Journal of Autism and Developmental Disorders
https://doi.org/10.1007/s10803-023-06199-w

ORIGINAL PAPER

Telecoaching for Parents of Young Autistic Children Using Strength-Based Video Feedback

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Accepted: 18 November 2023

Abstract

Parent-implemented Naturalistic Developmental Behavioral Interventions (NDBIs), rooted from applied behavioral and developmental sciences, focus on empowering families by training and coaching natural change agents to embed evidence-based strategies during regular events or contexts (e.g., play time). No research, however, has relied on strength-based video feedback coaching within parent-implemented NDBIs while providing flexibility with self-recorded sessions. We conducted a single case multiple-baseline design across five parent-child dyads to evaluate the effects of a telepractice-based parent-training on five NDBI strategies (i.e., Follow and Imitate, Model Language, Arrange Environment, Wait Time, Reward and Expand), utilizing strength-based video feedback coaching with parents (i.e., two mothers and three fathers) of young autistic children (i.e., ages 2 to 5) on parent strategy use and child social communication. An additional coaching package (i.e., parent self-reflections, goal setting, and joint discussions) was introduced to parents who did not meet a predetermined criterion. Maintenance data were collected 2-, 4-, and 6-weeks after intervention concluded. Visual analyses, nonoverlap calculations, and standardized mean difference effect sizes indicate strong effects for parent strategy use and small, varied effects on child social communication. Maintenance of parent strategy use and child social communication varied, with most remaining at equivalent or higher levels. Parent-implemented interventions that are delivered via telepractice may continue to be successful when coaching is focused on the parents' strengths, all coaching feedback is provided asynchronously, and families can flexibly record sessions based upon their week's schedules rather than relying on regularly scheduled meeting times with a coach.

Keywords Parent-implemented interventions · Social communication · Video feedback coaching · Naturalistic developmental behavioral interventions

Many young children on the autism spectrum benefit from supports (e.g., early intervention, speech language therapy) to develop functional vocal speech (Fuller & Kaiser, 2020; Wodka et al., 2013). Current recommendations and evidence-based practices for young autistic children include practitioners partnering with parents and caregivers to empower families to embed interventions within naturally occurring routines (Division for Early Childhood, 2014; Hume et al., 2021). Unfortunately, many families of autistic children experience barriers to accessing quality parent training (Raulston et al., 2019). Parent trainings that occur via telepractice can be more accessible to families as commute time is removed, often alleviating scheduling concerns that are associated with in-person trainings (Simacek et al., 2021).

Parent-Implemented Interventions

Parent-implemented interventions are effective practices that can lead to increases in child social communication. Key components to successful parent-implemented interventions

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Published online: 08 December 2023

include trainings that are brief and feasible for parents to implement; embedding the intervention within naturally occurring routines (e.g., play time); providing on-going follow-up coaching (Meadan et al., 2016); and highlighting strengths of the parent (Bruinsma et al., 2020). Naturalistic Developmental Behavioral Interventions (NDBIs) are intervention approaches that often involve empowering parents as key change agents. These interventions have a strong and growing research base and can be implemented by parents with high levels of fidelity.

Naturalistic Developmental Behavioral Interventions

NDBIs blend the sciences of applied behavior analysis (ABA) and developmental psychology to create socially valid outcomes on developmentally important skills in young children (Schreibman et al., 2015). Despite the slow uptake and knowledge within practical settings, the research evidence on NDBIs is growing (D'Agostino et al., 2023; Hampton & Sandbank, 2022). NDBIs can be manualized packages (e.g., Project ImPACT; Ingersoll & Dvortcsak, 2019) or selected strategies (e.g., narrating play, time delay). These naturalistic and behavioral approaches have been empirically evaluated to increase outcomes such as child social communication, social engagement, and play skills over the last several decades (Schreibman et al., 2015). Parents can be trained and coached on NDBIs in person and via telepractice (Akemoglu et al., 2020).

Using Telepractice to Decrease Barriers to Services

Many families of young children with autism experience barriers to accessing quality services, including parent training. Families have reported (a) receiving less service dosage than what is recommended (Hebbler et al., 2007; McIntyre & Zemantic, 2017); (b) experiencing financial constraints of costly in-person therapies (Raulston et al., 2019); and (c) navigating through difficulties coordinating multiple schedules (e.g., practitioner, parent, child; Simacek et al., 2021). One solution to these barriers is providing early intervention services via telepractice.

Telepractice services are those that occur remotely via a secure, online platform and provide several benefits. First, telepractice removes the travel-time required of in-person early intervention practitioners or families of autistic children resulting in more flexibility with scheduling (Simacek et al., 2021). By removing commute time, early intervention practitioners may become available to more families of autistic children, resulting in overall greater access to high-quality early intervention services (Marino et al., 2020). Second, early intervention practitioners who deliver their services via telepractice can capitalize on training parents to embed strategies into their existing family routines (Hume et al., 2021). By regularly incorporating services within naturally occurring routines and activities, autistic children can receive expanded access to intervention as parents can implement strategies throughout daily routines, thereby increasing the number of learning opportunities. Rather than the child receiving in-person interventionist-led intervention sessions during a restricted window of time, families can apply strategies with a variety of natural communication partners (e.g., parents, siblings); in different environments (e.g., home, neighborhood/community); and during various activities (e.g., playtime; Simacek et al., 2021). Finally, telepractice services can reduce the cost of early intervention services without sacrificing the effectiveness of those services (Lindgren et al., 2016).

Parents can successfully be trained on NDBIs remotely via telepractice (Akemoglu et al., 2020). Parent implemented NDBI interventions have occurred synchronously (e.g., parent and coach log onto an online platform to meet at the same time; Gevarter et al., 2022, Ousley et al., 2022), asynchronously (e.g., parent completing a self-directed online module; Douglas et al., 2018; McGarry et al., 2020), and a blend of both synchronous and asynchronous approaches (e.g., training occurring synchronously with coaching occurring asynchronously; Rogers et al., 2022). Regardless of the telepractice intervention occurring synchronously or asynchronously, parents can implement NDBIs with fidelity and children can increase their targeted skills (e.g., social communication; Simacek et al., 2021). Importantly, follow-up feedback (i.e., parent coaching) must be provided to parents after the initial training on NDBIs via telepractice to maintain high levels of implementation fidelity (Meadan et al., 2016).

Parent Coaching Practices

Parent coaching practices involve specific performance feedback and can vary widely. Directive coaching is a practice where a coach provides verbal instructions to the parent, whereas responsive coaching involves an expert reinforcing parent's use of a specific strategy (Bruinsma et al., 2020). Several coaching practices have been used in research and practice. One responsive coaching practice that has been used with parents for decades is video feedback coaching.

Video Feedback Coaching

Video feedback (VF) is a coaching approach for parents of young children with and without disabilities. VF was first introduced to improve parent-child interactions (Stern, 1971) and involves a parent and a coach viewing a pre-recorded parent-child interaction together (Balldin et al., 2018). While

viewing the video, the coach may pause or replay sections of the video recording to highlight positive interactions or reflect on missed opportunities with the parent. Fuller and Manning (1973) argue that parents are more likely to devote attention to videos that display themselves as the "positive model" during interventions, as opposed to viewing an expert flawlessly implementing an intervention with an unknown child.

VF coaching has promising preliminary findings for parents of autistic youth (Aiello et al., 2022; Ousley et al., 2022). For example, Ousley et al. (2022) used a telepractice-based intervention that consisted of (a) constructive and responsive VF coaching and (b) live joint reflections to provide three mothers of children with social communication delays with feedback on their strategy use during play time. The individualized VF included the coach sharing three video clips highlighting successful implementation of NDBI strategies. The coach recommended a strategy for the parent to focus on and played a video clip of the parent performing that skill successfully. After a 10-minute play session with no live coaching, the parent and coach reflected together on how the parent performed. The authors found that parents were able to increase their strategy use with the coaching package. In another study, Aiello et al. (2022) compared VF coaching (i.e., parent video uploads on interactions with their child followed by synchronous meetings with a coach to review), live streaming (i.e., real-time feedback with parents and a coach during the parent-child interaction), and parental psychoeducation (i.e., initial training focused on autism diagnoses) within *Early Start Denver Model*, an NDBI. All parents, regardless of coaching group, expressed that the intervention was useful and effective; however, parents in the VF coaching group implemented the intervention with the highest levels of fidelity and lowest levels of attrition compared to the other coaching groups. When viewed as a whole, the findings of these two studies provide evidence that VF coaching via telepractice may be an effective parent coaching model during NDBIs and can account for the scheduling demands busy parents often face. However, to our knowledge, no published literature has evaluated if VF coaching that only focused on the strengths of parents' implementation of an intervention with their young autistic child (i.e., no constructive feedback) is an effective coaching model.

The Current Study

We sought to expand the literature-base by evaluating the effectiveness of a telepractice intervention using *strength-based* VF coaching with flexible scheduling. Strength-based VF coaching included shortened video clips of the parent implementing specific strategies during play time with their child. The video clips highlighted three positive examples of the parent implementing the intervention. In other words, no constructive feedback was provided. Flexible scheduling included having the parents upload videos of play interactions with their child at any time throughout the week. In other words, parents could decide in-the-moment whether they had time for a 10-minute play session with their child as the coach did not have to be present.

We evaluated the effects of an initial parent training on five NDBI strategies (i.e., Model Language, Follow and Imitate, Environmental Arrangement, Wait Time, and Reward and Expand; adapted from Project ImPACT; see Ingersoll & Dvortcsak, 2019) followed by strength-based VF coaching. Data were collected on parent strategy use and child social communication learning targets. Additional coaching was provided to parents who did not meet a predetermined criterion, and maintenance data were collected. Specific empirical research questions were:

1. Is there a functional relation between a telepractice-based initial training and weekly strength-based VF coaching and an increase in parent-implemented NDBI strategies during 10-minute home play sessions?
2. Is there a functional relation between a telepractice-based parent-implemented intervention using strength-based VF and an increase in child social communication learning targets?
3. What are the additive effects of an additional coaching package (i.e., self-reflection, goal setting, and scenario-based discussions) on parent-implemented NDBI strategies during 10-minute home play sessions?
4. What are the additive effects of an additional parent coaching package (i.e., self-reflection, goal setting, and scenario-based discussions) on child social communication learning targets?
5. How well will parent strategy use and child social communication learning targets maintain 2-weeks, 4-weeks, and 6-weeks after the intervention concludes?

Method

We conducted a concurrent multiple baseline single-case experimental design employed across five parent-child dyads over a 20-week period (i.e., 14 weeks for intervention and 6 weeks for maintenance data collection) from October 2021 to February 2022.

Materials

All meetings and sessions occurred remotely using a teleconferencing platform (i.e., Zoom version 5.5.0). Parents self-recorded 10-minute play sessions with their child using

a tablet (i.e., Samsung Galaxy Tab A7) and tripod by logging into an empty password-protected Zoom Room that was only accessible to the parent and coach. Sessions were automatically recorded and uploaded to a secure cloud. The parent training was created by the first author using PowerPoint using PowerPoint™. Video feedback was created using the iMovie (version 10.1.12) application on a MacBook. Parents viewed VF asynchronously following weekly synchronous coaching sessions using a personal cellular device. Parent-procedures for each phase were laminated and a researcher-created self-reflection journal was printed and mailed to the parents, each individually sealed and in an envelope by each phase of the intervention. Envelopes were unopened until the researcher informed the parent to open it while live on Zoom during weekly coaching sessions. Postage, tablets, tripods, and assessments were funded by *The Organization for Autism Research Graduate Research Grant*. Qualifying parent-child dyads were notified that they could the technology as honorarium at the conclusion of the study.

Participants and Setting

After university review board approval, parent-child dyads were recruited across the United States. Recruitment flyers were distributed in local classrooms (i.e., preschools and college courses) and posted on social media platforms. Parent-child dyads were required to have access to the Internet (no minimum internet speed required), be able to capture 10-minute play sessions one to three times per week using researcher-provided technology and commit to the study for 14 to 20 weeks. Additional parent inclusion criteria were that the adult be 18 years of age or older and the legal parent of a child with an autism diagnosis. Additional child inclusion criteria were that the child be between 2 and 5 years of age, have a formal medical or educational diagnosis of autism spectrum disorder, experience difficulties with social communication skills, and score at least 1.5 standard deviations below their aged norm according to the communication composite score on the Vineland Adaptive Behavior Scale-3 (VABS-3; Sparrow et al., 2016).

Parents met synchronously with the researcher for screening, assessments, and coaching sessions. All play sessions occurred asynchronously (i.e., parent logged onto an empty Zoom room that automatically began recording) without the researcher present. The researcher never met with the children. Two mothers and three fathers of young autistic children contacted the first author via email, phone call, or text messaging upon receiving a recruitment flyer. All five parent-child dyads were screened and qualified. Parents provided written consent and assent for themselves and their child. All play sessions took place in the dyad's home. See Table 1 for demographic information.

Participant Information

Dyad 1. Atticus and Jem lived in the Mid-Atlantic portion of the United States and received the recruitment flyer from a friend. Atticus was a disabled veteran and worked full-time. Jem received a medical diagnosis of autism at the age of 2 and communicated using vocal speech, using single-words and short phrases. Atticus and Jem enjoyed playing basketball, painting, and running around in their basement.

Dyad 2. Danny and DJ lived in the Northeastern portion of the United States and saw the recruitment flyer on a social media group page. Danny worked full-time. DJ received a medical diagnosis of autism at the age of 2 by a psychiatrist and behavioral psychologist. He used minimal gestures and unintelligible speech to communicate. Danny and DJ enjoyed jumping on a trampoline, rolling in a barrel, swinging, and tickling in their living room.

Dyad 3. Meredith and Bailey lived in the Mid-Atlantic portion of the United States and discovered the recruitment flyer on a social media group page. Meredith was a stay-at-home mother. Bailey received a medical diagnosis at the age of 2. He used gestures (e.g., tapping a letter on an alphabet rug) and minimal word approximations to communicate. Meredith and Bailey enjoyed playing with alphabet letters, a ball pit, kinetic sand, and bubbles.

Dyad 4. Daetreon and Adrian lived in the Mid-Atlantic portion of the United States and received the recruitment flyer from Adrian's preschool teacher. Daetreon was self-employed. Adrian was diagnosed with autism at the age of 2 and experienced multiple medical concerns (e.g., detached retina) due to premature labor. He had no functional vocal speech, was literate, and communicated using icons and a keyboard on a tablet with the LAMP Words for Life application. Daetreon and Adrian enjoyed playing on tablets, painting, puzzles, and balloons.

Dyad 5. Diana and Harry lived in the Pacific Northwest portion of the United States and received a flyer during a college class. Diana worked full time as a behavior technician and was a full-time graduate student studying ABA. Harry was diagnosed with autism at age 2 by a developmental pediatrician. He used vocal speech (single words, word approximations, and phrases) and challenging behavior to communicate. Diana and Harry enjoyed playing on a trampoline, singing, counting, and playing games together on Diana's phone.

Procedures

Assessments

After screening for eligibility, two interviews were conducted between the first author (whom will be referred to as

Table 1 Demographic information

	Relation	Age (years)	Race/ethnicity	Annual household income (number of household members)	Parent education	Parent employment status
Dyad 1						Full time
Atticus	Father and son	35	White/Non-Hispanic	$70,000 - $80,0000 (3)	Associates degree	
Jem		4	White/Non-Hispanic			
Dyad 2						Full time
Danny	Father and son	45	White/Non-Hispanic	$90,000 + (4)	Graduate degree	
DJ		4	White/Non-Hispanic			
Dyad 3						Homemaker
Meredith	Mother and son	44	White/Non-Hispanic	$40,000 - $50,000 (5)	Some college	
Bailey		2	White/Non-Hispanic			
Dyad 4						Self-employed
Daetreon	Father and son	60	NR/Hispanic	$90,000 + (5)	High school	
Adrian		4	Asian/Hispanic			
Dyad 5						Full time
Diana	Mother and son	30	White/Non-Hispanic	$30,000 - $40,000 (4)	Bachelors degree	
Harry		4	White/Non-Hispanic			

Note: NR = no response

Table 2 Child assessment results

	CARS-2 (severity)	VABS-3				MCDI
		ABC score	Communication standard score	Receptive AE	Expressive AE	
Jem	47.5 (severe)	68 (*SD* = − 2)	64 (*SD* = − 2)	1 year 6 months	1 year 8 months	5 words
DJ	46.5 (severe)	53 (*SD* = − 3)	40 (*SD* = − 3)	1 year 0 months	0 years 5 months	0 words
Bailey	45.5 (severe)	67 (*SD* = − 2)	51 (*SD* = − 3)	0 years 11 months	1 year 2 months	0 words
Adrian	43.5 (severe)	69 (*SD* = − 2)	64 (*SD* = − 2)	1 year 5 months	0 years 5 months	0 words
Harry	49.0 (severe)	45 (*SD* = − 3)	32 (*SD* = − 3)	0 years 8 months	1 year 4 months	2 words

Note: CARS-2 = Childhood Autism Rating Scale – 2nd Edition; VABS-3 = Vineland Adaptive Behavior Scale – 3rd Edition; MCDI = MacArthur-Bates Communication Development Inventories; ABC = Adaptive Behavior Composite; AE = age equivalence; SD = standard deviation

the coach thus forward) and each parent, lasting one to one and a half hours for each session. The coach interviewed the parents to complete a researcher-developed demographic questionnaire and review the child's Individualized Family Support Plan or Individualized Education Program goals on social communication. Next, the coach and parent completed the VABS-3 (internal consistency range 0.94–0.99; test-retest reliability range 0.64–0.94; Pepperdine & McCrimmon, 2018), CARS-2 (internal consistency coefficient kappa; validity $r = 0.84$; Schopler et al., 2010), Form III of the MacArthur-Bates Communicative Development Inventories (MCDI-III; internal consistency rs = 0.95–0.96; test-retest reliability rs = 0.80–0.90; Fenson et al., 1993), and the Verbal Behavior Milestones and Assessment Placement Program (VB-MAPP; Sundberg, 2008) through conversational interviews (e.g., coach would ask, "what does your child do when they are frustrated"). To reduce redundancy, if topics were covered in one assessment, the coach would refer to the previous conversation, confirm the answer with the parent, and continue to the next assessment item. A researcher-developed indirect preference assessment on play activities was conducted to identify a list of acceptable play activities that the parent-child dyad could engage in during the study. See Table 2 for child assessment results.

Baseline (Phase A)

No training or coaching on strategies were provided to the parent before or during the baseline phase. However, prior to baseline beginning, parents were trained on use of the technology. Specifically, the coach logged onto Zoom to meet with the parent and (a) guided the parent through settings to ensure videos automatically uploaded to a secure shared online folder, (b) practiced the parent setting up the tripod and tablet, and (c) prompted the parent to practice a quick video to test the automatic video upload. All parents' trial videos uploaded successfully. During baseline, some parents' internet speeds did not allow for the 10-minute videos

to upload within one-weeks time. As such, procedures for all families were adjusted. Rather than having videos automatically upload using the parents' internet, the coach provided a unique and secure Zoom room for each parent. The Zoom room automatically recorded and uploaded to the coach's secure Zoom cloud, thus avoiding the need for ongoing high-speed internet to upload a large file. After this adjustment, all parents' videos uploaded within minutes of the recording, despite the varying internet speeds.

Once baseline began, the coach met with parents via Zoom for five to ten minutes at the beginning of each week at a regularly scheduled time. Children did not attend these meetings. The coach (a) greeted the parent; (b) stated if videos were received or not; (c) provided any necessary guidance on future recordings (e.g., muted volume); (d) asked parents to delete the videos off of the tablet (this step was not applicable after the adjustment to automatic Zoom cloud recordings outlined above); (e) requested parents to record one to three 10-minute videos for the next week; (f) asked parents if they had any questions; and (g) verified the next meeting date.

Parents self-recorded 10-minute play sessions between themselves and their child one to three times per week at times that were convenient for them. Sessions could take place on any day (i.e., weekday or weekend) at any time (e.g., morning, evening) as the coach did not have to be present online for the session. The coach requested that each recording take place on different days. The parent (a) set up the tablet and tripod in a position that captured the play interaction between themselves and their child, (b) logged into Zoom, (c) began a 10-minute timer, and (d) played with their child until the timer sounded. The recording was automatically uploaded to a secure Zoom profile that was shared with the coach. The coach viewed and coded the video upon receiving each 10-minute probe.

Training

Once a parent entered intervention, the coach provided a synchronous one-hour parent training that was individualized to represent each individual child's interests (i.e., specific toys and activities; Raulston et al., 2019). Training was provided using PowerPoint and averaged 1 h 3 min 48 s (range 43 min 8 s – 1 h 25 min 38 s). During each training the coach: (a) briefly described antecedent, behavior, and consequence using a video example from baseline; (b) collaboratively crafted a social communication learning target for the child; (c) taught the parent five strategies; (d) collaborated with the parent to create examples on how the strategy could be incorporated during their play routines; (e) engaged in scenario-based discussions on how all strategies could be incorporated within a play activity of the parent's choice; (f) reflected on each strategy and discussed any lingering questions, comments, or concerns; and (g) provided written notes outlining the strategies and examples that were discussed. At the conclusion of training, the parent was shown their first strength-based VF. See Tables 3 and 4 for operational definitions and examples of the strategies taught to the parents and individualized child learning targets, respectively.

Strength-based VF (Phase B)

The coach created strength-based VF clips that averaged 2 minutes 28 seconds and ranged from 1 minute 38 seconds to 3 minutes 10 seconds from the 10-minute play-session videos that were uploaded by the parents in the previous week. Using clinical judgement, the coach viewed each parent-uploaded video from the previous week and selected three positive examples of the parent implementing the strategies and their child responding. The examples were shortened from the 10-minute video and combined into one strength-based VF. Textual feedback was overlaid on the video to highlight the strategy that was being used (e.g., "Model Language; You say, 'smoosh' while pushing the sand'").

Once per week, the parent and coach met for approximately 30-minutes for strength-based VF coaching during regularly scheduled Zoom meeting times without the child. Each session the coach (a) engaged the parent in a brief social interaction; (b) inquired how the video capturing and technical process went within the previous week; (c) highlighted one specific interaction using praise to empower the parent and build confidence; (d) asked the parent if they had any questions regarding the previous week or strategies; and (e) shared their screen and audio with the parent to display the strength-based video feedback, periodically providing praise and highlighting strong examples of how the parent implemented the various strategies (e.g., "You did an *excellent* job imitating DJ by drumming along with him!"). At the conclusion of the meeting, the coach and parent verified the next meeting date, and the coach sent the VF to the parent. Procedures for the parent mirrored baseline, except the parent viewed that week's strength-based VF prior to each play session.

Additional Coaching Package (Phase C)

An additional coaching package was provided for parents who did not meet criterion (i.e., the parent implemented strategies in less than 65% of intervals for 4 out of the first 6 consecutive sessions). Additional coaching (i.e., self-reflection, goal setting, and scenario discussions) was incorporated into the weekly meetings using the researcher-created reflection journal. See Supplemental Fig. 1 for an

Table 3 Operational definitions and examples for the five NDBI strategies targeted

Strategy	Definition	Example
Follow and imitate the child	Focusing on toys or activities that are of interest to the child and playing in a similar way as the child does	If the child splashes hands in the water, the parent splashes their hands in the water, too.
Model language at the child's communication level	Vocalizing or gesturing (depending on child communication level) vocabulary related to the toys or activities	Parent says, "Splash!" as they pat the water with their hands.
Arrange the environment	Modifying items in environment (e.g., people, toys) that requires communication from the child to access the desired activity or item	Parent splashes the water with their hands, then pauses the splashing by hovering their hands over the water.
Wait at least 3 s	Following *model language* or *arrange environment*, expectantly looking (e.g., eyebrows raised, arms/hands up) at child while remaining silent for approximately 3 s	While hovering their hands over the water and pausing, the parent looks at the child with an expectant look followed by 3–5 s of silence.
Reward and expand the child's communication	Providing child with natural reinforcement (e.g., desired item or action) and saying the vocabulary associated with the reinforcer one step-above the child's social communication learning target	When the child raises their hands and vocalizes (e.g., "pash") the parent splashes the water again and says, "Splash the water!" with enthusiastic affect.

Note: The child uses communicative gestures and a few word approximations to request items, actions, and their caregiver's attention

Table 4 Operational definitions and examples of child social communication learning targets

Child	Modality(ies)	Definition	Example
Jem	Vocal speech	Vocally says one word or short phrase	"catch!" "1, 2, 3 slide!"
DJ	Gestures	Extends one or both arms toward parent with open palms. Six inches of space must be between parent and child upon reach	Reaches to dad to request high jumps on trampoline
	Vocal speech	Vocally says a word approximation (i.e., at least one correct phoneme of a single word)	"/oo/" for *blue* "ma" for *more*
Bailey	Vocal speech	Vocally says word, letter name, animal sound, or word approximation (i.e., at least 1 correct phoneme of a single word)	"b" "ball"
Adrian	AAC use	Independently says word or phrase by activating (i.e., touching) AAC system via icon or keyboard.	"green eyes" "a-l-l d-o-n-e"
Harry	Vocal speech	Vocally says a word or word approximation (i.e., at least 1 correct phoneme of a single word)	"bubu" for *bubble* "go"

Note: Communication modes and learning targets were developed in collaboration with the parent after reviewing current speech goals from their speech services, parent input/preference, and assessment results; AAC = augmentative and alternative communication

example of the self-reflection journal. Each parent continued to receive new strength-based VF each week in addition to the reflection journal.

Maintenance (Phase D)

Parents were asked to upload one 10-minute video 2-, 4-, and 6- weeks post intervention. The coach and parent did not meet. Procedures mirrored those in baseline (Phase A) and no coaching was provided.

Research Design

A multiple-baseline single case experimental design was employed via three sequential concurrent replications of baseline to intervention comparisons, systematically staggered across time to demonstrate experimental control (Ledford et al., 2018). Four phases occurred: Phase A (i.e., baseline; no training or coaching); Phase B (i.e., one initial training followed by weekly strength-based VF coaching); Phase C (i.e., Phase B coaching *plus* an additional coaching package: a reflection journal consisting of goal setting and self-reflections, and guided scenario-based discussions with a coach); and Phase D (i.e., maintenance; no additional training or coaching collected at 2-weeks, 4-weeks, and 6-weeks after intervention concluded).

Independent and Dependent Variables

One independent variable and two dependent variables were evaluated. The independent variable was a one-hour individualized parent teletraining that occurred in combination with strength-based VF telecoaching. A supplementary additional coaching package (i.e., Phase C) was incorporated if parents did not meet a predetermined criterion (see *Additional Coaching Package [Phase C]* for criterion).

The primary dependent variable was percentage of intervals with parent implementation of at least one NDBI strategy. Ten-second partial-interval recording data were collected on each 10-minute play session. The secondary dependent variable was frequency of individualized child social communication learning targets. Child social

communication learning targets were individualized for each child and created in partnership with the parent. The ecologically valid short-term targets were guided by (a) the child's assessment results, (b) the child's current educational goals, (c) parent input and goals, and (d) direct observations by the coach from the child's baseline probes. See Tables 3 and 4 for operational definitions of the dependent variables.

Data Analysis

Data were assessed through visual analysis, nonoverlap calculations (i.e., Tau-*U*), and standardized mean difference effect sizes (i.e., scdhlm; Pustejovsky, 2021b). Visual analysis of parent and child behavior were evaluated by changes in level, trend, variability, immediacy, and consistency of data. Tau-*U* and scdhlm were calculated using web-based calculators at https://jepusto.shinyapps.io/SCD-effect-sizes/ and https://jepusto.shinyapps.io/scdhlm, respectively.

Procedural Fidelity and Interobserver Agreement

The third author, a doctoral candidate in special education, collected procedural fidelity on (a) coach behavior and (b) parent behavior. The third author used the task list of procedures to indicate if each step of each phase was performed or not performed in the session for both coach and parent behavior. Percentages were then calculated by dividing the number of steps performed by the number of steps that were supposed to be performed. To evaluate coach fidelity of implementation, all trainings and at least 20% of randomly selected parent-coach meetings were evaluated and determined to be implemented by the coach with 100% fidelity. To evaluate parent fidelity of implementation, at least 20% of randomly selected parent uploads were evaluated by the third author. Dyads 1, 2, 3, and 5 implemented all sessions with 100% fidelity. Dyad 4 implemented Phase A with 65% fidelity (range 33–67%), Phase B with 56% fidelity (range 50–75%), Phase C with 40% fidelity, and Phase D with 67% fidelity.

The first author trained the third author to perform interobserver agreement (IOA) in all phases on parent and child behavior for at least 20% of randomly selected sessions using a random-number generator by dividing the total number of agreements by the total number of agreements and disagreements multiplied by 100. Training consisted of (a) reviewing the definitions of each strategy, (b) reviewing the definition of each child's social communication learning target, and (c) practicing coding together before the coach scaffolded supports and the two coded separately. Once two consecutive sessions exceeded 90% agreement for parent and child behavior, IOA coding began. Agreement on parent behavior averaged 94%, 92%, 92%, 88%, and 95% for each parent, respectively, while agreement on child behavior averaged 96%, 91%, 91%, 98%, and 96% for each child, respectively.

Results

The current single case experimental design evaluated the effects of a one-time training followed by weekly strength-based VF delivered via telepractice on parent strategy use and child individualized social communication learning targets through visual analysis and standardized mean difference and Tau-*U* effect sizes. The experimental design rating met design standards without reservations, according to the What Works Clearinghouse design standards (See Kratochwill et al., 2013). See Fig. 1 for a graphical representation of the results.

Parent Strategy Use

All parents' strategy use increased from baseline to intervention. Visual analysis revealed four basic effects from Phase A to Phase B (i.e., Parents 1, 2, 3, and 4), demonstrating experimental control and a functional relation. Between-subjects standardized effect size from Phase A (baseline) to Phase B (strength-based VF) for parent strategy use was 2.294, $SE = 0.475$, 95% CI [1.286, 3.303], indicating a large effect. Three of the five parents (i.e., Parents 1, 2, and 4) entered Phase C, and visual analysis revealed no demonstrations of basic effects, suggesting no functional relation. Dyad 1, 2, 3, and 4 participated in Phase D. Dyad 5 did not participate in maintenance data due to a family tragedy. Maintenance of parent strategy use varied. See Table 5 for information on specific strategies used by each parent by phase.

Parent 1: Atticus

In Phase A, Atticus' strategy use remained at low levels with no variability and a decreasing trend. In Phase B, his strategy use immediately increased in level with minimal variability and a gradually increasing stable trend. Nonoverlap Tau-*U* calculations between Phase A and Phase B suggest very large effects ($ES = 1.00$, $SE = 0.06$, 95% CI [1.00, 1.00]) on parent strategy use. There was no demonstration of a basic effect between Phases B and C, as there was no change in level in Atticus' strategy use and a slight increasing and variable trend in Phase C. Tau-*U* calculations suggest a large additive effect ($ES = 0.65$, $SE = 0.23$, 95% CI [0.03, 0.90]) on parent strategy use. In Phase D, Atticus participated in the first maintenance probe (i.e., 2-weeks post intervention) with strategy use remaining at intervention levels.

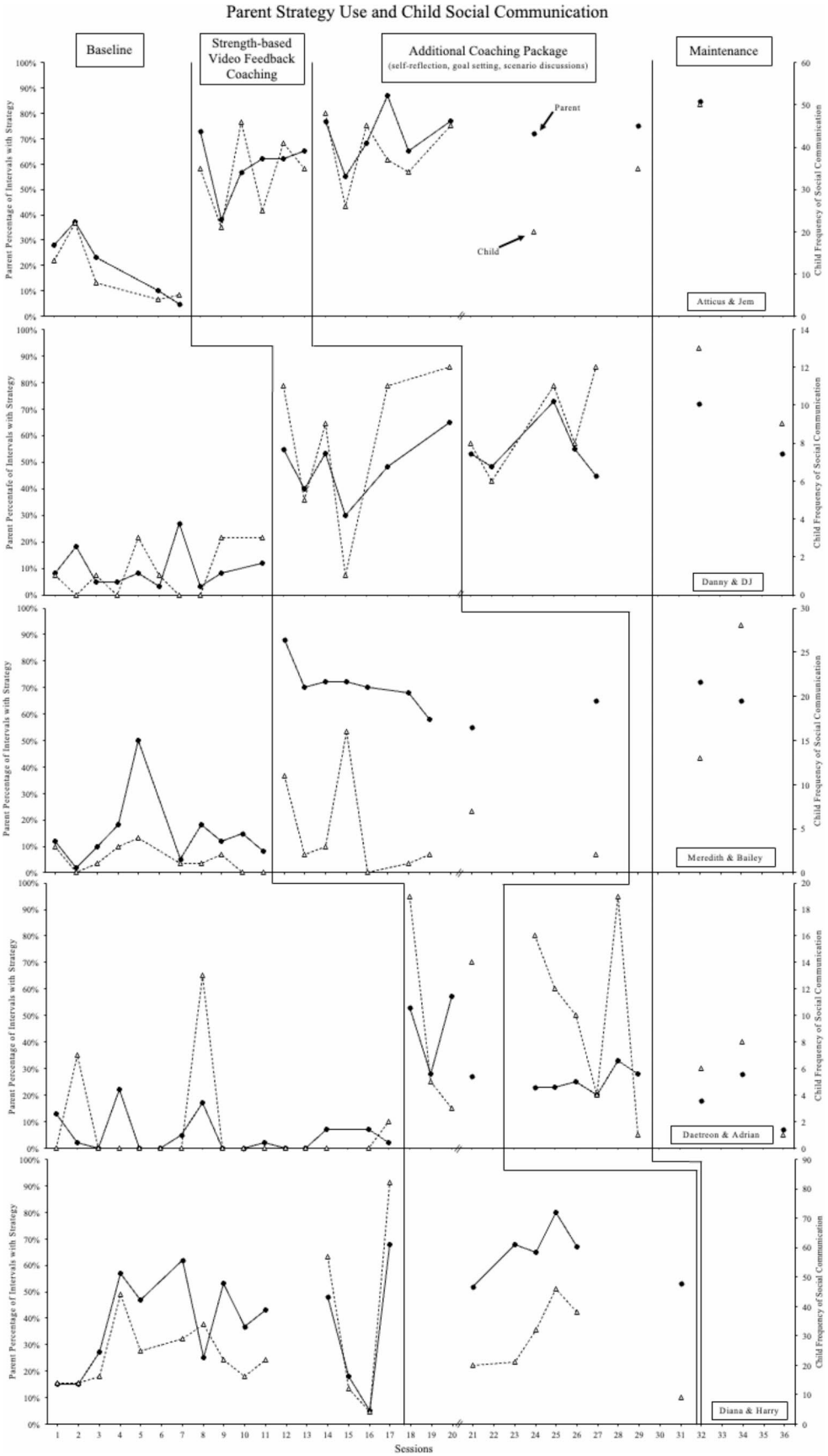

Fig. 1 Graphical representation of parent strategy use and child social communication. *Note*: The figure depicts a graphical representation of parent strategy use (solid line with closed circle) and child social communication (dashed line with open triangle)

Table 5 Means and ranges of the percentage of intervals on parent strategy use

	Strategy					Intervals with any strategy[a]
	Follow & imitate	Arrange environment	Model language	Wait time	Reward & expand	
Atticus						
Phase A						
M	1%	1%	10%	3%	8%	21%
(range)	(0-5%)	(0-5%)	(0-17%)	(0-8%)	(0-20%)	(5-37%)
Phase B						
M	20%	15%	23%	14%	27%	60%
(range)	(5-32%)	(12-18%)	(13-32%)	(10-17%)	(15-38%)	(38-73%)
Phase C						
M	28%	13%	39%	6%	31%	72%
(range)	(5-48%)	(0-27%)	(30-45%)	(0-23%)	(12-50%)	(55-87%)
Phase D						
M	3%	42%	48%	33%	47%	85%
(range)	NA	NA	NA	NA	NA	NA
Danny						
Phase A						
M	4%	2%	5%	1%	2%	10%
(range)	(0-22%)	(0-5%)	(0-12%)	(0-3%)	(0-5%)	(3-27%)
Phase B						
M	14%	16%	26%	16%	11%	49%
(range)	(8-23%)	(5-30%)	(17-37%)	(5-28%)	(2-18%)	(30-65%)
Phase C						
M	20%	14%	35%	7%	12%	55%
(range)	(12-27%)	(10-18%)	(30-48%)	(2-13%)	(8-17%)	(45-73%)
Phase D						
M	22%	27%	25%	16%	15%	*63%*
(range)	(13-30%)	(20-33%)	(15-35%)	(5-27%)	(12-18%)	(53-72%)
Meredith						
Phase A						
M	3%	2%	9%	2%	2%	15%
(range)	(0-7%)	(0-8%)	(2-45%)	(0-12%)	(0-5%)	(2-50%)
Phase B						
M	30%	6%	46%	7%	5%	69%
(range)	(7-52%)	(2-13%)	(30-66%)	(2-17%)	(0-12%)	(55-88%)
Phase D						
M	32%	9%	43%	3%	15%	69%
(range)	(8-55%)	(5-12%)	(38-48%)	(0-5%)	(5-25%)	(65-72%)
Daetreon						
Phase A						
M	3%	0%	1%	0%	1%	5%
(range)	(0-20%)	(0-2%)	(0-7%)	NA	(0-15%)	(0-22%)
Phase B						
M	11%	9%	8%	12%	13%	41%
(range)	(0-37%)	(0-25%)	(3-13%)	(0-17%)	(7-28%)	(27-57%)
Phase C						
M	5%	3%	10%	0%	11%	25%
(range)	(0-8%)	(0-8%)	(2-23%)	(0-2%)	(0-18%)	(20-33%)
Phase D						
M	2%	5%	4%	1%	7%	18%
(range)	(0-5%)	(0-7%)	(0-8%)	(0-3%)	(2-12%)	(7-28%)
Diana						
Phase A						
M	3%	5%	15%	2%	23%	37%
(range)	(0-15%)	(0-25%)	(3-48%)	(0-8%)	(3-57%)	(5-68%)

Table 5 (continued)

	Strategy					Intervals with any strategy[a]
	Follow & imitate	Arrange environment	Model language	Wait time	Reward & expand	
Phase B						
M	16%	13%	29%	22%	23%	64%
(range)	(3-37%)	(8-18%)	(15-48%)	(0-38%)	(13-37%)	(52-80%)

Note: Meredith and Diana did not enter Phase C and Diana did not submit videos for Phase D; Phase A = baseline; Phase B = strength-based video feedback; Phase C = additional coaching package; Phase D = maintenance

[a]The total number of intervals with at least one strategy is what is graphed within Fig. 1. NA = not applicable

Parent 2: Danny

Phase A, Danny's strategy use remained at low levels with little variability. In Phase B, Danny's strategy use immediately increased in level with moderate variability with an increasing trend. Nonoverlap Tau-*U* calculations between Phase A and Phase B suggest very large effects (*ES* = 1.00, *SE* = 0.03, 95% CI [1.00, 1.00]) on parent strategy use. There was no demonstration of a basic effect between Phases B and C, as there was no change in level in Danny's strategy use with moderately variable data and no trend in Phase C. Tau-*U* calculations suggest a moderate additive effect (*ES* = 0.23, *SE* = 0.36, 95% CI [-0.41, 0.71]) on parent strategy use. In Phase D, Danny participated in the first and third maintenance probes (i.e., 2- and 6-weeks post intervention) with strategy use remaining at intervention levels.

Parent 3: Meredith

In Phase A, Meredith's strategy use remained at low to moderate levels with little variability and no trend. In Phase B, Meredith's strategy use immediately increased in level with a slight decreasing trend and no variability. Nonoverlap Tau-*U* calculations between Phase A and Phase B suggest very large effects (*ES* = 1.00, *SE* = 0.02, 95% CI [1.00, 1.00]) on parent strategy use. Meredith did not enter Phase C. In Phase D, Meredith participated in the first and second maintenance probes (i.e., 2- and 4-weeks post intervention) with strategy use remaining at intervention levels with a slight decrease in trend.

Parent 4: Daetreon

In Phase A, Daetreon's strategy use remained at low levels with little variability. In Phase B, Daetreon's strategy use immediately increased in level with moderate variability and no trend. Nonoverlap Tau-*U* calculations between Phase A and Phase B suggest very large effects (*ES* = 1.00, *SE* = 0.03, 95% CI [1.00, 1.00]) on parent strategy use. There was no demonstration of a basic effect between Phases B and C, as there was a slight decrease in level in Daetreon's strategy use with small variability and no trend in Phase C. Tau-*U* calculations suggest a large negative additive effect (*ES* = −0.71, *SE* = 0.23, 95% CI [-0.94, 0.06]) on parent strategy use. In Phase D, Daetreon participated in all three maintenance probes with strategy use at or below intervention levels.

Parent 5: Diana

In Phase A, Diana's strategy use indicated moderate to high levels with a high degree of variability and no trend. In Phase B, Diana's strategy use maintained at Phase A levels with an increasing trend and some variability. Nonoverlap Tau-*U* calculations between Phase A and Phase B suggest moderate effects (*ES* = 0.29, *SE* = 0.25, 95% CI [-0.26, 0.68]) on parent strategy use.

Child Social Communication

Child social communication varied. Visual analysis of the graph revealed two basic effects (i.e., Child 1 and 2), suggesting experimental control but no functional relation between Phases A and B. Between-subjects standardized mean difference calculation from Phase A (baseline) to Phase B (strength-based VF) suggests a small effect with an effect size of 0.440, *SE* = 0.170, 95% CI [0.070, 0.810]. Three of the five children had parents enter Phase C (i.e., Child 1, 2, and 4). Visual analysis revealed no demonstrations of basic effects, suggesting no functional relation. Maintenance of child social communication varied. Four of the five children participated in maintenance data 2-, 4-, and/or 6- weeks after intervention concluded. Dyad 5 did not participate in maintenance data due to a family tragedy. Visual analysis revealed comparable social communication for Child 2, slight increases for Child 1 and 3, and comparable to lower social communication for Child 4.

Child 1: Jem

In Phase A, Jem's vocal speech of a word or phrase remained at low levels with no variability with a decreasing trend. In Phase B, Jem's social communication immediately increased in level with moderate variability and

no trend, demonstrating a basic effect. Nonoverlap Tau-*U* calculations between Phase A and Phase B suggest very large effects (*ES* = 1.00, *SE* = 0.06, 95% CI [1.00, 1.00]) on child social communication. There was no demonstration of a basic effect between Phases B and C, as there was no change in level in Jem's social communication with moderate variability and a slightly increasing trend followed by high variability and no trend at the end of Phase C. Tau-*U* calculations suggest a small additive effect (*ES* = 0.12, *SE* = 0.32, 95% CI [-0.43, 0.61]) on child social communication. In Phase D, Jem participated in the first maintenance probe (i.e., 2-weeks post intervention), and his social communication level was slightly higher than in intervention.

Child 2: DJ

In Phase A, DJ's social communication remained at low levels with little variability. In Phase B, DJs social communication immediately increased in level with large variability and a slightly increasing trend, demonstrating a basic effect between Phases A and B. Nonoverlap Tau-*U* calculations between Phase A and Phase B suggest very large effects (*ES* = 0.85, *SE* = 0.15, 95% CI [0.27, 0.97]) on child social communication. There was no demonstration of a basic effect between Phases B and C, as there was no change in level in DJ's social communication with variable data with an increasing trend in Phase C. Tau-*U* calculations suggest a small additive effect (*ES* = 0.03, *SE* = 0.39, 95% CI [-0.55, 0.59]) on child social communication. In Phase D, DJ participated in the first and third maintenance probes (i.e., 2- and 6-weeks post intervention), and his social communication remained at intervention levels.

Child 3: Bailey

In Phase A, Bailey's word approximations remained at low levels with little variability and no trend. In Phase B, Bailey's word approximations remained at similar levels with large variability and no trend, not demonstrating a basic effect between Phases A and B. Nonoverlap Tau-*U* calculations between Phase A and Phase B suggest very large effects (*ES* = 0.84, *SE* = 0.11, 95% CI [0.35, 0.97]) child social communication. Bailey did not enter Phase C. In Phase D, Bailey participated in the first and second maintenance probes (i.e., 2- and 4-weeks post intervention) and increased his social communication to above intervention levels.

Child 4: Adrian

In Phase A, Adrian's use of AAC remained at low or moderate levels with little variability and no trend. In Phase B, Adrian's use of AAC visual analysis illustrates no clear change in level with large variability and no trend, not demonstrating a basic effect between Phases A and B. Nonoverlap Tau-*U* calculations between Phase A and Phase B suggest very large effects (*ES* = 0.88, *SE* = 0.10, 95% CI [0.25, 0.98]) on child social communication. There was no demonstration of a basic effect between Phases B and C, as there was no change in level and large variability in Adrian's social communication in Phase C. Tau-*U* calculations suggest a small negative additive effect (*ES* = − 0.04, *SE* = 0.41, 95% CI [-0.62, 0.57]) on child social communication. In Phase D, Adrian participated in all three maintenance probes (i.e., 2-, 4-, and 6-weeks post intervention) with social communication lowering in level from intervention.

Child 5: Harry

In Phase A, Harry's social communication indicates moderate to high levels of child social communication with a high degree of variability and no trend. In Phase B, Harry's social communication maintained at Phase A levels with a slightly increasing trend, not demonstrating a basic effect between Phases A and B. Nonoverlap Tau-*U* calculations between Phase A and Phase B suggest small negative effects (*ES* = − 0.24, *SE* = 0.30, 95% CI [− 0.65, 0.30]) on child social communication.

Discussion

The current study extends NDBI research and practical implications with young autistic children. First, we evaluated a strength-based VF coaching model that allowed families flexibility with recording play sessions. Our findings support a strong functional relation between VF and an increase in parent strategy use, which are also supported by the standardized mean difference effect size (*ES* = 2.294). Second, we observed two basic effects for child social communication, which did not demonstrate a functional relation. The standardized mean difference effect size, however, was small (*ES* = 0.440). Taken as a whole, our findings support small-moderate effects on child social communication behavior. Third, an additional coaching package did not produce additive effects on parent strategy use nor child social communication, suggesting that focusing on parents' strengths as opposed to providing constructive feedback, may yield similar changes in parent strategy use. Fourth, most parents' strategy use maintained similar levels post-intervention, and child social communication remained at stable or increased levels during the maintenance phase, suggesting that the effects may remain consistent over time.

Parent Strategy Use

Parental total strategy use increased following strength-based video feedback. Thus, providing coaching by highlighting the strengths of parent-implementation, that is areas in which the parent is performing the strategies well, may be a valid method when coaching parents of young autistic children in NDBI strategies. Interestingly, providing more constructive feedback (i.e., highlighting areas in which the parent could improve with their strategy implementation) did not yield additive changes in parent implementation. That is, constructive feedback did not always produce increased parent strategy use. While the trend of Atticus' (Dyad 1) strategy use increased slightly, Danny's (Dyad 2) strategy implementation remained comparable to when strength-based VF was the sole coaching tool (i.e., no change in level or trend). Also, Daetreon's (Dyad 4) strategy use decreased in level following constructive feedback. It should be noted that this finding could have been influenced by our measurement methods, which looked at overall strategy use using partial-interval recording (i.e., at least one strategy in the interval) rather than a treatment fidelity score. Constructive feedback may be necessary when fine tuning or tailoring specific strategies rather than when seeking to increase overall NDBI strategy use more globally.

The specific strategies that each parent implemented varied throughout the play sessions. Parents generally *Modeled Language* most frequently ($M = 29\%$, range 7-45%). This may be due to the ease of generalization of the skill. For example, when modeling language, parents were told to say a word or phrase at the child's level that was relevant to the activity in which the child was engaging. While language varied between activities (e.g., language used while jumping on a trampoline was different than language used while painting), the task was the same: labeling the item or action the child was engaging in (e.g., saying "blue paint!" or "jump!). *Wait Time* was generally the least implemented strategy ($M = 12\%$, range 4%-22%). There are two possible explanations for this. First, wait time was only marked if the parent had (a) *Modeled Language* or *Arranged the Environment* and (b) provided at least three seconds of silence. Thus, this strategy was contingent upon the parent implemented an additional strategy before. Second, if the initial strategy (i.e., *Modeling Language* or *Arrange the Environment*) was implemented and the parent waited three seconds, but the child responded to the parent within those three seconds of *Wait Time*, wait time was not marked as occurring.

Finally, parents were able to maintain the levels of their strategy use 2-, 4-, and/or 6-weeks after intervention and coaching concluded. Therefore, a parent-implemented intervention utilizing strength-based feedback may be a viable intervention coaching approach for some parents to learn and maintain strategies. In practice, this may mean that coaching could be removed or lessened in frequency and parents could maintain strategy use for about a month, though additional research is required to analyze the optimal dosage of coaching sessions for parent-implemented NDBIs.

Child Learning Targets

Although a functional relation for child social communication learning targets was not demonstrated, a small standardized mean difference effect size was found. There are two possible reasons for the small effect on child social communication. First, the current study utilized a cascading logic model of behavior change. That is, with the parent-implemented intervention, training and coaching produced changes in parent strategy use, and parent strategy use produced small and variable changes in child social communication. Second, in line with previous parent-implemented literature, changes in child behavior are often observed distally versus proximally (Gevarter et al., 2022; Meadan et al., 2016; Ousley et al., 2022; Wattanawongwan et al., 2022). Our maintenance probes indicated that children's level of social communication maintained or exceeded at 2-, 4-, and 6-weeks after intervention. This is a promising finding suggesting that the effects of parent NDBI strategy use can produce durable and perhaps more distal effects on child social communication which aligns with recent research (Kasari et al., 2023). Further, several weeks of practice may be needed before consistent results are observed. This is consistent with recent research indicating that some child outcomes, such as number of unique words, may require additional time to acquire when using a more naturalistic approach (Kasari et al., 2023).

Individual Dyad Considerations

There are several components of Dyad 4 that warrant discussion. Dyad 4 engaged in low levels of procedural fidelity, ranging from 33 to 75% accuracy in all phases. Specific procedural checklist items that were regularly not completed included: (a) setting a timer in all phases, (b) watching VF prior to play sessions during Phase B and C, and (c) reviewing the weekly goal prior to play time during Phase C. Throughout the intervention, the coach offered a new copy of the procedures to the father, but it was declined. Daetreon participated in all training and coaching sessions identically to the other parents; however, Daetreon's training included an additional step: having Adrian's AAC device accessible during all play sessions. This decision was made as Adrian's AAC device was present during only present during 19% of baseline sessions, thus limiting Adrian from being able

to communicate. A potential hypothesis as to why there was lower procedural fidelity with Dyad 4 may be due to the added demands families and children often experience when the child requires an AAC device (Goldbart & Marshall, 2004).

Dyad 5 displayed high levels of parent strategy use and child social communication with variability and no trend in baseline. In the B phase, parent strategy use and child social communication decreased in level and variability and had a slight increase in trend. Thus, there was no basic effect, and Tau-*U* nonoverlap calculations revealed moderate ($ES = 0.29$) and small negative ($ES = -0.24$) effects on parent strategy use and child social communication, respectively. The overall decrease in level of strategy use could be partially explained by Diana's training as a behavior technician. Dyad 5 engaged in several of the strategies prior to receiving training and coaching. Specifically, several Diana regularly engaged in the strategies *Modeling Language* (e.g., Diana saying, "say blue!" and Harry echoing "blue!") and *Environmental Arrangement* (e.g., Diana saying "1, 2…" with Harry saying "3") in baseline. After training and VF coaching were introduced, Diana engaged less in the *Environmental Arrangement* prompts and focused more on *Following & Imitating* Harry by engaging in the play activity together. This is consistent with recent research that indicates that most behavior analysts do not receive training on NDBIs (Hampton & Sandbank, 2022). This change in parent behavior is not represented in the graphical data, as data were represented as total strategy use (i.e., any strategy) and not individual strategy use (e.g., Diana's use of the strategy *Follow & Imitate*).

Limitations, Future Research, and Implications for Practice

Limitations should be considered when interpreting the results. First, the study evaluated a multi-component intervention where coaching immediately followed the training. Therefore, the active ingredient of the intervention is unclear. Future research may wish to evaluate the effects of (a) individual strategies of NDBIs, and/or (b) isolating strength-based VF from initial trainings. Second, generalization data were not collected. Multiple play activities were chosen and rotated through with each dyad. Future research may seek to embed the strategies and coaching packages within novel routines (e.g., morning routines), settings (e.g., playdates with classmates), and people (e.g., sibling). Thirdly, Dyad 4 engaged in lower levels of parent strategy use and procedural fidelity. Finally, the participants were required to have reliable internet within the home to participate, and adjustments to how parents uploaded the videos were required during baseline given the varying internet speeds of the participants. There is a limitation on the generalizability of the outcomes to the general population, as not every family has access to reliable internet.

While recent research has demonstrated that (a) parent-implemented NDBIs can be successfully implemented by Latinx families (Gevarter et al., 2022), and (b) parent-implemented NDBIs can be successfully implemented with children who require AAC (Wattanawongwan et al., 2020), more research needs to be conducted on when and how to adapt interventions and coaching practices based upon the individual needs of the family. Finally, it is critical for future researchers to transition closer to translational research by having practitioners implement the intervention and coaching tool rather than an experienced researcher. Training practitioners and understanding the feasibility of VF as a coaching tool will be pivotal to understanding how the current research project can translate from research to practical services.

Important to highlight, the method of intervention evaluated in the current evaluation (i.e., asynchronous video uploads and parent coaching) differs from traditional in person family guidance sessions. In other words, the coach and parents did not prescribe to the regularly scheduled same-day same-time model that is typically used with in-person therapy. Rather, the parent was given flexibility on when the recorded sessions occurred with their child (i.e., they had 1 week time to record one to three sessions). This model may be adequate for some families, whereas other families may need more structure and in person support from an early intervention provider. In such instances, VF coaching may be useful to supplement in-person sessions and may promote generalization of parent NDBI use across settings (e.g., home, clinic, community). VF coaching may also be useful for follow-up booster sessions to promote maintenance and adaptation of NDBI strategy use over time. More research is needed to know for whom a low-dose strength-based VF intervention would suffice and which families would benefit from varied approaches. Finally, the scalability of asynchronous VF coaching should be considered. Specifically, in medical service delivery systems, the time spent editing videos would not be billable for reimbursement by insurance companies. Thus, VF coaching may not be feasible for some early intervention providers. Additional research is needed to fine-tune and streamline video editing processes for efficiency.

The current study evaluated the effects of strengths-based VF coaching that was created and available to families on demand. Additionally, the intervention required a relatively small time commitment from parents (about 1 to 1 ½ hours per week following a 1 h training), and play sessions were able to commence at convenient, non-scheduled times throughout their week. Flexibility not only assists with the therapy scheduling issues often experienced by parents of

children on the autism spectrum (Raulston et al., 2019; Simacek et al., 2021), but it allows for interventionists to coach more authentic interactions that better represent the typical parent-child interaction that may not be regularly viewed during scheduled therapy visits. Furthermore, this flexibility could allow for the parent to receive feedback on their skills as a supplemental tool to in person therapy. For example, if in-person sessions needed to be cancelled or if the parent wanted additional coaching between their in-person sessions, the parent could capture interactions with their child to send to the coach without having to coordinate schedules and the coach could provide additional feedback to the parent between their scheduled in-person sessions. Strengths-based VF coaching may be an effective and flexible practice that may enhance a practitioner's ability to build family capacity and strengthen their NBDI skills.

Conclusion

Research has demonstrated that parents of young autistic children can implement NDBIs during naturally occurring routines. In the current study, visual analysis, supplemented with standardized mean difference and nonoverlap analyses, revealed a functional relation and very large effects for parent strategy use, suggesting that training on NDBIs using strength-based VF coaching via telepractice while providing flexibility in scheduling play time interactions, can increase parent strategy use during 10-minute play time interactions with their autistic child. The current evaluation expands upon the literature by demonstrating that parent-implemented interventions that are delivered via telepractice can continue to be successful when (a) coaching is focused on the parents' strengths, (b) all coaching feedback is provided asynchronously, and (c) families can flexibly record sessions based upon their week's schedules rather than relying on regularly scheduled meeting times with a coach. Given the promising strength of evidence for incorporating strength-based VF as a coaching tool within telepractice-based parent-implemented NDBIs, the current study provides insight to inform future research and practice.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s10803-023-06199-w.

Acknowledgements This study was a part of the first authors dissertation study, *Coaching Parents of Young Children with Autism and Minimal to No Vocal Speech in Naturalistic Developmental Behavioral Strategies Using Strength-based Video Feedback*. The first author would like to thank Dr. David McNaughton for assistance with the conceptualization, modifications, and interpretation of the study. Additionally, she would like to thank Dr. Jessica Caron and Dr. David Lee for providing useful feedback prior to and after the study concluded. Finally, we thank *The Organization for Autism Research* and all OAR donors who helped support this project.

Funding This study was funded by *The Organization for Autism Research* as a Graduate Student Grant awarded to the first author.

Declarations

Conflict of interest All authors report that there are no conflicts of interests.

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