The Evaluation of a Personal Narrative Language Intervention for School-Age Children With Down Syndrome

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Abstract
The purpose of this study was to evaluate the feasibility of an intervention focused on improving personal narrative skills of school-age children with Down syndrome (DS) using an approach involving visual supports. Four females with DS, ages 10 through 15 years, participated in this multiple baseline across participants single-subject experimental design study. Participants completed 18 intervention sessions that targeted personal narrative goals. Parents completed a survey regarding their perspectives of the intervention. Two participants made small treatment gains in mean length of utterance. One participant had small to medium gains on all macrostructural measures. Parent perspectives were positive. Results support the feasibility of personal narrative interventions for individuals with DS when visual support is provided.

Key Words: Down syndrome; language; intervention; narrative; grammar

From an early age, individuals with Down syndrome (DS) develop language more slowly than their age-matched peers who are typically developing (Berglund, Eriksson, & Johansson, 2001). Delays span all language domains including expressive and receptive vocabulary, syntax, morphology, and pragmatics (Martin, Klusek, Estigarribia, & Roberts, 2009). Related to these language delays, individuals with DS also demonstrate more generalized cognitive deficits resulting in delayed recall and limited verbal working memory (Chapman & Hesketh, 2000; Jarrold & Baddeley, 2001). With these wide-reaching language and cognitive weaknesses, one particularly challenging area of development is narrative language (i.e., collections of utterances coherently arranged to relay past events). Narrative language requires successful use and integration of each of these language and cognitive domains to facilitate the recollection of events, formulation of grammatical sentences, and organization of event components. Thus, the aim of the current study was to evaluate an intervention focused on improving the narrative language of school-age children with DS.

Narrative Language Deficits Associated With DS
Narratives encompass a broad range of topics, including both fictional and personal contexts. Fictional narratives relay made-up stories, whereas personal narratives recount events or experiences that the speaker has encountered. All types of narratives can be evaluated at the microstructural and macrostructural levels (Kintsch & van Dijk, 1978; Liles, Duffy, Merritt, & Purcell, 1995). Microstructural narrative measures reflect language use at the sentence level and include measures such as the frequency of grammatical utterances and sentence complexity (e.g., mean length of utterance in morphemes [MLU-M]). In contrast, macrostructural narrative measures reflect language use at a global level and include measures of narrative organization and quality (Liles et al., 1995). Most studies focused on the microstructural and macrostructural narrative language skills of
individuals with DS have used fictional contexts, but some have analyzed personal narrative language samples (van Bysterveldt, Westerveld, Gil- lon, & Foster-Cohen, 2012).

Studies examining fictional narrative micro-structural skills reveal that, compared to children who are typically developing (TD) and have a similar nonverbal mental age (NVMA), children with DS produce a fewer number of different words, fewer total words, lower MLU-Ms, fewer grammatically correct utterances, less complex utterances, and weaknesses in use of specific grammatical forms (e.g., past tense, wh-questions; Chapman, Seung, Schwartz, & Kay-Raining Bird, 1998; Eadie, Fey, Douglas, & Parsons, 2002; Finestack & Abbeduto, 2010; Joffe & Varloksota, 2007; Keller-Bell & Abbeduto, 2007; Price et al., 2008). It is important to note that other studies have found no differences between children with DS and younger language matched peers. For example, Thordardottir, Chapman, and Wagner (2002) found no significant differences on the proportion of complex utterances and diversity of complex sentence types when comparing adolescents and young adults with DS to younger peers who were TD and had equivalent MLU-M. Kay-Raining Bird, Cleave, White, Pike, and HelmKay (2008) found that the children and adolescents with DS in their study produced significantly longer narrative samples than younger NVMA-matched peers with TD.

Results of studies focused on the macrostructural skills of children with DS have also indicated significant weaknesses relative to peers of similar cognitive ability on key variables. For example, compared to children of similar NVMA, Boudreau and Chapman (2000) found that children and adolescents with DS produce more unclear references and Miles and Chapman (2002) found that adolescent and adult participants with DS included fewer thematic elements. However, similar to studies examining microstructural measures, there are several examples of macrostructural findings in which individuals with DS did not perform significantly differently (Kay-Raining Bird et al., 2008; Keller-Bell & Abbeduto, 2007; Miles & Chapman, 2002) or performed better (Boudreau & Chapman, 2000; Finestack, Palmer, & Abbeduto, 2012; Miles & Chapman, 2002; Roberts et al., 2007) than matched TD peers. These discrepant macrostructural profiles are most likely due to differences in comparison groups. For example, the Miles and Chapman (2002) study compared the fictional narratives of adolescents and adults with DS to those collected from three matched groups: younger TD children of similar NVMA, younger children with similar syntactic comprehension scores, and younger children with similar MLU-M. Although the participants with DS included fewer thematic elements than the NVMA group, there was no difference compared to the MLU-M-matched group. However, the MLU-M matched group was, on average, two years younger than the NVMA matched group. This age difference most likely is because the nonverbal cognitive abilities of individuals with DS, particularly visual-spatial skills, tend to be greater than their verbal abilities, (Chapman, Schwartz, & Kay-Raining Bird, 1991; Hick, Botting, & Conti-Ramsden, 2005; Miles & Chapman, 2002), resulting in NVMA-matched comparison groups that are older than MLU-M matched groups.

Very few studies have examined the personal narratives of adolescents with DS. Van Bysterveldt et al. (2012) conducted a study that described the microstructural and macrostructural personal narrative profiles of children with DS. The study included twenty-five 5- through 13-year-old children with DS who each had the opportunity to relay 11 personal experiences. Microstructural analyses indicated a MLU-M range of 1.1 – 5.1. Macrostructural analyses revealed that the majority of children with DS produced narratives of low quality with no more than three past-tense events. The children with higher macrostructural quality were those with higher MLU-Ms and a greater number of different words. Thus, poor narrative quality was likely heavily influenced by weak macrostructural language skills.

Overall, it is clear that children and adolescents with DS have significantly impaired microstructural and macrostructural language abilities relative to chronological age. Compared to younger children of similar NVMA, individuals with DS display weaker microstructural abilities on most measures. There is also evidence of impaired macrostructural language skills; however, several studies demonstrate that the macrostructural skills of individuals with DS are not significantly different than younger children matched on NVMA, most likely due to the relative visual-spatial strengths of children with DS resulting in these NVMA matched children being closer in age than children matched on language measures.
Narrative Intervention

Despite documented weaknesses across both microstructure and macrostructure features on narrative language tasks among individuals with DS, relatively little empirical evidence exists evaluating appropriate intervention techniques for this population. The existing literature focused on language interventions for school-aged children and adolescents with DS is even narrower, despite evidence that language skills continue to develop throughout adolescence for this population (Chapman, 1999; Chapman, Hesketh, & Kistler, 2002). The intervention studies that do exist (Buckley, 1995; Hewitt, Hinkle, & Miccio, 2005; Sepúlveda, López-Villaseñor, & Heinze, 2013) have focused primarily on microstructural language elements outside of narrative contexts and have found significant positive treatment effects for adolescents, teenagers, and adults with DS on these forms. No known intervention studies to date have focused on macrostructural elements related to the narrative language of individuals with DS.

A. McCabe and Bliss (2003) describe personal narratives as the relaying of past events that the narrator has experienced. Some defining features include the use of past tense, inclusion of a setting, use of first and/or third person subject and verb forms, temporal sequencing of events, and presence of high point or climax. Personal narratives are one of the earliest narrative forms produced by TD children (Hudson & Shapiro, 1991; Preece, 1987), so that most children with TD produce complex and complete personal narratives by first grade (Peterson & McCabe, 1983). Personal narratives are produced by children as part of their daily conversations and interactions much more frequently than fictional narratives (Preece, 1987). To this point, in a study of 5- and 6-year-olds, Preece found that fewer than 4% of the narratives produced during conversation were fictional narratives and the vast majority of narratives produced were personal.

Several studies (Petersen et al., 2014; Petersen, Gillam, Spencer, & Gillam, 2010; Spencer & Slocum, 2010) have examined the use of narrative-based language interventions in populations with language disorders other than DS. Studies by Petersen and his colleagues (Petersen et al., 2014; Petersen et al., 2010) found that their narrative-based interventions led to language gains for children with language impairments due to a variety of etiologies. Using a multiple baseline across participants single-subject experimental design (SSED), Petersen and colleagues (2010) found that after only 10 treatment sessions, children with co-occurring neuromuscular and language impairments made gains on both microstructure and macrostructure measures using fictional narrative contexts. Microstructural analyses revealed that participants increased their use of causative relations, adverbs, elaborated noun phrases, and pronominal references and increased their MLU-M. Based on macrostructural analyses, each of the three participants increased their use of story grammar elements (e.g., characters, settings, actions, consequences) across the intervention period.

More recently, Petersen et al. (2014) used a multiple baseline SSED to examine the outcomes of personal narrative treatment involving children with autism spectrum disorder (ASD). Three 6- to 8-year-old boys with ASD participated in up to 12 weeks of intervention focused on both microstructural and macrostructural components of personal narratives. The treatment included a story modeling procedure, story retell, personal narrative generation, and supported personal narrative retell. Participants also generated an independent retell to track performance across the intervention phase. During this treatment, pictographs were used as visual supports to aid children’s inclusion of key story elements during their production of personal narratives. Results revealed a positive effect of the intervention for all three participants on story grammar and a positive effect for seven of nine microstructural targets. Maintenance performance was mixed, remaining above baseline performance for only half of story grammar and linguistic complexity targets. These findings suggested that although participants were able to make rapid gains, a longer intervention period might be necessary for those gains to be retained.

Although there are no known studies to date that have focused on improving macrostructural narrative language forms produced by individuals with DS, as noted previously, there are a few interventions studies that have focused on improving microstructural forms (Buckley 1995; Hewitt et al., 2005; Sepúlveda et al., 2013). In each study, the investigators noted positive language gains related to the intervention. Moreover, it is important to note that in each study, the intervention included a type of visual support to teach targets forms. For example, when teaching
sentence structures to 13- to 15-year-olds with DS, participants viewed illustrations depicting the target form while repeating sentences containing the target. In the Hewitt et al. study, interventionists asked adults with DS to comment on pictures and photographs (not their own) to allow the participants to practice targeted grammatical forms. Similarly, in the Sepúlveda et al. study (2013), interventionists used picture cards and verbal prompts to elicit targeted grammatical forms from study participants who were 6- to 15-year-old children with DS.

Notably, visual supports are often a component used in narrative interventions. In a systematic review of narrative interventions of children with language impairment, Petersen (2011) noted that the vast majority of interventions examined included visual support as part of the treatment procedures. Commonly used visual supports include wordless picture books, single pictures and photos, and story maps. A story map is a written or pictorial guide of key narrative components (e.g., setting, characters, goal, action; Idol & Croll, 1987). Visual supports can be particularly useful to support narrative language because a single picture can cue multiple story components (e.g., the setting and the characters). Moreover, visual supports may be particularly beneficial for individuals with DS because they tend to have weak verbal short-term memories (Naess, Halaas Lyster, Hulme, & Melby-Lervag, 2011) which visual supports may help to offset (Chapman et al., 1998; Miles, Chapman, & Sindberg, 2006; Roberts, Chapman, Martin, & Moskowitz, 2008).

Personal narratives may serve the important role of enhancing a child’s self-esteem and social function by supporting the child’s connection with others through the sharing of personal events. Evidence suggests that children with poor language abilities are more likely to have poor social competency (Fujiki, Brinton, & Todd, 1996; P. C. McCabe & Marshall, 2006). Using personal narratives to improve language skills may have the added benefit of improving social interactions. Therefore, intervention goals may be best served, both from the perspective of the individual with DS and the interventionist, by incorporating personal narratives.

When developing new intervention programs for children with severe disabilities such as DS, Calculator (1988) recommended that the intervention should (a) improve communication across a variety of settings, (b) be age appropriate, (c) be able to be practiced multiple times throughout a typical day, (d) be significant to the client and significant others, (e) be able to be learned in a reasonable amount of time, and (f) improve the individual’s self-perception and the perception that others have of the individual. Thus, one type of narrative intervention that meets these criteria and may be particularly well suited for children with DS is one that targets microstructural and macrostructural language in the context of personal narratives. Thus, consistent with Calculator’s (1988) suggestions, personal narratives (a) are appropriate at almost all developmental levels; (b) are used in all types of daily interactions; (c) can (and should) be practiced at home as well as school; (d) can improve language form, may be targeted in a limited number of sessions; and (e) can enhance self-esteem by enabling an individual to share personally relevant events.

**Current Study**

The goal of the current study was to evaluate the feasibility of a personal narrative intervention approach that incorporates self-selected visual supports for school-age children with DS. Because of the dearth of research on personal narrative interventions for individuals with DS, we aimed to gain information regarding study procedures, dosage, and measures to inform future research studies and clinical practice focused on narrative intervention for individuals with DS.

The current study used intervention procedures very similar to the procedures used in the Petersen et al. (2014) study, which focused on improving the personal narrative skills of children with ASD. The procedure entails the interventionist modeling a personal narrative with visual supports and giving participants multiple opportunities to retell the model story while fading support. Additionally, in both studies, the interventionist guided participants in the development of their own personal narrative and gave participants multiple opportunities to practice telling their narrative while fading support.

The present study used a novel form of visual supports during the personal narrative intervention. Interventionists trained participants to use an iPod Touch photo application to support the personal narratives of individuals with DS. With this application, the participants could take pictures of events occurring in their everyday lives, and then refer to those photos to recall, create, and retell personal narratives. We selected
to use the iTouch photo visual support in an attempt to directly support the participants’ personal narratives, to have a high degree of social validity, and to increase motivation for the participants to engage in the intervention.

At the microstructural level, the intervention targeted production of increased language complexity. At the macrostructural level, the intervention targeted the number of on-topic utterances, overall narrative quality, and the inclusion of specific personal narrative components. Using a multiple baseline across participants SSED, the study addressed the following research questions:

1. Does a visually supported intervention lead to significant gains on microstructural measures (i.e., MLU-M) of personal narrative language?
2. Does a visually supported intervention lead to significant gains on macrostructural measures (i.e., number of on-topic utterances, narrative complexity, inclusion of targeted wh-components) of personal narrative language?
3. After intervention is complete, are personal narrative gains based on microstructural and macrostructural maintained and generalized to a different conversational partner?

The present study’s novel approach for providing participants visual support had the potential to cause disruptions at home or school because it required participants to take photos with an iPod Touch in both settings. Thus, the study also evaluated parental perspectives of this aspect of the intervention in a postintervention survey that was completed by a parent of each participant.

**Method**

**Participants**

Four school-age children with DS participated in this multiple baseline across participants study. Participants were recruited from a metropolitan area through DS organizations. All participants met the following inclusion criteria: (a) diagnosed as having DS due to trisomy 21 based on parent report; (b) mental age greater than 4 years based on the Differential Ability Scales-2nd Edition (Elliott, 2007); (c) mean length of utterance in morphemes (MLU-M) greater than 3.0 based on a conversational language sample elicited using a structured interview; (d) moderately good intelligibility such that at least 70% of utterances obtained in a conversational language sample were completely intelligible; (e) no more than a mild hearing loss in at least one ear (i.e., mean pure tone threshold of 30 dB or greater at 1000, 2000, and 4000 Hz) or the use of hearing aids; (f) no parent report of a history of ASD or frank neurological disorders (e.g., stroke, seizure); and (g) English as the native language of the participant and the primary language spoken in the home.

All participants, from this point forward referred to as Participants A, B, C, and D, were females with DS who lived at home. Participants A, B, and D were of European-American descent with mothers who had completed at least some graduate school. Participant C was of mixed European and African American descent; her mother had completed a technical degree. Each participant spent most of her time in a general education classroom setting, but received special education services, including reading and writing support and speech-language intervention. No participants were specifically targeting narrative development as a part of their education plan. Although no parents reported a history of ASD or neurological disorder, Participant A’s mother reported that her daughter was taking medication for attention deficit hyperactivity disorder (ADHD) symptoms. See Table 1 for a complete description of participant characteristics.

**Procedures**

Institutional review board permission, consent, and assent were obtained. Each participant completed two assessment sessions, four to six baseline sessions, 18 treatment sessions, and one generalization session. All examiners and interventionists were either MA-level speech-language pathology graduate students or speech-language pathologists certified by the American Speech-Language Hearing Association who also trained and supervised the students. All sessions were audio recorded for coding purposes.

**Assessment sessions.** Participants completed two assessment sessions in a private room on a university campus prior to the initiation of the baseline and treatment sessions. Performance on the cognitive and language assessments administered during these sessions was used to ensure that the participants met the inclusion criteria and to characterize the participants’ abilities. These mea-
sures are described in the following sections and results are included in Table 1.

**Differential Ability Scales, Second Edition (DAS-II).** Participants completed the DAS-II (Elliott, 2007) to evaluate nonverbal cognitive ability. We calculated a nonverbal mental age for each participant by averaging the age equivalent scores from the three nonverbal DAS-II subtests, including Picture Similarities, Matrices, and Pattern Construction. Because of scheduling conflicts, Participant C was unable to complete the Pattern Construction subtest. Thus, we estimated NVMA based on the Picture Similarities and Matrices age equivalents. However, complete DAS-II scores were available from 2 years before participation in the current study. NVMA based on this earlier assessment was 5;9, just one month different than the estimate in the current study. As directed by the administration manual, all participants completed the Early Years Battery (ages 2;6-5;11); therefore, Table 1 contains performance age equivalents, but no standard scores.

**Clinical Evaluation of Language Fundamentals, Fourth Edition (CELF-IV).** Participants also completed the CELF-IV (Semel, Wiig, & Secord, 2003) to assess core language skills. Table 1 contains the age equivalents and raw scores of the participants’ performance on the Concepts and Following Directions and Recalling Sentences subtests, which measure receptive language, and the Formulated Sentences subtest, which measures expressive language. Due to floor effects, standard scores could not be calculated.

**Test of Narrative Language (TNL).** Participants completed the TNL (Gillam & Pearson, 2004) to evaluate narrative language skills prior to intervention. The TNL is a norm-referenced standardized assessment comprising tasks containing no picture cues, sequenced picture cues, and a single picture to evaluate narrative oral and comprehension skills. Table 1 contains the age equivalents for the Narrative Comprehension and Oral Narration scales. Two of the participants were outside the norming range; thus, we report age equivalents and raw scores.

**Conversational language sample.** Examiners also collected 20- to 30-min conversational language samples during one of these sessions. Examiners used a scripted structured interview to prompt the participants to talk about their interests and daily activities.
activities. Sampling methods for this procedure were based on those of Leadholm and Miller (1995). The goal was for the participant to generate 100 unique, nonimitated utterances. The elicited samples contained 140-194 communication units or C-units, each of which includes an independent clause and its modifiers (Loban, 1976).

**Intervention goals.** Across the 18 treatment sessions, the interventionists targeted three microstructural grammatical goals and three macrostructural personal narrative goals, with one of each goal type targeted per session. Interventionists targeted both the grammatical goals and the narrative goals using a cyclical approach comprising a single cycle. For all participants, regardless of performance on each goal, sessions 1-6 targeted elaborated noun phrases as the grammatical goal and “who” for the personal narrative goal. Sessions 7-12 targeted advanced verb phrases and “what.” Sessions 13-18 targeted conjunctions and “where/when.” Examples of each goal are included in Table 2. Additionally, across all of the intervention sessions, the interventionist encouraged participants to include dialogue and description of the mental states of key people involved in the narrative. These elements were included to help participants expand their narrative content and to make the narratives more interesting.

**Pretreatment baseline sessions.** Examiners used a computer-generated randomization sequence to assign participants to four, five, or six baseline sessions prior to the initiation of intervention (Todman & Dugard, 1999). Examiners collected the first baseline data point at the end of the second assessment session. Interventionists allowed, but did not prompt, participants to access their iPod Touch (iTouch) and the Daily Log application (subsequently described) during their personal narratives.

**Performance tracking.** At the beginning of each session, the interventionists elicited three personal narratives from participants using procedures almost identical to the pretreatment baseline procedures. The only difference was that the interventionists allowed, but did not prompt, participants to access their iPod Touch (iTouch) and the Daily Log application (subsequently described) during their personal narratives.

**Review of daily log.** Beginning with the first intervention session, the interventionists provided participants with an iTouch personal device to use throughout the intervention. The device had no games and its only application (app) was a photo journal called Daily Log (Velasquez, 2012). This app was selected because it time-stamped photos and allowed for text entry of labels. During the first intervention session, the interventionists taught participants how to use the device and app, including how to charge and power on the device, and how to take pictures and search entries until the participants could independently take a picture and access the log of photos. Interventionists asked participants to take pictures of at least three different events using their iTouch between each session. All participants demonstrated necessary proficiency within the first session and agreed to take pictures. During subsequent sessions, interventionists reviewed use of the iTouch and the Daily Log application with participants.
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<th>Grammatical Goals</th>
<th>Sessions</th>
<th>Description</th>
<th>Examples</th>
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| Elaborated noun phrase | 1 – 6 | Simple designating noun phrases and simple descriptive noun phrases | • “We climbed the giant staircase.”  
• “I picked the yellow slide.”  
• “We had a great day.”  
• “We were excited to go and hike.”  
• “We ate sandwiches and chips.”  
• “We can go back to the park next week.” |
| Advanced verb phrase | 7 – 12 | Verb forms that receive a DSS Main Verb score of 2 (3rd person singular, regular and irregular past tenses, copulas, auxiliaries) or 4 (modals can and will, do + verb) | • “I asked my mom if we could have a party.”  
• “She panicked because she could not find her costume.”  
• “We had food and drinks for everyone.” |
| Conjunctions | 13 – 18 | Conjunctions that receive a DSS score of 3 (and), 5 (but, so, and so, so that, or, if), or 6 (because) | • “I went to the fair with my mom, dad, and brother Daniel.”  
• “Daniel loves to eat at the fair.”  
• “My family goes every year.”  
• “We went to look at the waterfall.”  
• “My friend wanted to take pictures.”  
• “She lost her camera.”  
• “In October I wanted to have a costume party at my house.”  
• “Finally, it was the day of the party.”  
• “Her dad found her costume in the laundry room.” |

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| Who | 1 – 6 | Key people or animals involved in the event | • “I went to the fair with my mom, dad, and brother Daniel.”  
• “Daniel loves to eat at the fair.”  
• “My family goes every year.”  
• “We went to look at the waterfall.”  
• “My friend wanted to take pictures.”  
• “She lost her camera.”  
• “In October I wanted to have a costume party at my house.”  
• “Finally, it was the day of the party.”  
• “Her dad found her costume in the laundry room.” |
| What | 7 – 12 | The main actions that occurred during the event | • “We went to look at the waterfall.”  
• “My friend wanted to take pictures.”  
• “She lost her camera.”  
• “In October I wanted to have a costume party at my house.”  
• “Finally, it was the day of the party.”  
• “Her dad found her costume in the laundry room.” |
| Where and When | 13 – 18 | Where and when the event or actions involved in the event occurred | • “I went to the fair with my mom, dad, and brother Daniel.”  
• “Daniel loves to eat at the fair.”  
• “My family goes every year.”  
• “We went to look at the waterfall.”  
• “My friend wanted to take pictures.”  
• “She lost her camera.”  
• “In October I wanted to have a costume party at my house.”  
• “Finally, it was the day of the party.”  
• “Her dad found her costume in the laundry room.” |
Model personal narrative. We developed 18 scripted accounts of personal events that were used as model personal narratives during the intervention. A corresponding picture presented on an iTouch accompanied each of these narratives. These personal narratives met the following criteria: (a) contained at least five examples of the targeted grammatical goal, (b) contained at least five examples of the targeted personal narrative goal, and (c) were 15 sentences in length and less than 200 total words. The models were written from the perspective of the interventionists and included personal events that the interventionists would likely encounter (e.g., going to a birthday party, cooking dinner). The purpose of the models was to demonstrate well-structured, cohesive personal narratives to participants.

Interventionists began the model personal narrative activity by introducing the current grammatical and narrative goals to participants. For example, when targeting “Who,” the interventionists said, “When you talk about the person or animal in your story, use describing words. You could say, my new cat or my old cat. Also when you tell about people in a story, you want to say who they are. Like my sister Katie or my friend Sara. It’s also important to tell how people are feeling in your stories and what people in your story say to each other.” The interventionists then used their own iPhone or iTouch to present a picture in the Daily Log that corresponded with the model personal narrative. The picture served as a simple visual cue to support the model narrative. During the presentation of the model, the interventionists instructed participants to look at the picture and listen carefully. After the model presentation, the interventionists highlighted the targeted grammatical and narrative goals by explicitly presenting an example of each from the model personal narrative.

Model narrative retell. During this activity, interventionists prompted participants to retell the interventionists’ model personal narrative. The purpose of this activity was to give interventionists the opportunity to highlight essential components of personal narratives, particularly the target macrostructural components and for participants to practice producing these components. As intervention progressed through the narrative goals, the number of elements to be included in these narratives correspondingly increased to include current and past goals. To help participants remember to include all necessary narrative components, interventionist introduced a second visual support, a narrative map. The map was introduced between Sessions 6 and 10 for Participants A, B, and D and at Session 1 for Participant C. Because the need for this visual planner only became clear mid-way through intervention, the timing of when the map was introduced varied. Due to the randomization process and scheduling, the interventionists introduced the map at different time points across the participants. The map, which was made using a piece of paper or a white board, included cells to note each narrative component (i.e., “when,” “where,” “who,” “what,” “talking,” and feelings”). Interventionists prompted participants as necessary to ensure that participants identified each essential narrative component. The map was designed to ease the cognitive load required of participants to recognize, recall, and sequence each of the macrostructural elements. Because the participants demonstrated relatively strong reading skills, interventionists wrote simple notes in each cell to describe the narrative components.

Once the map was created, the interventionists prompted the participants to retell the interventionist’s model personal narrative. The participants could retell the narrative as if it happened to them using first person forms or as if it happened to the interventionist using second person forms. During the retell, interventionists encouraged participants to use the picture representing the event available on the Daily Log app and the narrative map as visual supports. These supports helped to reduce the amount of information the participants needed to recall and allowed participants to focus on the production of the key narrative components. Interventionists prompted the participants as necessary until the participants produced all narrative components present on the map. Upon the completion of the retell, interventionists reviewed one example of each narrative component included in the retell. Interventionists then prompted participants to tell the model personal narrative a second time using the same procedure described above. This activity gave participants an additional opportunity to tell a well-formed narrative that they did not have to develop.

Sentence imitation task. The interventionists prompted participants to imitate 12 sentences, each containing an example of the session’s target grammatical and narrative goals. The sentences were loosely related to the session’s model
personal narrative. This task was designed to give participants discrete opportunities to practice producing both the microstructural and macrostructural targets.

**Participant personal narrative creation.** For the final intervention activity, participants created a personal narrative about a recent event in their life, using the Daily Log app and the narrative map as visual supports. The interventionists helped participants look through all of the pictures taken since the last intervention session to find a photo representing an event of interest to the participant. Using the selected photo, interventionists worked with participants to create another narrative map following the procedure described in the Model Narrative Retell section. Once the map was completed, interventionists reminded participants to include dialogue, mental state, and the targeted narrative and grammatical goals when telling their personal narrative. Using the map, participants retold the narrative two times. At the end of the session, the participants told the personal narrative a third time to a family member or friend who was not present during the narrative creation.

Two trained graduate students assessed treatment fidelity using a worksheet detailing steps involved in eliciting baseline narratives, reviewing the iTouch and photo journal application, presenting the model personal narrative, completing the sentence imitation task, prompting for retells, guiding participant narrative creation, and recasting participant grammatical goals. We randomly selected 20% (i.e., 16 sessions) of the sessions to review and use to compute fidelity for each intervention activity. For the performance tracking activity, interventionists could earn a maximum of nine points per session (prompts for three unique personal narrative = 3 pt., uses neutral conversational continuers during each narrative = 3 pt., provides two prompts to ensure participant completed narratives = 3 pt.). Fidelity for Performance Tracking was 97.2% (140/144). Interventionists could earn one point for reviewing the Daily Log application with participants. Review fidelity was 75% (12/16). Interventionists could earn six points for successful presentation of the model personal narrative (two presentations of the target grammatical goal = 2 pt., two presentations of the target narrative goal = 2 pt., prompts for participants to retell narrative two times = 2 pt.). Model Personal Narrative fidelity was 100% (96/96). For the sentence imitation activity, interventionists earned one point for each sentence presented for a maximum of 12 points per session. Sentence Imitation fidelity was 100% (192/192). For the participants’ personal narrative creation activity, interventionists could earn a maximum of four points per session (prompting for “Who,” “When,” “Where,” and “What” = 1 pt. each). Personal Narrative Creation fidelity was 100% (64/64).

**Posttreatment generalization session.** Each participant had one generalization session that was randomly assigned to occur 1, 2, or 3 weeks postintervention. This session included elicitation of two narratives using the same procedures that were implemented during baseline sessions and the performance tracking activity. One of the interventionists elicited the first narrative. An unfamiliar, trained research assistant elicited the second narrative. During both elicitations, participants had access to their iTouch devices, but received no prompt to use them. We analyzed participants’ performance to determine if participants maintained performance and to examine if participants generalized narrative skills to an unfamiliar conversational partner.

**Transcription**

Immediately upon obtaining the participants’ personal narratives, a research assistant transcribed each personal narrative for data tracking purposes. Next, this initial transcript and its corresponding audio file were de-identified, removing participant and session number information. Then, a trained, research assistant who was blinded to participant identity and session number, independently transcribed each de-identified audio file a second time. The blinded research assistant was provided with narrative topics to aid intelligibility. These files were transcribed using Systematic Analysis of Language Transcription Software (SALT; Miller & Chapman, 2000) conventions, with the exception that up to two independent clauses conjoined with a conjunction were allowed in each utterance. We implemented this modification because one of the intervention grammatical goals was to increase the use of conjunctions. This exception permitted us to capture increases in syntactic complexity related to this goal in our primary microstructure measure, MLU-M. Last, a third trained, blinded research assistant compared the first two transcriptions while listening to the audio file and made any necessary adjustments to the transcripts resulting in the final transcriptions that were used for study analyses. For reliability purposes, a trained research assistant independent-
ly transcribed 20% of the participants’ personal narratives. Reliability for transcription and segmentation was 90% and 88%, respectively.

**Follow-Up Survey**

Approximately three weeks after the posttreatment generalization session, a parent of each participant completed a survey adapted from Calculator (2002) to measure the acceptability of the intervention. Questions focused on perceived effectiveness of the intervention, disruptiveness to family routines, time investment, and willingness of participants and families to take part in the program (Kazdin, 1980; Reimers & Wacker, 1988). Parents responded using a 6-point scale ranging from Strongly Disagree (1) to Strongly Agree (6).

**Dependent Measures**

**Microstructural measure.** MLU-M served as the primary microstructure outcome measure because each of our grammatical targets (i.e., elaborated noun phrases, advanced verb phrases, and conjunctions), if accurately produced by the participant, would increase the number of morphemes in a sentence, resulting in an overall increase in MLU-M. Given the short amount of time devoted to each goal, we did not anticipate consistent production of any one of the targeted forms. Instead, we predicted that across the intervention period, participants would increase their attempts at each targeted form, which would lead to a higher MLU-M. We calculated MLU-M using SALT (Miller & Chapman, 2000) software.

**Macrostructural measures.** We included three sets of macrostructural outcome measures: percent of personal narrative utterances (PPNU), Index of Narrative Complexity (INC), and “Wh” counts. First, to assess the participants’ overall narrative productivity, we calculated the percent of utterances produced that were on-topic, personal narrative utterances. To do this, research assistants coded each utterance as either a personal narrative utterance or a non-personal narrative utterance. We defined personal narrative utterances as utterances marked with a past tense event that related to the participant. Exceptions were made for present tense statements that added information or were evaluative to the narrative, such as, “We went to dinner at my favorite restaurant. It’s called Applebee’s,” or “We went to Applebee’s. I like it so much.” We calculated the PPNU by dividing the number of personal narrative utterances by the total number of utterances in the narrative.

Second, to measure overall narrative quality, research assistants coded each narrative sample using an adaptation of the Index of Narrative Complexity (INC) scoring system (Petersen, Gillam, & Gillam, 2008). We adjusted the INC to more closely reflect elements of personal rather than fictional narratives. For example, we collapsed the “Consequence” category into “Action,” and divided the “Setting” category into separate “Time” and “Place” categories. We also adjusted the scoring of the INC components so that the maximum score for each was 3 points (4-point scale: 0-3). With 10 categories, this resulted in a maximum possible INC score of 30 points.

Third, to more directly examine use of the intervention targets, trained research assistants counted each occurrence of “who,” “what,” “where,” and “when” elements. We defined these components as follows: (a) Who: person or people involved in the narrative, including proper nouns and personal pronouns; (b) What: active verb, which helps describe what happened, or what the participants did; (c) Where: locations included in the narrative, including both settings (e.g., school) and directions (e.g., behind); (d) When: time references within the narrative, including temporal markers (e.g., after) and frequency markers (e.g., “We go every week,” “I call sometimes”).

**Coding**

Research assistants de-identified each of the transcribed personal narratives to blind coders from the session number. A trained research assistant coded each macrostructural component. Another trained blinded research assistant independently scored 20% of the narratives for reliability purposes. Interclass correlations of reliability were above .80 for PPNU, INC, and all “wh” measures.

**Statistical Analyses**

This study used an AB multiple baseline across participants SSED. Researchers have frequently used this design in narrative intervention studies (e.g., Petersen et al., 2014; Petersen et al., 2010; Spencer & Slocum, 2010). To increase the design rigor, we randomly assigned participants to one of three predetermined baseline lengths (Todman & Dugard, 1999). During the baseline sessions and at the beginning of each intervention session, the examiners and interventionists asked participants to recall
three personal narratives without directive prompts. Of these three narrative samples, we used the narrative with the highest INC score for all analyses.

We used three approaches to analyze each microstructure (i.e., MLU-M) and macrostructure (i.e., PPNU, INC, “Wh” Word Counts) measure. First, we visually compared level, variability, and trend of the baseline and intervention phases for each measure. Next, we calculated and analyzed percent of non-overlapping data (PND), a standard descriptor of single subject design data. Last, to characterize the magnitude of change, we calculated effect sizes for all measures using Busk and Serlin’s (1992) \( d \) statistic, a version of Cohen’s \( d \) (1988) for single subject designs that compares the means of the baseline and intervention phases. When baseline variance is non-zero, Busk and Serlin’s \( d \) has been shown to be the most reliable estimator of effects compared to alternate statistics (Beeson & Robey, 2006). We used the rigorous benchmarks of Beeson and Robey to interpret effect sizes as follows: 2.6 - small, 3.9 - medium, and 5.8 - large. Table 3 contains the PND and \( d \) values for each measure.

### Results

#### Mean Length of Utterance-Morphemes (MLU-M)

The graphs of MLU-M in Figure 1 reveal relatively stable baselines for all participants. Visual inspection suggests that Participant A’s MLU-M increased in the intervention phase. The calculated PND (41%) also supports gain in MLU-M for Participant A; however, the calculated effect size was small (\( d = 2.35 \)). Participant B’s intervention MLU-M fluctuated around baseline performance with no clear trend for change during the intervention phase. Participant C’s intervention MLU-M remained flat. PND and \( d \) values for both Participants B and C were unremarkable. Visual inspection of Participant D’s intervention performance and the calculated PND (59%) suggest some gain in MLU-M; however, the effect size is small (\( d = 2.91 \)). Both Participants A and D maintained intervention gains and generalized MLU-M performance in the post-intervention session.

#### Percent of Personal Narrative Utterances (PPNU)

Visual inspection of PPNU in Figure 2 shows wide variability in performance across baseline and intervention phases for all participants. Both Participants A and B demonstrate upward shifts in the intervention phase, which are supported by relatively high PNDs (47% and 65%, respectively); however, neither trend is supported by a large effect size (\( ds = 0.49 \) and 1.33, respectively). Although Participant C’s PPNU level during the intervention phase did not increase relative to baseline, PPNU performance variability decreased in the intervention phase and performance was maintained posttreatment. Participant D’s performance varied significantly across both the baseline and intervention phases. Toward the end of the intervention period, there appears to be some

<table>
<thead>
<tr>
<th>Effect Sizes</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>MLU-M</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PND</td>
<td>41%</td>
<td>28%</td>
<td>0%</td>
<td>59%</td>
</tr>
<tr>
<td>( d )</td>
<td>2.35</td>
<td>0.61</td>
<td>-0.25</td>
<td>2.91</td>
</tr>
<tr>
<td>PPNU</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PND</td>
<td>47%</td>
<td>65%</td>
<td>0%</td>
<td>29%</td>
</tr>
<tr>
<td>( d )</td>
<td>0.49</td>
<td>1.33</td>
<td>0.36</td>
<td>0.66</td>
</tr>
<tr>
<td>INC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PND</td>
<td>35%</td>
<td>0%</td>
<td>44%</td>
<td>12%</td>
</tr>
<tr>
<td>( d )</td>
<td>0.25</td>
<td>0.11</td>
<td>1.05</td>
<td>0.48</td>
</tr>
<tr>
<td>Who</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PND</td>
<td>41%</td>
<td>29%</td>
<td>67%</td>
<td>12%</td>
</tr>
<tr>
<td>( d )</td>
<td>0.46</td>
<td>0.62</td>
<td>3.18</td>
<td>1.24</td>
</tr>
<tr>
<td>What</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PND</td>
<td>24%</td>
<td>41%</td>
<td>67%</td>
<td>12%</td>
</tr>
<tr>
<td>( d )</td>
<td>-0.20</td>
<td>0.87</td>
<td>2.17</td>
<td>0.68</td>
</tr>
<tr>
<td>Where</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PND</td>
<td>0%</td>
<td>35%</td>
<td>61%</td>
<td>0%</td>
</tr>
<tr>
<td>( d )</td>
<td>-0.12</td>
<td>0.67</td>
<td>3.72</td>
<td>0.32</td>
</tr>
<tr>
<td>When</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PND</td>
<td>29%</td>
<td>0%</td>
<td>61%</td>
<td>6%</td>
</tr>
<tr>
<td>( d )</td>
<td>-0.19</td>
<td>-0.32</td>
<td>2.19</td>
<td>1.33</td>
</tr>
</tbody>
</table>

Note. MLU-M = Mean Length of Utterance in Morphemes; PPNU = Percent Personal Narrative Utterances; INC = Index of Narrative Complexity. Effect sizes suggestive of clinically significant change (i.e., PND value greater than 50%; \( d \) value greater than 2.6) are bolded.
stabilization of Participant D’s performance, but PND is low (29%) and the effect size is small ($d = 0.66$). Participants A and C maintained high levels of performance on the PPNU measure in the postintervention session; whereas, the maintenance and generalization on this measure was low for both Participants B and D.

**Index of Narrative Complexity (INC)**

Figure 3 display participants’ performance on the INC. Visual inspection reveals fluctuating, but relatively high baseline performance for all participants. Participant A’s performance is characterized by a gradual upward shift in trend; however, PND (35%) and effect size ($d = 0.25$) values are small. Participant B’s performance remains flat with little variability. This lack of improvement is supported by a PND of 0% and very small effect size ($d = 0.11$). Similar to Participant A, Participant C’s performance gradually increases over the intervention phase. This increase is supported by a modest PND (44%); however, the effect size is small ($d = 0.66$).

*Figure 1. Multiple baseline results for mean length of utterance in morphemes.*
Participant D demonstrated little change in INC performance in intervention compared to baseline. PND (12%) and effect size ($d = 0.48$) also suggest little intervention gains. All participants had relatively high levels of performance based on the INC measure during the generalization session. Figure 4 contains graphs of each of the number of “Wh” components. Visual inspection of Participant A’s performance across the four measures suggest gradual level increases for the “Who” and “What” components. There is some increased variability in the use of “When” and no clear shift is use of “Where.” PND values suggest the greatest increase is in the use of “Who” (41%), followed by “When” (29%) and “What” (24%). All effect sizes were small. Participant A maintained and generalized high levels of performance across all “Wh” components during the post-intervention session.
Visual inspection of Participant B’s performance indicates patterns similar to Participant A’s patterns. There are upward level shifts for both the “Who” and “What” components; however, variability is high for both components in the intervention phase. There is greater variability for inclusion of “Where.” PNDs for these three components are relatively small: “What” = 41%, “Where” = 35%, and “Who” = 29%. There is a decrease in inclusion of “When” components. All effect sizes are small. Participant B’s postintervention performance was high across all components, with exception of the “When” component.

Of the four participants, Participant C appeared to make the greatest gains on the “Wh” components. There are clear increases in level and trend for “Who,” “What,” and “When.” There is a more gradual increase associated with high variability for “Where.” The PNDs for all components are greater than

Figure 3. Multiple baseline results for Index of Narrative Complexity.
Figure 4. Multiple baseline results for “Wh” components.
60% and all effect sizes are greater than 2.00, with two approaching the medium effect size standard. However, Participant C's postintervention performance indicated a decline in use of all of the “Wh” components.

Participant D’s performance is relatively flat across both baseline and intervention phases for all measures. All PNDs were less than 15%. The largest effect size (d = 1.24) was associated with the “Who” component, but intervention performance was well below baseline performance. Participant D’s postintervention performance was commensurate to her baseline performance for all components.

Parent Survey
Table 4 includes mean ratings and responses to each parent survey item. Items grouped under the Positive Perceptions header are those to which high ratings are more favorable. Items grouped under the Negative Perceptions header are those to which low ratings are more favorable. Results of the Positive Perception items indicated that all parents indicated that the instruction provided was acceptable (Item 1), helpful (Item 2), and that their children enjoyed taking part in the intervention (Item 11). In particular, parents responded that having a picture available was helpful in supporting their children’s ability to provide a narrative about something that had happened to them (Item 5). Despite the value of having a picture to support the retell of personal narratives, the lowest ratings were for Items 4, 8, and 10, all of which were related to picture use. Ratings of the Negative Perception items were all low indicating that parents did not believe that there were major disadvantages or negative side effects associated with the intervention. However, the highest average rating (2.5) in this section was for Item 13, which indicated that taking pictures was somewhat disruptive for families.

Discussion
Four school-age children with DS participated in a single-subject multiple baseline study, which aimed to evaluate the feasibility of a visually supported personal narrative intervention using an iTouch in conjunction with a narrative map. We evaluated performance on both microstructural (i.e., MLU-M) and macrostructural (i.e., number of on-topic utterances, INC, inclusion of targeted wh-components) measures and examined short-term maintenance and generalization.

All participants learned to use the iTouch and were able to demonstrate how to take and review pictures after a single session. Participants demonstrated small to modest improvements related to both micro- and macrostructural language measures. More specifically, Participants A and D demonstrated gains in performance based on microstructural MLU-M measure, which were supported by small effect sizes. These gains generalized and were maintained. Analyses of each of the macrostructural measures indicated that Participants A and B made intervention gains based on PPNU, but only Participant A maintained her gains. For the INC measure, Participants A and C made significant gains and all participants maintained a high level of performance. Participants A, B, and C each made gains on at least two of the macrostructural “Wh” component measures. Although Participants A and B maintained these gains, Participant C demonstrated a decline in performance on the maintenance-generalization probe. Parents endorsed both the acceptability and feasibility of the intervention program.

Consistent with previous examinations of the narrative language skills of individuals with DS, all of the study participants demonstrated significant deficits in their narrative language abilities. Preintervention assessments indicated floor performance on the Test of Narrative Language. Also consistent with previous studies, participants appeared to benefit from visual supports throughout the intervention. Moreover, the findings of Chapman and colleagues (Chapman, 1999; Chapman et al., 2002) that indicate continued growth and development of the language skills of individuals with DS throughout adolescence were further supported by current study outcomes. Each participant demonstrated intervention growth on at least one of the dependent variables.

It is important to note that although participants tended to maintain and generalize intervention gains, there were inconsistencies in gains across participants. Participants A and C, the participants who made the greatest gains, had chronological ages greater than the other two participants. Participant B’s NVMA was greater than both Participants A and C. Participant C’s language performance on the standardized assessments was the lowest of all the participants. Thus, it does not appear that cognitive and language
ability measured by these standardized assessments accounted for the positive gains made by Participants A and C. Based on our limited sample size and measures, chronological age seems to heavily influence study performance.

Given the lack of previous examinations of narrative interventions for individuals with DS, this study aimed to determine if an intervention focused on improving microstructural and macrostructural language forms within a personal context would be feasible for individuals with DS. Additionally, we evaluated the feasibility of the use of a novel visual support: personal photos taken by participants using an iTouch. Study results suggest that the intervention approach used in the current study is feasible and has the potential to be beneficial for individuals with DS. Each study participant completed 18 treatment sessions and made gains on at least one of the dependent measures. Gains were made on

Table 4
Participant Survey Results

<table>
<thead>
<tr>
<th>Survey Items</th>
<th>Participant</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Perceptions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. I found the personal narrative instruction provided to my child to be acceptable.</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>5.75</td>
<td></td>
</tr>
<tr>
<td>2. I found the personal narrative instruction provided to my child to be helpful.</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>5.75</td>
<td></td>
</tr>
<tr>
<td>3. Thinking in the long term, it is likely that this type of instruction might make permanent improvements in my child’s success in telling personal narratives.</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>4. By the end of the study, my child independently took appropriate pictures to support their personal narratives.</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>5. Having a picture available of something that recently happened supported my child to tell a personal narrative about that experience.</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>5.75</td>
<td></td>
</tr>
<tr>
<td>6. I believe this type of instruction could be used at home by parents to support the personal narratives of a child with Down syndrome.</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>5.25</td>
<td></td>
</tr>
<tr>
<td>7. I have witnessed an improvement in some aspect of my child’s personal narratives as a result of this instruction.</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>5.25</td>
<td></td>
</tr>
<tr>
<td>8. At least occasionally, my child still uses some form of pictures to support telling a personal narrative.</td>
<td>2</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>4.75</td>
<td></td>
</tr>
<tr>
<td>9. The iPod worked well as a picture-taking and picture storage tool for my child.</td>
<td>5</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>10. The “Daily Log” application’s time stamping and picture naming features worked well for my child to record information about her pictures.</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>4.25</td>
<td></td>
</tr>
<tr>
<td>11. My child enjoyed participating in the instructional sessions held in her home.</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Negative Perceptions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. I believe there are disadvantages to this instruction.</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1.75</td>
<td></td>
</tr>
<tr>
<td>13. It was disruptive to my family to have my child with Down syndrome take pictures for the purpose of this personal narrative instruction.</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>14. It takes too much time to have my child with Down syndrome take pictures for the purpose of this personal narrative instruction.</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>15. There were undesirable side effects associated with this instruction.</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1.75</td>
<td></td>
</tr>
</tbody>
</table>

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = Slightly Disagree, 4 = Slightly Agree, 5 = Agree, 6 = Strongly Agree.
macrostructural measures, which, to the best of our knowledge, have never been examined in an intervention for school-age children with DS. Moreover, the participants readily took pictures between sessions and parents reported that they believed these photos helped to support their child’s sharing of a personal event. Importantly, all parents found the intervention to be helpful and believed that their child enjoyed the sessions. Based on these outcomes, we believe that similar interventions should be more fully evaluated to further advance language interventions for individuals with DS.

Future Considerations
This feasibility study offers rich information for researchers and clinicians to consider as they continue to develop and examine narrative interventions for individuals with DS. For example, there are several design features in the current study that may have limited treatment gains and restrict interpretation of study results, including (a) delayed use of the narrative map, (b) phase lengths, and (c) varied event selections for personal narratives. We describe each of these in the following sections.

Visual support. Given that individuals with DS frequently have co-occurring cognitive and language deficits, including significant weaknesses in working memory (Jarrold & Baddeley, 2001; Jarrold, Baddeley, & Hewes, 1999; Lanfranchi, Cornoldi, Vianello, & Conners, 2004), it is likely that the study participants benefitted from the iTouch photos. These photos could support both short- and long-term memory retrieval. Initially, we intended for the iTouch photos to be the only source of visual support, but as the intervention progressed, it was clear that additional support was necessary. Thus, the interventionists implemented use of narrative maps to support working memory and online organization of narrative elements. Because of the late and variable timing of the introduction of the narrative map, it is unknown if intervention outcomes would have been better if the map was used beginning with the first treatment session.

For Participant C, the interventionists introduced the narrative map during the first intervention session. Participant C demonstrated the greatest gains on macrostructural measures, particularly the “Wh” components. Thus, these gains may have been facilitated by the early map use. Given Participant C’s weak language performance on the standardized assessments, but relatively strong conversational skills based on MLU-M, the study intervention, with both types of visual cues, may have provided this participant with the necessary supports to improve her personal narratives. This finding is consistent with evidence that suggests individuals with DS have strengths in visual processing that can be leveraged to improve relative weaknesses in narrative language (Chapman et al., 1998; Roberts et al., 2008).

Participants and their families reported that they particularly liked the use of personal photos captured by participants on personal devices. Participants were motivated to capture photos and to draw on the photos during intervention. Thus, we recommend that clinicians consider using multiple types of visual supports in their interventions, including personal photos, and that in the future, researchers directly examine the impact of differing supports on outcomes.

Phase lengths. Study analyses were somewhat limited due to unstable baseline performance across participants. To maximize time efficiency, we decided to randomly assign participants to baseline phases varying in length from four to six sessions. Researchers have recommended this approach as an alternative to response-guided baseline lengths as a way to remove potential biases (Todman & Dugard, 1999). However, because of this approach, we did not achieve stable baselines for every participant and measure. Thus, it is difficult to be confident that performance increases during the intervention phase were linked to the intervention and not other potential external factors. We recommend that future investigations randomize longer baseline lengths, for example, lengths of six, eight, and 10 sessions.

The intervention phase was relatively short at 18 sessions, although intensive at two to three sessions a week. We targeted each grammatical and narrative goal for six sessions. This completed one cycle of goals. Given that many participants started to make treatment gains during the last six sessions of the intervention period, it likely that with more sessions, participants would have made greater gains. Ideally, the interventionists would have cycled through each goal set a second time. Thus, we recommend that researchers and clinicians employ more intervention sessions.

Event selection. There are many benefits to focusing on personal narratives in interventions for children with DS. Personal narrative contexts
meet each intervention criterion recommended by Calculator (1988). Personal narratives can be used across a variety of settings, they are appropriate for all ages, they can be practiced throughout the day, and they can help build social relationships. One limitation of using a personal narrative-based intervention is that the selection of the event to be relayed is primarily in the control of the client. We found that during the baseline phase, many participants relayed personal narratives that may have been highly familiar and well rehearsed. For example, for Participant A, two of the first three personal narratives produced during the first baseline session included 20 or more utterances. Across all other sessions, the average number of utterances included in the samples was 10. The topics of these narratives included going to grandma’s house and a sister’s birthday party. Some of these early personal narratives are likely to have negatively impacted the baseline data points. Increasing the number of baseline sessions will help to reduce the impact of these highly familiar narratives.

An additional limitation to the use of personal narratives is that the events captured by photos to be used session to session are likely to vary significantly in terms of characters, settings, and actions. Some events inherently have more narrative components than others. Some days are likely to have more exciting events than others; thus, variability on the personal narrative measures used in this study is likely. Future studies should consider using an alternative narrative quality-rating scheme that rates overall completeness of the recounted event. In intervention sessions, clinicians should consider working closely with their clients with DS to capture and select photos that offer rich content to support personal narratives.

Conclusions
Study results indicate that an intervention focused on improving the expression of personal narratives is feasible to implement and has the potential to be highly advantageous for school-age children with DS. All participants readily used personal devices to capture photos to support their own personal narratives and parents reported that their children enjoyed the intervention. We recommend that future investigations continue to examine personal narrative interventions for individuals with DS. It is important for future studies to include more intervention sessions and to continue to investigate use of multiple types of visual supports, including narrative maps and personal photos.

References


Personal Narrative Intervention for DS

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