* more often than fathers during baseline, and perhaps that is why they did not demonstrate the same significant increases as fathers following training. Mothers did, however, show a significant increase in use of *the child's lead*, while fathers did not. Reasons for this finding are uncertain. Child responses were similar for both parents in that sessions with each showed significant increases in both *initiating* and *non-speech vocalizations*. This finding is particularly important since a hallmark feature of autism is impaired social initiating, and non-speech vocalizations (pre-speech "babble") often precede intelligible speech.

Fathers in this study were trained by the PI and instructed to train mothers, who had no training other than this. To our knowledge, ours are the first studies to test this approach. In both studies fathers demonstrated they could learn the strategies and train mothers. Mothers, in turn, effectively learned from fathers as demonstrated by their ability to implement these strategies. Further study is needed to determine if this approach is an efficacious means of soliciting and maintaining father involvement.

Results of this and our prior study indicate that identifying and implementing strategies designed to promote social reciprocity in parents and children with autism is a valuable approach and well-accepted by participating families. A fifth aim of this study, not discussed in this article, was the development of a website to inform families and reinforce training (Ferdig et al. 2009). A web-assisted approach also shows promise and will be empirically evaluated in future research. We have provided evidence indicating that father-directed training is effective and addresses a variety of family and child needs. Although labor-intensive, we also noted that collecting videotaped data over numerous sessions rather than single pre and post-intervention is very important because behavioral variability in children with autism often occurs. Visually analyzing baseline data from the wait list control group also helped discern that treatment effects were from the interventions, not merely from attention to, or presence of, investigators. As in every new area of inquiry, more research is needed to further validate family-focused, in-home interventions in children with autism as well as other related disorders.

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