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Kate A. Helbig

Stefanie R. Schrieber

Keith C. Radley

James R. Deriuex

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An Evaluation of a Teaching Interaction Procedure Implemented in a Recess Setting

Kate A. Helbig, Stefanie R. Schrieber, Keith C Radley, and James R. Deriuex

Abstract

The teaching interaction procedure (TIP) is a strategy that has been demonstrated as effective in promoting social skill acquisition in school settings for young students with social communication deficits (Leaf et al., 2009; Leaf et al., 2010). However, a frequently cited criticism of social skills training is the lack of generalizability of target skills to novel contexts (Bellini et al., 2007). The purpose of the study was to evaluate a TIP-based social skills intervention conducted on the playground, intended to promote generalizability through training in naturalistic settings and to evaluate generalizability of skill acquisition to the classroom. Eight students 5-8 years old with an educational classification of autism or developmental delay participated in the study. The primary dependent variable was skill acquisition in the playground setting, and a secondary measure was generalized skill acquisition to the classroom setting. Target skills included appropriate body language, participation, and responding to initiations. A multi-probe design embedded within a multiple baseline design across target skills with concurrent replication across participants was used to evaluate the primary and secondary measures. Overall, results suggest that increases in skill acquisition were observed during implementation of the TIP across most participants and skills in both training and generalization phases. However, substantial variability was noted across participants related to maintaining skill acquisition during maintenance and follow-up phases in both the training and generalization settings. Limitations of these results are discussed as well as implications for school practitioners.

Keywords: *social skills, developmental delay, special education, modeling, performance feedback*.

Deficits in social and communication skills are defining features of autism spectrum disorder and developmental delays (American Psychiatric Association, 2013; IDEA, 2004). A lack of social communication skills is often associated with a host of undesirable outcomes (Garrison-Harrell et al., 1997; Locke et al., 2013; McConnell, 2002). During preschool, social deficits may appear as lack of response to name, poorly modulated eye contact, and difficulty with joint attention skills. These skills are often prerequisites to more complex and advanced social skills; therefore, it is critical that they are acquired early on. Further, acquisition of these foundational skills has been linked to stronger social, cognitive, and language repertoires (Dawson, 2013; Neimy et al., 2017).

Given the impact of these outcomes, it is imperative to identify strategies to support social skill development. Early intervention has been identified as an effective means to improve social communication skills (Kasari et al., 2010). Based on an operant learning perspective, provision of social skills training during early childhood development can potentially prevent or reduce the likelihood that children with autism spectrum disorder and other developmental delays experience social and communication deficits through shaping, prompting, and reinforcing prosocial skills (Neimy et al., 2017). An operant learning-based intervention focuses on events that precede and follow the occurrence of a behavior (Neimy et al., 2017). More specifically, this type of intervention focuses on teaching various cues in the environment to elicit corresponding social skills, and provides direct reinforcement following the demonstration of a social skill, thus increasing the likelihood of those social skills occurring in the future.

One strategy that fits within an operant learning category and has been demonstrated to be effective in promoting social skill acquisition for young students with social communication deficits is the teaching interaction procedure (TIP; Leaf et al., 2009; Leaf et al., 2010). TIP is comprised of various intervention strategies, including description of the specific target skill, rationale for using the skill, breaking the target skill into discrete steps, inappropriate

and appropriate modeling of the skill, opportunity for students to role-play the skill, and provision of feedback (Bedlington et al., 1978; Minkin et al., 1976). Although similar to behavioral skills training, TIP has two unique features: (a) provision of a rationale for students to engage in the specific skill or behavior, and (b) an inappropriate demonstration of skill during the modeling phase of the intervention (Leaf et al., 2015). The effectiveness of TIP has been evaluated in the context of increasing social skills acquisition (Leaf et al., 2010; Leaf et al., 2009). Both of these studies evaluated the effectiveness of TIP on increasing acquisition of social skills for young students with autism spectrum disorder. Results of both studies demonstrated the effectiveness of TIP on promoting social skills acquisition. Readers should see full studies for procedural details.

A frequently cited criticism of social skills training is the lack of generalizability of target skills to novel contexts (Bellini et al., 2007). This limitation extends to TIP, as evidenced by limitations noted within Leaf et al. (2010). Specifically, although generalization to a novel person was evaluated, this was measured in the same room where training was conducted. There is a further need for evaluation of social skills teaching and the generalization of social skills to a novel environment. It has been suggested that social skills interventions be implemented within naturalistic settings to improve the likelihood of generalization of skill acquisition (Bellini et al., 2007; Gresham et al., 2001). The purpose of the current study was to evaluate a TIP-based social skills intervention on social skill acquisition conducted on the playground, intended to promote generalizability through training in a naturalistic setting, and additionally to evaluate generalization of skill acquisition to the classroom environment.

Methods

Participants and Setting

The study took place at a public elementary school in a suburban area in the southeastern United States. Racial make-up of the student population was 85% Black, 6% White, and 5% multiracial.

Additionally, 100% of students received free or reduced lunch. Participants included eight Black male students who were receiving special education services full-time in a behavior support classroom.

All students received services under the primary disability category of developmental delay (DD) or autism (AU). The special education teacher held a bachelor's degree and had approximately ten years of previous teaching experience. She requested assistance with social skills programming to meet students' Individualized Educational Plan (IEP) goals. Every student in her classroom had a broad goal related to improving social interaction skills on their IEP. All eight students participated in the group to increase the number of social opportunities students, and to mimic the natural environment of class recess on the playground. The special education teacher and all parents/guardians provided informed consent prior to participation in the study. Data were collected as a means to monitor student progress on IEP goals.

Social skills groups were conducted at the school's playground, which consisted of a play set with a slide, playhouse, tricycles, and a picnic table. Group sessions and data collection were facilitated by doctoral school psychology graduate students and were conducted during the participants' recess. Sessions were conducted 1-2 times per week for ten weeks with each session lasting approximately 35 minutes, including intervention time and data collection. Materials required for the intervention included a playground area, "fun-ties" (e.g., a small band that students could wear around their wrist), small edible items (e.g., candy), and data collection sheets.

Students IEPs were reviewed for their present level of performance. Only data related to students' social/emotional, communication, and cognitive abilities was reported below. Psudonyms are used for student names.

Landon was a 6-year-old Black male with a special education classification of DD. Limited data were provided in his IEP regarding current social-emotional capabilities. Anecdotally, Landon had a limited verbal repertoire comprised of single word phrases, and

his teacher reported that he had minimal interactions with peers on the playground.

Lance was a 5-year-old Black male with a special education classification of DD and a secondary classification of Language/Speech Impairment (L/S). A review of his IEP indicated that his language and social-emotional skills were in the "significant delay" range on the Learning Accomplishment Profile, 3rd Edition (LAP-3). Additionally, Lance was performing below the first percentile for social-emotional and cognitive abilities on the Developmental Profile, Third Edition (DP-3), His cognitive capabilities as measured by the LAP-3 were significantly below those of same-aged peers.

Stephen was a 6-year-old Black male receiving services under the special education category of AU. Based on his performance on the Battelle Developmental Inventory, 2nd Edition (BDI-2; Newborg, 2005), he was performing below the first percentile in personal social skills. His cognitive capabilities as measured by the Stanford-Binet, Fifth Edition (SB-5; Roid, 2003) were reported in the mildly impaired range when compared to same-aged peers.

Jay was a 5-year-old Black male receiving special education services under the category of DD. A review of his IEP indicated that his social-emotional and communication skills were in the below average range on the DP-3. His cognitive capabilities, as measured by the SB-5, were reported in the low average range.

Bray was a 5-year-old Black male with an AU special education classification. LAP-3 results, as reported in his IEP, indicated that he was significantly delayed in language and personal social skills. Additionally, his performance on the DP-3 indicated that his cognitive, communication abilities, and social-emotional skills were at or below the first percentile.

Joe was a 6-year-old Black male receiving special education services under the eligibility category of DD. According to the data reported in his IEP, Joe was performing below the first percentile in personal-social, and communication skills on the BDI-2. No other information was documented regarding Joe's cognitive abilities.

Matthew was a 9-year-old Black male receiving special education services under the DD category. There were no test scores or measures to indicate his current level of social-emotional skills or cognitive capabilities. Anecdotally, Matthew often used two to three word phrases and had minimal appropriate social interactions with peers.

Kevin was a 7-year-old Black male with a special education classification of AU. According to his IEP, his scores on the BDI-2 indicated that his personal-social, communication skills, and cognitive abilities were below the first percentile.

Measures

Target skills were selected based on teacher report. Skills included body language, participation, and responding to initiations. Cues (i.e., signals for the participants to engage in a target skill) and task analyses (i.e., a breakdown of discrete steps within each target skill) were developed to systematically collect data (see Table 1).

Table 1

Target Skill Cues and Task Analyses

Body Language	Participate	Responding to Initiations
Engage in Conversation with Participant	"(Name) go play with (Name of student/group)"	*Student invited to play with another student or group*
1. Face the person (orient head & shoulders w/i 3s)	1. Physical Proximity (within 5 ft of partner)	1. Use all steps in Body Language
2. Make eye contact (w/i 3s, and maintain for 5s)	2. Face the person (orient head and shoulders w/i 3s)	2. Listen to the interaction (do not talk over anyone)
3. Use appropriate volume (appropriate for outside)	3. Make eye contact (within 3s, and maintain for 5s)	3. Decide if you want to play (make eye contact)
4. Use appropriate expression that matches how he/she is feeling	4. Wait for an opportunity to engage without interrupting others/skipping someone's turn	4. Give a clear and appropriate response (yes or no, thank you)
5. Relaxed Position (shoulders down and within 3ft of conversation partner)	5. Join by engaging in activity without disrupting progression	

The primary dependent variable was the percent of accurate skill demonstration in the playground setting (i.e., training setting), with a secondary dependent variable of percent of accurate skill demonstration in the classroom setting (i.e., generalization setting). Percent of accurate skill demonstration was calculated by dividing the total number of steps the participant performed correctly by the total possible number of steps and multiplying by 100. A second independent observer (i.e., doctoral school psychology student) simultaneously recorded the accurate and inaccurate steps for a minimum of 30% of probes across participants, skills, and phases. Observers were trained using behavioral skills training led by the primary author. Observers were required to meet a minimum of 80% agreement across all skills before their training was completed. Interobserver agreement was calculated by dividing the number of agreements by the total agreements and disagreements. The average of the interobserver agreement across all participants, skills, and phases was 99.39% (range 80-100%).

Treatment integrity data were also collected to measure the degree to which the social skills intervention was implemented correctly. The intervention was broken down into 15 different steps, and graduate student researchers recorded whether each component was implemented, not implemented, or not applicable for the current phase. The intervention was implemented with 100% integrity. A second, independent observer also recorded the treatment integrity for 30% of all sessions and was noted to have 100% agreement.

Social validity data were also collected to evaluate teacher and student perceptions of the intervention. The teacher completed the Usage Rating Profile-Intervention Revised (URP-IR; Chafouleas et al., 2011), and students completed a modified Children's Inventory Rating Profile (CIRP; Witt & Elliot, 1985). The CIRP was adapted to best match the participants' cognitive abilities. It was composed of six questions, each with a 6-point "smiley-face" Likert scale. At the conclusion of the study, a graduate student researcher met with

each student individually, read each question aloud, and asked the participants to circle the face that best matched their agreement with the statement.

Design

A multi-probe design across skills with concurrent replication across participants (Cooper et al., 2019) was used to evaluate the effectiveness of the intervention. A multi-probe design was used for its flexibility to evaluate student response to cues intermittently. With this design, a series of probes is provided prior to intervention of the target skill until stability in performance is achieved. Phases included baseline, intervention, generalization, maintenance, and follow-up.

Baseline

During baseline, graduate student researchers provided the cues on the playground and in the classroom to signal each student to engage in the target skills. Student researchers allowed the students 10 seconds to initiate a response to the cue. If no response was initiated, all steps were scored as inaccurate. A minimum of 60 seconds was required between the provision of cues. Instruction, corrective feedback, or reinforcement was not provided during baseline sessions.

Intervention

Participants were directed to the picnic table on the playground where they were welcomed to the group, reviewed the schedule of the social skills lesson, and discussed the group rules (i.e., voices off when the teacher is talking, keep hands and feet to yourself, participate, and follow directions). Next, the graduate student researchers utilized TIP (Leaf et al., 2015) to teach the target skills. This procedure involved the graduate student researcher (a) stating the target skill, (b) providing a rationale explaining why engaging in the target skill is important, (c) listing the discrete steps in the task analysis, (d) modeling an inaccurate and accurate demonstration of the skill and requiring participants to identify the correct and incorrect steps, (e) role-playing, and (f) giving corrective

feedback until the skill was demonstrated with 100% accuracy two consecutive times. These procedures were conducted as a group, with students having the opportunity to observe their peers practice and receive feedback. Student researchers then explained the "fun-tie contingency". Specifically, participants were told that if they demonstrated the skill correctly, they would be provided with a fun-tie that they could wear on their wrist. If they earned at least four fun-ties, they would receive a prize. Once the contingency was explained, participants were dismissed from the picnic table and provided a minimum of 5 minutes on the playground prior to the start of data collection for the target skill. Data collection procedure was identical to baseline, with a 10 second allotment for initiation of the target skill and 60 seconds between the provision of cues. Each student was provided a minimum of five opportunities to engage in the target skill. Decisions to provide additional cues were determined on an individual basis using visual analysis. If data were not stable (e.g., trending, but with an outlying or inconsistent data point), additional cues were provided. Students were not provided explicit corrective feedback for inaccurate demonstrations but were provided a fun tie for 100% accurate demonstrations of the target skill. After data collection was complete, participants with four or more fun-ties could exchange their fun-tie for a small edible item (i.e., candy). At the conclusion of recess, participants returned to their classroom settings where graduate student researchers provided the same cues to collect generalization data on the target skill. There was no provision of reinforcement or corrective feedback during generalization data collection. Mastery of the target skill was defined as 100% accurate demonstration across three consecutive cues.

Maintenance

After participants mastered the target skill and TIP intervention was completed, maintenance data were collected during all subsequent sessions. A minimum of one probe was collected for each skill in both settings during the maintenance phase. Data

collection was identical to baseline sessions (i.e., no provision of instruction, corrective feedback, or reinforcement). Data were collected in both the playground and classroom settings.

Follow-Up

Follow-up data collection occurred one month after the completion of the intervention phase. Data collection was identical to baseline sessions (i.e., instruction, corrective feedback, and reinforcement were not provided). Data were collected in both the playground and classroom settings. A minimum of one probe was administered for each skill and setting.

Data Analysis

Data were analyzed using visual analysis of level, trend, variability, immediacy of effect, and magnitude of change. A secondary statistic, baseline-corrected tau (Tarlow, 2017), was also calculated to estimate the effectiveness of the intervention. Phase change decisions were made based on stability of data and mastery of target skills.

Results

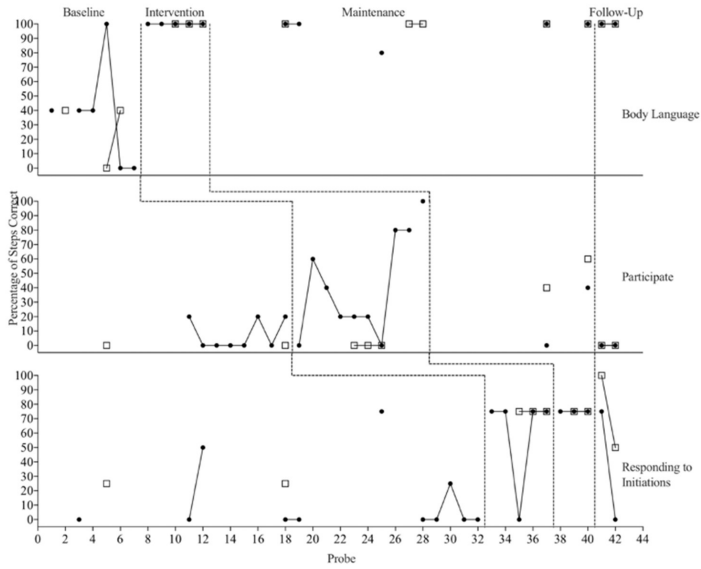
Landon

Landon demonstrated variable levels of skill accuracy for the body language skill during baseline, and low to moderate levels of skill accuracy for the participation and responding to initiations skills (Figure 1). Intervention resulted in large and immediate increases in skill accuracy in training and generalization settings for body language, moderate yet variable increases in participation in the training setting with no changes for generalization, and large and immediate increases in training and generalization settings for responding to initiations. Whereas increases in skill accuracy were maintained for body language and responding to initiations during the maintenance phase, decreases in accuracy were observed for training setting probes for participation and increases in accuracy for generalization setting probes. Follow-up was associated with maintained levels of accuracy for body language and decreases in

accuracy for participation and responding to initiations. Baseline-corrected tau effect size calculations indicated moderate to large effects for all skills across all phases for skill accuracy (Table 1), though smaller effects were observed.

Figure 1

Percentage of Skill Steps Demonstrated Correctly, Landon



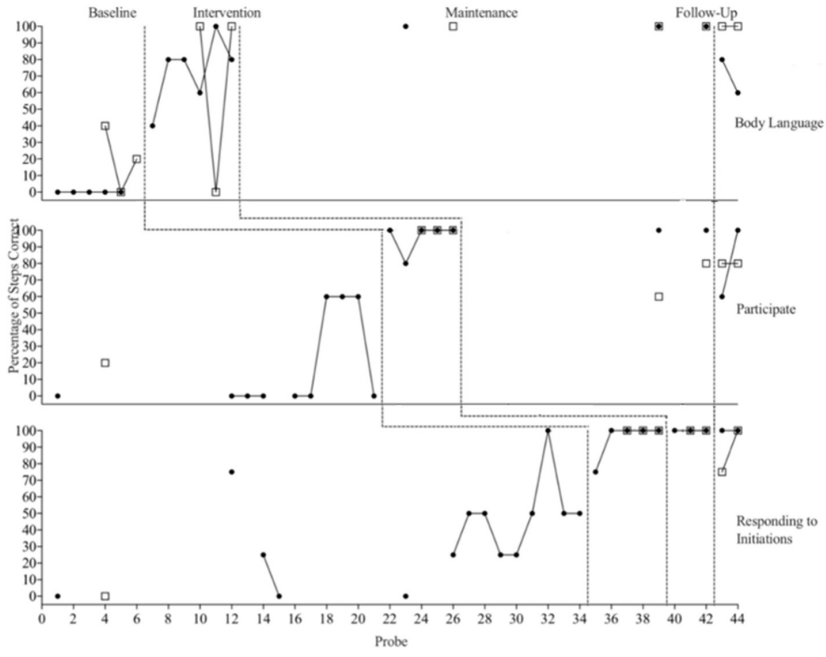
Note. Filled circles = training setting; open squares = generalization setting.

Lance

Lance demonstrated low to moderate levels of skill accuracy for the body language and participation skills during baseline across both the training and generalization setting probes (Figure 2). For the responding to initiations skill, Lance demonstrated variable levels of skill accuracy for the training setting probes and a low level of skill accuracy for the single generalization setting probe. Across all skills, introduction of intervention was associated with immediate increases in skill accuracy in both training and generalization settings. During the maintenance phase, skill accuracy remained at high levels for training and generalization setting probes for body language and responding to initiations, with a decrease in skill accuracy from intervention phase levels observed for participation in the generalization setting. During follow-up, skill accuracy for participation and responding to initiations remained consistent with the previous phase, with a decrease in accuracy observed for body language in the training setting. Baseline-corrected tau effect size calculations indicated moderate to very large effects across skills (Table 1).

Figure 2

Percentage of Skill Steps Demonstrated Correctly, Lance

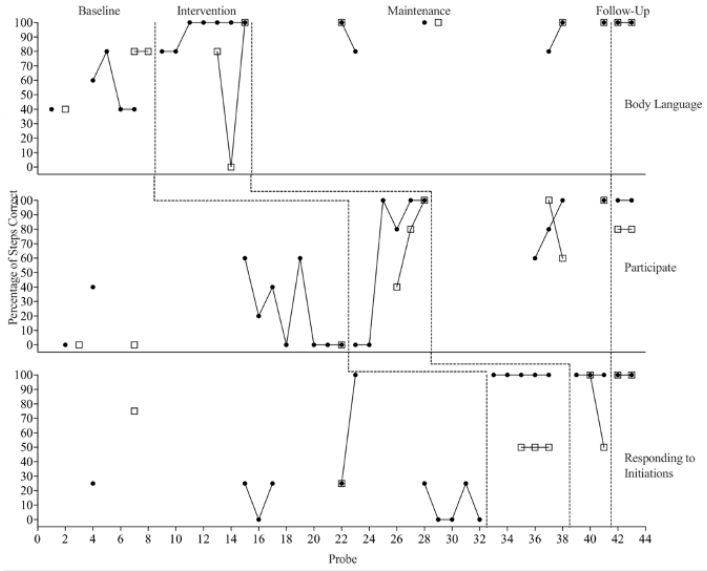


Stephen

During baseline, Stephen's levels of skill accuracy were generally low to moderate across all skills in both training and generalization settings (Figure 3). Introduction of intervention was associated with increases in skill accuracy for training setting probes across skills. Generalization setting probes demonstrated increases for participation, with minimal change from baseline for body language and responding to initiations. During maintenance and follow-up, skill accuracy was observed to remain at similarly high accuracy levels for training setting probes across skills. Generalization setting data were high for body language and responding to initiations, and moderate for participation. Baseline-corrected tau effect size calculations indicated a range of effects across skills and settings, with small to large effects observed (Table 1).

Figure 3

Percentage of Skill Steps Demonstrated Correctly, Stephen



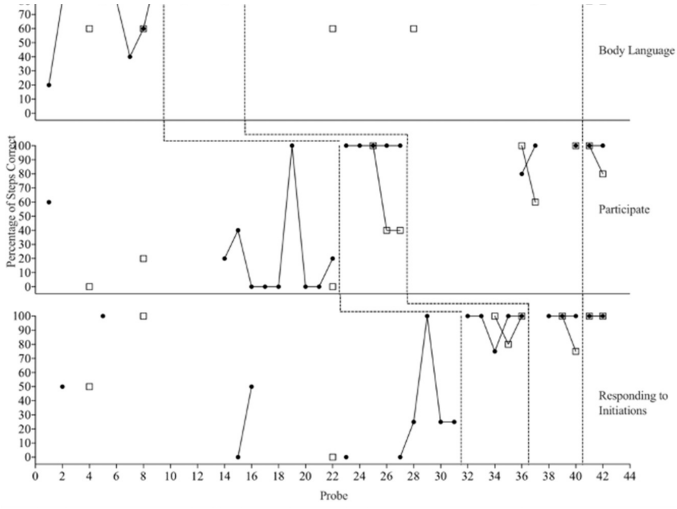
Note. Filled circles = training setting; open squares = generalization setting.

Jay

Jay demonstrated variable levels of skill accuracy during baseline across all three skills for the training setting probes (Figure 4). Baseline levels of skill accuracy for the generalization setting probes were variable across all three skills with moderate to high levels for the body language skill, low levels for the participation skill, and low to high levels for the responding to initiations skill. Introduction of intervention was associated with immediate increases in skill accuracy across all skills in the training setting. Generalization data during the intervention phase also indicated increases in skill accuracy across skills, though a decreasing trend was observed for participation. High levels of skill accuracy continued to be observed during the maintenance phase in the training setting. Generalization data for the maintenance phase were variable, with moderate to high levels of skill accuracy observed across skills. Data during follow-up indicated high levels of skill accuracy in the training setting across skills, with moderate to high levels of skill accuracy observed in the generalization setting. Baseline-corrected tau effect size calculations indicated variable effects, with small to large effects observed across skills and phases for skill accuracy (Table 1).

Figure 4

Percentage of Skill Steps Demonstrated Correctly, Jay

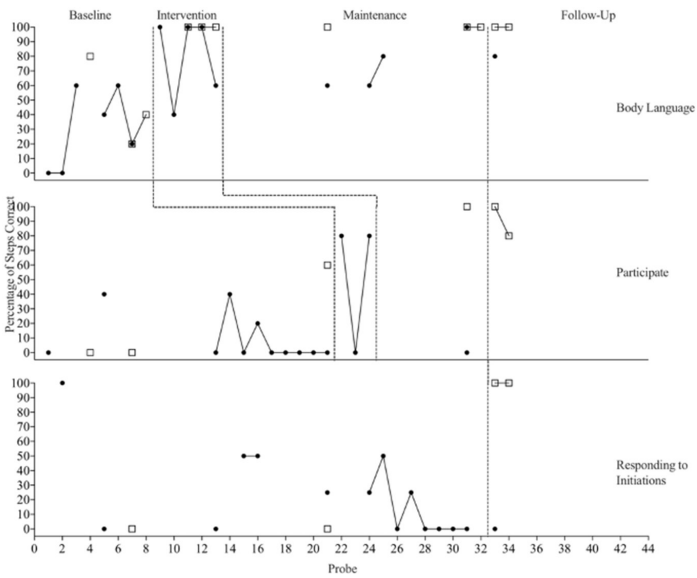


Bray

During baseline, Bray's levels of skill accuracy were variable with low to moderate levels for all three skills in the training setting (Figure 5). In the generalization setting, baseline levels of skill accuracy were moderate to high for the body language skill, low to moderate for the participation skill, and low for the responding to initiations skill. Introduction of intervention was associated with immediate increases in skill accuracy in the training setting for body language and participation. No data were collected for responding to initiations due to inconsistent attendance. Maintenance data were variable and moderate to high for body language. For participation, training setting data returned to baseline levels and generalization setting data indicated highly accurate skill demonstration. During follow-up, training setting data were high for body language and at zero for responding to initiations. No data were collected for participation due to inconsistent attendance. Generalization setting data were high across skills. High levels were observed of responding to initiations although Bray did not receive intervention for this skill. Baseline-corrected tau effect size calculations were variable across skills and phases, with effects ranging from small to large (Table 1).

Figure 5

Percentage of Skill Steps Demonstrated Correctly, Bray

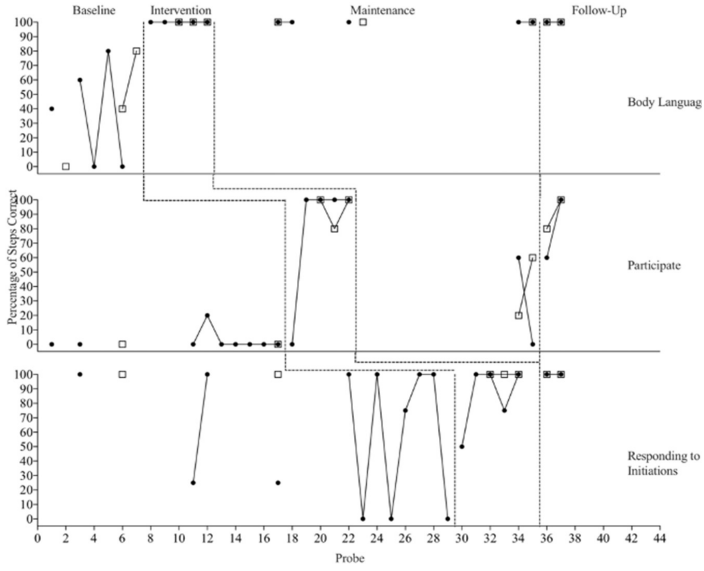


Joe

Joe demonstrated variable (low to high) levels of skill accuracy during baseline across both the training and generalization setting probes for the body language skill, and also during the training setting probes for the responding to initiations skill (Figure 6). However, for the generalization setting probes for the responding to initiations skill, level of skill accuracy reached mastery levels. Levels of skill accuracy for the participation skill were low across baseline in both the training and generalization setting. For all skills, reductions in variability and increases in skill accuracy were observed in both training and generalization settings. Maintenance data were only collected for body language and participation, with body language skill accuracy being maintained from intervention and participation demonstrating a decrease in skill accuracy. For all skills, follow-up data were associated with high levels of skill accuracy in both training and generalization settings. Baseline-corrected tau effect size calculations indicated small to very large effects across skills and phases (Table 1).

Figure 6

Percentage of Skill Steps Demonstrated Correctly, Joe

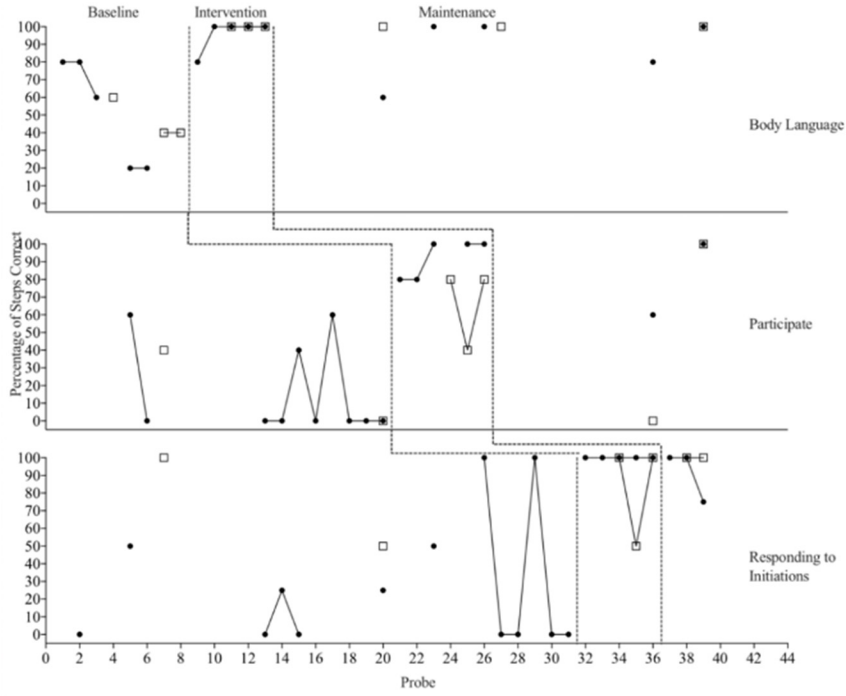


Matthew

Matthew demonstrated variable levels of skill accuracy during the baseline phase across all skills in both training and generalization settings (Figure 7). Intervention resulted in immediate increases in skill accuracy across skills in both training and generalization settings. During maintenance, skill accuracy was observed to increase in variability for body language and participation, though accuracy remained above baseline levels. Skill accuracy for responding to initiations remained at high levels. No follow-up data were collected due to inconsistent attendance. Baseline-corrected tau effect size calculations were variable across skills and conditions, with small to very large effects for all skills across intervention and maintenance phases for skill accuracy (Table 1).

Figure 7

Percentage of Skill Steps Demonstrated Correctly, Matthew



Note. Filled circles = training setting; open squares = generalization setting.

Kevin

During baseline, Kevin demonstrated variable, low to moderate levels of skill accuracy across all skills in both the training and generalization settings (Figure 8). Upon introduction to intervention, levels of skill accuracy for body language remained at low levels for one probe in the training setting and then increased for the remainder of the intervention phase, and skill accuracy was high in the generalization setting. For participation, levels of skill accuracy were initially low before increasing during the last two probes. Levels of skill accuracy were low in the generalization setting. Intervention data for responding to initiations was high in training and generalization settings. Similar levels and patterns of data were observed during the maintenance and follow-up phases across skills and settings. Baseline-corrected tau effect size calculations indicated small to moderate effects for all skills across all phases (Table 1). However, effect size calculations were very large across all skills and all phases for generalized skill acuracy, with the exception of a small effect for participation in the intervention.

Figure 8

Percentage of Skill Steps Demonstrated Correctly, Kevin

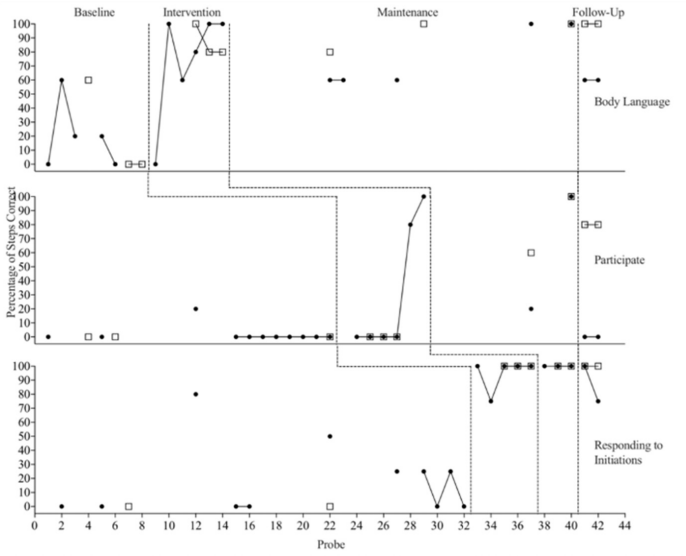


Table 2

Baseline-Corrected Tau Effect Size Calculations

		Skill Accuracy			Generalized Skill Accuracy		
		Body Language	Participate	Responding to Initiations	Body Language	Participate	Responding to Initiations
Landon							
	Intervention	0.76	0.49	0.58	0.91	0.00	1.00
	Maintenance	0.68	0.44	0.69	0.97	0.89	1.00
	Follow-up	0.63	0.33	0.23	0.87	0.00	0.89
Lance							
	Intervention	0.85	0.82	0.63	0.37	1.00	1.00
	Maintenance	1.00	0.70	0.57	0.87	0.82	1.00
	Follow-up	0.95	0.61	0.50	0.82	1.00	0.82
Stephen							
	Intervention	0.79	0.40	0.74	0.10	0.87	0.00
	Maintenance	0.78	0.69	0.65	0.93	0.91	0.41
	Follow-up	0.77	0.61	0.58	0.87	1.00	0.89
Jay							
	Intervention	0.53	0.72	0.59	0.71	0.83	0.48
	Maintenance	0.65	0.59	0.56	0.17	0.83	0.41
	Follow-up	0.59	0.56	0.49	0.29	0.82	0.62
Bray							
	Intervention	0.61	0.45	*	0.87	*	*
	Maintenance	0.66	0.17	*	0.87	0.78	*
	Follow-up	0.56	*	0.11	0.82	0.82	1.00
Joe							
	Intervention	0.86	0.75	0.20	0.87	0.87	0.00
	Maintenance	0.86	0.43		0.87	0.89	*
	Follow-up	0.73	0.82	0.32	0.82	0.89	0.00
Matthew							
	Intervention	0.78	0.80	0.65	0.91	0.72	0.17
	Maintenance	0.59	0.62	0.52	0.91	0.22	0.58
	Follow-up	*	*	*	*	*	*
Kevin							
	Intervention	0.56	0.33	0.73	0.83	0.00	1.00
	Maintenance	0.73	0.79	0.69	0.83	0.93	1.00
	Follow-up	0.63	0.12	0.55	0.87	1.00	1.00

Note. *Effect sizes scores below .2 are considered small, between .2 and .6 are considered moderate, between .6 and .8 are considered large, and above .8 are considered very large (Vannest & Ninci, 2015). Very large effect scores are in bold. Asterisk indicates data was not available.*

Social Validity

Upon completion of the study, the URP-IR and the CIRP were completed by the teacher and seven of the student participants to assess their acceptance of the intervention package. Questions on both the URP-IR and CIRP were based on 6-point Likert scales ranging from 1 (strongly disagree) to 6 (strongly agree). The teacher reported consistently high scores on the URP-IR across all six factors, including acceptability (M = 5.78), understanding (M = 5.67), home-school collaboration (M = 5.33), feasibility (M = 5),

system climate (M = 5.8), and system support (M = 4.67). These scores are interpreted as an indication that the teacher found the intervention components acceptable, easy to understand, and feasible to implement with her class. Although she indicated that collaboration with the students' home was important, this was not a component of the intervention. As for the CIRP, all participants' scores indicated that they found the intervention moderately to highly acceptable (M = 4.84; R = 3.67- 6.0). Matthew was absent the day the CIRP was completed.

Discussion

The current study sought to evaluate the effects of a TIP implemented in a naturalistic setting (i.e., recess) on the acquisition of social skills of students with special education classifications of autism and developmental delays. Overall, increases in percentages of skill acquisition were observed during implementation of TIP across most participants and skills in both training and generalization phases. However, substantial variability was noted across participants related to maintaining skill acquisition during maintenance and follow-up phases in both the training and generalization settings.

As a secondary measure to evaluate TIP effectiveness, baseline-corrected tau was used to calculate effect sizes across phases. Results indicate moderate to very large effect sizes for body language in the training setting, with a range of small to very large effects in the generalization setting. Effect sizes for participation ranged from small to very large effects in both the training and generalization settings. Lastly, effect sizes ranged from small to very large effects in both the training and generalization setting for responding to initiations. Social validity was also assessed, and results suggested that the participants found TIP to be moderately to highly acceptable. Further, the teacher noted consistently high scores across all factors on the URP-IR, suggesting an overall positive perception of the intervention.

Previous research has suggested that social skills interventions should be implemented within more naturalistic contexts (Gresham et al., 2001) as a means to promote generalization of skill acquisition. The current study extends the literature base by evaluating a TIP implemented within a recess setting. Though the results were not as desirable as intended, particularly in relation to maintenance and generalization of skill acquisition, the findings are still meaningful in that they may inform future practice in the context of social skills teaching procedures for students with autism and developmental delays. Specifically, additional procedures may need to be incorporated to ensure maintenance and generalization of social skill acquisition for some students.

Several factors that may have contributed to these findings should be considered. First, the social skills group consisted of a relatively large number of students (i.e., eight), whereas most groups consist of three to five students. The current group was larger because every student in the class participated. The number of students within the group may have impacted students' likelihood to attend during sessions since more opportunities for distractions were available. Additionally, the frequency with which the intervention was implemented may not have been sufficient. Recommendations indicate that social skills interventions should be implemented at a high dosage (Bellini et al., 2007; Gresham et al., 2001); however, the duration of current intervention sessions were relatively short (i.e., approximately 35 minutes). The rationale for the brevity of sessions was a means to promote feasibility of intervention implementation. However, based on lack of maintenance of skill acquisition, more exposure and practice may have been beneficial for these participants. Lastly, the participants demonstrated relatively low levels of cognitive and language abilities which may have contributed to current findings. Previous research has indicated that these factors can impact outcomes of social skills interventions (Kasari et al., 2006).

Limitations

Limitations must be considered when interpreting current results. First, it is unclear if the target skills were developmentally appropriate for the current participants based on their language abilities. Though some of these skills (e.g., body language) were nonverbal in nature, others (e.g., participation and responding to initiations) may have been too advanced given students' current behavioral repertoires. The current study utilized teacher interview to identify target skills; however, this may have not been a specific enough assessment procedure. Future research should incorporate a multimodal assessment approach that considers the students' cognitive and language abilities to best identify skills that correspond to their developmental level.

Another limitation is the potential impact of carryover effects. Given the nature of skill acquisition and similarity between some of the task analyses, there was likely some previous exposure and learning by participants prior to intervention for the subsequent skill. For instance, body language and participation have two discrete steps that are identical. It is likely that students learned these steps during the body language intervention phase, which then carried over to the participation skill and thus impacted the internal validity of the study. This should also be noted for the first step of responding to initiations and the entirety of the task analysis for body language. The pre-exposure or learning occurring prior to the specific skill intervention may also explain the substantial increase in responding to initiations that was observed for Bray. More specifically, Bray did not receive intervention for responding to initiations, but substantial increases in skill acquisition in both the recess and classroom setting were observed, which may be attributed to carryover effects.

Conclusion

Social and communication deficits can lead to a plethora of undesirable outcomes (Garrison-Harrell et al., 1997; Locke et al., 2013; McConnell, 2002) therefore, it is important to identify

strategies to support social skill development. TIP is an evidence-based strategy that has been shown to increase skill acquisition for students with developmental disabilities. (Leaf et al., 2009; Leaf et al., 2010). The purpose of the current study was to evaluate a TIP implemented in a naturalistic setting (i.e., recess). Overall, the findings suggest a TIP implemented in a naturalistic setting may be an effective way to increase skill acquisition for students with autism and developmental delays. However, future researchers should consider additional strategies to strengthen maintenance and generalization of skill acquisition as well as multimodal assessment procedures to better identify target skills.

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