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A Child With Autism Spectrum Disorder Teaches Siblings to Skateboard: Effects on Sibling Skills and Family Social Behavior

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ABSTRACT

Children with autism spectrum disorder (ASD) may have few common activities with their siblings who do not have ASD, and this can limit their opportunities for social play. In this study, we used a multiple-baseline across skills design to assess the effects of a boy with ASD following an activity schedule to teach his favorite activity of skateboarding to his two siblings who do not have ASD. Family social behavior was also measured before and after sibling training. After training by the boy with ASD, both of the siblings' skateboarding skills improved, and measures of family social behavior also increased. Results suggest that sibling relationships may benefit when a child with ASD teaches siblings to play.

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Activity schedules; autism spectrum disorder; recreation; sibling-mediated intervention; social interaction

The significant social impairments characteristic of autism spectrum disorder (ASD) can diminish affected children's viability as play partners with peers and siblings. Notably, children with ASD have been shown to have delays in, or lack skills necessary for, joint play, such as joint attention (e.g., Kasari, Locke, Gulsrud, & Rotheram-Fuller, 2011), spoken language and conversation (e.g., American Psychiatric Association, 2013; Blanc, Adrien, Roux, & Barthelemy, 2005), and understanding the roles and perspectives of partners during play (Heagle & Rehfeldt, 2006; Hobson, Chidambi, Lee, & Meyer, 2006; Ozonoff & Miller, 1995). Additionally, children with ASD often show a restricted range of play interests (e.g., American Psychiatric Association, 2013; Baker, 2000; Desha, Ziviani, & Rodger, 2003), play in stereotyped ways, or use toys inappropriately (American Psychiatric Association, 2013; Koegel, Firestone, Kramme, & Dunlap, 1974; Nuzzolo-Gomez, Leonard, Ortiz, Rivera, & Greer, 2002). Many also have significant deficits in the fine and gross motor skills

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necessary for playing games, sports, and with toys (Askari et al., 2015; Miltenberger & Charlop, 2014; Wong, & Kasari, 2012). Unfortunately, children with ASD often lack friendships and experience isolation in their homes and communities due to their social challenges (Frankel, Gorospe, Chang, & Sugar, 2011; Kasari et al., 2011; Petrina, Carter, & Stephenson, 2014).

Siblings can have an important influence on children's early social development (Dunn & Munn, 1986; Salmivalli, 2017). In the home, children with ASD have shown preference for sibling interaction (e.g., El-Ghoroury & Romanczyk, 1999); however, their skill deficits and behavior problems can adversely affect sibling relationships. For example, siblings of children with ASD report that play interactions, shared activities, and positive affect toward brothers or sisters are very infrequent (e.g., Banda, 2015; Ferraioli Hansford, & Harris, 2012; Orsmond, Kuo, & Seltzer, 2009; Takeda & Kumagai, 2015). In families of children with ASD, siblings are likely to take on parenting roles rather than that of a playmate (Tomeny, Barry, & Fair, 2017). Unfortunately, research also suggests that children with ASD are more likely to be bullied by their siblings than are children without ASD (Toseeb, McChesney, & Wolke, 2018). Therefore, improving social and play skills of siblings and children with ASD could have a positive impact on family social development, sibling relationships, and general social inclusion of children with ASD.

Importantly, sibling relationships can provide lifelong opportunities for individuals with ASD to develop social skills, communication, empathy, and other competencies (McHale, Updegraff, & Feinberg, 2016; Orsmond et al., 2009). Positive interactions between a child with ASD and siblings can also enhance the dynamic of the family unit (Colletti & Harris, 1977; Ferraioli & Harris, 2011; Oppenheim-Leaf, Leaf, Dozier, Sheldon, & Sherman, 2012), improve their relationship satisfaction (Schreibman, O'Neill, & Koegel, 1983), and may foster play skill development that can generalize to the community (Ferraioli et al., 2012). In the literature, sibling-mediated behavioral interventions show promise for improving social engagement between individuals with ASD and their siblings who do not have a diagnosis of ASD (see Banda, 2015; Tsao & Odom, 2006).

Research also suggests that sibling play interactions may be enhanced when the child with ASD's preferred activities are incorporated into play settings (e.g., Baker, 2000; Hoch, McComas, Johnson, Faranda, & Guenther, 2002). Along these lines, there may be some situations in which a child with ASD has competency in an activity. Thus, it might be beneficial for the child to teach his or her sibling the skills necessary to participate in a shared play activity to improve their social interaction. There is a small body of literature suggesting that individuals with ASD can teach

others, and this might be another avenue for enhancing sibling relationships. For example, Lerman, Hawkins, Hoffman, and Caccavale (2013) used behavioral skills training (BST; i.e., *instructions, modeling, rehearsal, and feedback*) to teach four adults with mild ASD how to correctly use discrete-trial teaching procedures with young children with ASD. Given the effectiveness of BST, sibling skills may also benefit when being taught in this manner by a brother or sister with ASD.

Children with significant social deficits, however, might require more support as teachers, especially if they are to be using specialized teaching procedures such as BST. Some literature suggests that activity schedules can also be beneficial for increasing social behavior of children with ASD (e.g., Brodhead, Higbee, Pollard, Akers, & Gerencser, 2014; Machalicek et al., 2009). Activity schedules are teaching tools that involve a series of prompts in written or pictorial format to facilitate independent behavior (MacDuff, Krantz, & McClannahan, 1993; McClannahan & Krantz, 1999). The purpose of this study, therefore, was to examine the effects of a child with ASD using a written activity schedule that contained components of BST to teach skateboarding, on the skateboarding skills of two siblings without ASD, and their family social interaction.

Method

A family of three Egyptian-American children participated: Tony, an 11-year-old boy with ASD, Sara, his 13-year-old adolescent sister, and Sami, his 5-year-old brother. At the time of the study, all siblings rarely socialized appropriately, and only Tony engaged in outdoor recreational activities. Observing Tony's competence in skateboarding, Sara and Sami expressed interest in learning the skill and requested to learn how to ride skateboards with their brother Tony. All experimental sessions for sibling training took place in a cement courtyard outside of the children's apartment home. Prior to the study, informed parental consent and assent were obtained from all participants.

Table 1 presents the children's Vineland Adaptive Behavior Scales-2, Survey Interview Form scores (VABS-2; Sparrow, Cicchetti, & Balla, 2005). Tony, the boy with diagnosed ASD, had an Adaptive Behavior Composite score in the Low adaptive level range on the VABS-2 (standard score = 59, < 1st percentile; Sparrow et al., 2005). His domain standard scores were 65 for Communication (Low, < 1st percentile), 53 for Socialization (Low, < 1st percentile), and 62 for Daily Living Skills (Low, < 1st percentile). Raw scores for Motor Skills were 75 for Gross Motor and 66 for Fine Motor. Tony's maladaptive behaviors were rated as clinically significant, with a ν -Scale score of 22 for the index (ν -Scale score for internalizing = 21; externalizing = 21). Tony's ASD was rated as severe

Table 1. Vineland Adaptive Behavior Scores-2.

	Tony			Sara			Sami		
	v-Scale score	Domain standard score	Adaptive level	v-Scale score	Domain standard score	Adaptive level	v-Scale score	Domain standard score	Adaptive level
<i>Adaptive Behavior Composite</i>									
<i>Communication</i>					102			90	<i>Adequate</i>
<i>Receptive</i>	9	59	Low	16	106	Low	16	91	<i>Adequate</i>
<i>Expressive</i>	8	65	Low	17		Low	14		<i>Adequate</i>
<i>Written</i>	9		Low	14		Low	11		<i>Mod. Low</i>
<i>Daily living skills</i>		62	Low		100	Low		97	<i>Adequate</i>
<i>Personal</i>	8		Low	16		Low	13		<i>Adequate</i>
<i>Domestic</i>	5		Low	13		Low	14		<i>Adequate</i>
<i>Community</i>	11		Mod. Low	16		Mod. Low	17		<i>Adequate</i>
<i>Socialization</i>		53	Low		100	Low		106	<i>Adequate</i>
<i>Interpersonal relationships</i>	7		Low	17		Low	17		<i>Adequate</i>
<i>Play and leisure</i>	6		Low	14		Low	16		<i>Adequate</i>
<i>Coping skills</i>	6		Low	14		Low	16		<i>Adequate</i>
<i>Motor skills</i>		n/a			n/a			75	<i>Mod. Low</i>
<i>Gross</i>	n/a		n/a	n/a		n/a	11		<i>Mod. Low</i>
<i>Fine</i>	n/a		n/a	n/a		n/a	11		<i>Mod. Low</i>
<i>Maladaptive behavior index</i>	22		Clinically Sig.	12		Clinically Sig.	17		<i>Average</i>
<i>Internalizing</i>	21		Clinically Sig.	13		Clinically Sig.	12		<i>Average</i>
<i>Externalizing</i>	21		Clinically Sig.	13		Clinically Sig.	16		<i>Average</i>

(raw score = 44.5), according to the Childhood Autism Rating Scale, 2nd Edition (CARS-2; Schopler, Van Bourgondien, Wellman, & Love, 2010).

At the time of the study, Tony spoke in sentences of up to 7 words, although his spontaneous speech was mostly limited to requesting preferred items and activities. He was also able to answer almost 100 Wh-type questions about events that were not present (e.g., “When is spring break?”, “Why do eat?”). He had difficulty, however, with back-and-forth exchanges in conversations, with responding to the physical play behavior of others (e.g., moving out of the way, returning a ball thrown to him), and with describing his actions versus those of others (i.e., pronouns). Additionally, Tony’s frequent vocal and hand stereotypy, self-injurious behavior, aggression, and screaming all limited his viability as a play partner. Prior to the study, Tony had extensive experience using written activity schedules for participating in various daily activities.

Sara, Tony’s older sister, did not have a diagnosis of ASD. Her VABS-2 Adaptive Behavior Composite score (Sparrow et al., 2005) fell in the Adequate range (standard score = 102, 55th percentile), and scores were in the Adequate range across all domains/subdomains. She did not exhibit any maladaptive behavior. Sara was not observed or reported to socialize with Tony in shared play activities. The majority of her interactions with Tony involved prompting him through daily self-help routines. Sara also did not participate in physical play with neighborhood peers.

Sami, Tony’s younger brother, also did not have a diagnosis of ASD. He interacted with Tony more often than Sara; however, the majority of his interactions included maladaptive bids for attention such as taking Tony’s toys and yelling at Tony while he played on the computer. Sami’s VABS-2 Adaptive Behavior Composite score (Sparrow et al., 2005) was in the Adequate range (standard score = 90, 25th percentile). His motor domain skills, however, fell in the Moderately Low range (standard score = 75, 5th percentile). Sami’s *v*-Scale scores were 11 for Gross Motor and 11 for Fine Motor. Additionally, he scored in the Moderately Low range for the Written communication subdomain (*v*-Scale score = 11).

Materials and safety

Skateboards, helmets, protective body padding, and continuous access to water were provided during each session. During training, an adult remained near participants to limit falls and restrict rolling speed to a walking pace. Sessions were conducted on flat surfaces only.

Measurement and integrity

Dependent variables

There were three dependent variables. The first two were the siblings' correct demonstration of *standing* and *riding* on a skateboard. Standing correctly was defined as placing the left foot on top of the front screws (by nose of board), the right foot on the rear screws (by tail), and standing on the skateboard without falling for at least 5 s. Correct riding was defined as placing the left foot on top of the front screws, pushing right foot on the ground 3 times to propel the board and rider, and then standing with both feet on the board while rolling for at least 5 s. Correct steps for each skill were scored as a "+" and incorrect steps as a "-". Percentage correct for demonstration of each skill was computed by dividing the number of correct steps from the total steps for each skill.

The third dependent variable was *social interaction behavior* for all three participants. Three observations occurred before and after sibling training. Social interaction was not trained and was defined as a contextually appropriate vocal statement or sound (e.g., laughing) combined with a reciprocal gaze with a sibling. Experimenters used a 10-s momentary time sample recording method during 10-min observation samples in which the children were situated near each other and attempted to ride skateboards. The presence or absence of social interaction was recorded during the last 3 s of each 10-s interval. Percentage of intervals with social behavior was calculated by dividing the number of intervals with social behavior by the total number of intervals observed and multiplying the quotient by 100. All sessions were video-recorded and analyzed later with PinPoint Digital Video Coding and Analysis System software.

Interobserver agreement

One primary observer scored in vivo, and two secondary observers scored the dependent variables from video recordings during 100% of baseline and training sessions for all three participants. Exact agreement among all three observers was used to calculate interobserver agreement (IOA). Dividing the total number of intervals with 100% agreement by the total number of intervals observed and multiplying by 100 calculated percentage IOA. The mean agreement for sibling skills was 92% (range = 84% to 100%). Mean agreement for social interaction was 90% (range = 86% to 100%).

Procedural fidelity

Two observers scored Tony's correct use of BST from video recordings. Tony used BST correctly 83.4% of the time on average (91.7% for Sara and

75% of the time for Sami). Mean observer agreement for Tony's teaching fidelity was 100%.

Research design and procedures

Experimenters used a multiple-baseline design (Baer, Wolf, & Risley, 1968) across responses to assess the effects of sibling-mediated BST on the skateboarding skills of standing and riding for Sara and Sami. When stability in skill performance was observed in baseline, teaching sessions were initiated. A pre- and post-design was used for social behavior.

Pre-training for Tony

Prior to the baseline phase for skateboarding, the experimenters used BST to teach Tony how to follow his written activity schedule containing components of BST for teaching skateboarding. The checklist is described in detail in the sibling-training phase below. One adult acted as the trainee while another adult provided training. Tony was given the instructions "Teach (person) how to skateboard. Read and do your checklist." Tony only required two 10-min training sessions to achieve 100% correct teaching. Tony's previous experience following written activity schedules and skateboarding proficiency likely contributed to his quick mastery, as was expected.

Social baselines

Prior to and following training, all participants were provided with an opportunity to ride skateboards together. Participants were given skateboards and told to ride. Instructions and feedback were not provided to siblings about their performance; however, adults were present to ensure their safety.

Instructions baseline

During baseline, the experimenter gave verbal instructions on how to skateboard correctly, and then asked the children to recite the steps. At the beginning of each baseline session, the experimenter stated, "Ride the skateboard." Each session consisted of 3 trials (i.e., opportunities to ride) and lasted between 3 and 5 min.

Sibling-training

In the training phase, Tony followed a written activity schedule containing components of BST and the steps to the respective skill being taught. The schedule contained highlighted directions explicitly for Tony (e.g., "Read")

or “Show”) followed by the steps he was to relay to his sibling for standing and then riding on a skateboard (e.g., “Put your left foot on the screws”). His written schedule followed this sequence: (a) read the skateboarding steps to the sibling; (b) model the correct steps of skateboarding skill three times; (c) ask the sibling to practice three times and observe; (d) score the sibling’s performance on the checklist, and (e) provide immediate positive or corrective feedback about the step performed (e.g., “You didn’t put your foot on the screws”). Tony was given the instructions “Teach (sibling) how to skateboard. Read and do your checklist.” Modeling and rehearsal + feedback were alternated and repeated three times (approximately 10 min). Tony monitored his adherence to the teaching schedule by making a mark in a box next to each step after it was completed. Following the teaching schedule, Tony exchanged his completed checklist for coins to use in a local arcade. Data collection sessions immediately followed the training, consisted of three probe trials each, and lasted between 3 and 5 min each. Criterion for post training was three sessions at or above 80% or two sessions at 100% correct performance.

Post-training

In post-training sessions, participants were given skateboards, were instructed to ride, and were not provided with instructions or feedback. Each session consisted of three probe trials and lasted between 3 and 5 min. Some of the post-training social behaviors were also measured in this phase.

Results

Figure 1 presents data for Sara and Sami’s percentage of correct skateboarding skills during baseline and following sibling-training sessions. During instructions baseline, Sara’s standing skill was 11.1% on average (range = 0% to 33.3%). After three training sessions, Sara’s standing on the skateboard improved to 100% correct. Sara’s riding was 22.2% correct on average in baseline (range = 0% to 33.3%), and following four training sessions, her riding skills increased to 94.5%, on average (range = 88.9% to 100%). On average, her skateboarding skills improved from 17.3% to 97.8%. During instructions baseline, Sami’s correct standing was on average 4.4% (range = 0% to 11.1%). He improved this skill to 71.1%, on average, after four training sessions (range = 55.6% to 100%). Sami had more difficulty acquiring the riding skill, particularly in staying on the rolling board for more than 5 s. Accordingly, he did not achieve training criterion, although the skill slightly improved from 15.9% in baseline (range = 0% to 22.2%) to 25.9% during training, on average (range = 11.1% to 44.4%).

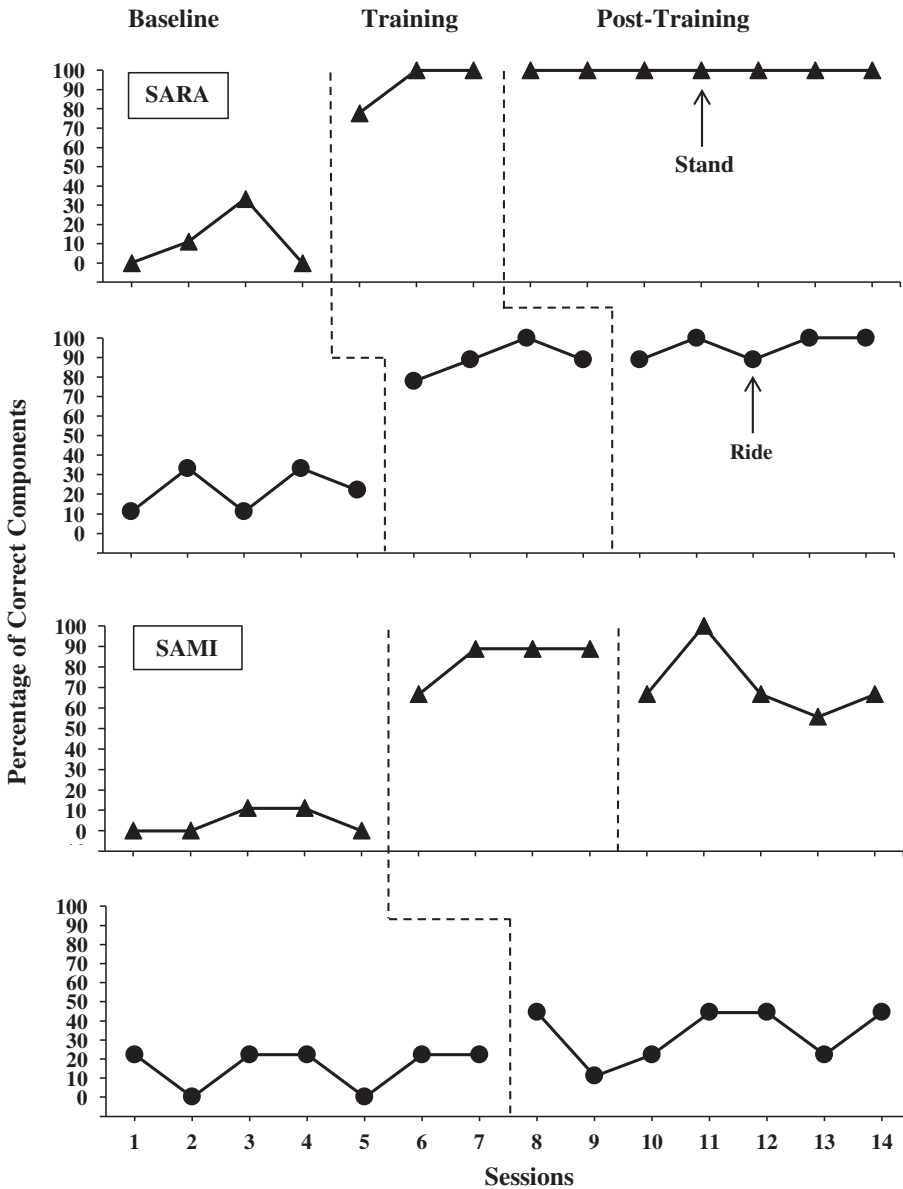


Figure 1. Percentage of correct steps by Sara (top two panels) and Sami (bottom two panels) for standing and riding skills, during baseline, sibling-mediated training, and following training.

Figure 2 presents data for the social interactions among Tony and his siblings before and after sibling training. Among all siblings, social interactions increased from an average of 11.1% to 35.6%. After teaching his siblings, Tony's social interaction increased from less than 15% to almost 40% while skateboarding with his siblings. Sara's interactions with Tony increased from less than 20% to almost 50% on average, and Sami's

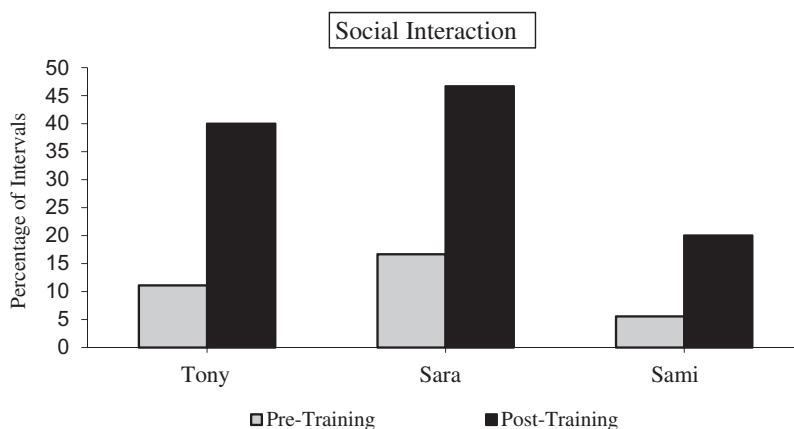


Figure 2. Percentage of 10-s momentary-time-sample intervals containing the social interaction behaviors of Tony (child with autism spectrum disorder) and his siblings, Sara and Sami, while skateboarding before (gray bars) and after sibling-mediated training (black bars).

interactions also increased from approximately 5% to 20%, on average, following sibling training. In the post-training sessions, the children were observed to make eye contact much more frequently, laugh, and call out to one another by name to watch them ride skateboards (e.g., “Tony, look at me!”).

Social validity

After completion of the study, family members were briefly interviewed about their experiences participating. Both siblings stated that they enjoyed the experience and would like their brother with ASD to teach them other activities he enjoys, such as mini-golf or bowling. Sara expressed surprise about how difficult it was to ride a skateboard and admiration for her brother Tony’s skills. Additionally, she intimated that she did not expect he would have the skills to show her how to ride a skateboard, and as such, was impressed and proud of him for doing it so well.

The children’s mother was also asked about her impressions of the study as well as having her children engage in recreational activities together. She thought that the study had a good outcome, and the approach of teaching recreational skills can improve socialization skills with siblings and peers and enhance the family’s opportunities for social bonding. The children’s mother also stated that learning to skateboard has brought a sense of normalcy for Tony, such that he gets to enjoy what other kids his age learn to enjoy. She stated that skateboarding has also improved Tony’s confidence, and teaching his siblings appears to have helped him focus and attend to others.

Discussion

The present study used a multiple-baseline across skills design to assess the effects of a boy with ASD following an activity schedule to teach his two siblings who do not have ASD how to skateboard correctly so they could play together. Results indicate that the siblings' skateboarding skills and family socialization in that context improved following training by the boy with ASD. This study extends previous sibling training studies by training a child with ASD as the teacher rather than a sibling who does not have a diagnosis of ASD. The present study also extends the use of BST and activity schedules for teaching individuals with ASD by demonstrating application in teaching recreational skills.

Skateboarding is often considered a solitary recreational activity, presumably because there is no team aspect or cooperative goal-oriented behavior. However, children generally ride skateboards together in groups, jointly engaged in riding around and performing tricks for one another. In the present study, social interaction skills were not trained, although an ancillary increase in social behavior was observed. As noted previously, positive increases in socialization can occur when the preferred items of a child with ASD are incorporated into training and play contexts (e.g., Baker, 2000; Hoch et al., 2002). Our findings add to this body of literature by including reciprocal measures of sibling social behavior and consideration for sibling skill mastery. While researchers did not measure Tony's social behavior when skateboards were absent, noticeable differences in his socialization occurred following sibling training while skateboarding, compared to baseline measures.

The improvements in social interaction could also be a beneficial byproduct of the training structure. For example, Tony's siblings emitted few social behaviors during social baseline when they did not have mastery of skateboarding. Therefore, it is possible that siblings did not initiate social interactions or respond to Tony's social attempts because they focused their attention on trying to master a new skill. Following training, all siblings emitted more social behavior. Sibling mastery of skateboarding skills, therefore, might have allowed them to allocate more attention to the social aspects of the activity and thus display more joint engagement. Alternatively, improved socialization might also be related to the teaching process. That is, structured interactions among siblings might have improved their perspective-taking skills to some extent, within the context of the activity. Separating these variables in future research may prove fruitful for improving socialization in children with ASD and their siblings.

Notably, in this study, a child with ASD taught siblings to engage in one of his preferred activities, and this effort created a context for him to socialize. Prior to the study, the three siblings did not have similar interests

and did not play together. Following training to be included in the boy with ASD's preferred activity, the siblings had something in which they could bond and interact. For children with ASD, many efforts are taken to foster their inclusion into the activities of children without ASD (Crosland & Dunlap, 2012; Kasari et al., 2011). For example, behavioral therapy in the homes has routinely focused on encouraging the child with ASD to join the play of siblings (e.g., Ferraioli & Harris, 2011; Oppenheim-Leaf et al., 2012; Tsao & Odom, 2006). The present results indicate that children with ASD also have worthy play interests and might also be capable of bringing playmates into their world, rather than always being expected to join those of others (Weiss & Harris, 2001). Creating the play setting, via teaching siblings a skill, may also have far-reaching and positive consequences for the boy with ASD and his siblings (i.e., a behavioral cusp; Rosales-Ruiz & Baer, 1997). For example, the new joint skateboarding skills may have established a positive context for embedding future therapeutic efforts to improve social behavior and sibling relationships. The acquired skills might also allow the children to interact with neighborhood peers, and this could lead to the development of friendships and other skills.

There are some limitations and avenues for future research worth noting. For example, Tony did not teach his siblings with perfect integrity ($M = 83.4\%$), and providing them with performance feedback was the step with least consistency. Accordingly, future research may examine promoting generalization within teacher training sessions to ensure success across various contexts and people, as well as add a requirement of "standing still" in the directions. Second, Tony's brother Sami did not completely master riding, although was able to remain on the board for 3 to 4 s while rolling. Given his motor difficulties, it is likely that he required more training sessions or an alternative approach such as physical prompts (i.e., hand-holding). To this end, future research and practice should consider skill complexity when deciding on a form of sibling-mediated training. For example, children enjoy countless other recreational play activities that might require less difficult motor actions and proficiencies and, thus, those could also be explored for a sibling-mediated intervention. In other words, although it was not observed in this study, it is plausible that "trainee" siblings may choose not to engage in activities that are too difficult for them.

In summary, the results of this study suggest that skateboarding and physical play may be an appropriate social activity for children with ASD to engage with siblings. Results also show that positive interactions can be experienced when an individual with ASD shows competency and expertise when helping others (e.g., Harris, Handleman, & Alessandri, 1990). Our findings therefore should contribute to literature showing positive

perceptions of siblings with disabilities and improved relationship quality (e.g., Celiberti & Harris, 1993; Sage, & Jegatheesan, 2010; Smith, Romski, & Sevcik, 2013). We hope our findings offer some insight for future research and practice into building positive sibling relationships through physical play and capitalizing on the strengths and interests of children with ASD.

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Ethical approval

All procedures in this study were in accordance with ethical standards of the institutional research review board and the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The authors report that there are no conflicts of interest.

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References

- American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Askari, S., Anaby, D., Bergthorson, M., Majnemer, A., Elsabbagh, M., & Zwaigenbaum, L. (2015). Participation of children and youth with autism spectrum disorder: a scoping review. *Review Journal of Autism and Developmental Disorders*, 2(1), 103–114. doi:10.1007/s40489-014-0040-7
- Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis*, 1(1), 91–97. doi:10.1901/jaba.1968.1-91
- Baker, M. J. (2000). Incorporating the thematic ritualistic behaviors of children with autism into games. *Journal of Positive Behavior Interventions*, 2(2), 66–84. doi:10.1177/109830070000200201
- Banda, D. R. (2015). Review of sibling interventions with children with autism. *Education and Training in Autism and Developmental Disabilities*, 50, 303–315.
- Blanc, R., Adrien, J. L., Roux, S., & Barthelemy, C. (2005). Dysregulation of pretend play and communication development in children with autism. *Autism*, 9(3), 229–245. doi:10.1177/1362361305053253
- Brodhead, M. T., Higbee, T. S., Pollard, J. S., Akers, J. S., & Gerencser, K. R. (2014). The use of linked activity schedules to teach children with autism to play hide-and-seek. *Journal of Applied Behavior Analysis*, 47(3), 645–650. doi:10.1002/jaba.145

- Celiberti, D. A., & Harris, S. L. (1993). Behavioral intervention for siblings of children with autism: A focus on skills to enhance play. *Behavior Therapy, 24*(4), 573–599. doi:10.1016/S0005-7894(05)80319-3
- Colletti, G., & Harris, S. L. (1977). Behavior Modification in the Home: Siblings as Behavior Modifiers, Parents as Observers. *Journal of Abnormal Child Psychology, 5*(1), 21–30. doi:10.1007/BF00915757
- Crosland, K., & Dunlap, G. (2012). Effective strategies for the inclusion of children with autism in general education classrooms. *Behavior Modification, 36*(3), 251–269. doi:10.1177/0145445512442682
- Desha, L., Ziviani, J., & Rodger, S. (2003). Play preferences and behavior of preschool children with autistic spectrum disorder in the clinical environment. *Physical & Occupational Therapy in Pediatrics, 23*, 21–42. doi:10.1080/J006v23n01_03
- Dunn, J., & Munn, P. (1986). Siblings and the development of prosocial. *Behavior. International Journal of Behavioral Development, 9*(3), 265–284. doi:10.1177/016502548600900301
- El-Ghoroury, N. H., & Romanczyk, R. G. (1999). Play interactions of family members towards children with autism. *Journal of Autism and Developmental Disorders, 29*(3), 249–258. doi:10.1023/A:1023036223397
- Ferraioli, S. J., Hansford, A., & Harris, S. L. (2012). Benefits of including siblings in the treatment of autism spectrum disorders. *Cognitive and Behavioral Practice, 19*(3), 413–422. doi:10.1016/j.cbpra.2010.05.005
- Ferraioli, S. J., & Harris, S. L. (2011). Teaching joint attention to children with autism through a sibling-mediated behavioral intervention. *Behavioral Interventions, 26*(4), 261–281. doi:10.1002/bin.336
- Frankel, F. D., Gorospe, C. M., Chang, Y. C., & Sugar, C. A. (2011). Mothers' reports of play dates and observation of school playground behavior of children having high-functioning autism spectrum disorders. *Journal of Child Psychology and Psychiatry, 52*(5), 571–579. doi:10.1111/j.1469-7610.2010.02318.x
- Harris, S. L., Handleman, J. S., & Alessandri, M. (1990). Teaching youths with autism to offer assistance. *Journal of Applied Behavior Analysis, 23*(3), 297–305. doi:10.1901/jaba.1990.23-297
- Heagle, A. I., & Rehfeldt, R. A. (2006). Teaching perspective-taking skills to typically developing children through derived relational responding. *Journal of Early and Intensive Behavior Intervention, 3*(1), 1–34.
- Hobson, P., Chidambi, G., Lee, A., & Meyer, J. (2006). Foundations for self-awareness: An exploration through autism: VII. The place of self in development. *Monographs of the Society for Research in Child Development, 71*, 128–165.
- Hoch, H., McComas, J. J., Johnson, L., Faranda, N., & Guenther, S. L. (2002). The effects of magnitude and quality of reinforcement on choice responding during play activities. *Journal of Applied Behavior Analysis, 35*(2), 171–181. doi:10.1901/jaba.2002.35-171
- Kasari, C., Locke, J., Gulsrud, A., & Rotheram-Fuller, E. (2011). Social networks and friendships at school: Comparing children with and without ASD. *Journal of Autism and Developmental Disorders, 41*(5), 533–544. doi:10.1007/s10803-010-1076-x
- Koegel, R. L., Firestone, P. B., Kramme, K. W., & Dunlap, G. (1974). Increasing spontaneous play by suppressing self-stimulation in autistic children. *Journal of Applied Behavior Analysis, 7*(4), 521–528. doi:10.1901/jaba.1974.7-521
- Lerman, D. C., Hawkins, L., Hoffman, R., & Caccavale, M. (2013). Training adults with an autism spectrum disorder to conduct discrete-trial training for young children with

- autism: A pilot study. *Journal of Applied Behavior Analysis*, 46(2), 465–478. doi: [doi:10.1002/jaba.50](https://doi.org/10.1002/jaba.50)
- MacDuff, G. S., Krantz, P. J., & McClannahan, L. E. (1993). Teaching children with autism to use photographic activity schedules: Maintenance and generalization of complex response chains. *Journal of Applied Behavior Analysis*, 26(1), 89–97. doi:[10.1901/jaba.1993.26-89](https://doi.org/10.1901/jaba.1993.26-89)
- Machalicek, W., Shogren, K., Lang, R., Rispoli, M., O'Reilly, M. F., Franco, J. H., & Sigafos, J. (2009). Increasing play and decreasing the challenging behavior of children with autism during recess with activity schedules and task correspondence training. *Research in Autism Spectrum Disorders*, 3(2), 547–555. doi:[10.1016/j.rasd.2008.11.003](https://doi.org/10.1016/j.rasd.2008.11.003)
- McClannahan, L. E., & Krantz, P. J. (1999). *Activity schedules for children with autism: Teaching independent behavior*. Bethesda, MD: Woodbine House.
- McHale, S. M., Updegraff, K. A., & Feinberg, M. E. (2016). Siblings of youth with autism spectrum disorders: Theoretical perspectives on sibling relationships and individual adjustment. *Journal of Autism and Developmental Disorders*, 46(2), 589–602. doi:[doi:10.1007/s10803-015-2611-6](https://doi.org/10.1007/s10803-015-2611-6)
- Miltenberger, C. A., & Charlop, M. H. (2014). Increasing the athletic group play of children with autism. *Journal of Autism and Developmental Disorders*, 44(1), 41–54. doi:[10.1007/s10803-013-1850-7](https://doi.org/10.1007/s10803-013-1850-7)
- Nuzzolo-Gomez, R., Leonard, M. A., Ortiz, E., Rivera, C. M., & Greer, R. D. (2002). Teaching children with autism to prefer books or toys over stereotypy or passivity. *Journal of Positive Behavior Interventions*, 4(2), 80–87. doi:[10.1177/109830070200400203](https://doi.org/10.1177/109830070200400203)
- Oppenheim-Leaf, M. L., Leaf, J. B., Dozier, C., Sheldon, J. B., & Sherman, J. A. (2012). Teaching typically developing children to promote social play with their siblings with autism. *Research in Autism Spectrum Disorders*, 6(2), 777–791. doi:[10.1016/j.rasd.2011.10.010](https://doi.org/10.1016/j.rasd.2011.10.010)
- Orsmond, G. I., Kuo, H. Y., & Seltzer, M. M. (2009). Siblings of individuals with an autism spectrum disorder Sibling relationships and wellbeing in adolescence and adulthood. *Autism*, 13(1), 59–80. doi:[10.1177/1362361308097119](https://doi.org/10.1177/1362361308097119)
- Ozonoff, S., & Miller, J. N. (1995). Teaching theory of mind: A new approach to social skills training for individuals with autism. *Journal of Autism and Developmental Disorders*, 25(4), 415–433. doi:[10.1007/BF02179376](https://doi.org/10.1007/BF02179376)
- Petrina, N., Carter, M., & Stephenson, J. (2014). The nature of friendship in children with autism spectrum disorders: A systematic review. *Research in Autism Spectrum Disorders*, 8(2), 111–126. doi:[10.1016/j.rasd.2013.10.016](https://doi.org/10.1016/j.rasd.2013.10.016)
- Rosales-Ruiz, J., & Baer, D. M. (1997). Behavioral cusps: A developmental and pragmatic concept for behavior analysis. *Journal of Applied Behavior Analysis*, 30(3), 533–544. doi:[10.1901/jaba.1997.30-533](https://doi.org/10.1901/jaba.1997.30-533)
- Sage, K., & Jegatheesan, B. (2010). Perceptions of siblings with autism and relationships with them: European American and Asian American siblings draw and tell. *Journal of Intellectual and Developmental Disability*, 35(2), 92–103. doi:[10.3109/13668251003712788](https://doi.org/10.3109/13668251003712788)
- Salmivalli, C. (2017). Peers and siblings. In B. Hopkins, E. Geangu, S. Linkenauer (Eds.), *The Cambridge encyclopedia of child development* (pp. 482–486). New York, NY: Cambridge University Press.
- Schopler, E., Van Bourgondien, M. E., Wellman, G. J., & Love, S. R. (2010). *Childhood Autism Rating Scale* (2nd Ed.). Los Angeles, CA: Western Psychological Services.
- Schreibman, L., O'Neill, R. E., & Koegel, R. L. (1983). Behavioral training for siblings of autistic children. *Journal of Applied Behavior Analysis*, 16(2), 129–138. doi:[10.1901/jaba.1983.16-129](https://doi.org/10.1901/jaba.1983.16-129)

- Smith, A. L., Romski, M., & Sevcik, R. A. (2013). Examining the role of communication on sibling relationship quality and interaction for sibling pairs with and without a developmental disability. *American Journal on Intellectual and Developmental Disabilities, 118*(5), 394–409. doi: [10.1352/1944-7558-118.5.394](https://doi.org/10.1352/1944-7558-118.5.394)
- Sparrow, S. S., Cicchetti, D. V., & Balla, D. A. (2005). *Vineland adaptive behavior scales: Survey form* (2nd ed.). Circle Pines, MN: American Guidance Service.
- Takeda, M., & Kumagai, K. (2015). Relationships between children with autism spectrum disorder and their siblings: Influences of behavioral problems and intellectual disabilities. *Japanese Journal of Special Education, 53*(2), 77–87. doi:[10.6033/tokkyou.53.77](https://doi.org/10.6033/tokkyou.53.77)
- Tomeny, T. S., Barry, T. D., & Fair, E. C. (2017). Parentification of adult siblings of individuals with autism spectrum disorder: distress, sibling relationship attitudes, and the role of social support. *Journal of Intellectual and Developmental Disability, 42*, 320–331. doi:[10.3109/136682250.2016.1248376](https://doi.org/10.3109/136682250.2016.1248376)
- Toseeb, U., McChesney, G., & Wolke, D. (2018). The prevalence and psychopathological correlates of sibling bullying in children with and without autism spectrum disorder. *Journal of Autism and Developmental Disorders, 48*(7), 2308–2318. doi:[10.1007/s10803-018-3484-2](https://doi.org/10.1007/s10803-018-3484-2)
- Tsao, L.-L., & Odom, S. L. (2006). Sibling-mediated social interaction intervention for young children with autism. *Topics in Early Childhood Special Education, 26*(2), 106–123. doi:[10.1177/02711214060260020101](https://doi.org/10.1177/02711214060260020101)
- Weiss, M. J., & Harris, S. L. (2001). *Reaching out, joining in: Teaching social skills to young children with autism* (1st Ed.). Bethesda, MD: Woodbine House.
- Wong, C., & Kasari, C. (2012). Play and joint attention of children with autism in the pre-school special education classroom. *Journal of Autism and Developmental Disorders, 42*(10), 2152–2161. doi:[10.1007/s10803-012-1467-2](https://doi.org/10.1007/s10803-012-1467-2)