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Using an Inclusive Restricted Interest Group to Improve Social Skill Accuracy in Children with An Autism Spectrum Disorder

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USING AN INCLUSIVE RESTRICTED INTEREST GROUP TO INCREASE SOCIAL
SKILL ACCURACY IN CHILDREN WITH AN AUTISM SPECTRUM DISORDER

A Specialist Project
Presented to
The Faculty of the Department of Psychology
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
Of the Requirements for the Degree
Specialist in Education

By
Hillary Y. Jenkins

May 2017

USING AN INCLUSIVE RESTRICTED INTEREST GROUP TO INCREASE SOCIAL SKILL ACCURACY IN CHILDREN WITH AN AUTISM SPECTRUM DISORDER

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There are a number of evidenced-based practices which aim to improve the social skills of children with high functioning autism (HFA). An emerging field of study is to develop social skills interventions that incorporate restricted and repetitive interests to increase social skills. Their results are promising and suggest improved social skills in students with HFA. The current study has aimed to incorporate a common interest among elementary age children with HFA in social skill instruction within a structured setting. A multiple baseline across behaviors single subject design was used to collect data on the accuracy with which two young males applied social skills within the structured “club” setting. Data were collected by determining whether the students had an opportunity to use the social skill, and whether they used the skill correctly. While the results do not suggest a functional relationships between the participants’ social skill accuracy and the intervention, the data show a positive trend which indicates an overall increase in their social skill accuracy.

Introduction

The purpose of the current study was to focus on improving social skill accuracy in children with high-functioning autism (HFA). Children who have been diagnosed with HFA often experience a number of symptoms which negatively impact their ability to create and maintain relationships with their peers. Their impaired social relationships may, in part, be due to the difficulty they experience in understanding pragmatic language. Those diagnosed with HFA often have restricted and repetitive interests which may seem odd to others, or make it difficult for those with HFA to broaden their horizons of conversation beyond their own personal interests. Despite this, students with ASD often want to form and maintain lasting social relationships (Church, Alisanski, & Amanullah, 2000). This has been considered one reason why children with ASD are both at an increased risk of depression and anxiety, as well as why they report being lonelier than their typical peers (Lasgaard, Nielsen, Eriksen, & Goosens, 2010).

Several evidence based practices have been effective in improving the social skills of children along the autism spectrum. One such intervention is explicit instruction, which uses clear and concise language combined with opportunities for practice and feedback to teach children how to engage with their peers in a number of ways. Another evidence based practice is the use of peer modeling. Peer modeling provides an opportunity for children with autism to observe their neurotypical peers engage in appropriate social interactions and receive social reinforcement based on the correct use of their social skills. Reinforcement is also an evidence based practice, which has been effective in improving social skills in children across the autism spectrum by delivering a desired object, activity, or praise as a “reward” to the targeted individual for their use or completion of a desired behavior. Finally, although somewhat new to the bank of social

skills interventions, the incorporation of restricted and repetitive interest has also been effective in improving social skills in adolescents with autism spectrum disorders.

In an attempt to increase the likelihood that children with ASD would engage in the appropriate social skills when given the opportunity, the use of children's restricted and repetitive interests were used as a conduit to providing social-skills instruction. In order to provide social skills instruction to the targeted population, the characteristics of HFA were taken into consideration. The primary characteristics of HFA that were considered were the difficulty in pragmatics that a majority of children with HFA experience, the restricted and repetitive interests that limit their ability to relate to their peers, and their overall impaired social relationships. A number of evidence-based practices were incorporated into the current study. Such interventions include explicit instruction, peer modeling, reinforcement, and the use of restricted and repetitive interests within the interventions. The reader will see how the characteristics of HFA mentioned above were targeted through the use of social skills interventions which have shown to be effective with children with HFA.

To control for the lack of opportunities which could potentially affect data in a frequency measure, the current study used a data collection method similar to a contingency space analysis. In combination with a multiple baseline across behaviors design, this approach allowed researchers to determine whether an opportunity was present for the participants to engage in one of the measured social skills, then whether or not they used that social skill correctly. By using this method, the researchers were also able to determine the percentage of opportunities that were utilized and a probability that the participants would engage in the skills correctly outside of the experimental setting.

Literature Review

According to the Centers for Disease Control and Prevention (CDC, 2011), 1 in 68 children is diagnosed with Autism Spectrum Disorder (ASD), thus ASD is more prevalent than ever before. Researchers continue to search for answers as to why more and more children are being diagnosed with ASD but it is clear that as more children are diagnosed, we must continue to develop our repertoire of interventions. The deficits that many children with ASD experience have been shown to have a negative impact on their social-emotional well-being (Bellini, Peters, Benner, & Hopf, 2007). Autism Spectrum Disorder is defined by the American Psychiatric Association (APA, 2013) as a neurodevelopmental disorder characterized by “persistent deficits in social communication and social interaction across multiple contexts” and “restricted, repetitive patterns of behavior, interests or activities” (p.31). These symptoms must be present during the early developmental period and cause clinically significant impairment in social, occupational, or other important areas of functioning, and are not the result of an intellectual disability or global developmental delay (APA, 2013).

While ASD was previously diagnosed based on three criteria – social, communication, and repetitive interests – the latest diagnostic criteria has combined the social and communication criteria to be considered as one entity. Thus, ASD is now diagnosed based on *social communication* and *restrictive and repetitive patterns of behavior*. Although formerly separated as distinct disorders, such as Autistic Disorder, Asperger’s Disorder, or Pervasive Developmental Disorder, there has been a notable shift toward viewing autism as a spectrum ranging from low to high functioning. The level of support required in the aforementioned areas is used to determine the “level” at which a person should be diagnosed. The Diagnostic and Statistical Manual of Mental Disorders,

Fifth Edition (DSM-5; APA, 2013) categorizes ASD into three severity specifiers which consider the level of support needed for both diagnostic criterion: *Level 1*) Requiring support; *Level 2*) Requiring substantial support; *Level 3*) Requiring very substantial support (APA, 2013). In determining the level of ASD, one must consider the two criterion of an autism diagnosis: social communication and restricted, repetitive interests.

Characteristics of High Functioning Autism

High-functioning autism (HFA), previously known as Asperger's Disorder, is the focus for the current study. Children with HFA have cognitive and language abilities within the normal range, but struggle to communicate in a socially appropriate manner (Rao, Beidel, & Murray, 2007). High Functioning Autism (HFA) is characterized by difficulty in using language pragmatically, increased restrictive and/or repetitive interests, and impaired social relationships. Many of these social characteristics are linked to struggles within the academic setting and beyond into adulthood (Ostmeyer & Scarpa, 2012).

Difficulty in pragmatics. The Association for Speech and Hearing Association (ASHA) describes pragmatics as the use of social language, and outlines the following three major communication skills within pragmatics: (a) using language for different purposes; (b) changing language according to the needs of the user or listener; and (c) following rules for conversations and story-telling (ASHA, online, n.d.). One pragmatic rule is turn-taking in a conversation, or the "give and take" between two people. Children with ASD often struggle with perspective taking and understanding that a conversation, in its truest meaning of the word, requires input from both parties in a way that keeps the conversation going. For example, a neurotypical person might approach a person with

ASD and say, “How are you doing today?” and while the person with ASD may respond by saying, “Fine,” they likely would not elaborate or ask how the other person is doing. They may not understand that their peer’s question is actually an invitation to a conversation.

Baron-Cohen (1988) reviewed the literature regarding pragmatics in children with autism and outlined a number of pragmatic deficits that children along the autism spectrum experience. Although children with HFA have language and are often able to use their speech intentionally, they struggle to use their speech conversationally. That is, children with HFA are often able to use speech to obtain a tangible object, such as a toy or food, but they lack the ability to use speech in a way that is more abstract like holding a conversation with another person, asking for help, providing feedback, or explaining how they are feeling. Children with HFA may also struggle to ask questions to obtain information, use speech to acknowledge others or to obtain attention from another person to him or herself (Baron-Cohen, 1988). One is able to deduct how these pragmatic deficits in children with HFA might affect their academic or occupational functioning. While children with HFA often have cognitive abilities within the normal range or higher, it is almost unavoidable that they may need to ask for help on an assignment or ask for clarification of directions given by their teacher or supervisor. Also, the pragmatic deficits that children with HFA face can also have a significant impact on their ability to form and maintain social relationships with their peers, which can have a negative impact on their social-emotional well-being (Klin, Volkmar, & Sparrow, 2001).

Restricted and repetitive interests. Children with HFA may demonstrate an inflexibility of behavior, such as difficulty switching between activities, and/or preferred

interests (APA, 2013). Highly restricted and/or fixated interests, which may seem odd or abnormal in intensity, are also a characteristic of ASD. For example, a child may develop a fascination with vacuum cleaners or, for the sake of the current study, a video game. Studies have shown that restricted interests can vary greatly across children from typical, popular childhood interests to more obscure topics, and they often create significant interference between children with ASD and potential social interactions (Spiker, Lin, Van Dyke, & Wood, 2012).

Impaired social relationships. Due to the difficulty in pragmatics and restricted and repetitive interests in children with HFA, one can understand how their social relationships might be impaired. Children with HFA often have difficulty with initiating social interactions, a decreased interest in social interactions, and/or atypical or unsuccessful responses to social overtures (APA, 2013). They may also make seemingly odd attempts at making friends (APA, 2013). There may be an absence, reduced, or atypical use of non-verbal communicative behaviors, such as eye contact, gestures, and facial expressions. These children are at an increased risk for peer rejection and social isolation, and even more so as they approach adolescence (White, Keonig, & Scahill, 2006). Children with HFA show greater symptoms of depression than typically developing children (Andersen et al., 2015). Research suggests that children with ASD have fewer meaningful relationships with peers and spend less time in leisure or social activities outside of school (Bauminger & Schulman, 2003).

Social Skills Interventions

A number of interventions have shown to improve social skills among children with HFA. Social skills training is aimed to teach children with social-emotional deficits

how to appropriately interact with their peers through the use of role-playing, practice and feedback (Wong et al., 2014). Such interventions include explicit instruction, using peers as models, providing reinforcement, and using children's restrictive/repetitive interests to teach social skills. These interventions and empirical support for their use in social skills interventions will be further explained as the reader continues.

Explicit instruction. Archer and Hughes (2011) referenced Rosenshine (1987) in order to define explicit instruction as “a systematic method of teaching with emphasis on proceeding in small steps, checking for student understanding, and achieving active and successful participation by all students” (p. 1). White et al. (2006) reviewed the literature on social skills intervention in children with ASD and stated that “explicit training in a group format is a rational intervention” and as part of their review, they required that all identified articles include an “explicitly identified, direct social skills training intervention.” (p. 1859). Klinger and Williams (2008) suggested that successful social skills interventions with children with ASD should explicitly teach children “how to understand and interpret social cues and behaviors to compensate for their lack of implicit understanding of social information” (as cited in Duncan & Klinger, 2010, p. 177). Thus, when children with HFA are receiving social skills instruction, the instruction should clearly define what the child needs to do, as well as clearly define what they should not do. As we know, children on the autism spectrum struggle with the pragmatics of language, thus there is very little room for vagueness or figurative language. The instruction should be explicit, literal, and to the point in order to ensure their understanding. For the purposes of the current study, the *Skillstreaming* curriculum was used as the foundation of social skills instruction because of the focus on explicit

teaching of targeted social skills (McGinnis, 2011). The *Skillstreaming* is a manual originally developed by Goldstein and McGinnis (1997) to teach social skills to children ranging from early childhood to adolescence. Tse, Strulovitch, Tagalakis, Meng, and Fombonne (2007) evaluated the effectiveness of social skills training for students with HFA and adapted their curriculum from *Skillstreaming the Adolescent* (Goldstein & McGinnis, 2000) and found significant gains from pre- to post-measures which indicated increased confidence in the students' use of social skills.

Peer modeling. Peer modeling is based in Bandura's social learning theory which indicates that children can learn behaviors from observing others. More specifically, Bandura coined the term *observational learning* which states that "children learn behaviors taught to others by watching those students respond correctly and be reinforced" (Ledford & Wolery, 2013, p. 439). The reinforcement described is often reciprocated social interactions, or receiving the help or tangible object one wants or needs. Modeling involves "the demonstration of a desired target behavior" by a peer "that results in imitation of the behavior by the learner and that leads to the acquisition of the imitated behavior" (Wong et al., 2014). Modeling has been shown to be an effective intervention for achieving social outcomes in children along the autism spectrum ranging in ages from 0 years of age up to young adults 19-22 years old (Wong et al., 2014, p. 65). For example, Ledford and Wolery (2013) demonstrated that peer modeling, in combination with a progressive time delay, could be successful in teaching social and academic behaviors to young children with disabilities. Ledford and Wolery (2013) used a multiple probe across behavior sets design with three participants with disabilities, two of which were diagnosed with ASD, and ten neurotypical children who served as peer

models which resulted in an increase in academic behaviors in the participants with disabilities, as well as an increase in sharing. Wang and Spillane (2009) also identified video modeling as an effective, evidence based practice for improving social skills in students with HFA upon reviewing the literature of social skills interventions for students with ASD. Peer modeling provides opportunities for children with ASD to witness the social reinforcement that can be earned upon using social skills correctly (e.g. praise from peers and adults), it is also very important for those students with ASD to earn their own reinforcement from peers and adults as well.

Reinforcement. The concept of reinforcement is rooted in the early works of B.F. Skinner, and the concept has become a foundation of many psychological interventions. Reinforcement stems from *operant conditioning* in which a subject is reinforced, or given a desired stimulus, when he/she completes a desired action or outcome in order to increase the desired behavior (Skinner, 1963). In the case of social skills instruction, a child may receive reinforcement for raising their hand to ask a question in the classroom setting. “Reinforcement establishes the relationship between the learner’s behavior or use of skill and the consequence of that behavior or skill” and it is considered an evidenced based intervention for achieving social outcomes in children with autism and has shown to be effective for children ranging in ages from toddler to young adult (Wong et al., 2014, p. 83). Token economies are also an effective form of reinforcement in which individuals are given tokens for using the targeted skill and they are later able to trade in those tokens for a desired object or activity that is reinforcing to the person (Wong et al., 2014). Tarbox, Ghezzi, and Wilson (2006) demonstrated that a token economy is

effective in increasing attending behaviors through a single subject study with a young children with ASD.

Restrictive and repetitive interests. The research on using children's restrictive or repetitive interests, also known as perseverative or circumscribed interests, is relatively new compared to other methods of intervention. However, Koegel has been an integral leader in the instrumentation of this new approach to teaching children on the autism spectrum. Koegel and colleagues demonstrated an increase in percent of intervals engaged with peers, as well as the frequency of social initiations with peers in adolescents with autism by using perseverative interest groups in the junior high setting (Koegel et al., 2012). They selected three male adolescent students with autism and implemented structured socialization opportunities based on each student's perseverative interests, such as movies, cartoons, and card games. The structured socialization opportunities took form in social clubs that were available to the students during school hours. These clubs were available at the same time as other school social clubs met but these specific clubs were developed around the restricted interests of the three adolescent students with ASD, but the participants' diagnoses were at no point disclosed to their peers. Baseline data were collected during lunchtime activities where there were no perseverative interest groups, but there were ongoing school clubs and extracurricular activities available. All participants showed zero to near zero engagements with peers during the baseline sessions, but upon implementing the perseverative interest groups, each participant's average engagements and initiations increased significantly (Koegel et al., 2012).

Similarly, Koegel, Kim, Koegel, and Schwartzman (2013) demonstrated an improvement in socialization between neurotypical students and students diagnosed with ASD by using inclusive, preferred interest groups in a high school setting. Koegel et al. (2013) used a multiple baseline across participants experimental design to measure the percent of intervals engaged and the rate of initiations made by seven high school students with ASD in preferred interest groups which were set up during the students' regular school lunch times. All seven participants' percent of intervals engaged and rate of initiations increased with intervention, and both participants with ASD and their neurotypical peers indicated enjoyed participating in the activities as measured by social validation measures (Koegel et al., 2013). Additionally, combining token economies and perseverative interests demonstrated that the perseverative interest-based tokens were more effective at decreasing challenging behavior and increasing on-task behavior than tokens absent the perseverative interest during an early literacy activity (Carnett et al., 2014), as well as increasing social behaviors in children with ASD directed toward neurotypical peers (Boyd, Conroy, Mancil, Nakao, & Altern, 2006).

The overall goal of the current study is to improve the accuracy with which students with HFA use social skills. By using the social skills interventions mentioned above, the current study has been designed to incorporate each into the intervention. A common restricted and repetitive interest observed across students with HFA was selected as the "club" in which the students participated while social skills interventions were incorporated to improve the participants' accuracy of using the targeted social skills. Overall, the current research question is: "Do inclusive interest groups increase the percentage at which children with ASD will accurately, or appropriately, utilize social

skills when given the opportunity?” The hypothesis is that the students with ASD would increase the percentage of accuracy with which they use social skills.

Method

Participants

Participants were chosen from a group of 15 students who signed up to participate in an after-school club focusing on the online game, Minecraft. Seven of the students in the club were diagnosed with ASD and eight were neurotypical peers. For this study, data was collected on two elementary-age students diagnosed with ASD, as determined by a third-party professional. These participants were recruited through a local pediatrician who regularly works with students diagnosed with ASD. In order to participate in the current study, the participants were required to be working on grade equivalent academic material in school, and to have played and enjoy playing the online game, Minecraft. The current study is part of a multi-part study in which two graduate students collaborated with the advising faculty member to develop theses stemming from the advisor's original study.

Setting

This study took place over the course of eight weeks in the computer lab at a public university. Each participant was assigned one computer and participants were grouped into groups of three, with at least one student with ASD being in each group. There was an instructional computer at the front of the classroom that was used by the faculty advisor and a research assistant who was considered a "Minecraft expert." Several university faculty, graduate and undergraduate students served as assistants throughout the sessions in order to provide praise and assistance to the participants.

Dependent Variable

Data were collected for three social skills (a) *asking for help*, (b) *giving a compliment*, and (c) *accepting a compliment*. These dependent variables were chosen because these are skills that can be easily embedded into a special interest group and were identified by the *Skillstreaming* (McGinnis, 2011) curriculum as important skills for adolescents. Participants were videotaped during two 10-minute sessions during each of the Minecraft Club meetings, and the videos were coded later by a graduate student and an advising faculty member. There was a total of twenty, 30-second intervals for each session.

Asking for help. *Asking for help* was defined as any time the child obtained attention from at least one person and made it clear to the other person that they need help regarding a problem he/she is facing. An example of asking for help would be a child raising his/her hand, and when called upon, he/she asks, "Can you help me get past this level?" A non-example would be a child sitting at his computer saying, "I can't get past this level," without getting the attention of any one person.

Giving a compliment. *Giving a compliment* was defined as any time the participant obtains another person's attention and then gives positive feedback regarding an achievement or any other characteristic of that person (e.g., physical appearance,). An example of giving a compliment would be a child acknowledging that a peer did well in the Minecraft game and tells them, "Good job!" A non-example would be a child ignoring the peer's accomplishment and not saying anything or discrediting their accomplishment.

Accepting a compliment. *Accepting a compliment* was defined as any time the participant clearly receives a compliment from a peer or an adult, and the participant responds in a way that positively acknowledges the compliment. An example of accepting a compliment would be a child receiving a compliment, such as, “Good job!” and the child responding by saying, “Thank you.” A non-example would be a child receiving a compliment such as, “Good job!” and the child ignoring the compliment and saying nothing.

Design

A multiple baseline across behaviors single subject design was used for the current study. Single subject studies allow for an experimental approach without the use of large sample sizes and/or a control group because the participants themselves serve as their own control through the collection of baseline data (Horner et al., 2005). By using the multiple baseline across behaviors approach, multiple social skills, or behaviors, could be measured across both participants within one study rather than multiple studies. Within single subject research, visual analysis is primarily used to determine the effectiveness of such studies. The level, trend, and variability of data are measured as part of visual analysis and used to determine the effectiveness of an intervention. “Level refers to the mean performance during a condition (i.e., phase) of the study; trend references the rate of increase or decrease of the best-fit straight line for the dependent variable within a condition (i.e., slope); and variability refers to the degree to which performance fluctuates around a mean or slope during a phase” (Horner et al., 2005, p. 171). Overlapping data between the baseline and intervention phases are also compared during visual analysis as the presence of overlapping data compromise the potential

functional relationships between the independent and dependent variables (Horner et al., 2005).

The data collection method was modeled after a *contingency space analysis* (CSA), which is a method of data collection used to identify contingent relations from conditional probabilities (Martens, DiGennaro, Reed, Szczech, & Rosenthal, 2008). Martens et al. outlined four possible sequences that are required to determine the degree of contingency from behavior-consequence data: “(a) Behavior occurred and was followed by a consequence, (b) behavior occurred and was not followed by a consequence, (c) behavior did not occur but the consequence was still delivered, and d) neither behavior nor the consequence occurred.” (p. 80). For example, if a behavior occurred ten times, but the consequence was only delivered 5 times, then the conditional probability of the consequence occurring given the behavior would be .50 (Martens et al., 2008). While the design of this study did not directly follow the process of a CSA, it was modeled in a way that should allow for the calculation of a probability or percentage of appropriate use of the social skills taught. In a typical CSA, researchers first consider whether a behavior is present, then whether the consequence was observed.

In this study, the goal is to measure whether participants engaged in the appropriate social skills when the opportunity was presented, or when there was an apparent need to engage in such skills. Thus, a partial-interval recording method was used to determine, first whether the opportunity was present, and then whether the participants engaged in the appropriate social skill(s). For example, if a participant was observed calling out that they do not know how to perform a task in the game of Minecraft, but they did not directly ask an adult or peer, this was considered an

opportunity that was present, but the skill was not utilized. Conversely, consider a participant who exclaimed they leveled up to a new “world” in the Minecraft game, and the target student said, “Good job.” This would be considered as an opportunity that was present, and a skill that was utilized correctly. As previously stated, a partial interval recording method was used when coding the data. While coding, a timer was set to alert those coding every 30 seconds and if a behavior or opportunity occurred during the preceding 30 seconds then a plus sign was marked in that interval. If a behavior or opportunity did not occur during the 30 second interval, a minus sign was marked in that session’s place.

Procedures

Participants were recruited through a local pediatrician who regularly works with children with a diagnosis of ASD. The “Minecraft Club” met for one hour a week for eight consecutive weeks in a computer lab at a local university. The general layout of the session included 5-minutes of explicit instruction on the social skill, 10-minutes of role playing the social skills, and 40-minutes of playing the online game, Minecraft, while self-monitoring use of the skill.

These lessons were modified from *SkillStreaming* lessons. Each lesson included a description of the social skill and a task analysis of how to engage in the skill. The lesson was modified, where applicable, by embedding references to Minecraft into the instruction. For example, when the lesson on giving a compliment was introduced, the advising faculty member read from a written script about what giving a compliment was. The faculty member then pulled up the steps to giving a compliment on the computer in the front and went over each step. Additionally, the faculty member printed out a copy of

the steps and gave them to each participant in the club. The steps for giving a compliment were (a) get the attention of the person you want to give a compliment to and, (b) say something nice to that person. The print out also had a place for the participants to self-monitor their use of the social skill by checking each step as they went. Participants were told that if they used the skill five times in the session, they would be allowed to stay at the club for 5 extra minutes to play Minecraft before leaving.

During the role play time of the lesson, participants were given the opportunity to volunteer to model the skill, and were given praise and feedback. The students were divided into small groups with neurotypical students and students with ASD in each group and given the opportunity to role play using the newly instructed social skill. Each student, both neurotypical and those with ASD, was instructed to role play an example of the skill being performed and a non-example of the skill being performed. Therefore, each participant was given the opportunity to practice the skill and see others performing the skills. Reinforcement was provided using verbal praise and tokens, as well as feedback in case the students' examples or non-examples were inaccurate.

Following the instructional time, the students were given 40-minutes to play Minecraft in a pre-designed "world" that fit the skill of focus. For example, if the skill being taught was *asking for help*, in order to complete the Minecraft task, it was necessary for the students to collaborate with each other and ask for help throughout the game. The setting allowed for a naturalistic environment for the children to practice their social skills while also engaging in a preferred activity. During each session, the students were videotaped separately for two 10-minute sessions during the Minecraft portion of the session. These records were later coded by one graduate student and the advising

faculty member. Tokens were also used throughout the sessions for reinforcers for generally good behavior throughout the Minecraft time. Students also had the opportunity to cash in their tokens for Minecraft related toys and prizes at the end of the eight weeks.

The final 5 minutes of each session was a review of the social skill. The faculty advisor referred to the print-out of the steps and asked each participant how many times they were able to engage in their social skill. Any participants who met their goal of five uses of the targeted social skills were allowed an extra 5 minutes to play Minecraft before leaving the club meeting.

Data were collected on all social skills during each session. Before implementing the instruction for *asking for help*, during the instructional time of sessions 1 and 2 the leading faculty member addressed the skill *introducing yourself* which was also modified from the *Skillstreaming* manual. However, data was not collected on the participants' use of *introducing yourself*. At the following club meeting, during sessions 3 and 4, the instruction for *asking for help* was introduced and the collection of intervention data began for that skill. Further baseline data were collected for *accepting a compliment* and *giving a compliment* were also collected during sessions 3 and 4. During sessions 5 and 6 *accepting a compliment* was introduced and taught to the participants, and intervention data was collected on both it and *asking for help*. Baseline data continued to be collected for *giving a compliment* throughout sessions 5 and 6. Finally, during sessions 7 and 8, instruction was presented on *giving a compliment* and intervention data were collected for the skill, as well as *asking for help* and *accepting a compliment*, thru session 12.

Interobserver Agreement

Two observers, one graduate student and one advising faculty member, independently recorded data for 42% of all sessions across all behaviors. Interobserver agreement (IOA) was calculated by the number of agreements divided by the total number of agreements plus disagreements multiplied by 100. For the total number of initiations of the social skills, agreements were defined as the observers recording the same total of plus marks within a 10-minute session. A plus mark indicated that a behavior occurred within a 30-second interval within the 10-minute session. Disagreements were defined as the observers recording an unequal number of plus signs in a 10-minute session. Table 1 shows the IOA for both the opportunities and the use of the social skills across the participants separately, as well as the opportunities and the use of social skills combined between both participants.

A generally acceptable level of IOA is 80% or greater agreement between observers that has been conducted at least 25 to 30% of sessions (Steege & Watson, 2009). As can be seen in Table 1, the observers had at least 80% agreement in a majority of the compared data, and the data that did not meet 80% agreement did not fall below 75% agreement. The highest level of IOA was measured in the use of the skills *accepting a compliment*, while the lowest level of IOA measured was measured in the *opportunity to give a compliment*. Overall, there were lower levels of IOA in determining whether opportunities were present compared to whether the social skills were used by the participants. This is likely due to the lack of clarity in defining an *opportunity* for each skill, which allowed for more subjectivity when collecting data.

Table 1*Interobserver agreement*

<u>Opportunity</u>	<u>Oliver</u>	<u>James</u>	<u>Total</u>
Asking for help	78%	88%	83%
Accepting a compliment	100%	90%	95%
Giving a compliment	80%	70%	75%

<u>Use of Skill</u>			
Asking for help	96%	80%	88%
Accepting a compliment	100%	100%	100%
Giving a compliment	100%	80%	90%

Results

The results for both participants show a positive trend in data across most behaviors, indicating an increase in the participants' accuracy in using the measured social skills. There are positive trends across all data, although it is stronger in some skills than others for both participants. However, based on visual analysis, the data do not show a functional relationship between the intervention and accurate use of social skills when given the opportunity. There were small changes in level between the baseline and intervention phases, high variability, and high amounts of overlapping data. Although the trends were relatively small, they were positive.

Sessions in which there were zero opportunities for the participants to engage in the social skill were deleted from the data to avoid an inaccurate representation of the participants' progress. For example, if Oliver's data were to include the sessions in which there were zero opportunities to ask for help, it would create a negative trend. Similarly, if James' data included sessions in which there were zero opportunities to ask for help, his average percent accuracy would decrease to 50%. Overall, one cannot confirm that the participants' increased accuracy is solely attributable to the intervention but the results of the current study provide a promising foundation for further research.

Oliver

Figure 1 shows that Oliver demonstrated a positive trend in his accurate use of all measured social skills. The sessions in which zero opportunities were recorded were deleted from the data to show the best representation of Oliver's growth throughout the study. While Oliver showed more improvement in some skills than others, the positive trend across all skills suggest overall improvement compared to baseline data.

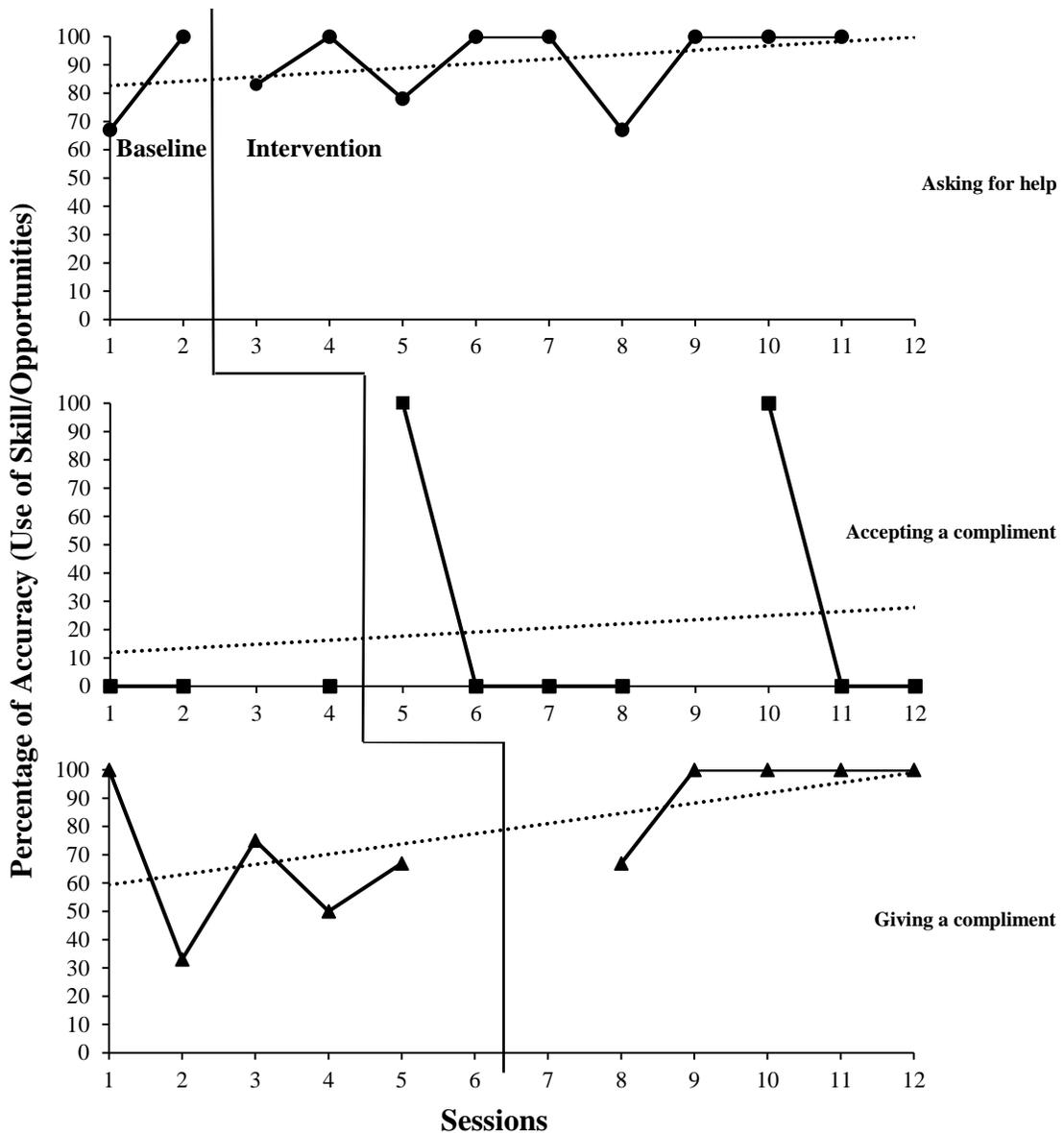


Figure 1. Oliver’s percent of accurate use of the measured skills when an opportunity was present. Sessions in which there were zero opportunities were deleted from the data.

Asking for help. During the baseline phase, Oliver averaged 83% accuracy when asking for help. There was a slight increase to Oliver’s accuracy in asking for help during the intervention phase as he averaged 89% accuracy upon receiving the “Asking for Help” intervention. During the intervention phase, Oliver had a total of 38 opportunities to ask for help and used the skills correctly in 34 of those opportunities. Although the

increase was slight, these results suggest that with further intervention, it is possible that Oliver would continue to increase in his accuracy of asking for help.

Accepting a compliment. Oliver showed some growth in the accuracy with which he accepted a compliment. Oliver averaged 0% accuracy in accepting a compliment during the baseline phase as he was given a total of 7 opportunities but did not accurately accept the compliments following during any of those opportunities. During the intervention phase Oliver accepted a compliment when given an opportunity with an average of 25% accuracy. Oliver had a total of 8 opportunities to accept a compliment during the intervention phase and accepted a compliment accurately twice during those 8 opportunities. While Oliver did not master this social skill, his growth shows improvement and with further intervention, it is possible that Oliver could have mastered this skill.

Giving a compliment. Oliver also showed growth in the accuracy with which he gave compliments to his peers and/or adults. During the baseline phase, Oliver averaged 67% accuracy when giving a compliment. Oliver had a total of 15 opportunities to give a compliment during the baseline phase and accurately gave a compliment 10 of those 15 opportunities. During the intervention phase, Oliver gave compliments with an average of 92% accuracy during the intervention phase. He was given 12 opportunities to give a compliment during the intervention phase, and he accurately gave compliments in 11 of those 12 opportunities. In the final four sessions, Oliver maintained 100% accuracy when given opportunities to give compliments, which demonstrated both consistency and mastery of the skill.

Table 2 shows the components of visual analysis used to analyze Oliver’s data. Oliver’s data showed a small, negative level of change between baseline and intervention phases in the data for *asking for help*, a large, positive change between baseline and intervention phases in the data for *accepting a compliment*, and no change between baseline and intervention phases in the data for *giving a compliment*. Trend was measured by the slope of each trend line for each skill’s set of data points. The trends across the skills showed positive, but small growth as evidenced by the slope of each trend line. There was variability throughout the data across all skills, in both baseline and intervention phase, which compromised the functional relationships between the intervention and Oliver’s social skill accuracy. Finally, there was a low percentage of non-overlapping data (PND) which indicates that a number of the intervention data points overlap with the baseline data and compromised the functional relationship.

Table 2

Visual Analysis of Oliver’s Data

<u>Social Skill</u>	<u>Level</u>	<u>Trend</u>	<u>Variability</u>	<u>PND</u>
Asking for help	Small, negative change (-17%)	1.56	Some variability across both baseline and intervention data	0%
Accepting a compliment	Large change (100%)	1.45	No variability in baseline data, but high variability in the intervention data	25%
Giving a compliment	No change	3.61	High variability in baseline data, fairly consistent intervention data	0%

James

Figure 2 shows that James demonstrated a positive trend in his accurate use of the social skills. The sessions in which zero opportunities were recorded were deleted from the data to show the best representation of James' growth throughout the study. While James showed more improvement in some skills than others, the positive trend across all skills suggest overall improvement compared to baseline data. Table 3 shows the visual analysis components that were used to analyze the functional relationship

Asking for help. During the baseline phase, James averaged 46% accuracy when asking for help. James was given 13 total opportunities to ask for help during the baseline phase and he accurately asked for help 6 of those 13 times. James' accuracy improved during the intervention phase as can be seen in Figure 2. James averaged 69% accuracy when asking for help during the intervention phase. There were a total of 32 opportunities to ask for help during the intervention phase, and James accurately asked for help 22 times of those 32 opportunities.

Accepting a compliment. During the baseline phase, James averaged 0% accuracy when accepting a compliment. There were 7 opportunities for James to accept a compliment during the baseline phase, and James did not accept a compliment accurately in any of those opportunities. During the intervention phase James' accuracy was quite variable as demonstrated in Figure 2. James averaged 41% accuracy when giving a compliment during the intervention phase. He had 17 opportunities to accept a compliment during the intervention phase, and accepted compliments in 7 of the 17 opportunities. While James did not master this social skill, results suggest that with further intervention, it is possible that James would continue to increase in his accuracy of accepting compliments.

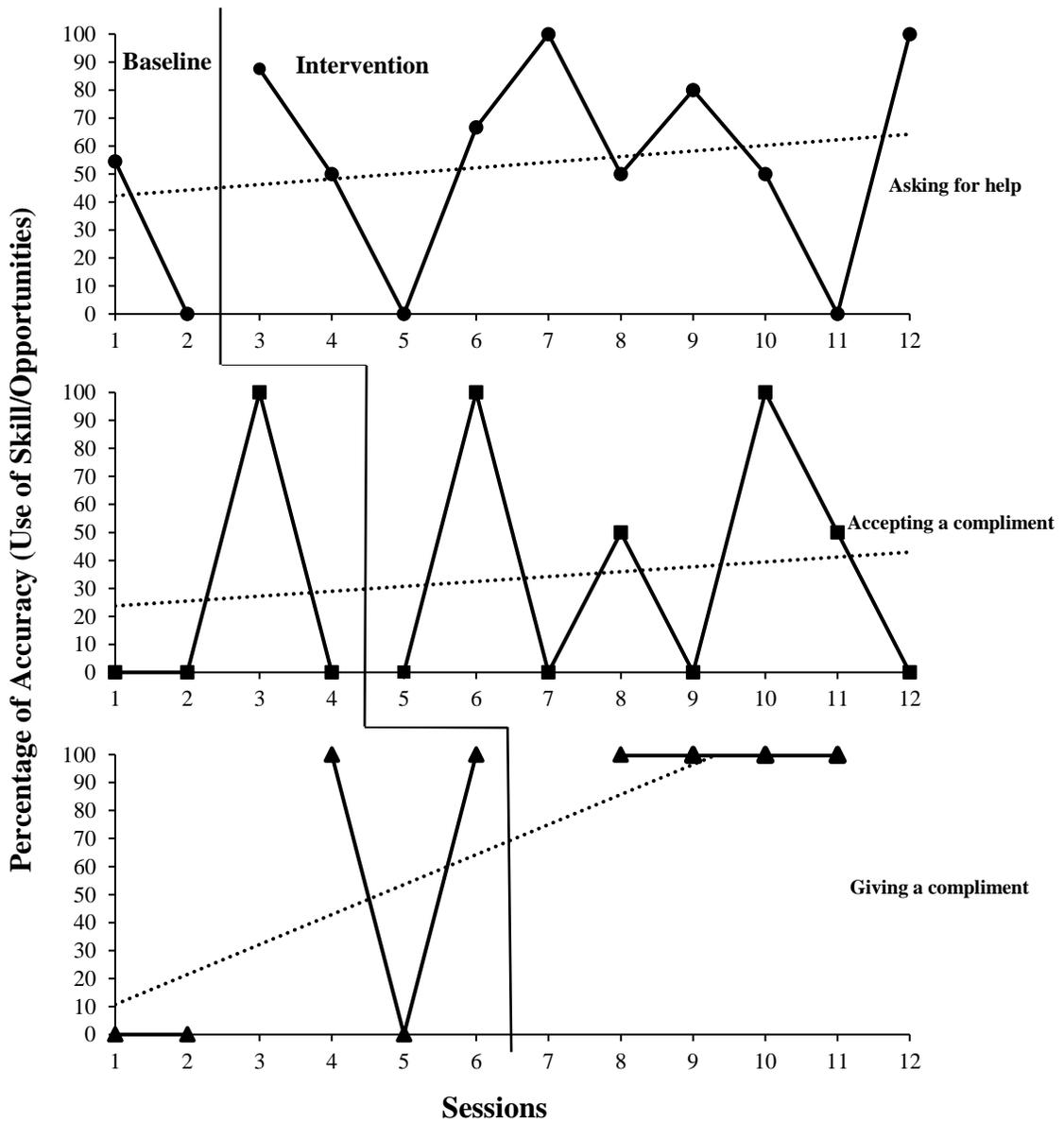


Figure 2. James' percent of accurate use of the measured skills when an opportunity was present. Sessions in which there were zero opportunities were deleted from the data.

Giving a compliment. James showed impressive growth in the accuracy with which he gave compliments. During the baseline phase, James averaged 60% accuracy when giving a compliment as there were a total of 5 opportunities to give compliments, and James gave compliments in 3 of those 5 opportunities. However, during the intervention phase, in four of the final five sessions (with the fifth having zero

opportunities to give a compliment) James gave compliments with 100% accuracy as there were 7 opportunities to give compliments, and James gave compliments in all 7 opportunities.

Table 3 shows the components of visual analysis used to analyze James' data. James' data showed a large, positive change in level between baseline and intervention phases in the data for *asking for help*, but no change in level between the baseline and intervention phases in the data for *accepting a compliment* and *giving a compliment*. The trends across the skills showed positive, but small growth for James in regard to *asking for help* and *accepting a compliment*, and greater growth for *giving a compliment* as evidenced by the slope (m) of the trend lines. There was variability throughout the data across all skills, in both baseline and intervention phases, which compromised the functional relationships between the intervention and James' social skill accuracy. Finally, there was a low percentage of non-overlapping data (PND) which indicates that a number of the intervention data points overlap with the baseline data and compromised the functional relationship.

Table 3

Visual Analysis of James' Data

<u>Social Skill</u>	<u>Level</u>	<u>Trend</u>	<u>Variability</u>	<u>PND</u>
Asking for help	Large, positive change (87.5%)	m = 1.99	High variability across both baseline and intervention data	50%
Accepting a compliment	No change	m = 1.75	High variability across both baseline and intervention data	0%
Giving a compliment	No change	m = 10.71	High variability in baseline data, but stable intervention data	0%

Table 4 shows a comparison of the participants' intervention data that includes the number of correct uses of the skill, the number of opportunities for each skill, and the percent of accuracy. The accuracy was calculated by dividing the number of correct uses of the skill by the number of opportunities.

Table 4

Comparison of Both Participants' Intervention Data

<u>Oliver</u>	<u>Correct Use of Skill</u>	<u>Opportunities</u>	<u>Accuracy (%)</u>
Asking for help	34	38	89%
Accepting a compliment	2	8	25%
Giving a compliment	11	12	92%
<u>James</u>			
Asking for help	22	32	69%
Accepting a compliment	7	17	41%
Giving a compliment	7	7	100%

Discussion

The results of the study not show a functional relationship between the intervention and social skill accuracy. That is, the data do not indicate that the participants' improvements can be directly attributed to the intervention itself as evidenced by visual analysis of the data. Small changes in levels, small changes in trend, high amounts of variability within the data, and small percentages of non-overlapping data compromised the potential functional relationship. However, the positive trends within the data do suggest an overall improvement in both participants' use of all three skills. Both participants showed the greatest amount of growth in giving compliments, while they showed the least amount of growth in accepting compliments.

The data collection method of the current study was unique, which provided a different way of examining the relationship between the intervention and the participants' social skills. By monitoring the number of opportunities the participants had to engage in the social skills, the researchers were able to control for a lack of opportunities which might affect data collected by frequency. That is, if a participant was masterful in the Minecraft world they were playing in during a session, it is likely that they did not need to ask a question which would impact a frequency measure for the skill *asking for help*. By monitoring the accuracy with which the participants engaged in the social skills based on the opportunities they had, there is less likelihood that external factors, such as the absence of opportunities, would affect the data.

While the current study does not provide strong support to the existing literature, the positive trend of data does provide a promising foundation for further research. The existing literature suggests that the incorporation of restrictive and repetitive interests

when teaching social skills and other pro-social behaviors to students with autism spectrum disorders can improve such behaviors (Boyd et al., 2006; Carnett et al., 2014; Koegel et al., 2012; Koegel et al., 2013). In regard to social skill instruction, existing research has primarily focused on junior high and high school aged students, thus further research is needed to determine the effectiveness in using restrictive and repetitive interests to teach social skills to children of elementary school age and younger. The current study could be modified for a younger age group using a common interest among such students with HFA and the explicit instruction could be modified to be more developmentally appropriate for a younger age group, as well. There were a number of limitations to the current study, but minor changes to the design could potentially result in an improved intervention aimed toward a younger, older, or similar age group.

Although the results of this study suggest a general improvement in social skills when restrictive and repetitive interests were incorporated with explicit social skill instruction, there were several limitations to the study. One limitation of the study was a lack of comparison group. A quasi-experimental design may have been beneficial within this study as it could have provided a comparison that would have given an opportunity to better determine the effectiveness of the intervention components. Similarly, data could have been collected from neurotypical students to provide a comparison of how often a majority of same-age students engage in the measured social skills when given opportunities compared to the students with ASD. Although there was not a large increase in the participants engaging in the social skills, the small increase may have allowed the participants to be more commensurate with their neurotypical peers. Data

about how often peers engage in these skills would be meaningful to know whether the intervention was successful as well.

The intervention contained a number of evidence-based practices; however, it is unclear whether all of these practices are necessary and/or which may have been most salient. A component analysis of the intervention could have provided evidence about which practices impacted student behavior. This would help future researchers or practitioners interested in replicating the study know which components to include. For example, a second club could have been conducted in which Minecraft was not incorporated but still included the social skills instruction. This would have provided a comparison to determine the role that the restrictive and repetitive interest of Minecraft played in the intervention results.

Another limitation of the study was that there was not a clear definition of *opportunity*. One of the criteria of data collection was to determine whether an opportunity was present for the subject to engage in the measured social skills. However, *opportunity* was not clearly defined and could be considered subjective to the raters. Despite acceptable IOA data, a clearer definition of what it meant for a participant to have an opportunity would improve the likelihood that this study could be replicated. Similarly, when measuring *asking for help*, there was no measure in place that considered moments when the participants needed help but simply did not vocalize it. For future studies, especially with higher functioning students, it would be beneficial to include a self-monitoring sheet in which students marked when they needed help that could then be compared to the moments in which they actually asked for help. This would also provide an opportunity for participants with ASD to practice metacognitive skills.

The timing of the recorded sessions may also have affected the data. The first recorded session usually began at the beginning of the 40-minute Minecraft time, but it is possible that the participants were not recorded at the exact same time for both sessions. With the social skill instruction fresh on their mind, it is possible that the participants might have used their social skills more accurately at the beginning of each meeting rather than later. Conversely, they may have used it more accurately at the end of each session after they had more practice with the skill throughout the first part of the session. No record was kept of when each session was recorded; thus, there is no way to determine whether the timing of the recorded sessions may have impacted the data. Similarly, another limitation is that the participants may have had several more opportunities to engage in each skill during the times that they were not recorded. Overall, the participants were videotaped for only half of the Minecraft time that was allotted during each session which means that there were an additional 20-minutes during which the participants were not recorded and no data was collected. In future research, it would be helpful to record the participants' behaviors during one continuous video, or two back-to-back 20-minute videos, for the entire 40-minutes of Minecraft time to ensure that no behaviors or opportunities are missed.

There were also an inconsistent amount of opportunities for each participant to engage in each skill which could potentially mean that one participant had more opportunities to practice the skill than the other. While both participants had a similar number of opportunities to ask for help, James had twice as many opportunities to accept a compliment than Oliver. Similarly, Oliver had almost twice as many opportunities to give a compliment than did James. While the current study was designed in a way for the

participants to use these skills in a naturalistic environment, in doing so there was no attempt to control the number of opportunities each participant received to engage in the skills. In future research, it might be helpful to have a specific number of opportunities delivered to each participant. For example, the neurotypical students and/or assisting adults may be designated to create specific number of opportunities for each participant by giving compliments, doing something to elicit a compliment, or creating opportunities for the participants to ask for help.

One of the inclusion criteria for the participants, both those with ASD and the neurotypical participants, was that they had to have played and enjoyed the game of Minecraft, which was based on parent report. There was no measure used to assess how interested or experienced the participants were in playing Minecraft, which could have limited the results of the current study. A parent may have overestimated how interested their child was in Minecraft and the game may not have actually been a restricted or repetitive interest for that student at all. Similarly, if a participant did not enjoy Minecraft as much as other participants, the opportunity to play Minecraft for an additional five minutes at the end of each meeting is less likely to have been reinforcing to that student. The students' level of proficiency with Minecraft may also have affected their behavior throughout the Minecraft meetings. For example, if a student was more experienced in playing Minecraft, they may have asked fewer questions because they required less help; or a student who lacked experience may have asked an influx of questions compared to their average peers within the group.

The lack of a generalization or maintenance phase following the intervention is another limitation to the current study. The inclusion of a generalization or maintenance

phase would have allowed for the opportunity to monitor the participants in their natural school environments to see how they maintained their social skills outside of the Minecraft Club setting. Overall, the current research suggests that the incorporation of restricted and repetitive interests had a positive impact on the participants' accuracy with which they used social skills.

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