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Assessing Generalization of Behavioral Interventions in Teaching Independent Play Skills to Individuals with Autism Spectrum Disorder: A Systematic Review

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by

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Abstract

A myriad of evidence-based practices has been effective in teaching independent play skills to individuals with Autism Spectrum Disorder (ASD). These interventions include video modeling, activity schedules, task correspondence training, task organization, individual work systems, and matrix training. This systematic review is aimed at examining the various behavioral interventions used to teach independent play skills to children and adolescents with ASD as the independent play literature will be evaluated to see if generalization was programmed for and assessed within the study. As one of the main dimensions of behavior analysis, generalization of skills, specifically independent play skills, is important to examine as a valuable characteristic of the field of applied behavior analysis (ABA). Generalization of independent play skills is essential for a child's development and overall well-being. Independent play refers to a child's ability to engage in play and activities without constant adult supervision or direct involvement. When these skills are generalized, it means the child can apply them across various settings, toys, and situations. The PRISMA program was used to screen potential articles for inclusion in the review. The final analysis included seven articles that met the predetermined inclusionary and exclusionary criteria. Six out of the seven included articles demonstrated generalization to either novel environments, people, or objects. More specifically, three out of the seven articles both programmed for and assessed for generalization. Similarities existed amongst the studies in that most generalized to new environments. Future research should continue investigating the benefits of the acquisition of independent play skills and how well these skills generalize to various stimuli so that these skills can transfer across new conditions.

Keywords: ASD, behavior, children, communication, generalization, independent, play, socialization

Chapter 1: Introduction

Autism Spectrum Disorder, often referred to as Autism or ASD, is a neurodevelopmental disorder characterized by three core deficits in the DSM-V: persistent deficits in social communication, deficits in social interaction across multiple contexts, and restrictive, repetitive patterns of behaviors, interests, or activities (American Psychiatric Association, 2013). These deficits may reduce opportunities for developing interactive play with other children and can consequently contribute to social isolation (Paterson & Arco, 2007). Social isolation might serve to perpetuate the child's deficits in socialization and communication (Morrison et al., 2002). To avoid or minimize challenges with socialization and communication, independence and self-management have been put forward as essential curriculum objectives for individuals with ASD (Olley, 1999). It is necessary to specifically teach and promote independence in individuals with ASD as they tend to exhibit on over reliance on caregiver prompting (i.e., prompt-dependence) and feedback for completing tasks and making transitions between activities (Olley, 1999). One of the ways independence can arise is through play.

Children with autism typically show deficits in independent toy play which can include ritualistic and repetitive patterns of behaviors. Specifically, these behaviors can be topographically identified by the child lining up toys by shape, color, or showing excessive attachment to toys (Paterson & Arco, 2007). Studies have shown that children with autism spend less time interacting with toys functionally and using toys independently and engage in fewer of these play skills compared to typically developing peers (Stone et al., 1990). Several studies have reported the play of children with autism to be characterized as stereotyped and less integrated, varied, and flexible than their typically developing peers (Koegel et al., 2001; Stone et al., 1990; Wing et al., 1977).

Importance of Play Skills

Play is a crucial skill in the development of all children (Lee et al., 2017). The significance of the acquisition of play skills for children with autism is notable for a few reasons. First, children that do not learn to play may miss opportunities for social interactions and that loss may negatively influence and delay the development of social skills (Barton & Wolery, 2008; Licciardello et al., 2008; Pierce-Jordan & Lifter, 2005). Second, increasing the quality and frequency of appropriate play has been shown to decrease stereotypy and other interfering behaviors in some children with autism and may be an effective approach to the prevention or treatment of these behaviors (Koegel et al., 1974; Lang et al., 2010). Third, teaching play reduces the observable differences between children with autism and typically developing children. A reduction in the apparent differences may increase the likelihood that the children with autism will be considered for inclusion in activities with typically developing children, lessening social isolation (Hine & Wolery, 2006).

With these benefits in mind, teaching play skills is among the priority targets in establishing appropriate peer interactions for children with ASD (Dunlap, 2009; Lovaas, 2003). Studies have shown that compared to typically developing peers, children with ASD display a lower frequency and range of independent play skills, and differences have been shown in the way in which they play games or play with toys (Barton & Pavilanis, 2012; Barton & Wolery, 2010). Paterson and Arco (2007) note that effective interventions to teach independent play skills are necessary in social environments. From their research with independent play skills, it seems reasonable to propose that if children with autism learned age-appropriate independent toy play, their opportunities for subsequently developing more interactive social play would be increased. Additionally, teaching age-appropriate leisure skills to individuals with developmental

disabilities has been recognized as filling habilitative needs that may increase quality of life (Jerome et al., 2007; Schleien et al., 1981). An example of these habilitative needs include recreation and leisure skills that children have mastered after maintenance of independent toy play skills early on in childhood (Terpstra et al., 2002). Specifically, in 1981, individuals with autism were taught to play darts using verbal cues and a step-by-step training model (Schleien et al., 1981). Considering that many autistic individuals during that time were being deinstitutionalized to group homes and other community living facilities, a large importance was placed on developing leisure skills for these adults (Schleien et al., 1981). Additionally, this study took social validity measures as 25% of the bars in the local community contained at least one dart board and playing darts taught these adults visual tracking skills as well as number recognition skills (Schleien et al., 1981). This is significant considering that this location was easily accessible for the participants to acquire the independent play skill of dart throwing, even after the intervention concluded, resulting in response maintenance for the participants. Lastly, generalization probes occurred where the participants were able to successfully hit the dart board in a friend's apartment, neighborhood bar, and another training facility, with no prompting or reinforcement (Schleien et al., 1981). These habilitative skills are both recreational and functional, which can increase quality of life.

Hine and Wolery (2006) offer several reasons why teaching play to young children with autism is a valuable treatment goal. Adults and other children may be more likely to comment on or join in the play of a child with autism if the child is engaged in behaviors that are recognized as play. For example, peers and teachers may be hesitant to comment or interact with a child that is mouthing a toy cow but may interact if the child is moving the cow around a toy barn. An increase in interaction and comments from others can lead to increased exposure to language

which research has shown to be associated with the acquisition of speech (Ellis et al., 2012; McDuffie & Yoder, 2010; Yoder et al., 2001). In the absence of intervention, play deficits often persist and it is common for adults with autism to lack the skills required to engage in recreational and leisure activities (Billstedt et al., 2011; Palmen et al., 2011). Meaningful leisure activities offer relief from boredom and provide a context for social engagement (Kleiber et al., 2002). More importantly, such activities may contribute to a person's ability to successfully cope with and recover from stressful life events (Kleiber et al., 2002). Ultimately, play provides a context for addressing many of the core deficits associated with autism (Lifter et al., 2011; Ninci et al., 2013).

Types of Play Skills

Children commonly learn to socially interact through play: first, through independent and parallel play, usually with toys, and then, by sharing toys in interactive and reciprocal play (Paterson & Arco, 2007). After children learn to play independently, these skills serve as a behavioral cusp to learning more complex play skills. A behavioral cusp is any behavior change that brings the learner's behavior into contact with new contingencies that have far-reaching consequences (Rosales-Ruiz & Baer, 1997).

Independent play does not necessarily have to include objects or toys being used for their intended purposes and while independent play can include imaginative play without physical objects, this review focuses on literature related to participants acquiring independent play skills related to various toy items. Independent play is also about a child's engaging in toy play activities without constant adult supervision or intervention, regardless of how they use the objects or toys involved (Paterson & Arco, 2007). Independent play is also characterized by the child pursuing their own activity without reference to what other children in their environment

are doing (Parten, 1932). Within independent play is functional play which is defined as any action on one or more objects in a manner which reflects their "proper" conventional use (e.g. putting a peg in a hole, dressing up a doll, making a construction with lego bricks) (Mavropoulou et al., 2011). Functional play is important because it promotes critical cognitive development and social interactions with others (McConnell, 2002). An example of this is a child using a toy pan as a real pan. This can look like the child physically manipulating the pan by placing toy food objects on it and vocalizing cooking sounds. Skills like these generally appear during the first year of life in typical development (Benson & Haith, 2009).

Also within independent play is symbolic play which typically develops between the ages of 18 to 24 months and occurs when children begin to enact events or actions out of context, with one toy or object representing another (e.g., feeds a doll a piece of sponge; makes an action figure drive a truck) (Thiemann-Bourque et al., 2019). There are different levels of symbolic play skills, such as substituting one object for another, using a doll or inanimate object as an agent of actions, or joining sequences of play into multi-scheme actions (Thiemann-Bourque et al., 2019). Symbolic play also has been defined based on the objects substituted (e.g., real, substitute, or imaginary objects), the agent involved in the action (e.g., child acts on an object or child has another agent act as in a doll holding a cup), and single or multiple play schemes (e.g., activities in play that children repeat that help language and social development (such as a child throwing a cup to understand its trajectory) (Barton & Pavilanis, 2012; Casby, 2003; Lifter, 2000).

Independent Play

Teaching children with ASD independent play skills has important implications on their social, communicative, motor, and emotional growth including fine motor skills and gross motor

skills (Terpstra et al., 2002). Children who can play independently will eventually be able to play games with their peers and have increased opportunities to learn social skills from their peer interactions (Luyben et al., 1986). Additionally, the development of independent play skills may predict self-regulation because it provides children with early opportunities for, and practice of, self-direction, used in a suite of later skills with beneficial outcomes such as emotional well-being and self-regulation skills (Colliver et al., 2022). This is all important considering play is an area of persistent difficulty for children with ASD since they tend to display play with less variation, elaboration, and integration than children with typical development or Down syndrome (Paterson & Arco, 2007; Williams et al., 2001).

Deficits associated with not developing independent play skills are a significant challenge for students with autism and may have negative implications for classroom and community inclusion (Hume & Odom, 2007). This impediment can limit one's potential to thrive in educational, vocational, and domestic settings (Pierce & Schreibman, 1994). Without systematic intervention strategies promoting appropriate independent play, children might encounter many barriers in their skill development. These barriers can include limited social development and underdeveloped communication skills as children with autism have severe and pervasive impairments in social interactions and communication that impact most areas of daily living and often limit independent engagement in leisure activities (Blum-Dimaya et al., 2010).

Considering the significant difficulties that students with ASD demonstrate in play, teaching independent play skills remains a challenge and an important curricular goal for their education (Mavropoulou et al., 2011). Students with autism require a curriculum that promotes independence and skills needed for adult functioning (Hume & Odom, 2007). The need for independent work skills for adults is well recognized, and the importance of independent play

skills is also well documented in the literature (Wehman, 1977). For example, Hume and Odom (2007) researched the effects of an individual work system on the independent work and play skills of students with autism. The purpose of the article was to report findings on if an individual work system produced increases in on-task behavior, work completion, and number of play materials utilized (Hume & Odom, 2007). Additionally, the authors sought to discover if an individual work system resulted in less adult prompting and socially important outcomes through a measurement of social validity. One of the participants, Mark, reported an additional job offer, with a competitive salary, scanning documents for a city's utility department. Since independence is the goal of behavior-analytic interventions, it is socially significant that outcomes like these occur. Thus, the acquisition of independent play skills is critical for children with ASD to thrive in the various environments they contact throughout their daily lives.

Generalization

Generalization of behavior change is a defining characteristic of ABA (Baer et al., 1968). Generalization as defined by Stokes and Baer (1977) is the occurrence of behavior under untrained conditions (i.e., across subjects, settings, people, behaviors, and/or time) in the absence of the stimuli present during initial training. Behavior change is said to have generalized if it lasts over time, occurs in many environments, or spreads to related behaviors (Arnold-Saritepe et al., 2009). A challenge with implementing interventions is establishing conditions such that the skills acquired in contrived settings will generalize outside of these controlled environments (Dixon et al., 2019). Systematic programming for generalization includes a selection of target behaviors that will result in naturally occurring reinforcement within similar environments or under similar conditions (Schmidt et al., 2023).

Baer et al. (1968) recommends actively programming for generalization rather than simply assessing if generalization occurred without specific programming. Edelstein (1989) has argued that generalization phenomena deserve careful scientific investigation exclusively, not just as something we examine or assess incidentally following treatment. This is the main difference between assessing and programming for generalization, since the first is simply an assessment or probe after the intervention is complete and the latter is a proactive measure built into the interventions. When a new skill is learned, one can look for generalization in the absence of contrived consequences, because, in most cases, contingencies in the natural environment should be expected to maintain the behavior, demonstrating generalization of that acquired skill (Shore et al., 1994). However, generalization is programmed by training a subset of the stimulus conditions or responses targeted for generalization. Most research in this area has dealt with generalization across experimenters (Corte et al., 1971; Stokes et al., 1974), although research has also examined generalization across settings (Corte et al., 1971; Rincover & Koegel, 1975) and across response topographies (Garcia et al., 1971). For example, assessing generalization could include introducing new toys, people, or environments to the learner after a specific independent play skill is acquired, and evaluating if the learner's responses are the same as during treatment. An example of programming for generalization is after a child has acquired the play skill of throwing a ball in a playroom, taking them to the park or diversifying materials.

Generalization can occur in three main ways. Stimulus generalization occurs when a response that has been associated with one stimulus occurs in the presence of another, similar stimulus (Martin & Pear, 2019). For example, if a child shows excitement and joy to play with their dog, they might play with another dog at a friend's house. The stimulus of the dog evokes a generalized response of the child playing from their learning history. Response generalization is

demonstrated when the learner emits a new, untrained behavior that is functionally equivalent to the behavior that was trained (Cooper et al., 2019). For example, if a child learns to tie their shoes using the bunny loop method, they then can apply this skill to tie a ribbon or piece of string also using the bunny loop method. Lastly, response maintenance occurs when the learner continues to perform the trained behavior after the intervention responsible for the behavior has ceased (Arnold-Saritepe et al., 2009). For example, if a child learns to play house in a toy kitchen set independently when they are two, they are likely to continue to play in that kitchen set when they are three, demonstrating maintenance of the behavior over time.

The purpose of the present study is to conduct a systematic review on teaching independent play skills to children with ASD and evaluate the extent to which studies actively program for and assess generalization. Children who acquire independent play skills are more likely to acquire self-management and leisure skills as they enter adolescence and adulthood. As an individual's level of independence increases, so does the individual's quality of life as they rely less on help from others and thus have increased autonomy. Evaluating the impact of programming for and assessing generalization in teaching independent play skills has implications for the continued development of independent life skills into adulthood and can guide future research on how best to promote generalization in independent play skills.

Chapter 2: Method

Procedure

A systematic review of the behavior analytic literature on teaching independent play skills to individuals with ASD was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021; see Appendix 2). The PRISMA model allows for identification and screening of potential articles, a way to evaluate the eligibility of each article using predetermined measures, and analyzing articles that meet the specified inclusionary criteria. Seton Hall University's online database system was used to conduct a systematic search between the dates of 01/26/23 and 08/16/23. The advanced search option was used within EBSCO Publishing's PSYCINFO database, and a combination of search terms were searched. We used the 'All text' and 'Subject' filter in the advanced search. The search strings were: "ASD" AND "independen*" AND "play skills", "ASD" AND "independent play skills", "Autis*" AND "independen*" AND "play skills", "Autis*" AND "independent play skills", "Generalization" AND "independent play" AND "autis*, and "Generalization" AND "independen*" AND "play skills."

After all filtered search results were obtained through the initial search, all articles were exported to Zotero. Zotero is an online reference management software program that organizes references of articles, allowing for easy storage of results, and removes any duplicate articles Then articles were exported from Zotero to Microsoft Excel after Zotero identified and removed any duplicate articles.

Inclusionary and Exclusionary Criteria

To determine a final list of articles to be included in the review, the following inclusionary and exclusionary criteria were applied:

Inclusionary criteria:

A. The article must have been in a peer-reviewed journal.
B. The dependent variable must be independent play, as defined as: any instance of the non-assisted use of or manipulation of any play object or toy where the physical object is being used independently of other individuals including children, parents, or other caretakers. This includes both verbal and non-verbal play behavior related to the play activity, toy, and/or situation (Paterson & Arco, 2007).
C. The age of the participant must be 21 years or younger.
D. The article must be written in the English language.
E. The article must have been published within the years 2002-2022.
F. All articles must have used a single subject experimental design.
G. All participants within the articles must have a diagnosis of ASD.
H. The article must have used behavior-analytic procedures in their interventions. Behavior-analytic strategies include applications from the field of the experimental analysis of behavior to change behaviors of social importance (Baer et al., 1968).

Exclusionary Criteria:

A. Articles NOT published in a peer-reviewed journal.
B. Any participant older than 21 years of age.
C. Articles NOT written in the English language.
D. Any article published prior to 2002 or after 2022.
E. Any design which was NOT a single-subject experimental design.
F. Any article that focuses on diagnoses of participants other than ASD.
G. Any article that did NOT use behavior-analytic procedures in their intervention.

Measures

Articles that met the inclusionary criteria were examined by the following variables:

Title of Journal Publication and Year Published

This refers to the name of the journal that the article was published in and the year that the article was published.

Participants

Participant demographics and characteristics including age, specific skill sets, and diagnosis were noted. As part of the inclusionary criteria, participants must have an ASD diagnosis. If participants had any additional diagnoses, those were reported as well.

Setting

The location of where the intervention took place as well as any setting in which generalization was programmed for and/or assessed were reported.

Experimental Design

This refers to the type of experimental design that the researchers used in their respective interventions to determine a functional relationship between the independent variable and dependent variable.

Independent Variable (IV)

The independent variable or intervention implemented to teach play skills was evaluated.

Dependent Variable (DV)

The specific behaviors and play skills targeted in the identified studies were noted.

Sessions to Mastery

This was defined as the number of treatment sessions needed for the participants to meet author-identified mastery criteria. The duration of the intervention was evaluated if that

information was provided in the article. Articles were also evaluated to determine the percentage of participants meeting the mastery criteria.

Interobserver Agreement (IOA)

This refers to the degree to which two or more independent observers reported the same observed values after measuring the same events. The percentage of sessions with IOA as well as the IOA results were evaluated.

Generalization

Studies were evaluated to determine whether generalization was specifically programmed for and/or assessed. Programming for generalization could include using multiple exemplar training, teaching the behavior in multiple settings, using multiple instructors in teaching, or using incidental teaching. The assessment of generalization could include conducting generalization probes in different settings, with different people, with different stimuli or target behaviors.

Maintenance

Studies were evaluated to determine whether data were collected post-treatment. An assessment of whether newly acquired skills remained in the absence of programmed reinforcement is helpful in analyzing the effectiveness of the treatment in promoting the durability of behavior change.

Technological description of procedures

Articles were evaluated to determine whether the procedures and intervention were described clearly such that they could be replicated by an independent researcher. This is significant considering replication is a characteristic of science in which repeating experiments with similar outcomes can determine the reliability of the findings.

Social validity

Data were collected on whether the article assessed for social validity. Cooper et al. (2019) found "Social validity refers to the extent to which target behaviors are appropriate, intervention procedures are acceptable, and important and significant changes in target and collateral behaviors are produced" (p. 800).

Chapter 3: Results

Literature Search

The PSYCInfo database within the Seton Hall University Library database yielded a total of 63 results. All 63 articles were exported to a reference management software, Zotero. After exporting these 63 articles to Zotero, 28 duplicate articles were removed through Zotero, leaving 35 articles. Next, a screening of each of the 35 articles was conducted. After screening all 35 articles against the predetermined inclusionary criteria, 28 additional articles were removed. Of the 28 removed articles: 18 articles were removed due to the dependent variable not meeting the criteria for independent play or an approximation of play similar to independent play; 4 articles were removed due to participants not meeting inclusionary criteria of an ASD diagnosis and/or being under the age of 21; 2 articles were removed because they were not published within 2002 and 2022; 1 article was removed because it was not written in English; 1 article was a literature review, not an empirical study; 2 articles were removed for the experimental design type, as they were mixed-effect regression models and a randomized controlled trial. This left a final number of seven articles to be included in this literature review. A summary of the results of the literature search are displayed in Appendix 1.

Journal Publication and Year Published

Out of the seven articles included in this review, two of the articles were published in the same journal while the other five articles were published across five different journals. Year published ranged from 2002 to 2019, with only one out of seven articles published within the last 10 years. Articles were published in the following journals: *Education and Treatment (*Blum-Dimaya et al., 2010; Hatzenbuhler et al., 2019), *Journal of Autism and Developmental Disorders* (Hume & Odom, 2007), *Behavior Analysis in Practice* (Libby et al., 2008), *Journal of Autism*

and Developmental Disorders (Mavropoulou et al., 2010), *Journal of Early Interventions* (Morrison et al., 2002), and *Behavior Modification* (Paterson & Arco, 2007).

Participants

There was a total of 23 participants across the seven studies included in this review. All participants were diagnosed with ASD and no comorbid diagnoses existed for any of the participants. One of the participants in Libby et al. (2008) had a diagnosis of PDD-NOS and for this reason was excluded from the review. There were 19 males and 4 females across the seven studies. The age of participants ranged from three to 20 years old, with the range of male participants being three to 20 years old and the range of female participants being five to 11 years old. Most of the participants were between the ages of four and 12 years old, with outliers at three years old and 20 years old. Morrison et al. (2002) had four participants including two males and two females ranging in age from three to five years old. The participants' symptoms of ASD ranged from moderate to severe, with significant deficits in social and language domains (Morrison et al., 2002). Age equivalent scores of social and language domains on *The Battelle Developmental Inventory* were given to each participant regarding their skill sets. The range for cognition was 26 months to 40 months, receptive language was 20 months to 36 months, expressive language was 24 months to 28 months, and personal-social were 12 months to 31 months (Morrison et al., 2002).

Setting

Although it varied whether the intervention took place in a public or private school, all seven studies took place in a school environment. For one of the participants in Hume and Odom (2007), the study took place at their employment site. One of the seven studies took place in a residential school (Libby et al., 2008) and six of the seven studies took place in non-residential

schools (Blum-Dimaya et al., 2010; Hatzenbuhler et al., 2019; Hume & Odom, 2007; Mavropoulou et al., 2011; Morrison et al., 2002; Paterson & Arco, 2007). Two of the seven studies took place in private schools (Blum-Dimaya et al., 2010; Libby et al., 2008), four of the seven studies took place in public schools (Hatzenbuhler et al., 2019; Hume & Odom, 2007; Mavropoulou et al., 2011; Paterson & Arco, 2007), and one of the studies did not explicitly specify if the school was public or private (Morrison et al., 2002). Five of the seven studies reported that the setting of the intervention took place in self-contained classrooms (Blum-Dimaya et al., 2010; Hume & Odom, 2007; Libby et al., 2008; Mavropoulou et al., 2011; Paterson & Arco, 2007), and two of the seven studies reported that the setting of the intervention took place in an inclusion classroom (Hatzenbuhler et al., 2019; Morrison et al., 2002).

Experimental Design

Three studies used a reversal design (Hume & Odom, 2007; Mavropoulou et al., 2011; Paterson & Arco, 2007), two studies used a multiple baseline across participants design (Hatzenbuhler et al., 2019; Morrison et al., 2002), one study used a multiple baseline across stimuli design (Paterson & Arco, 2007), one study used a multiple probe across participants design (Blum-Dimaya et al., 2010), and one study used an alternating treatments design (Libby et al., 2008). One notable feature of the experimental designs in Paterson & Arco (2007) was the implementation of a reversal design within a multiple baseline across stimuli design. The multiple baseline across stimuli design was used to evaluate the effects of the intervention of video modeling on the acquisition of independent play across three different toys. The reversal design was implemented with one participant and included continuous-generalization probes for play with two of the toys not in teaching to assess for functional control of the intervention.

Independent Variable

Six of the seven studies were similar in using a variety of visual strategies to teach the targeted independent play skills (Blum-Dimaya et al., 2010; Hatzenbuhler et al., 2019; Hume & Odom, 2007; Mavropoulou et al., 2011; Morrison et al., 2002; Paterson & Arco, 2007). Additionally, three of the studies used either video modeling and/or activity schedules as part of their interventions (Blum-Dimaya et al., 2010; Morrison et al., 2002; Paterson & Arco, 2007).

Morrison et al. (2002) evaluated the intervention of activity schedules and correspondence training. Correspondence training consisted of a play correspondence package including questions which served as prompts paired with programmed reinforcement to promote appropriate independent play behavior and performance during playtime. Morrison et al. (2002) also used graduated guidance, or shaping, providing the type and amount of prompting necessary to prompt the correct performance the task (Bailey & Wolery, 1992; Bryan & Gast, 2000). Hume and Odom (2007) examined the intervention of an individual work system. This visual work system was a table setup that required a desk, chair, computer, scanner, pen, and highlighter for Mark and a desk, chair, two small plastic shelves, a laundry basket with a laminated "finished" icon, functional classroom toys, interactive books, train magnet boards, inset puzzles, dot points, and play food and utensils for Scott and Chris.

Hume and Odom (2007) also examined the acquisition of independent play skills with functional play materials including a large field of play materials such as cause and effect manipulative toys and one-step functional toys. These toys or play materials were trains, Mr. Potato Head, and books. Paterson and Arco (2007) examined the independent variable or intervention of video modeling, using videotaped models for the appropriate target play behaviors. Similarly, Blum-Dimaya et al. (2010) examined the intervention of activity schedules

and video modeling. Libby et al. (2008) used modeling and behavior chains as their interventions in teaching the independent play skill of constructing a Lego figure. Mavropoulou et al. (2011) examined the intervention of task organization, which included visually organized tasks such as photos, drawings, and picture dictionaries to teach task completion and on-task play behavior as their independent play skills. Hatzenbuhler et al. (2019) examined the intervention of peer-mediated matrix training with visual prompt cards. Additionally, during teaching trials, Hatzenbuhler et al. (2019) used a behavioral skills training (BST) format which included instruction, modeling, practice, and feedback. While the use of peer-mediated matrix training was effective in teaching independent play skills, it also had a generalization component with the matrix training, which was an instructional approach to promote the occurrence of emergent responses without direct instruction (Hatzenbuhler et al., 2019).

Dependent Variable

Data collection and summary of the dependent variable varied across studies. Although specific independent play behaviors targeted for intervention varied, all studies included independent play targets consisting of some form of object manipulation or toy/game play, whether it was a game, toy, or other variation of a play sequence. Five of the seven articles also collected data on on-task and off-task behavior (Blum-Dimaya et al., 2010; Hatzenbuhler et al., 2019; Hume and Odom, 2007; Mavropoulou et al., 2011; Morrison et al., 2002).

Blum-Dimaya et al. (2010) examined the video game play of a Guitar Hero game, Hatzenbuhler et al. (2019) included the toy play of certain characters, and Libby et al. (2008) evaluated the construction of Lego structures. Morrison et al. (2002) examined the dependent variable of independent play skills, more specifically the percentage of intervals the child exhibited on-task behavior and the total number of occurrences of correspondence between

children's play selections and their actual play behavior. Play correspondence was defined as a measure of the child following the same play behavior sequence as indicated by his or her play selection that was placed on his or her photographic activity schedule, as the child received credit for correspondence when play behavior matched play selection on the activity schedule (Morrison et al., 2002). Paterson and Arco (2007) examined the dependent variable of independent toy play which included appropriate verbal play and appropriate motor play. Hume and Odom (2007) examined the dependent variable of on- and off-task responding, task completion, teacher prompting, and number of play materials utilized.

Libby et al. (2008) examined the independent play skill of children and teenagers constructing a Lego structure as data were collected on the number of steps of the task analysis performed independently. Blum-Dimaya et al. (2010) examined the dependent variable of the accurate completion of each component of the activity schedule and on task behavior for the guitar hero game that the participants were playing. Mavropoulou et al. (2011) examined the dependent variable of independent play which included dressing a doll, preparing food, and setting a table, an adapted sticker page, and lotto and domino games. Hatzenbuhler et al. (2019) examined the dependent variable of play which was defined as selecting the instructed character and engaging in the instructed action within five seconds of the peer trainer providing the instruction with four components of character, action, location, and vocalization. Additionally, there was an independent play probe which was defined as independently selecting any character and having it perform any of the corresponding actions in the correct location with the appropriate vocalization.

Sessions to Mastery

In four of the seven studies, 100% of the participants met mastery criterion (Blum-Dimaya et al., 2010; Hatzenbuhler et al., 2019; Hume & Odom, 2007; Libby et al., 2008). In Mavropoulou et al. (2011), 50% (1 out of 2) of participants reached mastery criteria. In two of the seven studies, participants reached mastery criteria in more than 10 sessions (Blum-Dimaya et al., 2010; Libby et al., 2008).

Morrison et al. (2002) reported that intervention sessions continued until the child independently selected and followed a sequence of play selections on his or her activity schedule for two consecutive sessions, remaining in at least two different play areas for a total of five minutes per play area. While the study did have criteria for the participants to demonstrate mastery, it was not explicitly mentioned in their results or graphs how many sessions it took to achieve this (Morrison et al., 2002). Hume and Odom (2007) reported the range of intervention sessions for all participants to reach mastery criteria of three to six sessions with a mean of 4.67 sessions. Something notable about this study was that the intervention phase consisted of two stages including a training stage and an intervention stage (Hume & Odom, 2007). Teaching occurred in the training stage with prompting from the instructor for the individual work system, whereas the intervention phase was a direct replication of the individual work system without the training component (Hume & Odom, 2007). Paterson and Arco (2007) did not explicitly define mastery criteria but reported rapid increases in appropriate motor and verbal play behavior after 8 and 10 sessions for the two participants, as appropriate play behavior stabilized at 100%. Libby et al. (2008) reported the range of intervention sessions for all participants to reach mastery criteria of 4 to 26 sessions with a mean of 11.86 sessions. Blum-Dimaya et al. (2010) reported the range of intervention sessions for all participants to reach mastery criteria of 13-27 sessions

with a mean of 20 sessions. Mavropoulou et al. (2011) reported the range of intervention sessions for all participants to reach mastery criteria of three to three sessions with a mean of three sessions. Hatzenbuhler et al. (2019) reported the range of intervention sessions for all participants to reach mastery criteria of five to 10 sessions with a mean of 7.67 sessions.

Interobserver Agreement

Across the seven included studies IOA data were above 90%, and data were collected for a minimum of 25% of all intervention and generalization sessions. IOA data were collected for enough sessions and IOA scores were sufficient to ensure the believability of the data. Morrison et al. (2002) reported that IOA data were collected for 25% of all experimental sessions and 85% of all generalization sessions. IOA across intervention and generalization sessions for on-task behavior ranged from 95% to 100%. Paterson and Arco (2007) reported that IOA data were collected for 46% - 48% of all sessions across the participants with an IOA ranging from 97% to 99% for measures of appropriate and repetitive behavior. Hume and Odom (2007) reported IOA data that were collected during 27% of all sessions across conditions and participants with IOA ranging from 91% to 100%. Libby et al. (2008) reported IOA data were collected during 50% of all trials with a mean agreement of 95% IOA and a range of 92-100%. Blum-Dimaya et al. (2010) reported IOA data that were collected during at least 33% of all sessions with a range of IOA of 98-100% across participants. Mavropoulou et al. (2011) reported IOA data that were collected for 30% of sessions across all conditions for each student with IOA ranging from a mean of 97 to 97% for Vaggelis and Yiannis. Hatzenbuhler et al. (2019) reported that the primary experimenter trained graduate ABA master's students to collect IOA data for 31%, 30%, and 33% of all sessions for Karly, Christopher, and Wyatt, respectively.

Generalization

Generalization measures varied across the seven studies, with certain studies specifically programming for generalization with generalization phases, while other studies assessed generalization with probe trials after the intervention occurred. Out of the seven studies, five of the studies assessed generalization (Blum-Dimaya et al., 2010; Hatzenbuhler et al., 2019; Libby et al., 2008; Morrison et al., 2002; Paterson & Arco, 2007), three of the studies programmed for generalization (Hatzenbuhler et al., 2019; Mavropoulou et al., 2011; Paterson & Arco, 2007), and one study did not include any generalization measures (Hume & Odom, 2007). More specifically, two of the studies both programmed for and assessed generalization (Hatzenbuhler et al., 2019; Paterson & Arco, 2007) and three of the studies only assessed for generalization (Blum-Dimaya et al., 2010; Libby et al., 2008; Morrison et al., 2002).

Morrison et al. (2002) reported that generalization probes occurred for 20% of all sessions and all participants exhibited generalization, as this was an assessment of generalization. Hume and Odom (2007) reported that no generalization occurred. Paterson and Arco (2007) reported that generalized toy play with toys of similar physical characteristics evoked generalization in both participants, as this was both programmed for and assessed. Blum-Dimaya et al. (2010) used two generalization probe sessions after the intervention took place, assessing for generalization. The generalization probe sessions occurred in the child's home. Libby et al. (2008) conducted generalization probes following mastery of the task analysis during the intervention phase, as this was an assessment of generalization. This generalization assessment occurred by a novel trainer in a different room, but typically on the same day that mastery was achieved. Mavropoulou et al. (2011) reported that a generalization phase occurred in the students' classroom with the presence of their class teacher and classmates, as this was

specifically programming for generalization. Tasks were assigned but different from the tasks used in the intervention. On-task play behavior remained high during the generalization phase at the end of the experiment. Hatzenbuhler et al. (2019) reported that generalization did occur with some participants during the independent play probe for two out of three participants, as this was specifically programming for and assessing generalization.

Paterson & Arco (2007) programmed for generalization by introducing generalized motor play with three related toys. This generalized toy play demonstrated in Paterson & Arco (2007) is an example of generalization across stimuli, as the transfer of stimulus control from teaching situations to situations without teaching, occurred. Mavropoulou et al. (2011) conducted a generalization phase as generalization skills across settings, stimuli, and people were examined three days after the completion of the second intervention phase. Results from the generalization phase in Mavropoulou et al. (2011) showed that one participant demonstrated an average rate of 81% of intervals for on-task play behavior with the other participant demonstrating an average rate of 82% of intervals for on-task play behavior. Morrison et al. (2002) conducted probes for generalization for 20% of all intervention sessions. The conditions were the same as baseline, as they assessed generalization across settings, to see if the participants could follow the activity schedule without prompts in an untrained setting (Morrison et al., 2002). Blum-Dimaya et al. (2010) conducted generalization probe sessions in each child's home after the intervention to assess the extent to which playing Guitar Hero II generalized across settings to the child's home. Accuracy in guitar playing ranged from 57% to 90% of correct notes during generalization probes across the four participants. Hatzenbuhler et al. (2019) assessed generalization across stimuli and people by assessing participant responses to untrained pairing of toys and probes with novel peers. Across the three participants, component completion probes of untrained

pairings of toys ranged from 50% to 100% and probes with novel peers ranged from 75% to 100% for component completion. Libby et al. (2008) conducted a generalization assessment following mastery with a novel trainer and in a different room than training occurred in. This type of generalization assessment is generalization across settings and people. Results from Libby et al. (2008) indicated that in generalization probes all steps of the behavior chains were completed independently by all participants. Hume & Odom (2007) did not report on any generalization measures, both for the assessment of generalization and programming of generalization.

Maintenance

Out of the seven included studies, four of the studies did not report on any maintenance measures (Hatzenbuhler et al., 2019; Libby et al., 2008; Mavropoulou et al., 2011; Morrison et al., 2002) while three of the included studies did report on maintenance measures (Blum-Dimaya et al., 2010; Hume & Odom, 2007; Paterson & Arco, 2007). Hume and Odom (2007) reported that maintenance sessions did occur with a one month follow up observation after the intervention was completely faded out, as the behavior maintained. Paterson and Arco (2007) did report that maintenance measures were taken after seven days following the completion of the intervention, after one of the participant's 22nd session and the other participants 21st session, as verbal and motor play maintained in the absence of the intervention of video modeling. Blum-Dimaya et al. (2010) reported that maintenance sessions occurred 30 days after the intervention was complete, as maintenance probes resulted in correct completion of 96%-100% of the schedule components for the four participants in the absence of all programmed reinforcement and entire schedule. Hatzenbuhler et al. (2019) reported no maintenance measures were taken.

Technological Description of Procedures

All seven articles included a technological description of procedures. Interventions were thoroughly described to allow for replication by other researchers. Procedures being precisely identified and described is paramount in behavior analytic interventions to allow for the identification of functional relationships between behavior and the independent variable(s). Hume & Odom (2007) described the individual work systems very clearly and explicitly both narratively and with visual pictures to allow for replication. Hatzenbuhler et al. (2019) operationally defined their procedures and dependent variables to allow for replication. Blum-Dimaya et al. (2010) used extremely descriptive language and visuals to allow for replication. Mavropoulou et al. (2011) also provided a detailed description of procedures including setting, materials, and protocol to allow for replication. Paterson & Arco (2007) provided a description of their procedures including specific toys, play sets, and the manipulation of variables in teaching the participants independent play skills. Morrison et al. (2002) was also very descriptive in clearly explaining the layout of the classroom and how experimenters manipulated variables in teaching independent play skills to the participants. Lastly, Libby et al. (2008) was descriptive in their procedures, clearly explaining the behavior chains, task analyses, and prompting techniques that were used to teach the participants Lego construction skills.

Social Validity

Social validity has three main dimensions: treatment acceptability, treatment appropriateness, and treatment effectiveness (Cooper et al., 2019). The term treatment acceptability, a component of social validity, was defined by Kazdin (1980) as judgments of treatments by actual or potential consumers of the treatments, such as nonprofessionals, clients, laypersons, and others. Treatment appropriateness refers to how well the intervention matches

the individual receiving the behavior analytic treatment (Cooper et al., 2019). Treatment effectiveness refers to the degree to which a behavioral intervention produces a desired change in a target behavior or skill (Cooper et al., 2019). Out of the seven included studies, five of the studies reported that social validity measures were taken, and all examined the social validity dimension of treatment acceptability and treatment effectiveness (Blum-Dimaya et al., 2010; Hatzenbuhler et al., 2019; Hume & Odom, 2007; Mavropoulou et al., 2011; Morrison et al., 2002). On the contrary, two out of the seven included studies did not report on social validity measures being taken (Libby et al., 2008; Paterson & Arco, 2007). Morrison et al. (2002) reported that social validity occurred via information gathered from consumers, parents, and teachers who found the intervention socially acceptable and usable for students. This is an example of treatment acceptability. Hume and Odom (2007) reported that social validity did occur in the form of treatment acceptability and effectiveness as a pre and post treatment questionnaire was conducted for six service providers across the participants. Blum-Dimaya et al. (2010) reported that social validity was measured as a five-point likert rating scale was given to 15 undergraduate psychology students. Their scores ranged from 4.1 to 5.0 across the three questions in the questionnaire. Mavropoulou et al. (2011) reported that social validity was measured with a five-point likert type rating scale in the form of a posttest questionnaire on the effectiveness of the intervention. This was given to four staff members at the school. Hatzenbuhler et al. (2019) reported that a five-point likert rating scale was given to teachers and therapists with an average score of 4.5 regarding strongly agreeing that the intervention was effective in improving the students social behavior at school, an average score of 4 regarding the students ability to appropriately interact with play materials and having improved interactions

with peers, and an average score of 4.5 regarding recommending this intervention to students in the future.

Chapter 4: Discussion

This systematic review focused on various independent play skills taught to individuals with ASD and if generalization was programmed for and assessed in these studies. The research supports the fact that there are interventions that are effective in teaching independent play skills to individuals with ASD. In addition to their effectiveness, these interventions were able to generalize to new environments after the subjects acquired the specific skills targeted in the interventions. Blum-Dimaya et al. (2010) both programmed for and assessed generalization as they had two generalization probe sessions after the intervention took place. The generalization probe sessions occurred in the child's home. Generalizing skills to a home setting can be beneficial for the learner considering that is typically where they spend most of their time. This is also promising to consider that when the individual wants to engage in leisure activities in their home, they have a newly acquired skill to do so.

Hatzenbuhler et al. (2019) both programmed for and assessed generalization as they reported that generalization did occur with some participants during the independent play probe for two out of three participants. With the independent play probe, play was measured if the participants independently selected any character and had it perform any of the corresponding actions in the correct location with the appropriate vocalization (Hatzenbuhler et al., 2019). This is significant because if participants are generalizing their newly acquired skills to novel toys without any programmed reinforcement or instruction, they can then continue to engage in independent play with novel toys/items they come in contact with throughout their lives. Mavropoulou et al. (2011) assessed generalization in the students' classroom with the presence of their class teacher and classmates. Tasks assigned were different from the tasks used in the

intervention. Since different tasks were assigned than the ones used in the intervention, and the students were still able to complete the tasks, it is also clear here that generalization occurred.

Paterson and Arco (2007) both programmed for and assessed generalization as did Morrison et al. (2002). For the first study, generalization probes were conducted for 20% of all sessions and in the second study generalized toy play with toys of similar physical characteristics evoked generalization in both participants. In summation, generalization of the newly acquired independent play skills occurred in six of the seven included studies. The only study that did not report any information on generalization measures was Hume and Odom (2007).

One commonality among most interventions is that they used some sort of visual aid or support. This could have been a task analysis, task organization system, video modeling, or activity schedules. The dependent variable also varied across studies but were all measures of independent play. Independent play was defined variably across studies but included on-task play behavior, appropriate toy play, appropriate vocalizations, play task completion, playtime performance, and completing an activity schedule. The various settings of the interventions included mostly schools, both private and public, with one setting being an employment site.

Three studies used a reversal design (Hume & Odom, 2007; Mavropoulou et al., 2011; Paterson & Arco, 2007), two studies used a multiple baseline across participants design (Hatzenbuhler et al., 2019; Morrison et al., 2002), one study used a multiple baseline across stimuli design (Paterson & Arco, 2007), one study used a multiple probe across participants design (Blum-Dimaya et al., 2010), and one study used an alternating treatments design (Libby et al., 2008), with Paterson & Arco (2007) using a combination of a reversal design and a multiple baseline across stimuli design. Treatment sessions varied in length across the studies but were between three and 27 sessions for the participants to reach mastery criteria and acquire the

targeted skill. IOA data were collected across all studies, which strengthens the reliability of their data collection. IOA data were collected for 25% to 33% of all intervention sessions with IOA ranging from 95% to 100%. The targeted outcomes included various objectives, all of which were either on-task play behavior, an increase in independent play behaviors, or mastery of components of an activity schedule. Three of the articles reported maintenance measures (Blum-Dimaya et al., 2010; Hume & Odom, 2007; Paterson & Arco, 2007). All articles had a high level of technological description of their procedures, as the processes in their studies were described in a way that allows for exact replication by a future experimenter. The included studies that collected social validity data examined the social validity dimensions of treatment acceptability and treatment appropriateness (Blum-Dimaya et al., 2010; Hatzenbuhler et al., 2019; Hume & Odom, 2007; Mavropoulou et al., 2011; Morrison et al., 2002). Paterson and Arco (2007) and Libby et. al (2008) did not report on any social validity measures. Four of the seven studies demonstrated that 100% of participants met mastery criteria and Mavropoulou et al. (2011) demonstrated that 50% of participants did.

Generalization data is very useful for informing practitioners in their behavior analytic practices. Generalization data can demonstrate specific barriers to skill generalization, thus informing practitioners on how they should adjust their teaching procedures and practices. For example, if a learner is playing independently in a structured environment but is struggling in less structured environments, modifications and additional interventions can be incorporated. Independent play skills and the generalization of these skills are also significant for social inclusion, not just individual development. Generalization data can inform practitioners on the social aspect of these interventions, ensuring that individuals can engage in independent play skills across various contexts and environments. Generalization data can facilitate effective

interaction and collaboration between educators, behavior analysts, parents, and caregivers. If more environments are supportive to the learner, it's likely that generalization outcomes will be enhanced. All this pertinent information can guide practitioners to make informed decisions regarding learners and their individualized goals for independence.

Although the systematic review did find that generalization occurred in teaching independent play skills to individuals with autism, there are some limitations. First, the PSYCInfo (EBSCO Publishing) database through Seton Hall University's database library was the only database used. Future literature reviews on this topic could include searching more databases which could potentially identify more studies investigating the principal topic. Additionally, a specific combination of search strings was used. For example, future researchers may choose to remove the word "skills" from their search strings which may return more results than were identified in the present study. Another limitation of this review is that I capped the age at 21 years old. This means that any potential participants above the age of 21 years old were excluded from the study. Future literature reviews can look to examine the acquisition of independent play skills for adults with autism who are older than 21 years old. Lastly, this review considered individuals with a diagnosis of ASD. Future researchers can examine the effectiveness of independent play skill interventions for populations with other diagnoses.

Chapter 5: Conclusion

In conclusion, the research supports the use of video modeling, activity schedules/task analyses, task organization, correspondence training, and individual work systems to teach individuals with ASD independent play skills that generalize to other settings or stimuli. Considering the importance of individuals with ASD generalizing independent play skills, researching this topic has much social significance.

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Appendix 1

Qualitative Summary of Included Studies

Author	Year	Publication	Diagnosis	Participants	Ages	Setting	Design	IV
Blum-Dimaya et al.	2010	Education & Treatment of Children	ASD	3 M, 1 F	Jared: 9 years old, James: 11 years old, Jackie: 11 years old, Martin: 12 years old	Self-Contained Classroom in Private Special Needs School	Multiple Probe Across Participants	Activity schedules, video modeling
Hatzenbuhler et al.	2019	Education & Treatment of Children	ASD	2 M, 1 F	Karly, Christopher, and Wyatt preschoolers "ranging in age from 5-6 years old"	Public school evaluation room	Multiple Baseline Across Participants	Matrix Training
Hume and Odom	2007	Journal of Autism & Developmental Disorders	ASD	3 M	Mark: 20 years old, Scott: 6 years old, Chris: 7 years old	Elementary School Classroom and employment site	Reversal	Individual Work System
Libby et al.	2008	Behavior Analysis in Practice	ASD	5 M	Ian: 9 years old, Tom: 9 years old, Ricky: 9 years old, Andy: 9 years old, Ernie: 11 years old	Private Residential School	Alternating Treatments	Behavior Chaining
Mavropoulou et al.	2011	Journal of Autism & Developmental Disorders	ASD	2 M	Vaggelis: 7 years old, Yiannis: 7 years old	Self-Contained Classroom in Public Special Education School	Reversal	Visual instructions (photos, drawings, and picture dictionaries
Morrison et al.	2002	Journal of Early Interventions	ASD	2 M, 2 F	Ned: 4 years 10 months, Kelly: 5 years 3 months, Michael: 3 years 6 months, Janet: 5 years 10 months	Inclusion Preschool classroom	Multiple baseline across subjects	Activity schedules and correspondence training
Paterson and Arco	2007	Behavior Modification	ASD	2 M	John: 6 years old, Luke: 7 years old	Special Education Center in Primary school in Australia	Multiple baseline across stimuli	Video Modeling

Author	DV	Sessions to Mastery	IOA	Generalization	Maintenance	Technological Description of Procedures	Social Validity
Blum-Dimaya et al.	Accurate completion of each component of activity schedule, on task behavior for guitar hero game	13-27 sessions, Mean = 20 sessions across participants	Yes, IOA data were collected by primary experimenter and secondary independent observer in vivo during at least 33% of all sessions. Range = 98-100% IOA	Yes, generalization probe sessions every 7th/8th song and 2 probe sessions after intervention in child's home	Yes, 30 days after the conclusion of the intervention	Yes. Multiple-exemplar training and multiple component intervention package. Intervention described clearly to allow for replication	Yes, 5 point likert rating scale to 15 undergraduate psychology students
Hatzenbuhler et al.	Play and independent play	5-10 sessions, Mean = 7.67 sessions across participants	Yes, the experimenter trained graduate ABA master's students for 31%, 30%, and 33% of all sessions. Range = 93-100% IOA	Yes, generalization probes to untrained pairings and a novel peer	No	Yes. Peer-Mediated Matrix training. Intervention described clearly to allow for replication	Yes, questionnaires with teachers and therapists of the participants
Hume and Odom	On/off task responding, task completion, teacher prompting, & number of play materials utilized	3-6 sessions, Mean = 4.67 sessions	Yes, graduate students. IOA recorded for 27% of all sessions. 90% IOA agreement	No	Yes, 1 month follow up	Independent Work System with details to allow for replication by another experimenter	Yes, pre and post treatment questionnaire for service providers working with participants
Libby et al.	Completion of building Lego structure	4-26 sessions, mean = 11.86 sessions	Yes, two trained independent observers collected IOA data for 50% of all sessions. Mean = 95% IOA, Range = 92-100%	Yes, generalization probes conducted in a different room with novel trainer	No	Behavior chains, task analyses, and prompting techniques all described to allow for replication by another experimenter	No
Mavropoulou et al.	On/off task responding, teacher prompting, task completion and task performance	3-3 sessions, mean = 3 sessions	Yes, two trained observers collected IOA data for 30% of all sessions. Mean = 97% IOA, Range = 90-100%	Yes, generalization skills across places, materials and people were examined 3 days after intervention with different tasks	No	Visual organization and task organization. Described to allow for replication by another experimenter	Yes, post test questionnaire on effectiveness of intervention: 5 point likert type scale rating
Morrison et al.	Independent playtime performance (on-task behavior and the total number of occurrences of correspondence between children's play selections and their actual play behavior)	Inconclusive	Yes, collected for 25% of all sessions. Range = 95% - 100%	Yes, generalization probes for 20% of experimental sessions	No	Activity Schedule Training, described to allow for replication by another experimenter	Yes, via information gathered from consumers, parents and teachers
Paterson and Arco	Independent Toy Play (appropriate verbal play and appropriate motor play)	Inconclusive	Yes, collected for 46% of all sessions. Range = 97 – 99%	Yes, generalization across related toys	Yes, 1 week follow up	Video Modeling described to allow for replication by another experimenter	No

Appendix 2

PRISMA Flowchart