Examining the Benefit of Including a Sibling in Story-Based Interventions With a Child With Asperger Syndrome

Jenna Foran Lewandowski
Tiffany L. Hutchins
Patricia A. Prelock
Dianna Murray-Close
University of Vermont, Burlington

ABSTRACT: Purpose: Story-based interventions have been used to address the social, communicative, and behavioral impairments that are characteristic of autism spectrum disorder (ASD). However, no studies have examined the potential benefit of including a typically developing child, such as a sibling, in this type of intervention.

Method: This case study examined the social validity of using comic strip conversations (CSCs) for a 6-year-old boy with Asperger syndrome and his typically developing younger brother to address conflict in a home setting. The 2 boys received separate adult-mediated CSC sessions around several discrete events involving the common theme of sibling conflict. Quantitative subjective ratings of behavior change were collected in the form of maternal daily diaries.

Results: Tau-U analyses across A (baseline), B (CSC with child with ASD only), A (withdrawal), C (CSCs with both the child with ASD and the typical sibling), and A (withdrawal) phases of study indicated therapeutic changes in the child with ASD during Phase C that were maintained in the final withdrawal period. Dyad-specific experiences between siblings and the importance of adult mediation to triangulate shared meaning-making, promote social learning, and address sibling conflict are discussed. Limitations and directions for future research are also considered.

KEY WORDS: autism, sibling, comic strip conversation, intervention treatment.
This article describes the characteristic features of ASD with an emphasis on ToM development, explains CSCs, and examines the nature of the social relationships between children with ASD and their typically developing (TD) siblings. The introduction concludes with a discussion of the importance of social validity in the context of family-centered intervention. It is ultimately argued that an examination of caregivers’ impressions of the effectiveness of CSCs to guide dyad-specific experiences is a valuable contribution to the field of autism research.

**Characteristic Features of ASD**

ASD is a complex neurodevelopmental disorder (National Institute of Mental Health, 2004) that ranges from mild to severe and is expected to affect individuals differently (Gray & Garand, 1993; Kientz, Hayes, Westeyn, Starner, & Abowd, 2007). The diagnostic category Asperger syndrome is not retained in the most recent version of the *Diagnostic and Statistical Manual* (APA, 2013); however, we retain the term here for descriptive purposes, as Asperger syndrome was the original diagnosis for the child who is described in this study. Under the previous diagnostic framework, individuals with Asperger syndrome were characterized as having relatively high cognitive skills and none of the language delays that have been identified for other spectrum disorders. Like other spectrum disorders, however, Asperger syndrome was also characterized by deficits in the pragmatic domain of language and by impairments in social skills (Neihart, 2000; Ruta, Mugno, D’Arrigo, Vitiello, & Mazzone, 2010).

Although a matter of debate, several researchers have argued that ToM plays an important role in the impairments that are seen in individuals with ASD and, more specifically, Asperger syndrome. As noted earlier, ToM can be broadly defined as the ability to reason about the thoughts and feelings of the self and others (Kuoch & Mirenda, 2003). Individuals with ASD generally perform poorly on measures of ToM compared to language- and age-matched peers, leading many researchers to conclude that deficits in ToM are the underlying *causal* factor leading to the social, communicative, and behavioral impairments that are characteristic of ASD (e.g., Baron-Cohen, 1995; Baron-Cohen et al., 1985). It makes sense that deficits in ToM, or the capacity to mind-read, could have profoundly negative consequences for social interaction and social communication. As Gray (1998) noted, “Discussions surrounding ToM have increased our awareness that most people are privy to a ‘secret code’: a system of unspoken communication that carries essential information; a system that eludes and frustrates individuals with high-functioning autism and Asperger Syndrome” (p. 169). One important theoretical implication is that if story-based interventions address a core ToM deficit, then treatment that is designed to support ToM development should be accompanied by improvements in social, communicative, and behavioral functioning.

**CSCs to Support ToM in ASD**

CSCs are story-based interventions where two people have a conversation using a structured visual format so as to share meaning about a social event. Thus, CSCs take advantage of the visual strengths of individuals with ASD (Arthur-Keely, Sigafos, Green, Mathisen, & Arthur-Kelly, 2009; Dettmer, Simpson, Myles, & Ganz, 2000; Grandin, 2006; Gray, 1994, 1998; Ukrainetz, 1998) and involve drawing, writing, and talking as major components of the activity.

A set of conventions has been established for constructing CSCs (Gray, 1994). First, a symbols dictionary introduces how basic concepts such as talking, thinking, and listening are visually represented (e.g., thought bubbles, talking bubbles; see Appendix). Other conventions include drawing a location symbol in the upper left corner of the paper to indicate where the story takes place, writing the title at the top of the paper, drawing simple stick figures to represent the people involved, and sequencing events in chronological order as they occur (Gray, 1994, 1998).

CSCs also aim to identify appropriate solutions for a problem. To do this, any solution offered by the participant is written down as a possible solution. The participant is asked to discuss each solution with the researcher and then eliminate (i.e., cross out) solutions that no longer seem appropriate or feasible (Gray, 1994). CSCs are dynamic interventions because they are created during conversation and their content relies on the children who actively coconstruct them. The researcher can guide and pose questions, but the ultimate goal is to have the individual with ASD complete the majority of the writing and drawing (Gray, 1994). In practice, CSCs usually follow an unsuccessful social situation but need not do so; in fact, affirmative stories that are designed to acknowledge and celebrate success are encouraged in order to increase a child’s motivation to participate in CSCs and to reinforce positive behaviors by giving meaning to praise (Vivian, Hutchins, & Prelock, 2012).

The research examining the effectiveness of CSCs is quite limited. Pierson and Glaeser (2007) sought to decrease loneliness and increase social satisfaction in three students with ASD using an AB design with 6
weeks of CSC intervention. Qualitative data indicated changes in the target behaviors for all three students. Specifically, signs of social satisfaction, interpreted as “fewer loneliness verbalizations, increased chatter/talkativeness with peers, and a greater desire to participate with peers in the classroom and on the playground” (p. 463) were observed, as were improvements in social skills. Vivian et al. (2012) used a combination of face-to-face meetings and telepractice to train the parents of a child with ASD to use CSCs in their home. A formal ToM measure and parent report indicated modest ToM increases and satisfaction with CSCs as an intervention technique.

Ahmed-Husain and Dunsmuir (2014) examined the effectiveness of CSCs to improve problem behaviors in eight adolescents with ASD in a school setting. They reported that CSCs were moderately to highly effective for seven of the eight students and that more effective CSCs tended to include highly specified, unambiguous target behaviors that had realistic and implementable strategies and solutions. To the best of our knowledge, all other studies on this topic that are reported in the peer-reviewed literature have combined CSCs with other story-based interventions (i.e., Hutchins & Prelock, 2006, 2008, 2013a; Rogers & Myles, 2001), making it impossible to evaluate the effects of CSCs when used in isolation and thus indicating an important direction for research.

Although there is a paucity of research on CSCs, social stories (Gray, 2010; Gray & Garand, 1993), which are a theoretically similar story-based intervention, have been the topic of rigorous scrutiny. Several descriptive (Ali & Frederickson, 2006; Karkhanesh et al., 2010; Nichols, Hupp, Jewell, & Ziegler, 2005; Rust & Smith, 2006; Sansoti, Powell-Smith, & Kincaid, 2004) and quantitative (Kokina & Kern, 2010; Reynhout & Carter, 2006, 2011; Test, Richter, Knight, & Spooner, 2011) reviews of the social story literature have been conducted, with most authors concluding that social stories are a promising intervention for children with ASD. This interpretation of the evidence is consistent with the conclusions of The National Standards Project (National Autism Center, 2009), which has identified story-based interventions as one of 11 established treatments in ASD.

One notable finding surrounding social stories is the tremendous variability that is reported in the efficacy research. When it comes to social stories, “the most striking feature of the data ... is the degree of inconsistency” (Reynhout & Carter, 2006, p. 466), and in large-scale studies where participants receive multiple interventions, a frequent outcome is mixed results (Hutchins & Prelock, 2013b). That is, there is a general lack of participant characteristics that predict success with this intervention and, for most participants, some stories seem to work whereas others do not. This inconsistency has proven frustrating from a clinical standpoint; however, it is not surprising to caregivers and researchers, who notice uneven levels of functioning across settings and situations. Moreover, this finding is particularly important in that it suggests a crucial role for context.

### Sibling and Other Dyadic Relationships as Context

Like all social interactions, the negotiation of sibling relationships is often challenging for children with ASD. This may lead to frustration and confusion in the TD sibling, who may not understand the lack of reciprocation in play and may be confused or frightened by aggression demonstrated by the child with ASD (Ferraioli, Hansford, & Harris, 2012). This, in turn, is associated with an increased risk in TD siblings for behavioral and emotional problems as well as less positive relationships with the child with ASD (Beyer, 2009; Orsmond, Kuo, & Seltzer, 2009; Petalas et al., 2012). Thus, one important (but rarely considered) implication of sibling involvement in intervention is to promote more optimal developmental outcomes and wellness among the siblings themselves.

Sibling relationships have been described as the “key medium” for the development of social skills in children with ASD (Knott, Lewis, & Williams, 2007, p. 1987). This is because the familiarity and consistency of sibling interactions offer a unique opportunity that is not often found in peer relationships (Abramovitch, Corter, Pepler, & Stanhope, 1986). Studies of children with various disorders, including ASD, have found that the TD sibling assumes the role of “teacher” regardless of birth order (Knott, Lewis, & Williams, 1995; Stoneman, 2001). This is consistent with the studies of ASD that have used trained interaction partners and recruited a TD child (i.e., a peer or sibling) to teach social skills and appropriate behaviors to the child with ASD (e.g., Bass & Mulick, 2007; Ferraioli et al., 2012; Tsao & Odom, 2006).

Findings from this research suggest that TD children can have a positive impact when they are trained to act as skilled interaction partners with children with ASD. It is noteworthy, however, that such a model of intervention is very much like models of adult-mediated interventions that view the adult (i.e., parent, teacher, researcher) as responsible for transferring the lessons (moral, emotional, behavioral) that constitute social competence (Root, Hastings, & Maxwell, 2012). Yet, in all social relationships, socialization effects are dynamic and bidirectional (Hubbard,
Dodge, Cillessen, & Coie, 2001; Klein, Feldman, & Zarur, 2002). That is, socializing forces act on and influence the child with ASD, but he or she is not a passive recipient in this process; the child also acts on the socializing agents so as to change the agent’s beliefs and behaviors through his or her own actions and development (Root et al., 2012).

In a related vein, the literature on peer intervention or sibling relationships generally views negative social and behavioral effects as emanating from undesirable but relatively stable characteristics of the individual with ASD. Thus, unilateral interventions, including story-based interventions like CSCs that incorporate adult-mediated dialogue to enhance social understanding in the child with ASD, risk neglecting the importance of “relationship as context” and the role of dynamic and evolving dyad-specific experiences. To be clear, story-based interventions are contextual in the sense that their content embeds settings, people, and activities into the social experience of the child; however, they are acontexual and unilateral insofar as they are directed solely at the child with a disability and therefore are removed from the mutually negotiated social relationships that are constructed between and among persons.

Social Validity and Family-Centered Intervention

Social validity involves the extent to which consumers view a given practice as addressing socially significant goals and socially important treatment outcomes (Wolfe, 1978). Social validity data for social stories have been collected in the form of interviews, questionnaires, and formal and informal rating scales so as to assess the feasibility and perceived effects of treatment among professionals (e.g., Reynhout & Carter, 2009).

As noted previously, very few studies have been conducted to examine the effects of CSCs, and so very little is known about their efficacy or effectiveness. Additionally, examinations of the social validity of CSCs are particularly rare (for a notable exception, see Vivian et al., 2012). This is an important direction for research because families are valuable partners in the design, implementation, and evaluation of treatment plans. Families are also well positioned to “determine what is in the best interest of a child” (Prelock & Hutchins, 2008, p. 323) and to ensure that outcomes are relevant to family priorities (Hutchins & Prelock, 2006, 2008). Moreover, caregivers are uniquely situated to provide insight into a child’s behavior and communicative challenges across a range of settings and situational contexts and are valuable collaborators in the development and assessment of intervention (Prelock & Hutchins, 2008). Involving caregivers as informants and interpreters of children’s behavior reflects the growing recognition that caregivers are not only experts regarding their children, but they are reliable and invaluable sources of information as well (Crais, 1993).

Statement of the Problem

Deficits in ToM are at the heart of the social, communicative, and behavioral problems that limit opportunities for shared meaning-making and challenge individuals with ASD and their TD siblings to engage in successful interactions. At the same time, Gray (1995) reminds us that failures in communication and understanding can result from “two equally valid but different perspectives” (p. 219). Adult-mediated story-based interventions seem well suited to the task of giving both the child with ASD and his or her interactional partner direct access to accurate social information. Although story-based interventions have been demonstrated to be effective for supporting communication and social behaviors (National Autism Center, 2009) when used unilaterally, their effectiveness for triangulating meaning and addressing the perspectives and behaviors of two parties has not been addressed.

This single case study examined the effects of a modification in the procedures for administering CSCs to address sibling conflict between a child with ASD and his TD younger brother. As described earlier, this study adopted a family-centered approach to intervention. In line with parental priorities for intervention, the primary focus in this study was sibling conflict; this focus presents ideal opportunities for supporting ToM development through learning about the social and emotional factors that contribute to both conflict and resolution (Ruffman, Perner, & Parkin, 1999).

Method

Participants

Participants included one child who had been diagnosed with ASD, his TD sibling, and the children’s birth mother. At the time of recruitment into the study, 5-year-old Peter (pseudonym) had recently received a diagnosis of Asperger syndrome from a developmental pediatrician. Peter lived with his mother, his father, and his TD younger brother, Brian (pseudonym), who was age 4:2 (years:months). Peter attended a local school where he was enrolled in a general education kindergarten class and where Brian was enrolled in the preschool.
Measures

A number of formal and informal parent-informant and child-performance measures were administered at pre-intervention to confirm a diagnosis of ASD for Peter and to obtain measures of baseline functioning (language, social skills, ToM) for both Peter and Brian. The formal measures described in the following paragraphs were selected on the basis of their good psychometric properties and their common use in the ASD literature.

**Parent-informant measures**

*Gilliam Autism Rating Scale—Second Edition (GARS–2; Gilliam, 2006).* The GARS–2 is a 42-item norm-referenced autism screening measure that assesses a child’s stereotyped behaviors, communication, and social interaction tendencies so as to help determine the probability and degree of autism.

*Social Responsiveness Scale (SRS; Constantino & Gruber, 2005).* The SRS assesses the social impairments that accompany ASD. The test is composed of 65 items measuring social awareness, social reciprocation, and the anxiety the child experiences during social situations.

*Social Skills Rating System (SSRS; Gresham & Elliott, 1990).* The SSRS assesses a wide range of social skills. It consists of two subtests: the Social Skills subtest and the Problem Behaviors subtest (49 items total).

*Theory of Mind Inventory (ToMI; Hutchins, Prelock, & Bonazinga, 2012).* The ToMI measures a child’s ToM development. The measure consists of 42 statements assessing a range of ToM abilities. The ToMI reflects a developmental progression of ToM and yields a composite score as well as three subscale scores corresponding to early, basic, and advanced ToM competencies.

The Early subscale is believed to tap those aspects of ToM that are the earliest emerging in typical development and that involve sharing affect, sharing attention, and reading emotional expressions (e.g., “My child can show me things”). The Basic subscale is intended to tap those ToM competencies that typically emerge in the preschool years and are associated with metarepresentation and the relationship between inner mental states and behaviors (e.g., “My child knows that if someone is afraid of the dark, they will not want to go into a dark room”). The Advanced subscale is designed to tap later emerging ToM understandings that rely on the integration of subtle social cues and more complex or recursive forms of metarepresentation (e.g., “My child knows the difference between when a friend is teasing in a nice way and when someone is bullying in a mean way”).

**Child-performance measures**

*Expressive Vocabulary Test—Second Edition (EVT–2; Williams, 2007).* The EVT–2 measures a child’s expressive vocabulary and word retrieval skills. The EVT–2 uses visuals and stimulus questions and requires one-word responses that correspond with the visual stimulus that is shown for each item.

*Peabody Picture Vocabulary Test, Fourth Edition (PPVT–4; Dunn & Dunn, 2007).* The PPVT–4 measures a child’s receptive vocabulary and is often used as an index of a child’s verbal mental age.

*Test for Reception of Grammar, Second Edition (TROG–2; Bishop, 2003).* The TROG–2 assesses a child’s understanding of grammatical concepts in individuals who are 4 years of age and older. The TROG–2 consists of 80 items that assess grammatical contrasts such as inflections, function words, and word order.

*Daily diaries to assess target behavior.* Peter and Brian’s mother used daily diaries to rate her observations of the targeted behaviors. Guided by her understanding of the goals of the intervention, she collaborated with researchers to develop the wording of the question on the diaries. Specifically, she responded to the prompt “Based on my judgments today, Peter/Brian [depending on whose diary she was completing] is able to negotiate challenging situations with his brother (e.g., he can use strategies to resolve conflict or exit the situation, he can use his words to communicate more appropriately).” This question was accompanied by a 10-point Likert scale that was anchored by disagree (1) and agree (10). The mother was instructed to respond “don’t know” in the event that she was unable to observe Peter and Brian in situations where she could form an impression. “Don’t know” responses were infrequent and were treated as missing data.

**Design and Procedure**

This study used a single-subject ABACA design that also included some qualitative, ethnographic methods (qualitative aspects are described more fully later). The baseline (A) phase lasted a total of 34 days, Peter’s CSC intervention (B) phase was 89 days, the following withdrawal (A) phase was 38 days, Peter and Brian’s co-occurring CSC intervention (C) phase was 75 days, and the final withdrawal (A) phase was 77 days. In both of the intervention phases (i.e., phases B and C), the intervention was delivered 12 times. By design, the first two A phases of study were shorter in duration compared to the two intervention phases and the final A withdrawal/maintenance phase.

We expected any trends in the first two A phases to be evident over an approximate 4- to 5-week interval but extended both intervention phases to ensure
enough time to deliver the full set of 12 CSCs in each at a reasonable pace (i.e., one to two times per week using a timetable that differed slightly across intervention phases and that aligned with the scheduling needs of the family). As noted earlier, the final A phase was also extended because longer maintenance phases are desired so as to be sensitive to performance trends that may not be immediately evident. In both intervention phases, the participant(s) completed CSCs addressing conflict negotiation. During the C phase (where both children received intervention), the CSCs took place on the same day for each boy, but each had individual sessions with the researcher. All intervention and data collection procedures occurred in the family’s home.

At the first home visit, the researchers obtained informed consent, collected demographic information, and administered all parent-informant and child-performance measures. The participants’ mother and father also participated in a semistructured interview that asked about the family and their priorities for intervention. Specifically, the parents were asked to provide some details surrounding their personal history (i.e., nature and age of diagnosis, interventions they have participated in during the past or at present) and to reflect on their child’s strengths and challenges more generally. During the interview, the researcher asked the mother to identify a challenging situation that she experiences with the child in the home. Researchers explained that this information would be used to develop the content of the intervention using CSCs. The initial home visit lasted approximately 3 hr.

In order to provide baseline behavior data, the participants’ mother completed daily diaries for approximately 1 month prior to the start of intervention. Once treatment began, she continued to complete daily diaries for each child across the phases of study. These daily diaries were collected on a monthly basis. In addition, the ToMI was completed for each child at the beginning of each A phase (hence, the ToMI was completed three times for Peter and two times for Brian).

Learning About Peter and Brian

The primary challenge identified by the participants’ mother involved Peter and Brian’s difficulty negotiating challenging situations with each other. Specifically, the mother reported that Peter had trouble negotiating conflict without becoming emotionally escalated and physical with Brian. He also showed characteristic signs of Asperger syndrome in that he struggled to understand Brian’s thoughts and desires as well as the causes and consequences of his and others’ behaviors.

Brian contributed to conflict with inflexible behavior and emotional outbursts. He would often yell and cry when he did not get his way. Given that sibling conflict was a parental priority for intervention, specific CSCs were developed to address these challenges.

CSC Intervention

Each intervention session took place at a table in the family’s home office. The researcher introduced and explained the symbols dictionary in the first few sessions in order to remind the participants of the talking and thinking bubbles that would be used in the session. After the participants showed understanding of the established conventions, the symbols dictionary was left on the table but was not reviewed unless Peter or Brian had questions. The activity was introduced by explaining that the researcher would help the boys write and draw while discussing a situation. The researcher explained why the topic of the CSC was selected and why it was important to discuss.

She then asked the participant to help by explaining the events that took place in the challenging situation. The participant sat next to the researcher and participated by writing and drawing as much as possible. A flip (video) camera was placed on a tripod and was used to record each session for reliability purposes.

The researcher followed a fidelity checklist that was designed to ensure that all elements of the intervention were executed during each session and that the intervention procedure remained consistent. The checklist prompted the researcher to ask the participants’ parent if something new had happened that needed to be discussed. It also prompted the researcher to introduce the CSC, include a location symbol, review the symbols dictionary as needed (see Appendix), use drawing conventions (e.g., stick figures, talking bubbles, and thinking bubbles), include an enumerated sequence of events (if appropriate), summarize the CSC, identify possible solutions at the end of the CSC, and engage in 5–10 min of child-directed play at the conclusion of each session. Every session was videotaped and was reviewed for fidelity by a supervising certified SLP (and third author) who is an expert in autism and story-based interventions.

In the opinion of this researcher (the first author) and his mother, Peter very much enjoyed CSCs. Peter seemed engaged in the activity, could sustain attention for relatively long periods of time, and quickly took responsibility for the majority of the talking and drawing. Peter was initially reluctant to discuss certain topics that he considered private, but with encouragement from his mother, he was able to discuss these topics openly. Brian also seemed to enjoy the
CSCs and was actively engaged in discussions surrounding the intervention topic. Due to Brian’s age, the researcher completed the majority of the writing and drawing during his sessions. The researcher prompted Brian for information as she created the CSC. Brian enjoyed identifying the stick figures in the CSC by writing the initial of their first name on the paper.

Prior to each CSC intervention, Peter and Brian’s mother would update the researcher on challenges the boys had faced since the last session and would suggest the topic for the CSC and provide details to facilitate the CSC. Fidelity checklists were used to guide the discussion, and the researcher gathered information from the mother about where the event took place, who else was there, what happened, what was said, what people did, and what people thought. Thus, the primary goals of the discussion with the mother were to understand the physical setting, the sequence of events, and the psychologies of each of the boys (and any other relevant persons) that surrounded the event.

The topics discussed during both intervention phases are presented in Table 1. In both the B (where only Peter received CSCs) and C (where both Peter and Brian received CSCs) phases, the conversations focused on recent events involving sibling conflict. Affirmative CSCs were introduced to recognize successful interactions, offer praise, and increase the children’s motivation to engage in the intervention. The frequency of affirmative stories was determined by parental priorities for intervention, with the result that two affirmative CSCs were completed for Peter in Phase B and one affirmative CSC was completed for each participant in Phase C.

With regard to specific content, every effort was made to keep the CSC content similar, but the language and complexity of the narratives were necessarily adjusted to suit each child’s cognitive and language level. Examples of the CSCs for each boy are offered to give a sense of the content and nature of the structured visual formats (the CSCs for Peter and Brian for session 11 in Phase C; see Figures 1 and 2, respectively). The researcher balanced the presentation of intervention by alternating the order of participation: Brian would participate first on one day, and Peter would participate first during the next intervention.

In this study, each boy was encouraged to share his social understanding of a difficult situation with the researcher. The researcher, in turn, shared her newly formed understanding of each boy’s perspective with the other child in order to facilitate a shared understanding of the event among the three interlocutors (i.e., the child with ASD, the TD child, and the researcher). Although the previous discussion with the boys’ mother often proved helpful in informing the researcher’s view of an event, the researcher primarily sought to understand the perspective of each of the boys so that she could structure a conversation to highlight these. Because the CSCs were conducted with each boy separately and sequentially, the researcher’s notions were imperfect insofar as insights from the first CSC could inform the second CSC, but the reverse was not true. On the other hand, certain themes and patterns of understanding

<table>
<thead>
<tr>
<th>Session</th>
<th>Child</th>
<th>CSC topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase B</td>
<td>Peter only</td>
<td>Not getting along with my brother</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Being nice to Brian</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Brian waking me up</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Brian wants everything I want</td>
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<tr>
<td>4</td>
<td></td>
<td>Brian woke me up last night</td>
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<tr>
<td>5</td>
<td></td>
<td>Going to nanny’s house and using my good hands (i.e., using hands in an appropriate way to play with Brian without hitting)</td>
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<tr>
<td>6</td>
<td></td>
<td>Yelling and screaming at Brian</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Brian makes me compromise</td>
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<tr>
<td>8</td>
<td></td>
<td>Yelling and unexpected behaviors</td>
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<tr>
<td>9</td>
<td></td>
<td>Coming home from camp</td>
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<tr>
<td>10</td>
<td></td>
<td>Not easy sharing toys</td>
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<tr>
<td>Phase C</td>
<td>Brian and Peter</td>
<td>Brian tickling Peter</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Arguing in the basement</td>
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<tr>
<td>2</td>
<td></td>
<td>Being surprised and flexible</td>
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<tr>
<td>3</td>
<td></td>
<td>Fight during horseback riding</td>
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<tr>
<td>4</td>
<td></td>
<td>Sharing</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Handling fights at school</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Waking Peter up (Brian’s story)/Brian calling me names (Peter’s story)</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Hitting in the basement</td>
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<tr>
<td>8</td>
<td></td>
<td>Inappropriate touching</td>
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<tr>
<td>9</td>
<td></td>
<td>Saying “please stop”</td>
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<tr>
<td>10</td>
<td></td>
<td>Yelling and screaming</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>Being flexible</td>
</tr>
</tbody>
</table>

*Denotes affirmative CSCs.

*After receiving feedback from Brian and Peter’s mother, both CSCs for session 7 were intended to be about waking Peter up when he was sleeping. During the transition between working with Peter and Brian, an argument between the boys began. Peter’s CSC topic was changed to discuss the name-calling event that took place immediately prior and to help him reflect on negotiating similar situations in the future.
did emerge for the researcher across treatment phases and proved helpful in informing her understanding of sibling dynamics so that she could offer this information in her first conversation about an event. This typically took the form of asking questions and providing suggestions for how to think accurately about the other child’s thoughts and feelings.

The researcher’s interpretation and facilitation of communication was especially important when Peter’s and Brian’s perspectives differed—a situation that was not infrequent. For example (see Figure 1 for the accompanying CSCs for each boy), for one story, Brian explained that the two were playing hide and seek in the dark and that he was afraid of the dark. Brian explained that he was yelling to Peter in an attempt to get Peter’s attention so Peter would not leave him alone in the dark. However, in Peter’s CSC, Peter explained that Brian was yelling at him because Brian was not getting his way during a game of hide and seek. Peter said that this made him sad, angry, and disappointed, and he felt like he was going to “erupt like a volcano.” Armed with a new understanding of the perspectives of the two boys, the researcher was able to translate these experiences so as to promote shared meaning-making and to help both Peter and Brian develop new ways of thinking about how to be more successful in this situation. Specifically, Brian said that he could ask Peter if he could stand and walk behind him when they were going into a dark room. Peter identified several candidate solutions. These included “going to save Brian” and telling Brian “Please come down here [and] I’ll be next to you.”

A diagram representing the people and processes involved in this study is provided as Figure 3. This diagram is intended to illustrate the triangulation and dialectical process using CSCs that was employed in Phase C. In this process, the researcher works to
understand each child’s unique perspective and uses her insight to provide explicit information to both children about the who, what, when, where, and why surrounding challenging situations. This process has been described thus far using terms such as triangulation (e.g., Leech & Onwuegbuzie, 2007) and dialectical, but the approach may also be characterized as translational in that the adult works to gather accurate social information from each participant so as to communicate that information (i.e., one individual’s unique understanding and experience) to the other.

**RESULTS**

Inspection of all fidelity checklists (completed by the researcher and the supervising SLP who reviewed 100% of the videotapes) revealed that 100% of the procedures outlined on the checklists were followed 100% of the time (i.e., for every intervention phase; no fidelity checklists were needed during the A phases). The results of all of the standardized tests provided an estimate of Peter’s and Brian’s baseline functioning. Peter obtained a standard score of 115 on the PPVT–4, indicating high-average receptive vocabulary skills. He received a standard score of 117 on the EVT–2, indicating above-average expressive vocabulary skills. On the TROG–2, Peter obtained a standard score of 113, indicating high-average receptive grammar.

Measures of social skills, behavior, and ToM were administered to confirm Peter’s diagnosis and to learn more about his social–cognitive profile. On the Social Skills subscale of the SSRS, Peter obtained a standard score of 68 (2nd percentile), indicating below-average acquisition of social skills and behaviors. On the Problem Behaviors subscale of this measure, Peter received a standard score of 120 (91st percentile, with higher scores associated with higher degrees of problematic behaviors), indicating the presence of significant problem behaviors. On the SRS, Peter obtained a standard T-score of 90, demonstrating...
behaviors that are “strongly associated with a clinical diagnosis of Autistic Disorders, Asperger’s Disorders, or PDD-NOS” (Constantino & Gruber, 2005, pp. 15–16). Peter obtained a standard score of 100 (50th percentile) on the GARS–2, indicating a very likely probability of an autistic disorder (Gilliam, 2006). Peter received an average of 8.52 (scores range from 0–20, with higher values taken as evidence for more developed ToM competencies) on the ToMI. This score is associated with the 4th percentile and indicates challenges in ToM that fall within the clinical range and are strongly associated with ASD.

Brian’s scores on every measure of language, social skills, and social cognition fell in the normal range as would be expected given his status as a TD child. Brian obtained a standard score of 122 (93rd percentile) on the PPVT–4, indicating high receptive vocabulary skills. He received a standard score of 101 (53rd percentile) on the EVT–2, indicating average expressive vocabulary skills. On the TROG–2, Brian obtained a standard score of 93 (32nd percentile), indicating average receptive grammar. On the Social Skills subscale of the SSRS, Brian obtained a standard score of 88 (21st percentile), indicating average acquisition of social skills and behaviors. On the Problem Behaviors subtest of this measure, Brian obtained a standard score of 107 (68th percentile), indicating behavior problems in the average and

Figure 3. The “triangulation” process used by the researcher to comprehend and facilitate shared meaning-making. The solid line (representing the quality of interaction between siblings) is the outcome measure in this study.
expected range. The ToMI was not completed for Brian at baseline but was completed for two subsequent A phases. These data are presented in Table 2 and in the Discussion section.

Maternal Report Data

Subjective quantitative maternal ratings from each phase of the study were plotted using professional graphing software. These data are presented in Figure 4. Split means were calculated to visually indicate trend; these are represented by solid lines. To determine split means, each phase is considered in isolation: The mean for the first half is calculated, the mean for the second half is calculated, both means are plotted, and a line is drawn between them. The asterisks indicate the days on which CSC interventions took place. Maternal daily ratings were collected regardless of whether an intervention session took place on any particular day.

For each phase (ABACA) of the study, means are reported (Table 3) to provide information about the overall rating level for each phase (Kazdin, 2011). Data from all of the phases of the study for both Peter and Brian were also submitted to a series of Tau-U analyses (Parker, Vannest, Davis, & Sauber, 2011). Tau-U is a relatively new index for analyzing single-case data. It combines nonoverlap between phases with trends from within the intervention phase (Parker et al., 2011). Tau-U can be used to statistically control for many undesirable Phase A trends (e.g., those indicating improvements during baseline), and as a nonparametric test, it can be used appropriately with data that do not conform to the requirements of parametric statistical tests. Tau-U can be interpreted as “percent of nonoverlap between phases or as trendedness: percent of data showing improvement between phases” (Parker et al., 2011, p. 291).

Table 3. Results of a single-case study investigating the potential benefit of including a TD sibling in the

\[ \text{Table 2. Descriptive statistics (raw average scores and percentile ranks) for the Theory of Mind Inventory (ToMI; Hutchins, Prelock, & Bonzinga, 2012) across the phases of study for Peter and Brian. ToMI scores range from 0 to 20, with higher values taken as evidence for more developed ToM competencies.} \]

<table>
<thead>
<tr>
<th>Child</th>
<th>Baseline (A) phase</th>
<th>First withdrawal (A) phase</th>
<th>Final withdrawal (A) phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early subscale</td>
<td>11.87 (4th %ile)</td>
<td>12.44 (4th %ile)</td>
<td>14.84 (8th %ile)</td>
</tr>
<tr>
<td>Basic subscale</td>
<td>11.77 (4th %ile)</td>
<td>12.74 (8th %ile)</td>
<td>15.10 (18th %ile)</td>
</tr>
<tr>
<td>Advanced subscale</td>
<td>3.19 (4th %ile)</td>
<td>4.94 (4th %ile)</td>
<td>5.86 (4th %ile)</td>
</tr>
<tr>
<td>Composite subscale</td>
<td>8.52 (4th %ile)</td>
<td>9.72 (4th %ile)</td>
<td>11.53 (8th %ile)</td>
</tr>
<tr>
<td>Brian</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early subscale</td>
<td>—</td>
<td>10.54 (20th %ile)</td>
<td>14.70 (20th %ile)</td>
</tr>
<tr>
<td>Basic subscale</td>
<td>—</td>
<td>9.88 (20th %ile)</td>
<td>12.54 (33rd %ile)</td>
</tr>
<tr>
<td>Advanced subscale</td>
<td>—</td>
<td>6.80 (11th %ile)</td>
<td>8.20 (18th %ile)</td>
</tr>
<tr>
<td>Composite subscale</td>
<td>—</td>
<td>9.35 (20th %ile)</td>
<td>10.75 (23rd %ile)</td>
</tr>
</tbody>
</table>

The purpose of this study was to investigate the potential benefit of including a TD sibling in the
story-based intervention of a child with ASD. For Peter, results indicated no effect of intervention from the first A phase to the B phase (CSC for Peter only). This lack of effect should be interpreted with caution and should not be taken as evidence that the conventional approach to CSCs is necessarily ineffective for this child. Although scant research has examined the efficacy of CSCs, perhaps the aforementioned patterns of effectiveness that were observed for other story-based interventions provide
some clues as to what the data for CSCs may eventually show. More specifically, we suspect that context and participant characteristics interact with story topic and content to predict uneven results for CSC interventions.

This interpretation is in line with the conclusion from research on other story-based interventions (i.e., social stories) that the “most striking feature of the data ... is the degree of inconsistency” (Reynhout & Carter, 2006, p. 466) and would account for the mixed results that are routinely observed (Hutchins & Prelock, 2013b). In a related vein, it is important to note that conflict negotiation is a skill that begins to develop in school-age children but is certainly not mastered in any child at the age of 6 years. In short, uneven context effects and the difficulty in remediating this particular target may have contributed to the null results that were observed for Peter’s first intervention phase.

We also concluded that no effect of treatment was evident for Brian. This result was expected given Brian’s status as a TD child. As such, we expected Brian to experience fewer social and communicative challenges and to exhibit fewer challenging behaviors than his brother with ASD. In line with this interpretation, inspection of Brian’s data revealed high baseline functioning. Notably, this may have created a ceiling effect that did not permit the detection of statistically significant improvements in overt behaviors despite a small positive trend that is visually evident in the final phase of study. Interestingly, there is preliminary evidence from the pre- and postadministration of the ToMI to support the notion of Brian’s improved social cognition over the course of study. We suspect, however, that increases in Brian’s scores are largely due to maturational factors as the greatest improvements were seen on the Basic subscale, which represents items intended to tap the ToM developments that occur around age 4–5 years. Of course, maturation may not be the sole factor explaining this change in ToM as many studies support the notion that the quantity and quality of mental state input by adults is positively associated with indices of social cognition for young TD children (e.g., Jenkins, Turrell, Kogushi, Lollis, & Ross, 2003; Ruffman et al., 1999).

Crucially, when Brian was involved in the intervention procedure, Peter showed improvements in early and basic ToM competencies; specifically, Peter’s ToMI scores improved to a greater degree in Phase C compared to a similar time interval during Phase B. According to his mother’s subjective impressions, Peter also demonstrated that he was better able to negotiate challenging situations with his younger brother following intervention. This may suggest that Peter benefitted from the researcher triangulating shared meaning-making between the siblings. This is consistent with research showing that the quality of adult–child dialogue about conflict is important and that adults can play a crucial role in helping children develop insights and strategies for thinking about mental states (e.g., Ruffman et al., 1999). What is special about Phase C intervention, however, was that both children were involved in this process of “guided participation” (Rogoff, 1990) with the adult.

From a Vygotskian perspective, the notion of apprenticeship describes learning that takes place during naturally occurring and culturally relevant activities. It is built not only on the nature of social interactions, but also on the nature of shared performance (Vygotsky, 1934). In line with this thinking, it may be that therapeutic effects for Peter were not realized until the younger sibling’s demands for social learning were also more formally supported. This may have occurred in a variety of ways. Adult–child dialogue may have supported implicit learning of the value that is placed on successful conflict negotiation. As they are designed to do, it is also likely that CSCs provided explicit information about specific strategies that could be employed to promote success by bringing attention to the causes and consequences of behavior and events that might otherwise go unnoticed.

In a related vein, a process for imparting accurate social information is particularly important for the child with ASD, who has difficulty interpreting the motivational and intentional stances of others. These candidate dialogical mechanisms are speculative at present. Nevertheless, this finding reminds us of the importance of more accurate mutual understandings, the role of relationship as context (Hubbard et al., 2001), and the unique features of the sibling relationship as a framework for social–cognitive development (Klein et al., 2002). Indeed, following a comment that intervention had helped to improve Peter’s drawing skills, Peter replied “[Researcher] didn’t teach me how to draw! She taught me how to solve problems!”

**Study Limitations**

Of course, any conclusions from this study are tentative given the present design and the examination of a single case. It must be acknowledged that the observed effect may be a result of Peter simply completing more CSCs, and it may be that he required more intervention sessions (or more time) to apply the concepts being discussed in his CSCs. Additional specific threats to internal validity include history and maturation, which cannot be controlled in the context.

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of this single-case design. Research employing group designs, or several participants in single-case reversal designs, are needed to address this limitation. Moreover, this study described an effect that is associated with intervention for a child with high language and cognitive skills but who also had the ToM deficits that are characteristic of Asperger syndrome. Clearly, there is a need for systematic replication to determine the extent to which this effect may or may not generalize to children with different social–cognitive profiles.

Further, difficulty in identifying participant characteristics that predict success with story-based interventions reminds us of the importance of context. Thus, one ambitious but important direction for future research involves the development of contextual (as opposed to trait) models of functioning with a priority for identifying contextual variables that are likely to be associated with fluctuations in behavioral functioning and that may be empirically isolated in research. Going forward, it will also be important to isolate dialogical processes that may be promising as causal mechanisms in the transmission of social and cultural knowledge in ASD.

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Contact author: Jenna Foran Lewandowski, 2 Baldwin Avenue, South Burlington, VT, 05403. Email: jlewandowski@sbschools.net