2019

Teaching the Leisure Skill of Photography to Children with Autism Spectrum Disorder

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Teaching the Leisure Skill of Photography to Children with Autism Spectrum Disorder

submitted to
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by
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for
Senior Thesis in Psychology
2018 - 2019
April 29, 2019

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Acknowledgements

I would first and foremost like to thank Dr. Marjorie H. Charlop for creating such a beautiful place as the Claremont Autism Center. Thank you for taking me under your wing and allowing me to bring my passion of photography to the children at the center. Being at the center and being with the children has consistently been the highlight of my every week, and they continually inspire me.

I would also like to thank all the undergraduate and graduate students who have assisted me with any part of my study, be it recording training sessions, coding data, or anything else. I would like to give a special shoutout to Claire Klein, who encouraged and helped me with my thesis every step of the way (even though she already graduated!) and to Benjamin Thomas, who provided invaluable edits on my drafts.

And finally, thank you to all my professors, friends, and family who have shaped me throughout my experience here and gotten me to this point. I am so grateful to have each of you in my life. You have truly changed me for the better.

Abstract

Children with autism spectrum disorder (ASD) often do not use their leisure time appropriately. Previous studies have shown that children with ASD tend to engage in inappropriate actions and maladaptive behaviors (such as engaging in stereotypy and tantrums) that decrease their quality of life. Establishing age-appropriate leisure skills is important for these children as these skills have been recognized as fulfilling habilitative needs, and can increase the quality of life and social acceptance and decrease the amount of stress for these individuals. The present study used a multiple baseline across-participants design to investigate whether children with ASD can learn and maintain the skill of photography. Eight children (5 boys and 3 girls, ages 5-16) with ASD were taught using behavioral skills training to engage in an appropriate leisure skill– taking pictures. When mastery criterion was met during training (participants were able to take two consecutive pictures following the six operationally defined steps), participants completed a follow-up three weeks later to examine whether they were able to maintain the skill. Six out of the eight participants were able to successfully learn how to take pictures. This study furthers the current literature on teaching leisure skills to children with ASD and future studies can focus on expanding appropriate leisure skills that are taught to children with ASD, as well as measuring the effects (i.e. social, therapeutic) of learning photography, in addition to other leisure skills.

Teaching the Leisure Skill of Photography to Children with Autism Spectrum Disorder

Introduction

Autism spectrum disorder (ASD) is a developmental disorder that affects 1 in 59 children and can typically be noticed in the child's first three years of life (Centers for Disease Control and Prevention, 2019). Several of the defining characteristics of ASD include rigid and stereotyped behavior, as well as deficits in social and communication skills, both verbal and nonverbal (American Psychiatric Association [APA], 2013). Children with ASD tend to display a preference for routine and systematic activities and have a low tolerance to change (Lovaas, Koegel, & Schreibman, 1979).

Leisure skills are another skillset in which individuals with ASD tend to showcase deficits (Matson, Hattier, & Belva, 2012). Previous studies have shown that children with ASD are less likely to be involved with leisure activities, and when given leisure time, often use their time inappropriately and take part in maladaptive behaviors (such as engaging in stereotypy and tantrums) that decrease their quality of life (Hochhauser & Engel-Yeger, 2010; Wehman & Schleien, 1981). Inappropriate social behaviors such as handflapping, body rocking, self-abuse, and unusual verbalizations are some of the behaviors typically seen that prevent positive social interactions from occurring (Wehmen & Schleien, 1980). Additionally, even when not engaging in stereotypy, children with ASD have poorly developed independent play skills and tend to stay isolated from other peers when given time to play and engage in less socially complex types of play (Anderson, Moore, Godfrey, & Fletcher-Flinn, 2004). As a result, there is a need for children with ASD to learn enjoyable, age-appropriate leisure skills that can help facilitate positive social interaction between them and their peers.

Although improving the quality of life for individuals with ASD is a top priority

for many public policies, it has still been consistently shown that individuals with ASD

have higher levels of stress and associated anxiety than those without ASD, for both

adults and children (Bellini, 2004; Green, Gilchrist, Burton, & Cox, 2000; Kim, Szatmari,

Bryson, Streiner, & Wilson, 2000). Individuals with ASD have also been reported to have

higher levels of loneliness, depression, and social dissatisfaction in comparison to their

peers (Ghaziuddin, Ghaziuddin, & Greden, 2002; Gillott & Standen, 2007; Huang &

Wheeler, 2006). These traits that negatively impact a person's mental health and quality

of life (loneliness, depression, stress, etc.) have been shown to have roots starting in

childhood that continue into adulthood. Having leisure skills can play a role in enhancing

these individuals' quality of life, as there is considerable evidence that shows that leisure

skills are a valuable resource to help people with disabilities effectively cope with life

stressors, as leisure "involves taking a time-out from one's stressful life and provide(s)

positive, alternative focus…[and] also helps individuals feel rejuvenated and gain a sense

of renewal." (Hutchinson, Bland, & Kleiber, 2008; Iwasaki, MacTavish, & MacKay,

2005). It is therefore important to begin teaching leisure skills to those with ASD as

children in order to increase their quality of life, lower their levels of stress and anxiety,

and prevent future adulthood depression and loneliness.

As discussed earlier, having appropriate leisure skills is important as these skills

have been recognized as fulfilling habilitative needs, can increase the quality of life and

social acceptance, and decrease the amount of stress for these individuals (Carlile, Reeve,

Reeve, & DeBar, 2013; Dimaya, Reeve, & Reeve, 2010; Garcia-Villamisar & Dattilo,

2010). Garcia-Villamisar & Dattillo (2010) demonstrated that ASD participants who

were involved in a one year leisure skills program (involving media, crafts, games, and exercise) had a significant decrease in overall stress levels and had significant increases in four quality of life factors (satisfaction, independence, competence, and social interaction).

Participating in a leisure skills program also provides opportunities for individuals to interact with their peers and practice social and communication skills, and as a result it has also been found that adults who participated in a leisure skills program and were taught leisure skills had a significant improvement in social and communication skills (Garcia-Villamisar & Dattilo, 2011). Some leisure skills that have previously been taught to adults with ASD include throwing darts, appropriate internet skills (such as accessing online games and websites), and passing a soccer ball (Jerome, Frantino, & Sturmey, 2007; Luyben, Funk, Morgan, Clark, Delulio, 1986; Schleien, Wehman, & Kiernan, 1981). Children with autism have been taught leisure skills such as playing Guitar Hero and aquatic play and swimming skills (Yilmaz, Birkan, Konukman, Erkan, 2005; Rogers, Hemmeter, Wolery, 2010).

In order to teach these leisure skills, task analysis, which involves breaking a skill down into multiple simple steps, is often used. Several prompting procedures involving task analysis in various formats have successfully been used to teach leisure skills, such as constant time delay (CTD), video modeling, most to least prompting, activity schedules, and behavioral skills training (Blum-Dimaya et al., 2010; Cuhadar & Diken, 2011; Rogers et al., 2010; Thomas, Lafasakis, & Spector, 2016; Vuran, 2008). For example, Rogers et. al (2010) used CTD, a procedure involving providing and fading prompts for the target behavior in a time-lagging fashion, to teach foundational

swimming skills such as the flutter kick to children with ASD. To teach adults with

autism how to make clay baskets, Vuran (2008) used a most to least prompting

procedure, which progressively reduces the assistance of an instructor so that an

individual can learn how to independently perform the target behavior. Video modeling

involves participants viewing a video clip that models the target behavior in order for the

individuals to imitate the behavior, and was used to teach children with ASD how to play

Guitar Hero (Blum-Dimaya et al., 2010). Activity schedules involve presenting an

individual with written or photographic prompts for a specific task of a desired chain of

activities to guide the individual through the desired task, which can be effective for

structuring appropriate use of leisure skills once they have been learned. A previous study

used activity schedules on an iPod touch to teach children with ASD to independently

structure their leisure time so that they appropriately engaged in leisure activities such as

coloring with crayons or playing with a slinky (Carlile, Reeve, Reeve, & DeBar, 2013).

Behavioral skills training involves instructions, modeling, rehearsal, and feedback, and

has successfully been used to teach skateboarding skills to a child with ASD (Thomas et

al., 2016).

Despite the fact that having age-appropriate leisure skills is beneficial for those

with ASD and helps increase their quality of life, the research surrounding leisure skills

and ASD is limited, and is even further limited when looking at leisure skills for children

with ASD. Given its importance, it is crucial to continue expanding the research

surrounding leisure skills and ASD. The present study aimed to teach the leisure skill of

photography to children with ASD using behavioral skills training (consisting of

instructions, modeling, rehearsal, and feedback). Since behavioral skills training consists

of modeling and practice, it is a more natural method of teaching a behavior, and more appropriate for a leisure skill that takes place out in the open, such as photography. With the current ease of accessibility to digital cameras and photography, it was determined that photography would be a fun, appropriate, and socially interactive leisure skill for the children to learn, and one that they could continue to have access to at home, once learned. It was hypothesized that children with ASD would learn how to take pictures and maintain the learned leisure skill of taking pictures.

Method

Participants

Participants were 8 children with autism spectrum disorder (ASD) between the ages of 5-16 (see Table 1). All participants were diagnosed with ASD by an independent agency according to the Diagnostic and Statistical Manual of Mental Disorders (5th ed; *DSM-5*; APA, 2013). The participants attended a weekly social skills session at an after school treatment center for children with ASD. Prior to beginning the study, the CARS-II (Childhood Autism Rating Scale) diagnostic scale was administered to each of the participants (Schopler, Reichler, & Renner, 2002). Informed consent was also obtained from the participants' parents prior to beginning the study.

Table 1

Participants

Child	Sex	Ethnicity	Age	CARS-II
Ally	Female	Korean American	9	Mild/Moderate
Wade	Male	Korean American	8	Severe
Brandon	Male	Korean American	13	Severe
Sonia	Female	Hispanic American	6	Severe
Alec	Male	European American	9	Severe
Allen	Male	Korean American	10	Mild/Moderate
Leonardo	Male	Mexican American	16	Severe
Jackie	Female	African American	5	Severe

Ally was a 9 year old Korean American girl with mild/moderate ASD, as measured by the CARS-II diagnostic scale (Schopler et al., 2002). Ally received social skills therapy at the center, where she received a fixed ratio reinforcement schedule. Ally tended to engage in inappropriate conversation topics and when the topic being talked about was not of interest to her she would ignore the conversation. She would also engage in inappropriate behavior such as aggressiveness toward her sister and inappropriate physical touching.

Wade was a 8 year old Korean American boy with severe ASD, as measured by the CARS-II diagnostic scale (Schopler et al., 2002).. He was on a fixed ratio reinforcement schedule and received social skills therapy at the center. Wade would often exhibit noncompliant behaviors, such as yelling negative words, pinching, running away,

and throwing tantrums. He would also express himself using inappropriate language and would be impatient when it came to taking turns and cooperative playing.

Brandon was a 13 year old Korean American boy with severe ASD, as measured by the CARS-II diagnostic scale (Schopler et al., 2002). He was on a fixed ratio reinforcement schedule and attended the social skills therapy group at the center. Brandon would engage in stereotypy such as rocking back and forth, jumping, and shaking items and would often not be very expressive or initiate conversation and communication.

Sonia was a 6 year old Hispanic American girl with severe ASD, as measured by the CARS-II diagnostic scale (Schopler et al., 2002). She was on a fixed ratio reinforcement schedule and received social skills group therapy at the center. Sonia would engage in non-compliant behaviors such as running away from a task, and she also had trouble focusing, as well as understanding personal space and asking for permission.

Alec was a 9 year old European American boy with severe ASD, as measured by the CARS-II diagnostic scale, and attended the social skills therapy group at the center (Schopler et al., 2002). He often exhibited noncompliant behaviors, such as laying on the ground, running away, yelling and breaking things, and throwing tantrums.

Allen was a 10 year old Korean American boy with mild/moderate ASD, as measured by the CARS-II diagnostic scale, and received social skills group therapy at the center (Schopler et al., 2002). He was very shy and did not talk or play a lot with the other children during outdoor game activities and did not initiate conversation, as it often took him a while to answer and ask questions.

Leonardo was a 16 year old Mexican American boy with severe ASD, as measured by the CARS-II diagnostic scale (Schopler et al., 2002). He received social skills group therapy at the center and was on was on a fixed ratio reinforcement schedule. Leonardo did not speak in full sentences and often repeated words other people spoke to him (echolalia). His social interaction and communication with peers was low and he also engaged in stereotypy such as flapping his fingers and hands as well as vocal stimulation, such as laughing.

Jackie was a 5 year old African American girl with severe ASD, as measured by the CARS-II diagnostic scale (Schopler et al., 2002). She received social skills group therapy at the center and was on a fixed ratio reinforcement schedule. She often had trouble focusing on tasks, asking for permission and understanding personal space, sharing and taking turns, and would use an inappropriate tone of voice, often screaming when she wanted things.

Procedure

Design. A multiple baseline across-participants design (Cooper, Heron, & Heward, 2007) was used in this study in order to determine the effectiveness of teaching the children how to take a picture with a camera. In a multiple baseline across-participants design, the amount of time that each child spends in baseline differs for each child in order to stagger the length of baseline (i.e. participant 1 had 3 baseline sessions, participant 2 had 5 baseline sessions, etc.). This staggering allows the experimenter to control for confounding variables and conclude that intervention during training is what results in the observed behavioral change.

All participants completed baseline, treatment, and criterion assessment. During baseline, participants were assessed on whether they could take a picture. During treatment, participants were taught using behavioral skills training (BST) to learn how to photograph. Criterion was assessed by having participants complete a 6 step checklist to determine whether they had learned to take a picture.

Materials and Data Collection. The study used a Sony DSCW800/B 20.1 megapixel digital camera. An Apple iPad® 2 with operating system iOS 11 was used to video record all sessions of the study. A coding sheet was used to determine whether the child acquired the skill of taking a photograph (see Appendix A) and was used during baseline, treatment, and the final assessment.

Baseline. The length of baseline was different for each child, with treatment occurring at different points in time. The first participant was introduced to treatment first, and the eighth participant spent the longest time in baseline. Baseline sessions were conducted in an outdoor area right outside of the center and a research assistant filmed each session on an iPad®. During baseline, participants received no instructions or training on how to take a picture. The experimenter stood outside across from the child, handed the child the camera, and delivered the discriminative stimulus (SD): "Take a picture". The experimenter gave no prompts or praise related to how the child responded to the instructed task. The session concluded after the participant attempted to take a picture two times.

Treatment. During intervention, the experimenter again stood outside across from the child, handed the child a camera, and delivered the SD: "Take a picture", mimicking the conditions from baseline. In addition, the experimenter used behavioral

skills training (consisting of instructions, modeling, rehearsal, and feedback) to teach

each participant how to perform the behavior of taking a picture properly. First, the

experimenter modeled the behavior of taking a picture and narrated each of the

specific six steps that consist of the operational definition of taking a picture, then

asked the participant to take a picture (The six steps were: find a target scene, turn the

camera on, put the target in the viewfinder, put the target in focus, click the shutter,

and turn the camera off). After the participant's first attempt at taking a picture, the

experimenter provided feedback and explained to the participant what they did not do

correctly. The participant was then allowed to try the behavior again. After the second

attempt, the experimenter modeled how to take a picture again, this time explaining to

the participant how to perform the steps they may be struggling with correctly. Until

the participant successfully performed the act of taking a picture with 100% accuracy

for two consecutive pictures, the experimenter continued the training. Having the

participant successfully take a picture two consecutive times with 100% accuracy was

defined as the learning criterion. Upon reaching learning criterion, the participant

entered the final assessment phase of the study.

Criterion. In the final assessment, the experimenter returned to baseline

conditions and again stood outside across from the child, handed the child the camera,

and delivered the SD: "Take a picture". Just as in baseline, there was no teaching

progression (modeling, reinforcers, feedback), and participants were given two

attempts to take a picture during this phase. Mastery criterion for taking a picture was

defined as having 100% accuracy on two consecutive pictures taken (without

prompting), and if this criterion was met, it was determined that the child had mastered

the behavior as operationally defined. If criterion was not met, the participant was

given a booster session.

Follow-Up. After three weeks, participants were assessed to see how well they

had maintained the behavior (completing all the steps of taking a picture two times in

a row without prompting). Just as in baseline, the child was handed a camera and the

SD was delivered: "Take a picture."

Booster Sessions. Booster sessions were given if the child was not able to

meet mastery criterion during the final assessment phase. Booster sessions were

exactly the same as the treatment phase, with the experimenter modeling and

demonstrating the target behavior and steps to the child. Just as in treatment,

participants needed to reach the learning criterion (100% accuracy on two consecutive

pictures with prompting) before they could re-enter the final assessment phase. Upon

re-entering the final assessment phase, if the participant was still unable to meet

mastery criterion, he or she received another booster session. A maximum of two

booster sessions was given for each child (three maximum total test phases), and if the

child still could not meet mastery criterion by the end of the second booster session, it

was determined that the child had not mastered the behavior and would no longer be

required to attempt to take a picture.

Dependent Measures

Dependent Variables. The dependent variable for this study was learning how to

take a picture. The operational definition of taking a picture was broken down into six

parts. The six steps were as follows: finding a target scene (i.e. leaf, butterfly, rock;

participants could either verbally communicate what their target was or point to the target

[i.e. telling the experimenter "I want to take a picture of the rock" or pointing to a rock]), turning the camera on, putting the target in the viewfinder, focusing the image, clicking the shutter button to take the picture, and turning the camera off. The child could not begin taking a picture before the SD of "Take a picture" was given.

Inter-Rater Agreement. The research team of the experimenter and two research assistants trained by the experimenter filmed all sessions. The experimenter coded all of the sessions and a research assistant also coded 33% of the sessions, either in-vivo or using the videos. Research assistants were familiar with the operational definition of taking a picture and were trained on how to code the picture taking. Inter-rater agreement was calculated by dividing the number of agreements by the total number of observations, multiplied by 100 for the percentage. Interrater reliability was between 83% and 100% across all sessions.

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Results

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As can be seen in Figure 1, six of the eight children reached mastery criterion during the final assessment. The remaining two children reached learning criterion (2 consecutive pictures at 100% accuracy with prompting) but did not successfully reach mastery criterion (2 consecutive pictures at 100% at baseline conditions; both children were at 83% instead). Four of the eight children completed 3 week follow-up sessions and one child maintained mastery criterion after three weeks, while the other three children were at 83% accuracy.

All eight children demonstrated low or inconsistent levels of the correct behavior during baseline. Baseline sessions were established when a stable baseline for the child

was present (i.e. if the baseline data was variable, baseline was continued until baseline

was stable). The length of the training intervention ranged from 4 sessions to 17 sessions.

Taking a Picture.

Ally. Ally spent five sessions in baseline and maintained a constant baseline of

17% accuracy across all five baseline sessions. She reached learning criterion after four

training sessions (two sessions at 100% accuracy with prompting) but did not reach

mastery criterion (two sessions at 100% at baseline conditions), so a booster session was

given. After meeting learning criterion during the booster session, Ally was able to reach

mastery criterion. A total of seven training sessions (including 1 booster session) were

given for Ally to reach mastery criterion. During Ally's three week follow-up, she

maintained the behavior and was able to take two consecutive pictures with 100%

accuracy without prompting.

Wade. Wade spent the longest time in baseline, being in baseline for seventeen

sessions. During baseline, he was unable to perform the correct behavior, and had a stable

baseline of 0% accuracy across all baseline sessions. Wade met learning criterion after

twelve training sessions and also met mastery criterion after twelve teaching sessions.

Brandon. Brandon was in baseline for fifteen sessions and had a stable baseline

of 0% accuracy, being unable to perform the correct behavior. Brandon reached learning

criterion after ten training sessions but was unable to meet mastery criterion on the final

assessment that followed. Brandon then received a booster session where he again met

learning criterion, but again was unable to meet mastery criterion on the final assessment.

Brandon received one more booster session and again met learning criterion, but was still

unable to meet mastery criterion on the final assessment, so the teaching progression was

stopped. On all mastery criterion assessments, Brandon demonstrated 83% accuracy, with

the one step that he was unable to do without prompting being identifying a target scene

(verbally or pointing to it).

Sonia. Sonia spent eleven sessions in baseline and had a constant baseline of 0%

accuracy across all baseline sessions. Sonia reached learning criterion after seven training

sessions and immediately met mastery criterion on the final assessment that followed.

Alec. Alec spent nine sessions in baseline and started at 0% accuracy before

stabilizing at 17% accuracy for the rest of baseline. Alec reached learning criterion after

eight training sessions but did not reach mastery criterion upon the final assessment, so a

booster session was given. Alec met learning criterion during the booster session but was

again unable to meet mastery criterion during the final assessment. Alec received one

more booster sessions and again met learning criterion, but was still unable to meet

mastery criterion, so the teaching progression was stopped. Alec demonstrated 83%

accuracy on all mastery criterion assessments, but was unable to identify a target scene

without prompting.

Allen. Allen spent the least amount of time in baseline, spending three sessions in

baseline with a stable baseline of 67% accuracy. Allen reached learning criterion after

four training sessions but did not reach mastery criterion. Allen received a booster session

and immediately met learning criterion, where he then met mastery criterion. During

Allen's 3 week follow-up he demonstrated 83% accuracy on two consecutive pictures.

Leonardo. Leonardo spent seven sessions in baseline with a stable baseline of 0%

accuracy. After twelve training sessions, he met learning criterion and was also able to

meet mastery criterion. During his three week follow-up, Leonardo demonstrated 83%

accuracy when taking two consecutive pictures.

Jackie. Jackie spent 13 sessions in baseline and had a stable baseline of 0%

accuracy. Jackie reached learning criterion after six training sessions and also reached

mastery criterion after six training sessions. During her three week follow-up, Jackie

demonstrated 67% accuracy when taking two consecutive pictures.

Discussion

In this study, children with ASD were taught to take pictures as a leisure skill and

were assessed to see whether they could learn and maintain the behavior. Of the eight

participants, all participants met learning criterion (two consecutive pictures with 100%

accuracy) and six participants met mastery criterion (two consecutive pictures with 100%

accuracy at baseline conditions), demonstrating that they successfully learned to take a

picture. Of the four children who completed three week follow-ups, all four demonstrated

an accuracy of 83% or higher for two consecutive pictures (with one child maintaining

mastery criterion), showing that they were mostly able to maintain the skill.

For the two children who did not meet mastery criterion, the only step that they

were unable to do (of the six steps) when being assessed for mastery criterion was

identifying a target subject. For this study, it was decided that identifying a target subject

needed to either be verbal (i.e. "I want to take a picture of the rock") or that the

participant needed to physically point to the item they wanted to take a picture of. This

helped ensure that the participant had a clear subject in mind and that they were focused

on taking pictures of a specific item instead of taking pictures of random objects.

Brandon, one of the two children who did not meet mastery criterion, had a hard time

initiating conversation so it may have been difficult for him to verbally or physically

indicate what he wanted to take a picture of without being asked or prompted. Alec, on

the other hand, was better able to initiate conversation and appeared to know that the first

thing he needed to do was say what he wanted to take a photo of, as he would ask

himself, "What do you need to do first?" when he was handed the camera and told to take

a picture. However, he would not verbally choose a target subject unless the experimenter

prompted him and asked, "What do you want to take a picture of?", which he would then

reply to. This could perhaps be due to some of the noncompliant behavioral tendencies

that Alec sometimes exhibited. Because both of these participants did not identify a target

subject verbally or physically, they did not meet mastery criterion, but it was still a good

sign to see that it appeared that they had a subject in mind when they were taking a

picture, as they would clearly turn the camera toward an object they wanted to

photograph and focus their attention on it. Since having a clear and focused subject was

the exact purpose of making them verbally/physically identify a target scene, it appears

that both of the participants who did not meet mastery criterion still successfully learned

how to take a picture in this study, for the most part.

　　　　For the three children who met mastery criterion and completed a follow-up with

lower than 100% accuracy, it was the same step of verbally/physically identifying a target

subject that was not met. This may indicate that having them verbally/physically identify

a target subject initially helped them learn how to pick and focus on a subject for the

photograph, but over the course of time the step of choosing a target subject naturally

became internalized, with the participant choosing the subject mentally in their mind

instead of verbally saying it or physically pointing to it. This is also more similar to how

pictures are taken in real life, as the natural way to photograph something may not be to say "I want to take a picture of the tree", but instead thinking that one wants to take a picture of the tree, then turning the camera toward the tree and placing it in the viewfinder of the camera.

As previous studies have found, leisure skills are extremely important for children with ASD, yet there is very little research surrounding the teaching of leisure skills to children with ASD (Blum-Dimaya et al., 2010; Rogers et al., 2010). This study furthered the literature on leisure skills by using behavioral skills training to teach photography to eight children with ASD. Previous studies teaching leisure skills to children with ASD have mainly been with four or fewer children, so having a larger sample size of eight children participate in the study and successfully learn how to take pictures was one of its strengths. The accessibility of photography was another one of the study's strengths, as the few previous studies teaching leisure skills to children with ASD involved leisure skills that were not as portable or easily accessible, such as Guitar Hero and swimming skills. Photography, on the other hand, has become extremely portable and accessible, thanks to the powerful cameras that can now be found even on cell phones. Small digital cameras are also very affordable, and these cameras and phones can easily be carried everywhere, allowing for children with ASD to have the opportunity to easily access and engage in the leisure skill of photography wherever they go.

Individuals with ASD also have been shown to have a lower quality of life (i.e. increased stress, anxiety, loneliness) in part due to inappropriate social behaviors and poorly developed independent play skills that isolate them from their peers, so leisure skills can help play a role in improving their quality of life (Bellini, 2004; Green et al.,

2000; Hutchinson et al., 2008; Kim et al., 2000). All the children who participated in the study found photography to be a very enjoyable leisure skill and demonstrated large levels of excitement when taking pictures, taking great pride in the pictures they took. For example, after taking a picture Alec would comment, "Look at that! A perfect picture!" Meanwhile, Jackie would start jumping up and down when she was told it was time to go take pictures and Leonardo would start grinning at the photo he had just taken. Sonia would also look up from the photo she had just taken and exclaim, "Look!!!" while pointing to her photograph and beaming.

There are a wide variety of leisure skills, and these leisure skills can be solo or social. However, children with ASD need leisure skills that can help them increase and better their social interactions, as they have been shown to have a deficit in appropriate play skills and social interaction (Anderson et al., 2004). The present study addressed this need by teaching children with ASD photography, which was a socially relevant leisure skill. Although not experimentally measured, it was observed that learning photography helped many of the children with their social skills, initiation, and conversation. For example, Ally, who tended to engage in inappropriate conversation topics, was now able to have an appropriate conversation topic to talk about, as she would go and show the other members of the after school treatment center the pictures she had just taken (e.g. "look at these rocks and minerals!"), and she would also start telling people interesting things she had seen that day that she would like to take a picture of. As another example, Wade was working on cooperative play and turn taking, and after he started learning how to take pictures, every time he arrived at the center he would go up to the experimenter and politely ask, "May I have the camera please?", showing a marked improvement in his

patience with turn taking and nicely asking to do an activity. Many of the children would take pictures of other workers or children at the center and would even request to take pictures of someone who was not present in the area with them, helping to facilitate social interaction and create conversation among the children. It is not hard to imagine that by allowing the children to continue to take pictures and engage in photography as a leisure skill, further social interaction would take place, as the children could take pictures with each other or even go on a nature walk and take pictures as a group, allowing them to further converse with each other and make more friends. The photographs that the children take could also be printed out into a photo book so that the children could take pride in their work and go around sharing their photos with others, creating even more interaction and conversation opportunities.

One of the limitations of the study was briefly mentioned earlier, as two of the children did not meet mastery criterion because they did not identify a preferred object to take a picture of. In order to help prevent this in the future, a preference assessment can be taken ahead of training in order to learn what objects each child may be interested in taking pictures of. However, although the child did not verbally or physically identify a target subject to photograph on the final assessment, they were able to do all the other steps of taking pictures, indicating that they, for the most part, learned how to take a picture. A social measure could have also been performed to strengthen the study, such as having the children share the photographs they had taken in the social group sharing portion of the after-school program. Also, although it was observed that the children enjoyed learning to take pictures, only casual observations of enjoyment were taken (i.e. seeing the children laughing and informally asking the child if they enjoyed taking

pictures); no objective measures of happiness were taken (such as a rating scale for child affect, similar to Dunlap & Koegel (1980)), and such ratings of affect could have also strengthened the study by having a more solid indication of social validity and increased quality of life.

Future studies should continue to explore different leisure skills that can be taught to children with ASD, as there still have not been many studies examining leisure skills that can be taught to children with ASD (Blum-Dimaya et al., 2010; Rogers et al., 2010). Since the beneficial effects of learning photography were observed but not explicitly measured in this study, future studies should also examine the effects photography may have for children with ASD (such as increases in social and communication skills, happiness, or therapeutic benefits), as well as continue to examine the effects that leisure skills in general may have. This would build upon the findings of Garcia-Villamisar & Dattilo (2011) that being involved in a leisure skills program helped decrease stress, increase quality of life, and improve social and communication skills for children with ASD. After school classes teaching photography to students with ASD and other special needs can also be created to provide further opportunities for the benefits of photography to be accessible. Other studies can also examine whether the leisure skill of photography plays a different role among children with ASD of varying function levels, and perhaps even more advanced photography skills (i.e. learning manual controls) can be taught to higher functioning individuals with ASD. Children with ASD who have learned how to take pictures can also be taught how to appropriately join and use social media to share the pictures they have taken.

In sum, this study demonstrated that photography is an enjoyable leisure skill that can be taught to children with ASD, as six of the eight children were able to fully learn how to take pictures and were also able to maintain the behavior after three weeks. This study contributes to the growing literature on leisure skills, adding photography as a leisure skill that can successfully be taught to children with ASD, and a leisure skill that was shown to be greatly enjoyed by those who learned it. Photography also appears to have many promising benefits to children with ASD (i.e. improving social skills and having therapeutic benefits), so future studies should build upon this study and examine the positive effects photography can have, in addition to researching other leisure skills that can be taught to children with ASD.

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Tables

Table 1

Participants

Child	Sex	Ethnicity	Age	CARS-II
Ally	Female	Korean American	9	Mild/Moderate
Wade	Male	Korean American	8	Severe
Brandon	Male	Korean American	13	Severe
Sonia	Female	Hispanic American	6	Severe
Alec	Male	European American	9	Severe
Allen	Male	Korean American	10	Mild/Moderate
Leonardo	Male	Mexican American	16	Severe
Jackie	Female	African American	5	Severe

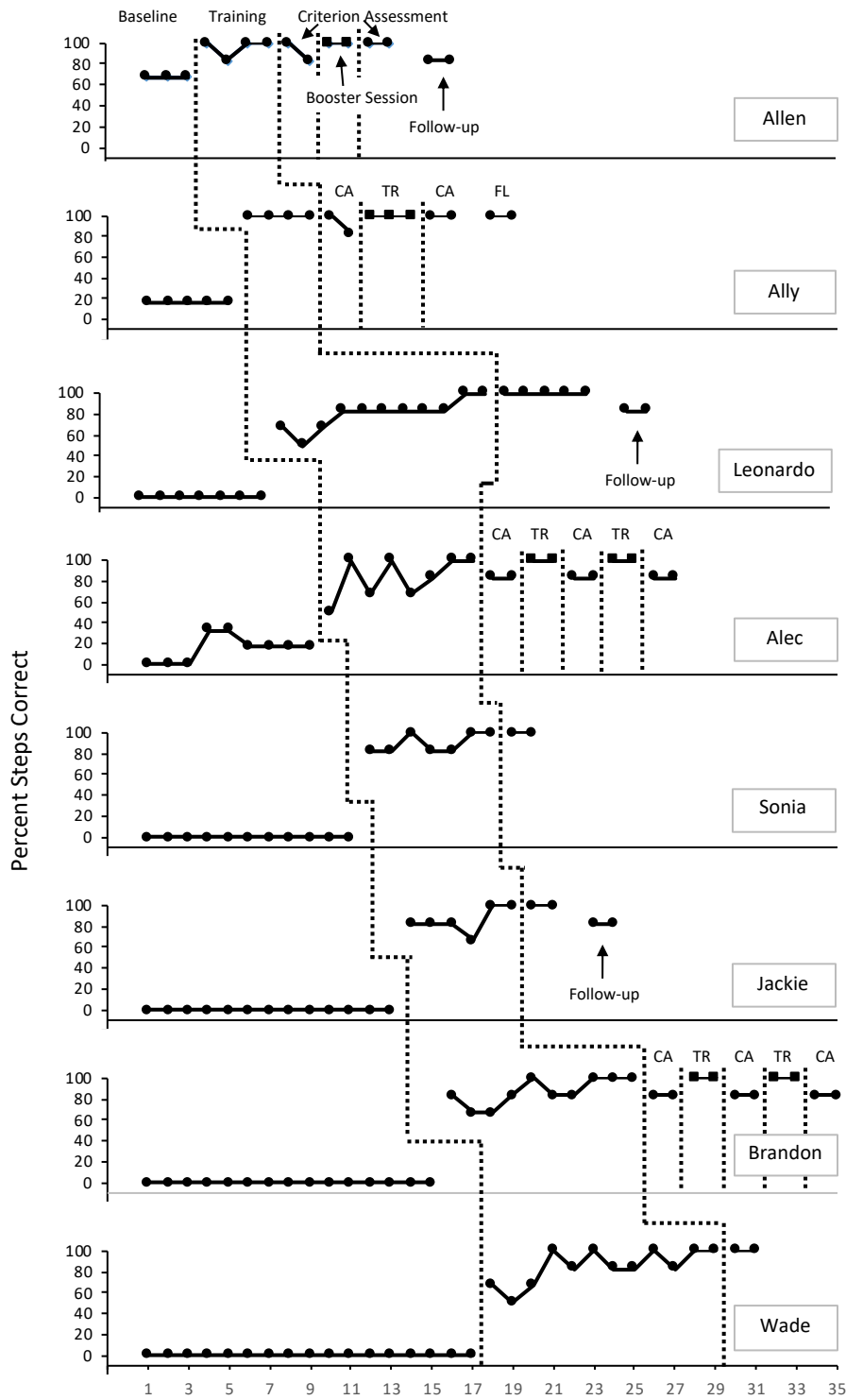*Note:* Age listed is chronological age at beginning of the study.

Figures

Figure 1. Percentage of correct picture-taking steps during baseline, training, criterion assessment (CA), additional booster training sessions (TR), and follow-up (FL).

Appendix A

Photography Coding Sheet

Name of Coder: Child Initials: Date:

Session Number: Phase:

Trial	Find a target scene	Turn camera on	Put target in viewfinder	Focus target	Click the shutter	Turn camera off