Social Intervention for Adolescents With Autism and Significant Intellectual Disability: Initial Efficacy of Reciprocal Imitation Training

Brooke Ingersoll, Katherine Walton, Danielle Carlsen, and Theresa Hamlin

Abstract

Individuals with autism have difficulty with social skills across the lifespan. Few social interventions have been examined for older individuals with autism who also have significant intellectual disabilities (ID). Previous research suggests that reciprocal imitation training (RIT) improves imitation and social engagement in young children with autism. This study used a multiple-baseline design to examine whether RIT could improve social behaviors in four adolescents with autism and significant ID. All adolescents improved their spontaneous imitation and two improved their joint engagement. In addition, two adolescents decreased their rate of self-stimulatory behaviors over the course of treatment. Overall, these results suggest that RIT may be effective at improving social interaction and decreasing self-stimulatory behavior in adolescents with autism and significant ID.

Key Words: autism; social intervention; intellectual disability; adolescent

Difficulties with social interaction are a hallmark feature of autism spectrum disorders (ASD). Differences in social development are present in children with ASD very early in life (Yirmiya & Ozonoff, 2007). In addition, longitudinal and retrospective studies examining the course of ASD symptoms over the lifespan suggest that most individuals with ASD continue to show significant social difficulties in adolescence and adulthood, and that social symptoms may show less improvement over time than symptoms in the other core ASD domains (Seltzer, Shattuck, Abbeduto, & Greenberg, 2004). Thus, a significant amount of research and clinical attention has focused on the development and implementation of interventions for improving social skills in individuals with ASD (see McConnell, 2002; Reichow & Volkmar, 2010; Rogers, 2000 for review).

Over the past 25 years, there has been a substantial emphasis on the development and evaluation of interventions for increasing social engagement and interaction skills in young children with autism (McConnell, 2002; Rogers, 2000). Many of these interventions are based on a developmental or naturalistic behavioral treatment philosophy, and utilize techniques associated with caregiver responsiveness (Ingersoll, 2010a). These interventions have been shown to increase social interaction, as well as promote the long term development of other important social-communication skills (Ingersoll, 2010a). Given the enduring nature of social skills difficulties in individuals with ASD, there has also been a growing interest in social intervention for older individuals with autism (Rao, Beidel, & Murray, 2007). However, current interventions are aimed almost exclusively at higher functioning individuals (Bellini, Peters, Benner, & Hopf, 2007). There are extremely few interventions available that are focused on increasing social interaction abilities among adolescents and adults with autism who also exhibit significant intellectual disability (ID). In fact, a recent comprehensive review identified 66 studies focusing on increasing social behavior in individuals with autism published between
RIT may be a particularly effective intervention for improving social interaction in older individuals with autism and significant ID for several reasons. First, RIT targets imitation, a pivotal developmental skill that serves both a social and learning function (Uzgiris, 1981). Individuals with autism, particularly those with ID, have significant deficits in imitation (see Smith & Bryson, 1994 for review), which may significantly impair the development of more advanced social communication and functional skills (Ingersoll, 2008; Rogers & Pennington, 1991). Thus, imitation is a critical social skill for individuals with autism. RIT has been shown to be efficacious for increasing imitation skills in 2- to 4-year-old children with autism (Ingersoll & Gergans, 2007; Ingersoll, Lewis, & Kroman, 2007; Ingersoll & Schreibman, 2006). In a small-scale randomized control trial of the intervention, children in the treatment group, who received 3 hours per week of RIT for 10 weeks, made significantly greater gains in elicited and spontaneous imitation than children in a community-based control group (Ingersoll, 2010b). These data indicate that RIT can effectively teach spontaneous, generalized imitation skills in children with autism.

Second, through its use of responsiveness strategies such as contingent imitation, RIT is likely to promote other positive social behaviors. Previous research indicates that contingent imitation promotes social responsiveness in young children with ASD (Escalona, Field, Nadel, & Lundy, 2002; Ingersoll & Schreibman, 2006; Lewy & Dawson, 1992; Tiegerman & Primavera, 1984). Further, our own work with 2- to 4-year-old children with ASD suggests that RIT can improve autism-specific social deficits, such as joint attention and social-emotional functioning (Ingersoll, 2012; Ingersoll & Schreibman, 2006). While little systematic research has examined how older individuals with ASD respond to these responsiveness-based strategies, preliminary evidence suggests that an intervention using similar types of responsiveness strategies (including contingent imitation) may have positive effects on social interaction and engagement in individuals with autism and severe ID (Nind, 1996; Zeedyk, Caldwell, & Davies, 2009).

For a more thorough discussion of the conceptual framework of RIT, please see Ingersoll (2008).
Further, the vast majority of older individuals with autism and significant ID living in residential settings also present with self-stimulatory behaviors which can significantly limit their social interactions with others (Pilling, McGill, & Cooper, 2007). Thus, decreasing self-stimulatory behavior is also an important social goal for these individuals. Given that increased engagement in appropriate social interaction has been associated with a decrease in self-stimulatory behavior (Koegel, Koegel, Hurley, & Frea, 1992), one might expect that RIT would also be effective for reducing self-stimulatory behavior in this population. Finally, many adolescents with autism and significant ID are provided service in residential and community settings by intervention providers with limited training in specialized treatments for autism (Bourgondien & Elgar, 1990). RIT is a simple intervention approach that has been successfully taught to parents (Ingersoll & Gergans, 2007) as well as school-age siblings (Walton & Ingersoll, 2013) of children with autism. Thus, intervention providers in community settings may be expected to learn to implement this intervention with fidelity with moderate training and support.

Thus, the goal of this study was to examine the functional relation between RIT and imitation, joint engagement, and self-stimulatory behavior in four adolescents with autism and significant ID living in a residential treatment facility. A secondary goal was to examine the social validity of this intervention by obtaining feedback from intervention providers and untrained observers.

**Methods**

**Participants**

Four adolescents with autism and moderate to profound ID participated in this study (three male, one female). All participants were residential students at a treatment facility for individuals with developmental disabilities. All participating students had been in residence for at least 6 months before the study began. The program coordinator selected four students with ASD and significant ID who were perceived by staff to be the most socially impaired students based on their limited ability to communicate and engage in social interactions with staff and peers. Two students (Sarah and Brent) had no consistent functional communication system; the other two students (John and Logan) could use a limited number of single words and word approximations to request desired items and to protest, but did not communicate consistently with others. All students were actively avoidant of staff and peers. The staff psychologist administered the Autism Diagnostic Observation Schedule (Lord et al., 2000) to confirm the students’ ASD diagnoses and standardized assessments of nonverbal problem solving and adaptive behavior to evaluate the students’ level of intellectual functioning. All students were on psychotropic medication to manage their mood and behavior. In addition, three of the students, John, Sarah, and Logan, were on anticonvulsant medication to manage a seizure disorder. All parents gave informed consent for their children to participate in the study. See Table 1 for participant characteristics.

**Setting and Materials**

All assessment, baseline, and treatment sessions were conducted in secluded environments (e.g., lounge, empty classroom) at the residential facility. Sessions were conducted either seated at a table or on the floor, based upon the preference of the individual student. Five pairs of identical play materials were used in each session. Materials were varied across sessions so that each participant was exposed to treatment with a variety of play materials. All students had extremely limited interactions with play materials at pretreatment. Since the goal of RIT is to use the student’s interest in the play materials to encourage object imitation, it was important to ensure that the students’ were motivated to interact with the play materials used in session. Thus, prior to treatment, the teachers informedly observed the students’ interactions with a variety of play materials (e.g., blocks, miniatures, musical instruments, balls) and selected toys that the students engaged with for use in sessions. Although play materials were varied across sessions, all materials were used during both baseline and treatment; thus changes in student behavior could not be attributed to differences in materials across phases.

**Teacher Training**

All therapy was conducted by teaching staff at the residential facility. Each student was paired with a different teacher who conducted all of their treatment sessions. All teachers participated in a 2-day workshop on RIT led by the first and second
authors at the students’ school. In addition, two staff members received two additional days of training at the first author’s research laboratory. All teachers received video feedback on their implementation of RIT with nonstudy students until they met fidelity of implementation criteria based on the RIT Fidelity Form (Ingersoll & Lalonde, 2010), prior to starting treatment. The four teachers held positions as skills trainers; they were responsible for working directly with the residents as well as providing training and supervision to teaching and residential assistants. Each teacher had a bachelor’s degree in an education-related field (e.g., Education, Psychology) and had received training in therapeutic approaches while employees at the facility. Three of the teachers were female and one was male and each had worked at the facility for a minimum of 1 to 2 years.

### Design and Procedure

A single-subject, multiple-baseline design was conducted across participants (e.g., Gast, 2010; Hersen & Barlow, 1976). This design was chosen because the target behaviors were not expected to reverse (Ingersoll & Schreibman, 2006). Participants received two to six 20-minute sessions per week throughout baseline and treatment, depending on staff availability. Participants received baselines ranging from 4 to 24 sessions, followed by roughly 10 weeks of intervention. One participant, John, received an abbreviated treatment due to health issues unrelated to RIT treatment. During treatment, both Sarah and Logan had a seizure; thus, their treatment was suspended for a week and then gradually reinstated. Logan’s treatment was discontinued for 2 months due to a change in residence and then reinstated for 13 sessions (follow-up). Generalization probes implemented in a different setting, with a different teacher, and during a functional chore were conducted at the end of treatment for Sarah and Brent and during follow-up for Logan.

### Baseline

Baseline sessions consisted of free play with a teacher. The teacher sat facing the student. Every minute, on average, the teacher modeled a play action with a toy paired with a simple verbal description of the action. Each action was modeled up to three times. The teacher did not provide feedback to the student on his or her subsequent behavior. The teacher responded to all social initiations by the student and redirected disruptive behaviors, but did not attempt to initiate additional interactions.

### Treatment

During treatment sessions, teachers implemented RIT to teach object imitation skills. RIT consists of contingent imitation, linguistic mapping, following the student’s lead, physical prompting, and contingent reinforcement. During treatment, the teacher contingently imitated the student’s actions with objects, gestures, body movements, and vocalizations. The teacher also provided a running commentary on the student’s actions using simple, repetitive language. Finally, the teacher modeled an action for the student to imitate approximately once every minute. This model was paired with a descriptive verbal label and the same model and verbal label were provided up to three times. If the student did not imitate after the third model, the teacher then used physical guidance to help the student complete the action. After the student imitated (either spontaneously or with a physical prompt), the teacher provided verbal praise and returned to

<table>
<thead>
<tr>
<th>Student</th>
<th>Age in years</th>
<th>Diagnosis (ADOS(^1) algorithm score)</th>
<th>NVIQ(^2)</th>
<th>Adaptive behavior composite(^3)</th>
<th>ID classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>John</td>
<td>13</td>
<td>Autism (20)</td>
<td>49</td>
<td>34</td>
<td>Moderate</td>
</tr>
<tr>
<td>Sarah</td>
<td>13</td>
<td>Autism (17)</td>
<td>Untestable</td>
<td>30</td>
<td>Severe-Profound</td>
</tr>
<tr>
<td>Brent</td>
<td>15</td>
<td>Autism (19)</td>
<td>39</td>
<td>30</td>
<td>Moderate-Severe</td>
</tr>
<tr>
<td>Logan</td>
<td>16</td>
<td>Autism (18)</td>
<td>Untestable</td>
<td>39</td>
<td>Severe</td>
</tr>
</tbody>
</table>

\(^1\)Autism Diagnostic Observation Schedule–Generic (Lord et al., 2000). \(^2\)Comprehensive Test of Nonverbal Intelligence, 2nd Ed. (Hammill, Pearson, & Wiederholt, 2009). \(^3\)Vineland Adaptive Behavior Scales, 2nd Ed. (Sparrow, Cicchetti, & Balla, 2005).
imitating the student’s actions. For a more comprehensive description of RIT components, see Ingersoll, 2008.

**Generalization**

Generalization sessions were conducted at the end of treatment for Sarah, Brent, and Logan. Generalization sessions were not completed for John since his intervention was terminated early. Two 20-minute sessions were conducted with a different teacher and two 20-minute sessions were conducted in a different treatment setting. In addition, several brief imitation probes were completed during functional chores (Brent: folding laundry and setting the table; Logan: folding laundry; Sarah: sorting silverware and cleaning up dishes) to assess generalization of imitation to an observational learning context. During these probes, the teacher used the imitation training procedure to present each step in the functional chore, but did not use contingent imitation or linguistic mapping. Logan completed 13 sessions (including his generalization sessions) after a 2-month break. These sessions were used to examine maintenance of skill gains.

**Fidelity of Implementation**

To ensure correct implementation of the RIT procedure, teacher fidelity of implementation was scored from video during the first 10 minutes of each baseline, treatment, and generalization session. Correct use of each of the six elements comprising RIT (contingent imitation, linguistic mapping, modeling, prompting, praise, pacing) was scored on a 1 to 5 scale using the RIT Fidelity Form (Ingersoll & Lalonde, 2010), with higher scores indicating more correct implementation. Scores were averaged across these six elements to create a single fidelity composite score for each session. Scores of 4 or above were considered adequate fidelity. The average fidelity score for treatment sessions was 4.86 (Range 4.2–5.0) and the average fidelity score for generalization sessions was 4.80 (Range 4.5–5.0). The average fidelity score for baseline sessions was 2.06 (Range 1.3–2.5), indicating that the teachers were not implementing RIT during baseline.

**Dependent Measures**

**Session data.** Student outcome was measured using direct observation. Data were analyzed using visual analysis of performance during sessions. The first 10 minutes of each baseline, treatment, and generalization session were videotaped and scored for a number of student behaviors. Only the first 10 minutes were recorded because, in our previous work with RIT, rates of behavior during the first 10 minutes were similar to rates across the whole session. Object imitation was scored as the percentage of teacher models spontaneously imitated by the student. Joint engagement was scored using 10-second whole interval coding. Self-stimulatory behaviors were scored using 30-second whole interval coding. Specific self-stimulatory behaviors were identified before the onset of treatment based upon the students’ existing individualized behavior plan and discussions with staff members. Self-stimulatory behaviors for Sarah included mouthing and throwing objects. For Brent, self-stimulatory behaviors included mouthing objects and leg tapping. Self-stimulatory behaviors were not identified as a target of intervention by teaching staff for John or Logan, and thus were not scored for this study. See Table 2 for behavioral definitions.

Scoring was completed by undergraduate research assistants trained to 80% accuracy on practice tapes. Interrater reliability was obtained for 33% of the observations. Exact agreement was calculated for spontaneous imitation and was 88%. Cohen’s Kappa was calculated for interval data and was .68 for joint engagement and .85 for self-stimulatory behavior. Kappa scores from .61–.80 are considered good and Kappa scores >.80 are considered excellent reliability (Landis & Koch, 1977).

**Assessment data.** The Motor Imitation Scale (MIS; Stone, Ousley, & Littleford, 1997) and the Unstructured Imitation Assessment (UIA; Ingersoll & Meyer, 2011) were administered pretreatment, posttreatment, and as a two-month follow-up to assess generalization and maintenance of acquired imitation skills. The MIS is a structured imitation assessment that includes eight object imitation tasks and eight gesture imitation tasks. Students are seated at a table and each task is demonstrated. The student is then instructed “You do it.” Each task is repeated twice for a total of three trials. Imitation is scored as 0 for no imitation, 1 for partial imitation, and 2 for complete imitation. Only the highest score for each set of three trials is used.

The UIA is a semistructured imitation assessment that includes 10 object imitation tasks and
10 gesture imitation tasks, administered separately. During the UIA, the student is allowed to play freely with a standard set of 10 pairs of toys. The teacher then instructs the student to “Watch me” and shows the student the play action or gesture three times. The student is not given a specific instruction to imitate or given feedback on his or her behavior during this task. In between models, the teacher imitates the student’s actions with the toys. Each imitation task is scored as 0 for no imitation, 1 for partial imitation, and 2 for complete imitation, and the highest score for each set of three trials is used.

**Social validity.** To assess the clinical significance of students’ gains and the acceptability of the treatment, 54 naïve observers were asked to watch 2-minute video clips of the students during early and late treatment sessions and provide ratings of the students’ behavior and acceptability of the treatment. For each student, the second and third minute of a randomly chosen treatment session from the first five (early treatment) and the last five treatment sessions (late treatment) was selected. Naïve observers were undergraduate students recruited from the Psychology Department’s subject pool. Twenty-seven observers viewed videos of Sarah and Logan during early treatment and Brent and John during late treatment. The other 27 observers viewed videos of each student at the opposite point in treatment. Consent was obtained from parents to allow individuals to rate their children’s behavior. Raters were told that they would be viewing videos of adolescents with disabilities and their teachers interacting, but were not told anything else about the study. Undergraduate raters then answered six questions about the interaction using a 5-point Likert-type scale ranging from strongly disagree to strongly agree, with higher ratings indicating greater agreement with the statement.

To assess the acceptability and perceived effectiveness of the intervention, the four teachers who served as teachers completed a modified version of the Behavior Intervention Rating Scale (BIRS; Elliott & Treuting, 1991) and answered two open-ended questions regarding the perceived benefits and limitations of the intervention. The BIRS consists of 19 items rated from 1 (strongly disagree) to 3 (neutral) to 6 (strongly agree) that address the acceptability (11 items) and effectiveness (8 items) of an intervention. For the purposes of this study, items were modified to better reflect the goals of the intervention (increasing social-communication skills) and three additional items were added.

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**Table 2**

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Definition</th>
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<tbody>
<tr>
<td><strong>Spontaneous imitation</strong></td>
<td>Student imitates an action with an object within 10 seconds of the model in the absence of a verbal direction or physical prompt. Imitation may not be exact, but must look distinctly like model. Student may use a different, but similar object. Must occur before another action is modeled by the teacher or the student performs a different action.</td>
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<tr>
<td><strong>Joint engagement</strong></td>
<td>Student displays at least one behavior that indicates awareness of the teacher’s presence during joint play (student and teacher attending to the same activity). Includes eye contact, watching the teacher’s actions, smiling or laughing at the teacher, and exchanging materials with the teacher.</td>
</tr>
<tr>
<td><strong>Self-stimulatory behavior</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Mouthing</strong></td>
<td>Student places nonfood item on or in mouth. Includes licking, rolling object on chin, pressing object against lips, and placing object against teeth.</td>
</tr>
<tr>
<td><strong>Throwing</strong></td>
<td>Student engaging in nonfunctional throwing of objects. Includes dropping objects, throwing objects on the floor, or throwing objects at person. Throwing object into a receptacle is not scored as throwing.</td>
</tr>
<tr>
<td><strong>Leg tapping</strong></td>
<td>Student taps thigh with palm, back of hand, or fingers.</td>
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</tbody>
</table>
Results

Object Imitation

Session data. Sarah and Brent both exhibited low rates of spontaneous object imitation during baseline, while John and Logan exhibited low to moderate rates. Baseline rates were stable for Brent. Sarah, John, and Logan all exhibited some variability in baseline rates, and John exhibited a slightly decreasing trend in object imitation while Logan exhibited a slightly increasing trend. With the onset of treatment, all students exhibited a change in their rate imitative behavior. Sarah, Brent, and Logan exhibited an immediate change in both level and trend, and John showed a change in level that was slightly delayed. John, Sarah, and Brent's data became more variable with treatment and Logan's data became less variable over time. Brent, Logan, and Sarah exhibited generalization to a new setting and teacher. Generalization sessions were not completed for John due to the early termination of his treatment. Brent and Logan also showed generalization to functional chores, suggesting that spontaneous imitation skills learned within the context of play transferred to a different learning context; however, Sarah did not. Logan showed no deterioration in his spontaneous imitation skills after a 2-month break, suggesting strong maintenance of skill gains. See Figure 1.

Assessment data. Posttreatment and follow-up assessment data were missing for John due to his early termination and posttreatment data were missing for Logan due to scheduling difficulties. At pretreatment, the participants' ability to imitate in a structured context varied considerably, with Logan imitating most actions on the MIS and Sarah imitating only one action. At posttreatment, Brent exhibited an increase in his performance on MIS, while Sarah exhibited a slight decrease. At follow-up, Sarah exhibited a slightly higher score than baseline, and Brent and Logan continued to improve their imitative performance on the MIS. Participants' ability to imitate in an unstructured context at pretreatment was consistently low. At posttreatment, Sarah and Brent increased their spontaneous imitation performance on the UIA. At follow-up, gains on the UIA maintained for Sarah and continued to improve for Brent and Logan. See Table 3.

Joint Engagement

Rates of joint engagement during baseline were very low and stable for Sarah. Baseline rates for John, Brent, and Logan were moderate and more variable, with John and Logan showing a slightly decreasing trend. With the onset of treatment, Sarah and Brent showed an increasing trend in their rates of joint engagement behaviors, which generalized to a novel setting and teacher; however, the onset of these changes were less immediate than changes in their imitative behavior. Logan showed a slightly increasing trend in his joint engagement during treatment; however, the variability in his data makes his pattern of results difficult to interpret. While John's joint engagement began to increase towards the end of treatment, these gains could not be reliably attributed to treatment.

Self-Stimulatory Behaviors

During baseline, Sarah exhibited very high rates of mouthing and throwing objects. Towards the end of baseline, a slightly decreasing trend was seen in her rate of mouthing. Brent also exhibited a high rate of mouthing objects during baseline, although his rate of leg tapping was rather variable. With the onset of treatment, Sarah showed a declining trend in her rates of mouthing and throwing objects. Several weeks into treatment, Sarah had a spike in her rate of self-stimulatory behavior. After this, she showed a rapid decreasing trend in mouthing and a more gradual decreasing trend in throwing objects. Brent showed a gradual decreasing trend in his rate of mouthing with the onset of treatment. His rate of leg tapping also became less variable over the course of treatment. Improvements in Brent's self-stimulatory behavior and Sarah's mouthing behavior generalized to a new setting and teacher; however, improvements in Sarah's throwing behavior did not.

Social Validity

A MANOVA was used to analyze the ratings by naïve observers. Naïve observers rated the students as demonstrating significantly more appropriate social behavior with the teacher during late treatment sessions than early treatment sessions. Interestingly, observers also rated the intervention as significantly more acceptable during late treatment sessions than early treatment sessions, suggesting that opinions regarding acceptability of the intervention were influenced by the students' responsiveness in the interaction. See Table 4.

Teacher social validity ratings on the BIRS were uniformly positive. Teachers rated the intervention as highly acceptable (mean rating of
5.6 out of 6) and effective (5.4 out of 6), and all teachers strongly agreed that they plan to use the intervention with their students in the future. For the open-ended question regarding the benefits of the intervention, teachers reported that RIT increased eye contact, spontaneous and prompted verbal language, attention to task, ability to follow novel directions, decreased self-stimulatory behavior, and could be incorporated into daily tasks. The only limitation mentioned was that it would have been better if more staff were involved to promote generalization to functional routines.

Figure 1. Spontaneous imitation for baseline, treatment, and follow-up. GS=Generalization Setting, GT=Generalization Teacher, FC=Functional Chore.
Discussion

Imitation
All students showed improvement in their spontaneous object imitation during treatment sessions, and Logan, the only student with follow-up session data, showed strong maintenance after a 2-month break in intervention. For most students, these improvements generalized to a novel teacher and setting, as well as standardized imitation assessments. Improvements on standardized assessments of imitation skills maintained or continued to improve over a 2-month follow-up period for the three participants for whom follow-up assessment data were available. Taken together, these findings suggest that RIT is effective for improving spontaneous, generalized object imitation in adolescents with ASD and significant ID.

For two of the students, Brent and Logan, gains in imitation skills were also seen during imitation probes conducted during a functional chore. This finding indicates that these students were able to learn new self-care routines (e.g., folding laundry, setting the table) via imitation after undergoing training in social imitation with toys, and suggests that teaching spontaneous object imitation in a social context may also lead to improvements in imitation in a learning context (i.e., observational learning). However, Sarah did not generalize her ability to imitate to the functional routine probes. Thus, it is likely that some individuals with ASD would require additional imitative training during functional routines in order to acquire this skill.

Joint Engagement
Improvements were also seen in two of the four students’ rates of joint engagement with the teacher during treatment, although treatment gains were not as robust as for imitation skills and significant variability in data limit the ability to attribute these changes to the intervention. Thus, RIT may lead to broader improvements in social responsiveness in adolescents with ASD and significant ID, a finding observed in previous studies with young children with ASD (Ingersoll, 2012; Ingersoll & Schreibman, 2006). It may also suggest that these students found social interaction with the teacher more rewarding when the

Table 3

<table>
<thead>
<tr>
<th>Student</th>
<th>Motor imitation scale</th>
<th>Unstructured imitation assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>John</td>
<td>10</td>
<td>–</td>
</tr>
<tr>
<td>Sarah</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Brent</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Logan</td>
<td>25</td>
<td>–</td>
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</tbody>
</table>

Table 4

<table>
<thead>
<tr>
<th></th>
<th>Pre M (SD)</th>
<th>Post M (SD)</th>
<th>F-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student appears to be enjoying the interaction with the teacher.</td>
<td>2.70 (.33)</td>
<td>3.55 (1.09)</td>
<td>34.59*</td>
</tr>
<tr>
<td>The student shows an interest in the teacher.</td>
<td>2.45 (.32)</td>
<td>3.44 (.83)</td>
<td>50.07*</td>
</tr>
<tr>
<td>The student responds appropriately to the teacher’s attempts to initiate interactions.</td>
<td>2.69 (.39)</td>
<td>3.58 (.50)</td>
<td>52.65*</td>
</tr>
<tr>
<td>The student attempts to initiate interactions with the teacher.</td>
<td>2.24 (.11)</td>
<td>3.02 (.86)</td>
<td>29.77*</td>
</tr>
<tr>
<td>The student exhibits behavior that is inappropriate or disruptive to the interaction.</td>
<td>2.58 (.34)</td>
<td>1.86 (.25)</td>
<td>31.35*</td>
</tr>
<tr>
<td>This is an appropriate way for the teacher to interact with the student.</td>
<td>3.23 (.34)</td>
<td>3.70 (.37)</td>
<td>11.67*</td>
</tr>
</tbody>
</table>

*p < .01
teacher engaged in RIT strategies. If this is the case, it would suggest that RIT is a socially valid intervention from the perspective of the client (Walton & Ingersoll, 2013). Given that most students with ASD and significant ID, particularly those who remain nonverbal, have difficulty providing subjective reports of their experience with an intervention, this type of evidence is important for insuring that social interventions are perceived as acceptable by this population.

**Self-Stimulatory Behavior**

RIT may also be effective for reducing self-stimulatory behaviors in adolescents with autism.

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*Figure 2. Joint engagement for baseline, treatment, and follow-up. GS = Generalization Setting, GT = Generalization Teacher.*
and significant ID. The two students for whom self-stimulatory behaviors were identified as a target of intervention exhibited a substantial reduction in these behaviors with treatment. Interestingly, these two students also had the lowest rates of spontaneous imitation during baseline. Thus, there appeared to be a reciprocal relationship between the rate of spontaneous imitation and self-stimulatory behavior for these two students: As their rate of appropriate social behavior increased, their rate of self-stimulatory behavior decreased. Nind and Kellett (2002) also noted a decrease in self-stimulatory behavior in several adults and children with severe to profound ID following the use of Intensive Interaction, which includes the use of contingent imitation and simplified language. Thus, there is preliminary support to suggest that self-stimulatory behavior in individuals with autism and significant ID can be reduced through the building of positive social interactions with staff members. This may be particularly relevant in residential environments, where the opportunities for social interaction tend to be lower and the rate of self-stimulatory behaviors tends to be higher (Pilling et al., 2007). Given the high rates of self-stimulatory behaviors seen in individuals with ASD and significant ID (Pilling et al., 2007), further research on the use of these techniques for addressing self-stimulatory behaviors is important.

Social Validity

Naïve observers rated the students significantly better in their social behavior during a randomly selected session late in treatment than one early in treatment, indicating that gains were evident to naïve observers during a 2-minute observation. Since the early and late observations both took place during treatment, improvements should be attributed to changes in the students’ behavior or the quality of interaction between the students and their teachers, rather than the teachers’ behavior alone. These findings add further support to the behavioral measures and indicate that the students’ improvements were clinically significant.

One potential criticism of using RIT and related interventions with adolescents with autism and significant ID is that these interventions may not be age appropriate for older individuals (Firth, Elford, Leeming, & Crabbe, 2008). RIT uses several techniques derived from research on typical parent–infant interactions to enhance social responsiveness (e.g., contingent imitation, use of simplified language) and teaches spontaneous object imitation within the context of play with preferred toys, which, for the students in this study, were often those designed for infants and young children (e.g., balls, sensory toys, dolls). Age appropriateness is an important principle of normalization, a prominent theoretical approach.

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Figure 3. Self-stimulatory behavior for baseline, treatment, and follow-up. GS = Generalization Setting, GT = Generalization Teacher.
to serving individuals with intellectual disabilities (Wolfensberger, 2000). Although the overemphasis on age appropriateness in the treatment of individuals with severe to profound ID has been challenged (Forster, 2010; Nind & Hewett, 1996), the concept of age appropriateness has been widely adopted by programs serving older individuals with significant ID (Forster, 2010) and thus could affect the acceptability of the intervention (Firth et al., 2008). Indeed, during the initial training, several teachers voiced concern that RIT was not age appropriate for their adolescent students.

Our social validity data, however, did not support this concern. Naïve observers rated the intervention as an appropriate way for the teacher to interact with the student. Interestingly, the observer ratings of the later treatment sessions were significantly more positive on this question than ratings of the earlier treatment sessions, owing perhaps to improvements in the students’ interactions with the teachers. More importantly, the teachers who carried out the intervention were very positive regarding its acceptability on the BIRS, and did not voice concerns regarding its age appropriateness after having used the intervention with their students. In addition, the joint engagement data along with the ratings of social behavior by naïve observers suggest that the participants themselves found the intervention to be enjoyable. These findings suggest that the intervention is socially acceptable for use with adolescents with autism and significant ID to community members, those serving individuals with ASD, as well as the individuals themselves. One important group of consumers that was not formally assessed was the parents of the participants. Anecdotal parent reports to the teaching staff suggest that the parents were pleased with their child’s response to the intervention. However, a more formal analysis of treatment acceptability should be completed that includes parents. Also, assessing the acceptability of this intervention approach to same-aged peers and teachers who work with adolescents in nonresidential settings would also be important. Finally, despite preliminary support for the social validity of using RIT as originally developed with adolescents, future research should examine ways to modify the treatment procedures and materials to improve the age appropriateness of the intervention for older individuals.

Limitations and Future Research

There are several limitations that should be noted. First, generalization probes were not taken during baseline. Although the generalization data showed similar patterns of response as the session data for the same time period, without baseline probes it cannot be conclusively determined that student performance generalized to novel situations. Further, generalization and assessment data were not available for John due to his early termination of treatment. Thus, the degree to which his skills generalized to novel situations is unclear. In addition, follow-up session data were only available for Logan. Although imitation assessment data at follow-up were suggestive of skill maintenance for the other children, improvement on these assessments was minimal for Sarah. Also, the self-stimulatory behavior data were limited by their observation in only two of the students. It should be noted that the other two students also engaged in occasional self-stimulatory behavior, but it was not included in their individual behavior plans or noted by staff as a target of intervention. It should also be noted that across most behaviors, there was a significant degree of variability in performance across sessions. Thus, although most students showed improving trends in target behaviors with the onset of treatment, on a session by session basis, effects were quite variable. Finally, the small sample size limits the generalizations that can be made to a wider range of individuals. Further research using a randomized control trial, a larger sample of participants, and additional measures of skill generalization and maintenance would increase confidence in the findings.

Clinical Implications

These data offer preliminary support for the ability of RIT to improve key social behaviors in adolescents with autism and ID in the moderate to profound range. These findings, in combination with preliminary work on the use of Intensive Interaction with adults with ASD (Nind, 1996; Zeedyk et al., 2009) suggest that naturalistic interventions that use techniques derived from research on early parent–child interactions (e.g., following the child’s lead, use of simplified language around individual’s focus of attention, contingent imitation) have the potential to improve social interaction in older individuals with autism and significant ID. These findings
suggest that other recently developed interventions aimed at increasing important social-communication skills in young children with ASD (e.g., Kasari, Freeman, & Paparella, 2006; Landa, Holman, O’Neill, & Stuart, 2011) may also be effective with older individuals functioning at a similar developmental level. Research that can examine this possibility may substantially increase the number of available intervention options for adolescents and adults with autism and significant ID.

References


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