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AN APPLIED BEHAVIOR ANALYSIS-BASED INTERVENTION TO TEACH AGE-APPROPRIATE SPORT SKILLS TO CHILDREN DIAGNOSED WITH AUTISM SPECTRUM DISORDER

A Project

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

in

Child Development

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by

Junko Uehara Moran

December 2011

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ABSTRACT

This study investigated the effectiveness of a home-based behavioral intervention program to teach age-appropriate sport skills to children with autistic spectrum disorder (ASD). Previous studies demonstrate success teaching some degree of sport skills to these children; however, many of these studies do not report evidence of increased participation in the community setting. The intervention involved Applied Behavior Analysis (ABA) to teach age-appropriate sport skills to seven autistic children. A multiple-case study, changing criterion design was employed to determine whether the intervention enables children to successfully engage in sports activities across people and locations. All of the children demonstrated success in performing the age-appropriate levels of sports activities and six out of seven children successfully generalized the acquired skills with peers and family members in community settings. This study provides support for the effectiveness of the current model of intervention in teaching lifetime sports skills to children with ASD.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER ONE

INTRODUCTION

Children diagnosed with ASD exhibit severe impairments in their social interactions and communication skills, and engage in socially inappropriate behaviors (American Psychiatric Association, 2002). These impairments and problematic behaviors have a significant and negative influence on their daily lives (Blum-Dimaya, Reeve, Reeve, & Hoch, 2010). In addition, families of children with ASD are often exposed to a significant amount of stress (Allik, Larson, & Smedje, 2006; Lyons, Leon, Roecker Phelps, & Dunleavy, 2010; Seltzer, Shattuck, Abbeduto, & Greenberg, 2004). Acquiring age-appropriate sport skills (and related play or leisure skills) could increase the independence of ASD children as well as the amount of quality time they spend with their parents and peers, which, in turn, could create more opportunities to participate in the community.

Previous research has shown that children with ASD can successfully learn lifetime sport skills using the principal of ABA (Birkan, Bunyamin, Konkukman, Ferman, & Yilmaz, 2005; Pan, 2010; Prupas, Harvey, & Benjamin, 2006; Rogers, Hemmeter, & Wolery, 2010; Tekin-Iftar,

Kicaali-Iftar, Birkan, Uysal, Yildirim, & Kurt, 2001; Tomporowski & Ellis, 1984; Yilmaz, Yanardag, Birkan, & Bumin, 2004). Teaching sport skills to children with ASD has been found to improve language, communication, socialization, adaptive skills, and motor skills. These outcomes strongly suggest that teaching lifetime sport skills to children with ASD will increase their quality of life (QOL). The early intensive behavioral intervention (EIBI) program involving ABA is one of the most effective methods to teach children with ASD (Grindle, Kovshoff, Hastings, & Remington, 2009; Lovaas, 1987; Wong, Kasari, Freeman, & Paparella, 2007). ABA is the scientific method in which techniques based on behavioral principles are applied systematically to increase positive social behavior and reduce negative social behavior (Cooper, Heron, & Heward, 2007). In this study, the effectiveness of behavioral intervention to teach age-appropriate sport skills to children with ASD will be investigated.

Review of Literature

Autism

Autism is a severe form of a lifelong condition that falls under the umbrella of pervasive developmental disorder (PDD) (Leaf, Taubman, McEachin, Leaf, & Tsuji,

2011). The five conditions of PDD are autistic disorder, Asperger's disorder, Rett's disorder, childhood disintegrative disorder, and pervasive developmental disorder not otherwise specified (PDD-NOS) (American Psychiatric Association, 2002). Professionals refer to these five conditions as ASD. Today, one in every 110 children is diagnosed with ASD (Rice, 2009). The number of children diagnosed with ASD has dramatically increased in the last 20 years. In the 1970s and 1980s, parents, especially mothers, were blamed for causing children's autism (Langan, 2011). The label, "refrigerator mother" was used to describe a mother who was cold and uncaring and who traumatized her child, allegedly resulting in autism (Langan, 2011). However, it is now more common for professionals and families to believe that autism is the result of genetic factors and/or exposure to mercury-based vaccines (e.g., for measles, mumps, and rubella) or to specific teratogens and diseases (e.g., thalidomide, misoprostol, valproic acid, maternal rubella infection) in early pregnancy (Landrigan, 2010). Recent research appears to have ruled out a link between vaccines and autism (Landrigan, 2010). There is also no credible evidence supporting the refrigerator mother hypothesis. Consistent with genetic and other biological models, autism is

widespread across all socio-economic status (SES), backgrounds, and cultures (Fombonne, 2003).

Autism is a behaviorally defined developmental disorder and a diagnosis of autism is usually made before age three (Rapin, 1991). Boys are at higher risk for ASD than girls with a ratio of approximately four to one (Lee, Harrington, Louie, & Newschaffer, 2008). Children with ASD often display a significant deficit in socialization skills, communication skills, and language skills and tremendous excesses in repetitive and stereotyped patterns of behaviors (American Psychiatric Association, 2002). Many autistic children exhibit a variety of other symptoms such as attention deficits, inability to acquire independent living skills, and lack of play skills (Rapin, 1991). ASD includes a broad range of symptoms most of which last throughout a person's life. A low-functioning autistic person will require lifelong support from their families, in-group home, community, school, or institutions (Rapin, 1991). These children often engage in self-stimulatory behaviors such as flapping hands, head shaking, rocking, twirling fingers, gazing, and mouthing (Lovaas, Newson, & Hickman, 1987). Low-functioning autistic children may spend considerable time engaging in these negative behaviors and this interferes with their

ability to learn positive behaviors. On the other hand, a high-functioning autistic person may acquire substantial independence and need minimum assistance from the community (Rapin, 1991). Even though high-functioning autistic children demonstrate communication and language skills and have typical IQs, they feel more loneliness than typically developing children (Bauminger & Kasari, 2000).

In addition to behavioral issues for autistic individuals, recent research indicates that approximately 70% of autistic individuals meet criteria for a minimum of one psychiatric disorder (Simonoff, Charman, Chandler, Loucas, & Baird, 2008). These high rates of various psychiatric issues for autistic children mean that community mental health support for these children and their families is very important. Gadow, Devincent, and Schneider (2008) investigated mental health risk and protective factors for psychiatric symptoms in autistic children. The results showed that autistic children were at a risk for attention deficit/hyperactivity disorder, aggression, anxiety, and depressive symptoms. These symptoms are also associated with deficits in socialization skills and school performance.

It is critical that children with ASD receive effective support to decrease problematic behaviors and increase socially appropriate behaviors. Among the number of problematic behaviors, repetitive behaviors in general, and self-stimulatory behaviors in particular, are perhaps the most common and are especially likely to interfere with learning for children with ASD (Cunningham & Schreibman, 2008; Levinson & Reid, 1993; Lovaas, Newson, & Hickman, 1987; Turner, 1999). In order to find effective support for children with autism, it is necessary to identify the characteristics of repetitive behavior, the function of repetitive behavior, and effective interventions that can reduce these behaviors and replace them with positive behaviors.

Repetitive and Self-Stimulatory Behavior

Repetitive behavior is considered to be one of the most prominent characteristics of ASD (American Psychiatric Association, 2002; Margolies, 1977). The DSM IV indicates that a primary diagnostic feature of ASD is repetitive, stereotyped and restricted patterns of activities, interests, and behaviors (American Psychiatric Association, 2002). For example, some autistic children repetitively rock their body, some children will engage in high intensity tantrum behavior when there are changes in

routine, and some children exhibit obsessive interests. Repetitive behaviors can be sorted into two categories: lower-level behaviors and higher-level behaviors (Turner, 1999). Lower-level behaviors are characterized by repetition of movement (e.g., body-rocking, hand-flapping, lining up objects, self-injurious behavior). Higher-level behaviors are characterized by greater complexity (e.g., object attachments, repetitive vocalization/language, limited interest, and inflexibility of schedule). A good deal of repetitive behavior at each level is clearly self-stimulatory in nature. Thus flapping hands, tapping objects, head-shaking/nodding, body-rocking, jumping, toe walking, and walking in circles are sources of self-stimulation for children with ASD (Lovaas, Newsom, & Hickman 1987; Turner, 1999).

One significant controversy in the literature on ASD is whether or not repetitive behaviors are unique to ASD per se (Turner, 1999) or, alternatively, are the result of factors common across multiple disabilities (Cunningham & Schreibman, 2008; Lovaas, Newsom, & Hickman 1987) or present in typically developing children (Prior & Macmillan, 1973; Cunningham & Schreibman, 2008). Some low-level behavior is likely nonspecific to autism because these behaviors are commonly seen in typically developing

infants, young children, and other people with disabilities including Tourette's syndrome, Fragile-X syndrome, Rett syndrome, Parkinson's disease, and schizophrenia (Turner, 1999). Rates of repetitive motor movement are related to mental age for nonautistic populations, while autistic populations engage in these same behaviors for longer duration, with greater frequency, and with more severity in general. Thus, lower-level repetitive motor behavior may occur because of factors other than ASD, such as limited skill level, general organic symptoms, or other related impairments. On the other hand, high-level repetitive behavior may be largely unique to autism (Turner, 1999). Both a tendency toward restricted interests and insisting on sameness, for example, are more frequently observed in autism and Asperger's Syndrome than in other disorders (Kerbeshian, Burd, & Fisher, 1990; Tantam, 1991), though a focus on sameness can also be present in typically developing children between two and four years of age (Evans, Leckman, Carter, Reznick, Henshaw, King, & Pauls, 1997).

Whether or not repetitive and self-stimulatory behaviors are unique to autism, they clearly prevent individuals with ASD from responding appropriately and interfere with learning (Cunningham & Schreibman, 2008;

Levinson & Reid, 1993; Lovaas, Newson, & Hickman, 1987; Turner, 1999). Any intervention that is going to be successful in addressing these problematic behaviors must be based in a plausible explanatory model. Learning, arousal, and, as will be discussed later, social-historical theories provide that framework.

There are two principle hypotheses of the nature and origin of the self-stimulatory behavior associated with ASD. The most commonly known hypothesis is that self-stimulatory behavior is a learned or operant behavior (Cunningham & Schreibman, 2008; Lovaas, Newsom, and Hickman, 1987; Rapp & Vollmer, 2005; Turner, 1999). In this account, self-stimulation is contingent upon specific kinds of reinforcement (Cunningham & Schreibman, 2008). Functional analysis methodologies contribute to identifying the behavior-reinforcer link by systematically manipulating antecedents and consequences of the behaviors (Iwata, Dorsey, Slifer, Bauman, & Richman, 1994). According to this hypothesis, self-stimulation could be maintained by social positive reinforcement (e.g., verbal praise, attention), social negative reinforcement (e.g., task avoidance or escape), automatic positive reinforcement (e.g., sensory stimulation), automatic negative reinforcement (e.g., removal of undesired

stimulus), or some combination of social and non-social reinforcement (Ahearn, Clark, Glardener, Chung, & Dube, 2003; Kennedy, Meyer, Knowles, & Shukla, 2000; Rapp & Vollmer, 2005).

A second hypothesis regarding self-stimulatory behaviors considers the perceptual or sensory stimuli that these behaviors produce (Cunningham & Schreibman 2008; Lovaas, Newsom, & Hickman, 1987; Rogers & Ozonoff, 2005; Turner 1999). In this account, self-stimulatory behavior is maintained by sensory feedback. Thus, the behavior itself is reinforcing. According to Lovaas, Newsom, and Hickman (1987), sensory feedback is different from other types of reinforcement that reside more specifically in the social environment. Perceptual reinforcers are mediated by the individual, not the social environment. Therefore, it seems to be extremely difficult to change the behavior by manipulating the environment. However, the authors hypothesized that it is possible that the social environment may indirectly control self-stimulatory behavior by exposing the individual to conditions that trigger perceptual reinforcers. This hypothesis makes sense because the individual who engages in echolalia, for instance, requires a verbal language stimulus. Similarly, in order for the child to repetitively line up blocks or

beads, they need to be exposed to those items under conditions that facilitate pre-occupation with these materials.

The reinforcing nature of sensory feedback also relates to over- and under-arousal theories of autism. Over-arousal theories suggest that children with ASD tend to arouse and react easily to sensory stimuli compared to other children (Rogers & Ozonoff, 2005). Also, they fail to habituate or habituate to stimuli much more slowly than other children. Under-arousal theories indicate that children with ASD may demonstrate impairment in activating a system that connects previous experience with current experience (Rimland, 1964). It is hypothesized that these dysfunctional states may cause sensory symptoms. Each of these theories of arousal is consistent with a claim that manipulation of arousal levels - as could be accomplished through sports skill activities - should be effective in reducing self-stimulatory behavior. In addition, the two learning-based hypotheses of self-stimulatory behavior described above are consistent with an approach to intervention that seeks to disrupt reinforcer-behavior links while reinforcing new, more positive behaviors. Again, sport skill training could accomplish these goals.

Interventions with Repetitive and Self-Stimulatory Behaviors

Based on a large body of literature specifically focused on autistic individuals, Cunningham and Schreibman (2008) emphasized the importance of the implementation of behavior modification to reduce self-stimulatory behaviors, especially when self-stimulation is viewed as an operant behavior. Several behavioral intervention programs have been developed. Extensive research now shows that early intervention programs can be successful in reducing these behaviors in children with ASD. Several behavioral techniques have been employed in these interventions including sensory extinction, alternating self-stimulatory behavior with novel toy play, time-out procedures, differential reinforcement of other behavior (DRO), and overcorrection (Cunningham & Schreibman, 2008; Rapp & Vollmer, 2005). Research suggests that time-out procedures are not effective compared with alternating self-stimulatory behavior with novel toys and overcorrection. Overcorrection rapidly reduces self-stimulatory behavior in autistic children during the period that the intervention is provided. However, behavior change is not maintained without continued procedures.

Cunningham and Schreibman (2008) also indicated that sensory extinction is effective in reducing the target behavior. Rincover (1978) reported that one of three participants with developmental disabilities in his study engaged in stereotypic behavior that involved spinning plates on hard surfaces. As an intervention, the hard surface was covered in carpet to remove the sound produced by spinning the plate. This was based on the hypothesis that the self-stimulatory behavior was caused by auditory feedback. With the procedure of blocking sensory feedback, the target behavior was significantly decreased. Researchers have hypothesized that preferred sensory reinforcers might contribute to reduce stereotypy in duration and frequency (Piazza, Adelinis, Hanley, Goh, & Delia, 2000; Rapp, 2006). For example, a child who repeatedly engages in tapping of objects for the sensory feedback might be presented with noncontingent access to a toy drum. Another child who engages in excessive vocalization for the auditory feedback might be presented with noncontingent access to a music player or toy. However, these behavioral techniques may only decrease self-stimulatory behavior in children with ASD within a limited period of time. In other words, these behavioral interventions may demonstrate success with reducing the

intensity, duration, and frequency of such behaviors while the child is under supervision. However, it may be difficult to implement these interventions over much longer periods of time and/or they may not produce changes that last beyond the intervention itself.

It has been reported that physical activities significantly contribute to a decrease of self-stimulatory behavior in individuals with ASD. Watters and Watters (1980) observed the effects of jogging on self-stimulatory behavior. They investigated two children with ASD and severe developmental disabilities. The results show that one child's self-stimulatory behavior was significantly decreased after ten minutes of jogging and the other child did not demonstrate any significant change. Powers, Thibadeau, and Rose (1992) investigated the effects of roller skating for an eight-year-old child with ASD and severe developmental disability. The roller skating exercise was conducted for ten minutes. Thirty minutes after the exercise, the child's behavior was observed. The data showed that his self-stimulatory behavior was decreased and his appropriate behavior was increased. Levinson and Reid (1993) implemented two exercise programs for three autistic children. Mild exercise (i.e., walking) was provided for 15 minutes and vigorous exercise (i.e.,

jogging) was provided for 15 minutes. They found that only vigorous exercise had positive effects on reduction of self-stimulatory behavior. Petrus, Adamson, Block, Einarson, Sharifnejad, and Harris (2008) conducted a literature review of the effectiveness of exercise intervention on self-stimulatory behavior in individuals with ASD. Seven out of two hundred articles between 1980 and 2007 were selected in this study. The exercise interventions included water activities, walking, jogging, ball play, aerobic exercise, and warm-up stretches. The authors concluded that exercise intervention is effective for short-term reductions of self-stimulatory behaviors in children with ASD.

The conceptual basis for the effectiveness of exercise in reducing stimulatory behaviors derives from the theory that self-stimulatory behavior is maintained by sensory feedback (Levinson & Reid, 1993). Lovaas, Newson, and Hickman (1987) stated that self-stimulatory behavior occurs in a rhythmic pattern to maintain this sensory input. This explains why more vigorous physical activities contribute more to a reduction of self-stimulatory behavior than do milder physical activities. The former provide more significant sensory input. In addition, over- and under arousal theories may explain the effectiveness

of physical activities to reduce self-stimulatory behaviors because these kinds of activities impact arousal levels. While findings of short-term success are encouraging, further research is required to identify exercise programs and/or behavioral interventions that support longer-term outcomes.

In summary, many children with ASD display repetitive and self-stimulatory behaviors. Engaging in excessive behavior of this kind makes autistic children look socially awkward and prevents them from learning new skills. Although the function of self-stimulatory behaviors remains unclear, it is critical to provide children with ASD with appropriate behavioral intervention programs to reduce their socially devalued behaviors. Among several behavioral techniques reviewed in this section, using exercise intervention may be the most realistic method to increase appropriate behaviors and reduce inappropriate behaviors in children with ASD. Alternative behavioral strategies require technique and maintaining the procedure in the long-term may be unrealistic. By contrast, using exercise intervention allows children with ASD to improve physical fitness and continue engaging in the learned activities after the intervention is discontinued. In addition, it may be

important to teach children with ASD age appropriate sport skills so that they can continue playing for a long period of time. For these children, acquiring lifetime sport skills may increase their independence and quality of time with their family and peers. If there is no perfect methodology to completely remove self-stimulatory behavior from children with ASD, the focus should be on increasing socially appropriate behavior as much as possible.

Parenting Stress

Having a child with ASD is tremendously challenging for many parents and has been associated with higher child-care stress (Allik, Larson, & Smedje, 2006; Lyons, Leon, Roecker Phelps, & Dunleavy, 2010; Seltzer, Shattuck, Abbeduto, & Greenberg, 2004). Compared to parents with typically developing children, parents with autistic children are at greater risk of experiencing physical and psychological distress (Dumas, Wolf, Fisman, & Culligan, 1991; Meadan, Halle, & Ebata, 2010; Selzer, Shattuck, Abbeduto, & Greenberg, 2004). Often, mothers of autistic children report higher levels of anxiety and depression than fathers of autistic children (Davis & Carter, 2008; Hastings, Kovshoff, Ward, Espinosa, Brown, & Remington, 2005). It has been reported that there is a modest association between SES and the level of family stress;

however, the family stress becomes greater when the child is an adolescent or a young adult from 15 to 22 (Donovan, 1988). Little research has been conducted on the effects of having a child with ASD on marital relationships. However, some researchers found that having a child with disabilities negatively influences marriages resulting in high divorce rates (Meadan, Halle, & Ebata, 2010). In addition, siblings of children with ASD are required to make adjustments and cope with difficulties. Pilowsky, Yirmiya, Doppelt, Gross-Tsur, and Shalev (2004) hypothesized that siblings of children with ASD would demonstrate greater internalizing symptoms than siblings of typically developing children. They found no differences between these groups and 87% of the siblings of children with ASD adapted well to their environment. However, the authors also indicated that the severity of autism was negatively associated with the siblings' adjustment scores. Benderix and Sivberg (2007) found that siblings of autistic children feel unsafe and anxious, and many siblings report that their social life is poor and their relationships with their friends are adversely affected. Hastings (2003) also indicated that siblings of children with ASD exhibited lower levels of prosocial behavior and more adjustment problems when compared to

siblings of typically developing children. Based on these results, it is apparent that the presence of an autistic child can significantly affect family functioning and the home environment. Therefore, it is important to identify additional stress factors in order to provide effective stress-reduction and coping mechanisms for families of children with ASD.

The research discussed above indicates that autism symptoms are indeed a source of parents' anxiety, depression, and other distress. It is important to understand how the autistic child's behavior contributes to parents' and sibling's stress. It has been reported that parenting stress has a positive association with the child's level of challenging behavior (Allik, Larsson, & Smedje, 2006; Baker, Mcintyre, Blacher, Crnic, Delbrock, & Low, 2003; Shelzer, Shattuck, Abbeduto, & Greenberg, 2004; Tehee, Honan, & Hevey, 2009) and has a negative association with the child's functional communication skills (Bebko, Konstantareas, & Springer, 1987; Ello & Donovan, 2005). Hastings and Johnson (2001) found that caregivers reported the least stress when their children were more responsive. In addition, Davis and Carter (2008) found that lower child relatedness was associated with parenting stress, parent-child relationship issues, and

distress for both mothers and fathers. Lyons, Leon, Roecker Phelps, and Dunleavy (2009) reported that children's emotion-oriented scores were correlated with parent and family problems and parents' task-oriented coping scores were correlated with children's lower physical incapacity. Finally, the severity of problematic behaviors in autistic children is correlated with one of the strongest predictors of parental stress (Lecavalier, Leone, & Wiltz, 2006; Lyons, Leon, Roecker Phelps, & Dunleavy, 2009). It is obvious that both deficits (i.e., communication skills, language skills, social skills) and excesses (i.e., stereotypical behaviors, unpredicted behavior) are important contributors to parenting stress.

In addition to the stress factors that derived from the symptoms of autism, financial challenges may have a great impact in causing stress in the parents of children with ASD. Parish, Seltzer, Greenberg, and Floyd (2004) reported that having a child with disabilities is correlated with higher rates of job loss and medical costs. These stressful home environments may negatively affect the siblings' psychological well-being, adding to the challenges of dealing with their autistic siblings' problem behaviors. Autistic children often engage in aggressive behavior during interaction with their siblings

with anger being the most frequently reported responses (Ross & Cuskelly, 2006). The siblings of children with ASD spend less time in sibling-interactions and the sibling relationship is not as close as the relationships for siblings of children with other developmental disabilities (Orsmond & Seltzer, 2007). In addition, many siblings feel obligated to protect their autistic sibling from engaging in inappropriate behavior (e.g., loud and persistent noises, screaming, kicking, fighting, harming their pets) for themselves and others and it this is hurtful both mentally and physically (Benderix & Svberg, 2007). Based on empirical studies, impairment in communication skills, language skills, social skills, cognitive skills, and problem behaviors including aggressive behaviors, self-stimulatory behaviors, and unexpected behaviors are significant contributors to family stress.

The problematic behaviors of children with ASD are key antecedents to the strain and stress experienced by the parents and siblings of these children. These behaviors restrict the family's social life and negatively affect family relationships. Understanding the factors that lead to stress in the families of children with autism and developing effective means of support for these families is necessary. For example, providing family

members with counseling to promote coping strategies and respite care to increase their break time may ease their strain and stress. In addition, teaching children with ASD more appropriate behaviors is extremely important because it may result in training-up deficit behaviors and decreasing excessive behaviors. These positive behavioral changes may enable family members to spend more quality time with their children.

Quality of Life for Children with Autistic Spectrum Disorder

ASD negatively affects the development of language, social, cognitive, and physical abilities and produces stereotypic behaviors. These consequences of ASD can considerably limit access to the community and restrict QOL (Leaf, Taubman, McEachin, Leaf, & Tsuji, 2011). Many autistic individuals do not achieve normative outcomes in adulthood (Seltzer, Shattuck, Abbeduto, & Greenberg, 2004) and children with ASD are likely to remain dependent on their family for support throughout their life (Allik, Larson, & Smedje, 2006; Lyons, Leon, Roecker Phelps, & Dunleavy, 2010; Seltzer, Shattuck, Abbeduto, & Greenberg, 2004). For this reason, it is important to understand the QOL associated with ASD and the factors that influence

QOL. To date, little research has been conducted in this area.

Because of the communication and language difficulties for children with ASD, children's QOL is normally assessed using the parent-report format (Bastiaansen, Koot, Ferdinand, & Verhulst, 2004; Kuhlthau, Orlich, Hall, Sikora, Kovacs, Delahaye, & Clemons, 2010; Lee, Harrington, Louie, & Newschaffer, 2008). Children with pervasive ASD reported much worse emotional health than did typically developing children (Bastiaansen, Koot, Ferdinand, & Verhulst, 2004). Children with ASD exhibited worse Health-Related Quality of Life (HRQoL) for psychosocial, emotional, and social functioning (Kuhlthau, Orlich, Hall, Sikora, Kovacs, Delahaye, & Clemons, 2010). These results were particularly associated with self-stimulatory behaviors, social responsiveness, and adaptive behaviors (Kuhlthau, Orlich, Hall, Sikora, Kovacs, Delahaye, & Clemons, 2010). Also, children with ASD are often unable to attend religious services, school events, and organized activities and the inability to engage in social activity and lack of independence are some of the most serious concerns of parents (Lee, Harrington, Louie, & Newschaffer, 2008). In addition, compared to typically developing children,

high-functioning children with ASD reported that they were lonelier and the quality of their friendships was poorer (Bauminger & Kasari, 2000).

In summary, autistic symptoms and behavioral problems contribute to limit independent engagement, community involvement, and family activities. In order to increase QOL for children with ASD, it is extremely important to teach age-appropriate sport and leisure skills to these children. Children with ASD who can play age-appropriate sports by themselves and/or with their peers may have increased opportunities to improve their physical, social, and emotional development. In addition, acquiring lifetime sport skills may provide these children with an enduring competence that can impact their lives for many years.

The Importance of Teaching Age-Appropriate Sport Skills to Children with Autistic Spectrum Disorder

Children with ASD exhibit limited language and play skills, an inability to sustain conversations, and difficulty in social interactions (American Psychiatric Association, 2002). Repetitive behavior, protest behavior, and aggressive behavior including self-injurious behavior (SIB) are very common among children with ASD and related disorders (Canitano & Scandurra, 2010). This deficit in appropriate behaviors and excess of inappropriate

behaviors has a significant impact on children's daily living and often interferes with learning (Cunningham & Schreibman, 2008; Levinson & Reid, 1993; Lovaas, Newson, & Hickman, 1987; Turner, 1999). The families of children with ASD face problems that are related to the autistic child's inappropriate behaviors. Many parents of ASD children are at greater risk for psychological distress than parents of typically developing children (Dumas, Wolf, Fisman, & Culligan, 1991; Meadan, Halle, & Ebata, 2010; Selzer, Shattuck, Abbeduto, & Greenberg, 2004). Interventions are needed that can effectively address each of these areas.

One previously successful yet under-utilized intervention is the training of age-appropriate sports skills. The purpose of teaching children age-appropriate sport skills is not only to reduce inappropriate behaviors, but also to increase independence, self-esteem, physical and social skills, and QOL in children with ASD. In addition, sports-related forms of play have an essential role in physical, cognitive, social, and emotional development (Ginsburg, 2007), which encourages children to use their creativity and imagination as well as their motor skills. Social sports also help children learn how to work with other children under certain rules

such as sharing, taking turns, resolving conflicts, and negotiating. Lack of play skills and independence may limit QOL and contribute to the family's psychological distress. Therefore, teaching children with ASD age-appropriate skills, including sports should contribute to increase appropriate behaviors, independence of leisure activities, and quality of life.

Acquiring age-appropriate sport skills can increase not only a child's independence, but also the amount of quality time spent with parents and peers and opportunities to participate in activities in the community. A variety of age-appropriate sport skills can be taught to children with ASD. Sport skills such as bike riding, skateboarding, and scooter riding, may allow some autistic children to occupy their free time more independently. Sport skills such as baseball, soccer, and basketball may provide them with opportunities to interact with other children in school and/or at other community events. In addition, these sport skills can be long-term leisure activities. If these children acquire age-appropriate sport skills, it may have an impact throughout the life by maximizing quality time by themselves, with their families, and their peers.

There are several studies that suggest it is possible and desirable to teach what have been characterized as 'leisure skills' to young children with ASD and other developmental disabilities using ABA methods. Leisure skills can be defined as the skills that are personally selected to self-entertain and require interaction with others during free time (Turnbull, Turnbull, & Wehmeyer, 2010). Participating in leisure activities is very important for development not only for typically developing children, but also for children with disabilities (King, Law, King, Rosenbaum, Kertoy, & Young, 2003). Leisure skills are expected to promote social, emotional, and physical well-being for individuals of all ages (King, Law, King, Rosenbaum, Kertoy, & Young, 2003). The leisure skills that were taught to children with disabilities in previous studies were mostly sport skills. These leisure skills include: side-of-the-foot soccer pass (Luyben, Funk, Morgan, Clark, & Delulio, 1986); walking on the treadmill (Tomporowski & Ellis, 1984; Ellis, MacLean, & Gazdag, 1989); running (Tomporowski & Ellis, 1984); jogging (Ellis, MacLean, & Gazdag, 1989); biking (Tomporowski & Ellis, 1984); bowling and basic ball play skills (Zhang, Gast, Horvat, & Dattilo ,1995); pin knocking, basketball, pool, golf, Frisbee, and darts

(Tekin-Iftar, Kicaali-Iftar, Birkan, Uysal, Yildirim, & Kurt, 2001); water activity (Birkan, Bunyamin, Konkukman, Ferman, & Yilmaz, 2005; Yilmaz, Yanardag, Birkan, & Bumin, 2001); and swimming (Tomporowski & Ellis, 1984; Pan, 2010; Prupas, Harvey, & Benjamin, 2006; Rogers, Hemmeter, & Wolery, 2010). Also, Kurt and Tekin-Iftar (2008) taught non-sport leisure skills including taking a picture using a digital camera and turning on a CD player and Blum-Dimaya, Reev, Reev, and Hoch (2010) taught video gaming. In addition to improved physical proficiency, some children who were taught leisure/sport skills demonstrated a decrease in inappropriate behavior (Ellis, MacLean, & Gazdag, 1989; Tekin-Infar, Kicaali-Iftar, Birkan, Uysal, Yildirim, & Kurt, 2001; Yilmaz, Yanardag, Birkan, & Bumin, 2004) and increases in social skills (Birkan, Bunyamin, Konkukman, Ferman, & Yilmaz, 2005; Pan, 2010), language and communication skills with peers and the trainers (Ellis, MacLean, & Gazdag, 1989; Rogers, Hemmeter, & Wolery, 2010; Yilmaz, Yanardag, Birkan, & Bumin, 2004), adaptive behaviors (Yilmaz, Yanardag, Birkan, & Bumin, 2004), and independence (Blum-Dimaya, Reeve, Reeve, & Hoch, 2010). Birkan, Bunyamin, Konkukman, Ferman, and Yilmaz (2005) indicated that there might be a positive relationship between learning aquatic play skills and

improvement in social and language skills for children with ASD. Also, Prupas, Harvey, and Benjamin (2006) observed that teaching swimming contributed to strengthening the bond between parent and child as they participated in the activity together.

Previous research shows that teaching children age-appropriate sport skills is extremely beneficial for children with ASD and enables them to improve their motor skills, language skills, and social skills and decrease inappropriate behaviors. At the same time, teaching age-appropriate and community-referenced sport skills to adolescents with any degree of disability has not been fully successful and has its limitations (Zhang, Gast, Horvat, & Dattilo, 1995). Previous research shows success teaching some degree of sport skills to children with ASD; however, many of these studies do not report evidence of increased participation in the community setting. Therefore, it is extremely important for current interventions to teach children with ASD lifetime sport skills that they can generalize to the community, and become actively involved in organized community events. These achievements, in turn, may contribute to decreasing the family's psychological distress and should result in increasing independence and QOL for children with ASD.

A New Theoretical Framework for Applied Behavior Analysis Interventions - Social-Historical Theory

Vygotky's influence on the field of psychology is significant. His theory of human development has tremendous importance for educational practice. There is no theoretical framework that supports the phenomenon of EIBI; however, it seems best explained in terms of Vygotsky's social-historical theory. Vygotsky maintains that cognitive development occurs through children's social interactions within specific cultural and historical contexts. Higher mental functions begin outside the person as collaborative interactions with more advanced members of the community, eventually becoming internalized. This developmental process can be applied to understanding the positive changes of children with ASD who receive home-based EIBI. The UCLA model is implemented within the children's most natural environment (i.e., home-based) (Lovaas, 1987) and centers around intensive interactions with therapists, parents, and siblings. Previous studies of the UCLA EIBI program indicate significant benefit for the cognitive development of autistic children (Grindle, Kovshoff, Hastings, & Remington, 2009; Lovaas, 1987; Wong, Kasari, Freeman, & Paparella, 2007).

Vygotsky believed that cognitive development occurs during a dialectical process where speech plays a very important role (Vygotsky, 1978). Vygotsky argued that the self-regulatory use of speech evolves out of the social use of speech and helps children with goal attainment, problem solving, and self-control. Research suggests that there may be positive associations between social interactions and the development of language and communication for children with ASD. In the study of Wong and Kwan (2010), ASD children improved in language and communication skills after learning basic socialization skills (e.g., eye contact, gestures). Kasari, Paperella, and Freeman (2008) reported that teaching symbolic play to children with ASD improved language skills. Also, the trainers reported that all children improved social and communication skills with peers through training sessions with water activities (Rogers, Hemmeter, & Wolery, 2010; Yilmaz, Birkan, Ferman, & Mert, 2005). These results make sense in terms of Vygotsky's idea that cognitive and communication skills are developed through social interactions with others. These children were using longer sentences outside the water activity sessions such as at home, in the classroom, and in private therapy at the end of the sessions (Rogers, Hemmeter, & Wolery, 2010).

Vygotsky also introduced the notion of the zone of proximal development (ZPD) and the idea of scaffolding. The ZPD refers to the area where the appropriate adults' guidance should be provided so that children can maximize their progress (Vygotsky, 1978). He believed that children learn best within their ZPD and that functional assessment should be used to determine the child's ZPD (Bergen, 2008). Scaffolding refers to the specific form that adult guidance must take in order to promote the movement of a skill through the child's ZPD. These notions shed light on the success of ABA techniques. The ABA therapist implements behavioral strategies (i.e., DTT) that effectively increase motivation and facilitate learning in children with ASD by the careful use of appropriate scaffolding within the child's ZPD. The ABA therapist needs to break down complex tasks into smaller, simpler components to facilitate learning. Providing prompting (e.g., physical, model, and verbal) and systematically fading out the prompting are very important scaffolding techniques. In summary, the ABA therapist plays an influential role in providing autistic individuals with appropriate instruction (i.e., DTT), support (i.e., various teaching, prompting strategies), and encouragement (i.e., reinforcement) to maximize their learning and

enable them to reach higher levels of functioning. There are other parallels between ABA and social-historical theory. The ZPD requires the experts' assistance at first, but is gradually faded out to have a child be independently successful (Bergen, 2008). This principle is confirmed by the results of EIBI programs at both the micro (e.g., DTT) and macro levels (e.g., program). In other words, the goal for the DTT is for the therapist to fade out their prompting as soon as possible so that the child becomes successful independently. Also, the ultimate goal of EIBI program is for children with ASD to reach normal levels of functioning and mainstream in school (Lovaas, 1987).

In conclusion, Vygotsky's social-historical theory provides a sensible framework for conceptualizing the successes of ABA interventions with ASD children. First, children's cultural and social context is influential in their cognitive development. It is evident that many children with ASD improved their cognitive skills after specifically home-based EIBI programs (Grindle, Kovshoff, Hastings, & Remington, 2009; Lovaas, 1987; Wong, Kasari, Freeman, & Paparella, 2007). Second, social interactions with others play a significant role in promoting children's language/communication skills. The EIBI program

provides autistic children with opportunities to interact with multiple therapists, parents, siblings, peers, and teachers that contribute to their language/communication development. Finally, Vygotsky emphasized the importance of the ZPD. Learning new skills and gaining new information are complex processes (Wong, Kasari, Freeman, & Paparella, 2007). The quality of strategies used to teach the skills has a significant impact on the progress of children with ASD. Empirical evidence demonstrates that children with ASD can learn and acquire new skills with the appropriate assistance. The key is to find the appropriate strategy to teach them depending on their skill levels.

Effective Instructional Strategies: Early Intensive Behavioral Intervention

Many studies have demonstrated that home-based early intensive behavioral intervention (EIBI) can lead to significant gains for young children with ASD (Grindle, Kovshoff, Hastings, & Remington, 2009; Lovaas, 1987; Wong, Kasari, Freeman, & Paparella, 2007). EIBI is based on the principles of ABA which are developed from learning theory (Howlin, Magiati, & Charman, 2009). In general, the goal of behavioral intervention programs is to improve cognitive, language, communication, social, motor, and

independent-living skills while controlling or managing challenging behaviors (e.g., self-injurious, self-stimulatory behaviors) and attempting to replace them with more socially appropriate behavior (Howlin, Magiati, & Charman, 2009). The ultimate goal of the program is for a child with ASD to reach normal levels of functioning allowing them to be mainstreamed in school (Lovaas, 1987). In this section, one of the core instructional strategies in ABA, the UCLA EIBI program, and other EIBI programs, will be discussed.

ABA consists of scientific instructional strategies that are commonly used to enhance positive human behaviors. One of the basic ABA strategies is discrete trial teaching (DTT). DTT is a small unit of instruction that is specifically effective for teaching new forms of behavior, advanced skills, and managing disruptive behavior (Smith, 2001). Smith (2001) explained the procedure of DTT as follows.

1. Discriminative stimulus: The clear, simple, and concise instruction that the teacher presents for the student (e.g., "Do this," "What is it?).
2. Prompting stimulus: Assistance the teacher provides at the same time as the cue or

immediately after it to help the student perform correctly.

3. Response: The child engages in a correct or incorrect behavior in response to the teacher's instruction.
4. Reinforcing stimulus: The consequence following the child's response that increases the likelihood that the behavior will reoccur.
5. Inter-trial interval: The period of time (1-5 seconds) between the consequence and the instruction for the next trial when necessary.

Instructional goals in ABA are to break complex tasks into smaller, simpler behavioral objectives. The child is required to practice repeatedly until he or she achieves the specific behavioral objective before the next step is introduced. Appropriate prompting strategies (e.g., hand-over-hand prompt, pointing prompt, verbal prompt) should be employed to facilitate the child's success and a high quality of reinforcement should be delivered to increase the child's motivation. Prompting should be faded out systematically and the schedule of reinforcement should be thinned as the child demonstrates success. These behavioral strategies and techniques enhance improvement in many children with ASD (Lovaas, 1987; Simith, 2001).

The principal of ABA is implemented in many successful EIBI programs. Lovaas and his colleagues at the University of California - Los Angeles (UCLA) conducted one of the most thorough studies of home-based EIBI for young children with ASD. In their results, 47% of children in the experimental group mainstreamed with normal-range IQ scores. Based on his study, Lovaas indicated that EIBI should include several conditions: 1) intervention should begin as early as possible (i.e., before age of three years), 2) training should be provided in a one-to-one discrete trial format, 3) duration should be from 35 to 40 hours per week, 4) intervention should last for at least two years, and 5) the instructor/therapist should break complex tasks into smaller components by focusing on systematic teaching and repetitive practice. This program model is called the UCLA model. Since this model was established, there has been dramatic interest in developing effective EIBI for children with ASD. In the replicated programs, children made large gains in cognitive, language, adaptive, social, and academic measures (Eiketh, Smith, Jahr, & Eldevik, 2002; Howard, Sparkman, Cohen, Green, & Stanislaw, 2005; Magiati, Charman, & Howlin, 2007; Sallows & Graupner, 2005) and some of the studies demonstrated success in enabling

children to transition from home-based programs to school based-programs (Eiketh, Smith, Jahr, & Eldevik, 2002; Sallows & Graupner, 2005). These results suggest that the UCLA model is effective for the improvement of symptoms for children with ASD.

Although previous research demonstrated the effectiveness of the UCLA model, the intervention is very long and intensive (Wong & Kwan, 2010). According to Grindle, Kovshoff, Hastings, and Remington (2009), three quarters of the parents in their study reported difficulties with their Local Education Authority (LEA). More than 50% of the parents reported that their LEA was reluctant to provide EIBI services due to cost. In fact, it is extremely difficult for the majority of children with ASD to receive the UCLA EIBI program. Therefore, it is necessary for parents to find an alternative EIBI program that is as effective as the UCLA EIBI. In addition, it is important for parents to learn how to handle their children's behavioral issues and teach basic skills in their everyday environment. The question arises as to whether the UCLA EIBI program is the only effective program for children with ASD. Could a less intensive program also provide positive results for children with ASD? There are EIBI programs that pinpoint the target

behaviors to improve. Social deficits are some of the primary symptoms for children with ASD (American Psychiatric Association, 2002) and, consequently, these skills have been especially targeted. Limited eye contact and joint attention influence various types of social skills; therefore, children with ASD need to improve these pragmatic behaviors in order to function socially in their every day environment. It is reported that young children with ASD showed increased eye contact with persons (Bauminger, 2002) and materials presented in front of them (Donnely, Luyben, & Zan, 2009) and more sustained joint attention (Wong, Kasari, Freeman, & Paparella, 2007; Wong & Kwan, 2010) following participation in EIBI programs. EIBI is also effective in increasing symbolic play skills (Wong, Kasari, Freeman, & Paparella, 2007; Wong & Kwan, 2010) and social interaction (Baumminger, 2002; Hwang & Hughes, 2000; Rogers, 2000; Wong & Kwan, 2010; Yang, Schaller, Huang, Wang, & Tsai, 2003) for young children with ASD. Many children with ASD are seriously delayed in their language development (Ganz & Flores, 2009; Kasari, Paparella, Freeman, & Jahromi, 2008; Wong & Kwan, 2010). The inability to speak to, or communicate with, their caregivers for their basic needs often leads them to engage in aggressive behavior and/or protest behavior.

Therefore, it is essential to increase their language and communication skills. Positive changes have been reported in requesting objects for pre-verbal children (Wong & Kwan, 2010), verbal children (Charlop, Schreibman, & Thibodearn, 1985; Dyer, 1989) and nonverbal children (Charlop & Trasowech, 1991; Dyer, 1989) following participation in EIBI programs. Also, Kasari, Paparella, and Freeman (2008) found that teaching symbolic play and joint attention to children with ASD would significantly improve language skills. The intensity of these studies varied from two weeks to seven months. From these findings, it is apparent that EIBI significantly contributes to the improvement of deficit skills in children with ASD. In addition, some studies conducted follow-up study or maintenance and generalization sessions within the study. They showed that the acquired skills were maintained and/or generalized (Bauminger, 2002; Charlop & Trasowech, 1991; Donnely, Luyben, & Zan, 2009; Ganz & Flores, 2009; Wong, Kasari, Freeman, & Paparella, 2007; Yang, Schaller, Huang, Wang, & Tsai, 2003). These studies also demonstrated that EIBI successfully improved behaviors for children with ASD

In conclusion, EIBI programs have demonstrated significant success in teaching children with ASD. It is

apparent that the UCLA EIBI program has been associated with large gains including mainstreaming in school. In addition, EIBI programs in general have been linked to improvement in children with ASD. To be sure, various aspects of the quality and impact of the programs need to be considered. Some studies did not conduct follow-ups to investigate whether acquired skills were maintained across time or generalized across settings. To ensure and sustain a positive impact on parents and siblings of children with ASD, it is necessary for the ABA providers to clarify the requirements and responsibilities for the family members at the outset of the services. The ultimate goals for EIBI should be transferring instructional control over to parents. In addition, continuous communication between the parents and supervisors is important. Therefore, providing parents or siblings with training on a regular basis is important to continue motivating parents to stay involved with the program and ease the family members' strain and stress. These limitations not withstanding, it seems that EIBI is the key to successful improvements for children with ASD and their family members. For this reason, teaching age-appropriate sport skills to children with ASD should be implemented within an EIBI program.

Summary

It is extremely difficult for children with ASD to acquire appropriate skills independently. These children often spend an extended period of time engaging in problematic behaviors and are not motivated to learn functional and flexible skills without intervention. Families with an autistic child are at a higher risk for psychological distress because of the children's inappropriate and unpredictable behaviors. Limited previous research suggests that teaching these children lifetime sport skills can give them a better QOL. Acquiring sport skills may improve their peer interactions, motor skills, language skills, and communication skills. In addition, it may allow them to have a sense of belonging to their community. Overall progress in their development may contribute to reduction of parenting stress and enhancement of QOL for these children. Based on empirical evidence, behavioral intervention based in the principles of ABA is tremendously successful in teaching skills to children with ASD. With an effective intervention program, children with ASD should be able to acquire lifetime sport skills along with the important benefits that result from such skill acquisition.

Purpose of the Current Study

Previous studies have demonstrated that children with ASD are able to learn sport skills. However, there are some limitations to the results of previous studies. Some of these studies focused on simpler activities such as walking and jogging, rather than skills per se. Certain other studies focused on teaching a limited degree of sport skills such as kicking a ball or shooting at a basketball hoop instead of teaching children to participate in soccer games or basketball games with other children. These activities may contribute to improved physical fitness and reduction of inappropriate behaviors, but may not involve age-appropriate sport skills that the children with ASD can engage in with their family members or in the community. In general, prior research has failed to demonstrate successful engagement in learned or acquired skills in activities taking place in community settings. The purpose of the current study is to demonstrate that an effective behavioral intervention program can teach children with ASD to engage in age-appropriate lifetime sport activities (i.e., bike ride, scooter ride, skateboard, rollerblade, soccer, and baseball) and the ultimate goal of the current intervention is for children with ASD to maintain the

skills over time and generalize them to community activities.

CHAPTER TWO

METHOD

Participants

Seven children (one female and six males) were recruited from ABA BEARS using a sample of convenience. All of the participants had a clinical diagnosis of autism and met criteria to obtain program services from two Regional Centers (i.e., Inland Empire Regional Center, and San Gabriel and Pomona Regional Center). All received behavioral intervention services based on the principles of ABA. The participants ranged in chronological age from three to eight years old at the onset of services. The length of treatment varied from one year to two and a half years. All participants lived at home throughout the study. Informed consent from the parent was obtained prior to conducting the study. Demographics match the local demographics of the area. The sample consisted of two Caucasian children, three Asian children, and two Hispanic children. All of the mothers reported that their children demonstrated limited sport skills prior to receiving the intervention program. The following describes each participant's behavior at the onset of services. Pseudonyms were used to describe the participants' names.

James was a nine-year-old boy with autism. He had a doctor's prescription to stay at home due to safety concerns at public school. He received 40 hours per week of 1:1 ABA services from other ABA providers. His mother reported that he engaged in numerous forms of aggressive behavior (e.g., hitting, kicking, pinching, pushing, grabbing, biting, scratching, and throwing) as well as self-injurious behaviors. His behaviors were such that the previous provider could not control him and it had, at least on one occasion, caused cuts on his arms from attempting to physically control him. He demonstrated limited communication and language skills (ABA BEARS, 2010a).

Andy was a seven year-old-boy with autism. He attended a nonpublic school accompanied by a school district aide. He divided his time between a regular education classroom and an autism classroom. He engaged in protest and non-responsive behaviors that interfered with his learning, building social relationships, and effectively communicating his needs. His school aide reported that he engaged in protest behaviors that included running at the aide, lying on the ground, crying, pointing, kicking, yelling, and screaming (ABA BEARS, 2008a).

Sean was a nine-year-old boy with autism. He engaged in high levels of non-responsive behavior, elopement behavior, and self-stimulatory behavior such as playing with spit, squinting, flicking his fingers, flapping his hands, and shaking his head. He attended a special day class at public school. He received speech and occupational therapy at school. He was not toilet trained and demonstrated limited communication and language skills (ABA BEARS, 2008a).

Kelly was a three-year-old girl with autism. She engaged in protest and non-responsive behaviors. She demonstrated a lack of building social relationships and effectively communicating her needs. Prior to receiving the current intervention, she was receiving inconsistent services from another ABA provider. She was not toilet trained (ABA BEARS, 2009a).

Alfred was a four-year-old boy with autism. He attended a regular pre-school. He demonstrated a lack of building social relationships. He occasionally engaged in whining behavior, crying behavior, or repeating the same sentence (e.g., "Are you okay?") to meet his needs. He was not toilet trained (ABA BEARS, 2011).

Tyler was an eight-year-old boy with autism. He received 40 hours per week of 1:1 ABA services from other

ABA providers. He demonstrated some receptive and expressive language skills. He exhibited some resistance and tended to withdraw from social interactions with therapists. He also demonstrated limited leisure skills and frustration tolerance (ABA BEARS, 2008a).

Christopher was a seven-year-old boy with autism. He received 40 hours per week of 1:1 ABA services for approximately four years from other ABA providers. He engaged in numerous forms of aggressive behaviors, self-stimulatory behaviors (i.e., flapping hands, knocking objects and gazing), and protest behaviors (i.e., whining, screaming, and crying). He demonstrated limited communication and language skills. He was not toilet trained (ABA BEARS, 2009a).

Trainers

A total of 12 trainers worked with the children. The trainers consisted of one graduate student with a Marriage and Family Therapist (MFT) license, eight Bachelors level therapists, and three undergraduate students (enrolled in Psychology or a related field). All of the therapists had received training in ABA ranging from two months to seven years at ABA BEARS. The therapists who had less than two to three months' experience were accompanied by a senior

level therapist who had more than two years' experience in teaching individuals with ASD. There were four male and eight female therapists.

Settings

All probe, instructional, and maintenance sessions occurred in the backyard at the children's home. Generalization sessions occurred in the backyard and/or in the community (e.g., in the neighborhood or park). Approximately 20 minutes to one hour were spent to teach children sport skills. The children's family members were sometimes present during sessions. All sessions occurred in a 1:1 instructional format.

Materials

A bike, a scooter, a skateboard, a helmet, gears, a basketball, a basketball hoop, a baseball, a baseball bat, a glove, and baseball bases were used in this study.

Steps of Teaching Procedure

Each sport skill was broken into small steps by the program supervisor and senior level therapists. The target behavior was introduced systematically. For example, as soon as the child acquired step one, step two was added as a target behavior. Instead of teaching the child to learn the whole sport skill, this stepwise introduction of a

behavior allowed both verbal and non-verbal children to focus on one simple target behavior at a time. The individual steps and sequence for each sport area were as follows (ABA BEARS, 2008-2011b):

Bike

1. Place right foot on pedal.
2. Begin pedaling with right foot and push off of ground with left foot.
3. Place left foot on pedal.
4. Maintain handlebars steady to hold balance and pedal with both feet to gain momentum.

Skateboard

1. Place right foot on the board.
2. Push three to four times with left foot.
3. Bring left foot up and place it in front of right foot.
4. Push off with left foot and repeat steps as losing momentum.
5. Push off again when slowing down.

Scooter

1. Place right foot on front of scooter board.
2. Begin pushing off of ground using left foot.
3. Maintain handlebars steady to hold balance while pushing off ground using left foot.

Baseball (for a right-handed person)

Section 1(Batting)

1. Spread feet shoulder distance apart and stand four-inches away from the home plate.
2. Hold on bottom part of bat using left hand on bottom and right hand on top.
3. Spread elbows shoulder distance apart with right elbow at shoulder length.
4. Hold bat up towards right shoulder with hands near right shoulder level. Left elbow lifted, but lower than right elbow level.
5. Bend knees.
6. When ball gets close, swing the bat out to hit the ball.

Section 2 (throwing)

7. Hold the ball with right hand.
8. Move right hand back over the right shoulder.
9. While moving arm back, take a step forward with left leg to prepare to throw.
10. Bring arm forward with force and release ball as transferring weight from right to left leg.

Section 3 (catching)

11. Place glove out facing up at three feet apart from the therapist.
12. Increase distance from the therapist.

Basketball

Section 1 (shooting)

1. Place left hand on side of the ball to guide and place right hand on back of the ball to push the ball forward.
2. Bend knees as shooting ball to gain more momentum/force on shot.
3. Shoot from 5-6' away from the basketball hoop approximately 5'tall.
4. Shoot the basketball 8-10' away from the basketball approximately 8'tall.

Section 2 (passing)

5. Step in passes with non-dominant foot and push the ball with both hands from the chest.
6. Step in passes with non-dominant foot by bouncing the ball.

Section 3 (dribbling)

7. Bounce the ball with dominant hand in place 10 or more times.

8. Bounce the ball with non-dominant hand in place 10 or more times.
9. Bounce the ball by alternating hands in place 10 or more times.
10. Walk and bounce the ball with one hand.
11. Run and bounce the ball with one hand.

Soccer

Section 1 (kicking)

1. Move right foot back and up off of ground.
2. Swing right foot forward with force and hit ball with inside of foot.
3. Increase distance from the therapist.

Section 2 (passing)

4. Swing foot forward by using the inside of right or left foot.
5. Increase distance from the therapist.

Section 3 (dribbling around cones)

6. Begin on right or left side of first cone.
7. Weave in and out of all the cones.

Section 4 (stopping the ball)

8. Pick up right or left foot.
9. Step on the ball to stop it.

Probe Sessions

The probe session occurred prior to teaching target behaviors. Two different types of probe sessions were conducted to assess each child's skill level by a senior therapist and/or program supervisor. First, the senior therapist presented the child with the sport materials and observed the child's response. For example, the senior therapist handed a child a baseball bat and pitched a ball to observe if the child attempted to swing the bat to hit the ball. This probe session determined whether or not the child had the concept of the sport skill. Second, the therapist provided the child with a basic instruction that pertained to the skills they planned to teach. For example, the therapist delivered the instruction, "swing" when pitching the ball to observe the child's response. This probe session determined whether or not the child demonstrated the ability to respond to the instruction. Anecdotal data was taken by the senior therapist. The child's skill level in each of the sport skills prior to the general training was recorded by the therapist. Therapists planned to teach multiple sport skills for all of the participants. However, it was at the discretion of the case supervisor to recommend focusing on specific sport skills to introduce generalization sessions in the

community setting based on the child's performance level. This is because some children may excel in engaging in one sport activity compared to the others depending on their interest, preference, or skill.

General Training Session Procedure

Each session took from three to three and a half hours. In these hours, approximately 20 minutes to one hour per session were devoted to teach children sport skills with forward chaining. The length of teaching time varied depending on the child's performance. Each sport skill was practiced two to four times per week. The sessions to teach soccer and baseball occurred on the grass area in the child's backyard. The sessions to teach basketball occurred on the concrete area in the child's backyard. The sessions to teach skateboarding, bike riding, and scooter riding occurred on the concrete area in the child's backyard, on the driveway, or on the sidewalk. The therapist delivered the instruction (e.g., "Ride your bike" "Play soccer") and the prompts were presented immediately after the instruction. The prompting strategy included hand-over-hand prompt, physical prompt (e.g., tapping the child's foot, pointing to the skateboard), model prompt, and verbal prompt (e.g., "Put

your foot on the board"). The prompts were arranged from the most intrusive prompt (i.e., hand-over-hand prompt) to the least intrusive prompt (i.e., verbal prompt) and systematically faded out as the child demonstrated success. After the prompt was delivered, the therapist provided the child with reinforcement immediately. The reinforcement included primary reinforcement (e.g., lollipop), physical reinforcement (e.g., deep pressure, tickle), verbal reinforcement (e.g., "Great job!"), and tangible reinforcement (e.g., allow the child to get on the swing for five minutes). The reinforcement was selected based on the therapist sampling various reinforcers for each child at the beginning of each session. The schedule of reinforcement was thinned as the child demonstrated success. The mastery criteria included that the child demonstrated the new skills without prompts across two therapists. Anecdotal data were taken by a therapist in each session. After each session with the child, the therapist recorded the child's level of mastery of each sport skill. This allowed comparison across treatment sessions in accordance with a changing criterion design. In the initial proposal for this study it was expected that once the child reached full mastery of a particular skill, the generalization sessions for that

skill would begin. However, in practice, generalization sessions sometimes were initiated before a skill reached full mastery to promote children to generalize their acquired skill. Therefore, the parents were often requested to participate in this practice.

Generalization Sessions

The generalization criteria included that the child demonstrated the sport skill outside the teaching environment and with multiple people and at a level of performance comparable to that obtained in the original therapy context. Based on the fact that many children with ASD demonstrate difficulty transferring their acquired skills to new settings (Wong, Kasari, Freeman, & Paparella, 2007), generalization across people and places was targeted within the program. Therefore, each child's team consisted of two to five therapists and all of the parents were required to actively participate in the program. For example, when the child had made some progress in learning how to swing the baseball bat appropriately, the child's parents pitched the ball instead of the therapist. When the child learned to swing the bat and, perhaps, run bases in her backyard, the therapist practiced these skills in the park. When the

child acquired the whole sport skill to a reasonable extent, the child performed it in the community. For example, when the child demonstrated the ability to swing the baseball bat appropriately, catch the ball with the baseball glove, pitch the ball, and run bases after hitting the ball, the child was signed up for the baseball league in the community. In the community setting, the child was accompanied by the therapist and/or his parents.

There were multiple mastery criteria for generalization. First, whether or not the child demonstrated a comparable level of the skill with someone other than a therapist was determined. For example, the child needed to demonstrate the same level of performance with his or her parents after acquiring skateboard skills with the therapist. Second, whether or not the child demonstrated the skill in a setting that differed from the training setting(s) was assessed. For example, the child needed to demonstrate the same level of performance that was acquired in his or her backyard in the park. Third, degree of participation in organized community sports activities was assessed. The ultimate goal for these children in attending community-based activities should not be for them to engage in perfect performance, but for them to appropriately follow the instructions and learn to

improve the target skills just like typically developing children. Therefore, mastery was considered attendance of a complete practice and/or competition with or without adults' assistance. The need for adult assistance is not considered a limitation on skill generalization because even non-autistic children may require some degree of guidance from adults (e.g., instruction from a coach, encouragement from parents) during community outings with their family or sport lessons in the community league. In addition, attendance at community-based activities without behavioral disruption should be a reasonable criterion of success because inappropriate behaviors (e.g., aggression, tantrum, low level of attention) usually prevent non-autistic and autistic children from performing successfully. Anecdotal data were taken by the therapist. The data also included parental reports. The data for generalization were largely qualitative in nature based in anecdotal information. The following open-ended questions were asked.

1. How often did you engage in this activity before your child received the current intervention?
2. Did you think your child would engage in this activity appropriately? What did you think he or

she would be able to do? What did you expect him or her to do?

3. What does your child do now?
4. How much behavioral support does he or she need?
5. Please describe the overall quality of performance?
6. Is there anything else you would like to report?

Experimental Design

A multiple-case methodology, changing criterion design across participants was employed to examine whether the intervention was effective in teaching participants age-appropriate sport skills. A changing criterion design requires establishment of an initial baseline on a target behavior (probe session) followed by multiple treatment sessions featuring stepwise increases in the criterion level of performance (Hartmann & Hall, 1976). In this project, baseline data were collected prior to implementing treatment steps. As soon as the child demonstrated success with the target behavior, the next step of the target behavior was added. Level of performance for each skill area at the end of each treatment session was recorded so that therapeutic change and experimental control could be demonstrated. In

addition, after each child acquired the target behaviors, generalization data was obtained in the community. This consists of evidence of transfer across adult collaborators, settings, and organized activities.

CHAPTER THREE

RESULTS

Probe Sessions

Probe (baseline) data was taken during Functional Behavior Assessment (FBA) by the executive director or during training sessions by the senior level therapist. Baseline is described for ball play (i.e., baseball, basketball, and soccer) and outside play (i.e., rollerblading, biking, scooter riding, and rollerblading).

James

Ball Play (basketball and soccer)

James did not engage in any age-appropriate ball play (ABA BEARS, 2010a).

Outside Play (biking)

James did not engage in any age-appropriate outside play (ABA BEARS, 2010a).

Andy

Ball Play (baseball and soccer)

Andy was able to catch a ball and swing the baseball bat. However, he resisted instruction and demonstrated limited frustration tolerance to complex tasks (e.g., for baseball, getting into the appropriate stance, holding the bat

appropriately, and bending his knees at the same time) (ABA BEARS, 2008a).

Outside Play (rollerblading and skateboarding)

Andy rode his bike around the neighborhood and swam independently in pools. He demonstrated interest in skateboarding, but was not able to demonstrate the skill without physical assistance. He did not demonstrate the skill to rollerblade (ABA BEARS, 2008a).

Sean

Ball Play (basketball)

Sean did not engage in any age-appropriate ball play (ABA BEARS, 2008a).

Outside Play (biking and skateboarding)

Sean rode a bike with training wheels; however, he did not ride a bike without training wheels or engage in other age-appropriate outside play (ABA BEARS, 2008a).

Kelly

Ball Play (baseball)

Kelly did not engage in any age-appropriate ball play. She resisted instruction and engaged in high intensity protest behaviors (i.e., crying,

screaming, throwing herself on the ground) (ABA BEARS, 2009a).

Outside Play (biking and scooter riding)

Kelly did not engage in any age-appropriate outside play. She resisted instruction and engaged in high intensity protest behaviors (e.g., hitting her head on the pavement). However, it should be noted that she was able to ride her tricycle which would be a prerequisite skill for riding her bicycle after receiving training sessions from ABA BEARS. She demonstrated interest in scooter riding after she acquired a tricycle, but did not demonstrate the skill (ABA BEARS, 2009a).

Alfred

Ball Play (baseball)

Alfred did not demonstrate any age-appropriate ball play skills (ABA BEARS, 2011).

Outside Play (biking and scooter riding)

Alfred did not demonstrate any age-appropriate outside play skills (ABA BEARS, 2011).

Tyler

Ball Play (baseball)

Tyler did not engage in any age-appropriate ball play. He resisted instruction and demonstrated limited frustration tolerance to complex tasks (ABA BEARS, 2008a).

Outside Play (biking and skateboarding)

Tyler rode a three-wheeled scooter. He demonstrated interest in skateboarding by attempting to get on it, but was not able to demonstrate the skill without physical assistance (ABA BEARS, 2008a).

Christopher

Ball Play (baseball and basketball)

Christopher did not demonstrate any age-appropriate ball play skills (ABA BEARS, 2009a).

Outside Play (rollerblading and skateboarding)

Christopher independently rode a razor and a bicycle without training wheels. He did not attend to instructions to stop or turn. He did not engage in any age-appropriate games or physical activities other than the bike and razor (ABA BEARS, 2009a).

General Training Sessions

General training data for all participants are shown in Table 1. Each participant's age, which sport skills they learned, and how many training sessions they required to acquire each sport skill are presented. Summary statistics concerning number of sessions to criterion for each sport skill are presented in Table 2.

The number of general training sessions required to reach acquisition of a skill may be affected by two factors. The first factor is that each participant may have a preference for specific sports. For example, Andy required 37 training sessions to acquire baseball, 24 training sessions to acquire skateboarding, and 29 training sessions to acquire soccer while he required 99 training sessions to acquire rollerblading. Also, Alfred did not acquire biking and required 45 sessions to acquire scooter riding. He began learning to bike first, but his therapist reported that he exhibited a higher level of attention when he practiced riding a scooter. The second factor may be the individual therapists' skill level as a therapist. As described in the probe sessions, none of these children demonstrated age-appropriate sports skills. Some of the children had even received an ABA-based program from other providers which was evidently not

successful with respect to the skills targeted in this study, despite the attempts of the therapists in that program. In addition, most of the children engaged in high intensity problematic behaviors and they were unmotivated to learn the new skills during probe sessions. Therefore, the results seem to demonstrate that the therapists participating in this study might be well trained with high quality therapy skills that helped them manage severe behaviors and motivate the children to learn the new skills.

Another important point to note regarding the general training data is that the therapists' teaching style and procedure were based in part on the lead therapist's approach and in part on each individual child's needs. In this study, each participant had one senior level therapist and two to four therapists on his or her team. The senior level therapist was in charge of leading the team members on how to teach the child. Therefore, the senior level therapist individualized the task analysis depending on their own judgment and on the child's preferences and/or the pace of the child's progress over the steps of task analysis during general training sessions.

Table 1. The Number of Sessions Needed to Reach Criterion for Each Participant in Each Skill Area

Participant (age)	Sport Skill	Sessions to Acquisition
James (8)	basketball	53
	biking	53
	soccer	48
Andy (7)	baseball	37
	rollerblading	99
	skateboarding	24
Sean (9)	soccer	29
	basketball	156
	biking	82
	skateboarding	114
Kelly (3)	baseball	140
	biking	57
	scooter riding	82
Alfred (4)	biking	Not acquired (51)
	scooter riding	45
Tyler (8)	baseball	28
	biking	16
	skateboarding	18
Charlie (7)	baseball	173
	basketball	84
	rollerblading	39
	skateboarding	77

(ABA BEARS, 2008-2011b)

Table 2. Mean Number of Training Sessions Needed to Reach Criterion Across the Seven Participants for Each Sport Skill

Sport Skill	Minimum Sessions	Maximum Sessions	Mean	SD
Soccer	29.0	48.0	38.5	13.4
Baseball	28.0	173.0	94.5	72.9
Rollerblade	39.0	99.0	69.0	42.4
Skating	18.0	114.0	58.3	45.7
Scooter	45.0	82.0	63.5	26.2
Basketball	53.0	156.0	97.7	52.8
Biking	16.0	82.0	52.0	27.3

Note. The number of children contributing data for a given sport ranged from two to four.

Generalization Sessions

The general training sessions usually occurred in the child's home (i.e., front yard and/or backyard); however, the therapist practiced the acquired skills at different locations (e.g., the park, the school ground) and/or with different people (e.g., family members or peers) before the child completely reached the criterion indicating full acquisition of the entire sport skill. For example, as soon as a child learned how to pitch the ball, the therapist requested that his parents play catch with him. Therefore, the therapist' report includes a combination of

general training data *and* generalization data. The generalization data were obtained during general training sessions or are based on the parents' report during general training sessions. Meanwhile, the parental interview includes the most recent skill level that the children exhibited. The parents' answers were taken word-for-word for each question and the interviewer compiled the answers. The parents' check was conducted for the accuracy of the reports. This will be followed by some qualitative analyses. In order to maintain confidentiality, the identity of the parents who provided personal communications is not indicated. With one exception, the participating parent was chosen based on family preferences.

James

Basketball.

Therapist's report:

James began playing basketball at school in October 2010. He only played around kids with his therapists. He did not make any goals at first because the basket was too high for him at that time. After a month, he made three baskets; a month later he made 14 baskets. In March 2011, he began taking turns shooting the ball into a basket with other kids at school. He only

needed prompts to pay attention during play. He also played with his mom, sister, and his therapist at the park and the community centers. His mom and his sister directed some of his play; the therapist mostly gave instructions and dealt with his behaviors. With his dad, he played once at home and made 3/5 shots with his dad encouraging him to shoot. He recently played basketball at YMCA. He was very compliant to play though the therapist could tell he did not really want to play on that day. He liked to look at men playing basketball on the other side of the court (K. Cabrera, personal communication, October 2011).

Mother's report:

He never played basketball and he never discriminated the size of the balls and the purpose of use. He never demonstrated motivation or interest before. I did not think he would be able to play basketball. I bought the basketball and basketball hoop for him, but he never responded to me appropriately. I also lost my motivation to teach him. I often got disappointed because he was non-compliant or did not respond to me at all. He often screamed, cried, threw himself on the floor, escaped, and hit himself and

us. I am not talking about only basketball, we could not go anywhere and just stayed home. My daughter was afraid of sitting next to him in the car. We could not watch TV at a normal volume, could not keep the light on, and could not vacuum because everything bothered him. It was very hard for all of us. All we did was to accommodate my son. We never thought we could enjoy anything with him. Going out in the community is a big deal for us. Now, my son shoots basketball, dribbles, and passes...he knows chest pass, overhead pass, and bounce pass if we instruct him. I know he can do them independently with his therapists. He has great coordination. He throws the ball to an appropriate person and runs to the ball. He does not require every single instruction because he knows what to do. Compared to where he was at, he is doing very well. I realize that he has muscles and became a strong guy. My husband likes to play basketball, so this has a positive effect on their relationship. They never did anything together. I am very happy with this (James's mother, personal interview, October 2011).

Biking.

Therapist's report:

James has shown compliance with his mom riding at the beach outside of sessions. Mom said that participant 1 complies when she tells him to stop about 4/5 times. One instance when he did not comply was when they were riding up to a stop sign. The sign was there because of possible oncoming cars through the part of the pedestrian sidewalk. Mom needed to speed up and block him from riding into an oncoming car (his mom rides behind him to keep in eye on him). Overall he has done well with mom and is able to maneuver around the people. Mom gives verbal prompts to watch out for other people, though possibly more out of anxiety that he will run into some one than him not having the ability to do it. I have observed participant 1 ride and he is well aware of the people around him (K. Cabrera, personal communication, October 2011).

Mother's report:

When my son was two to three years old, I often brought him to the park. I tried to teach him how to ride his tricycle for about two years, but he never acquired it. I started to teach him how to ride his

bike when he was five years old, but he never acquired it with me. When he was seven, he rode his bike with training wheels, but did not know how to use the brake and had to be wearing his pajamas (My son would scream and hit us when we required him to get dressed appropriately). He never showed interest in riding his bike. I did not see any motivation in him. Therefore, I was not sure if he would be able to ride his bike without training wheels because he never acquired anything with me. When ABA BEARS began providing services, he was already eight years old. My husband told me not to get disappointed if he never got it. I wanted him to pedal appropriately, pay attention to where he was going so that he would not crash into anything in front of him. He did not seem to be aware of his environment at all. It was very dangerous. Now we can ride bikes with him everywhere except some streets that get heavy traffic. For example, we enjoyed biking at the park, the beach, and the biking course at Big Bear Mountain. My son rides 15 to 18 miles without protesting. He often smiles and asks us to ride more. Now he is aware of his environment much more, but may not understand the signs on the street. However, he

follows my instruction....I would say 80-90% of the time. He stops and slows down. I am still worried about him because he may not have the idea that the car on the street could hit him. We never tried to let him bike by himself so I don't know. But to me, this is great that I can take my children to the community and have fun family time (James's mother, personal interview, October 2011).

Soccer.

Therapist's report:

James began playing soccer at school in September 2010. He only kicked the ball to his sister and other kids. He mostly played independently and his therapist sometimes needed to direct him back to game when missed ball and needed to go get it or was distracted watching kids play around him. He also played with his mom and therapist at the park. He was compliant with some directions from his mom (K. Cabrera, personal communication, October 2011).

Mother's report:

My son never played soccer before he received the intervention at ABA BEARS. I tried to enroll him in the league for children with disabilities, but they never accepted my son due to his behaviors. Nobody

wanted to deal with my son. Therefore, I never thought he would be able to play soccer. He rarely kicked the ball back to me. His attention was not there. He never showed interest and motivation. My son used to receive early intervention program from two other providers before, but they did not teach him properly. They focused on more academic programs, but it was very important for my son to have quality of time. I really wanted him to be able to acquire appropriate play skills. Now he can dribble around the cones/obstacles, kick the ball very hard, and pass the ball to his sister, his father, and me. I feel that he may not like soccer as much as other sports, but he demonstrates appropriate coordination. He tracks his ball. This is perfect. We don't play soccer very often because we are not into it, but when we go out to the community, we take the ball with us and play soccer with him. He still does not go get the ball or initiate to play soccer, but if we tell him to do it, he complies. He sometimes requires verbal prompts. He sometimes attempts to escape, but I feel I have decent instructional control over him. I said I did not think he liked soccer very much, but this is not about that, I mean he probably doesn't

like this as much as he likes biking. This is about him acquiring age-appropriate coordination and skills. He pays attention to the ball, moves his legs appropriately, and responds to us. This is great (James's mother, personal interview, October 2011).

Other things to report from mother:

I would like to report that we are going everywhere with our son! I purchased the pass for all of the theme parks because my son is now interested in going out to the community. The other day he even asked me to take him to the Lego Land. My son is non-verbal, but he brought me the picture of Lego Land. He has brought me the picture of Disneyland too. We can enjoy vacations together as well. We recently flew to Aruba. We feel that we can enjoy our "real time" with him. He also takes drum lessons once a week and goes to the gym with me! His therapist taught him how to walk on the treadmill so now he can walk on the treadmill next to me for about 20 to 25 minutes. I never thought I could go to the gym with him. We go in the pool together too. He still cries and attempts to hit us, but we are able to redirect his behavior and his protest behaviors are much shorter. He was not happy before, and we were not happy, either. I

never expected that we could have a real family time with him before he received the services from ABA BEARS. Nobody believed my son could learn, but now I know he can learn and so can any children. I think many parents and ABA providers heavily focus on academics, but I don't believe it. I don't think my son will acquire academics without acquiring play skills. Acquiring age-appropriate sport skills has a significant effect on his overall quality of life. Not only my son's life. My life was going to a totally different direction. My son needed to learn how to be a kid. Now I want even more for my son and I think he can do it. I think my son is ready to acquire academic skills. He finally belongs to us and my husband and I are very happy with the outcomes (James's mother, personal interview, October 2011).

Andy

Rollerblading.

Therapist's report:

Andy generalized his rollerblading skill to roller hockey. We only taught him how to rollerblade forward, backwards, and how to stop. At the hockey practice/game, he learned how to hold the hockey stick and control the puck and shoot. With skating,

he was above the average with the children on his team, which were also first year players. Ages ranged from six to nine (C. Nuno, personal communication, October 2011).

Mother's report:

My son never rollerbladed prior to receiving the current behavioral intervention, but I knew once we introduced it, he would be able to do it because he had unbelievable balance. The issue was just to get him to do it, a process of learning something. He was often frustrated. He is tough so he can take a lot of physical activity. Now he is really good at rollerblading, but it is not something he enjoys doing. Rollerblading is not his first choice, but he needed this skill in order to play roller hockey. He plays roller hockey in the league with typically developing children. The new season just started on October 1st and the owner of the league moved him up to the next level. The owner thought my son was ready to move up and this is something he really enjoys. I have not intervened at all and neither has his therapist. His therapists do not always go there, but he follows instruction from the coach. When he rollerblades, he rarely falls, but when he plays

roller hockey, he periodically falls because the floor is very slippery. I think he demonstrates average skills compared to other children. This is something he has wanted to do for a long time, but since it is such an aggressive sport, I did not enroll him for a long time. During his first season, he sometimes did not understand why he got knocked out, slammed on the wall, or pushed by other children, so he would stand up and go hit other children. I talked to the coach to let him know my son was getting a little rough, but the coach said it was fine. He (the coach) said the referee never said anything and my son actually has never gotten sent to the penalty box while other children have. But I explained to my son that it (some children pushed him during the game) was not on purpose, it was an accident, so he should not hit them back. I told him that the sticks needed to stay on the ground. He seemed like he understood. He said, "Okay, I will say it's okay." Now if another kid fell on the ground, my son would pick him up and say, "Are you okay?" I think the timing and his skill level fall together because if he had not acquired rollerblading, he wouldn't have been able to do this. I think he was

physically and emotionally ready. He made three goals during the game (Andy's mother, personal interview, October 2011).

Skateboarding.

Therapist's report:

Andy's riding was effortless and did not require any prompting. He did tricks such as stopping and making the front stand up while the back was down, he could crouch while riding on the skateboard and pick up items off the ground. At the skate park, he went down and up on the smaller ramps. He had excellent control of the skateboard (C. Nuno, personal communication, October 2011).

Mother's report:

My son never skateboarded before and he did not even own the board before. His biggest obstacle has been frustration tolerance. Just to get him to go from the garage to the grass in the yard, it was like an hour project. He just did not want to do many things. I always wanted him to at least try and if he didn't like it, he wouldn't have to do it. Not just sports...anything... like food. Just try it and you don't have to eat it if you don't like it. But he usually ends up liking it. He doesn't like the

learning process. If he feels something is difficult, he does not want to do it. He gets frustrated. Now he rides (skateboard) throughout the neighborhood and he goes to the skate park with us. (At the skate park,) he goes up and down the ramp and he can do a swivel slap turn. I don't think he requires any behavioral support. His performance is great. He doesn't do the jump on the ramp, but demonstrates equivalent skills to other children at the skate park. I think he will do the jump later because he started to do the jumps on the bike at the park. We even tried "A skate" and he skateboarded with professionals for about a little over an hour and really enjoyed it (Andy's mother, personal interview, October 2011).

Baseball.

Therapist's report:

Andy played on a little league team with typical children. He was not in the age group he should have played with, but instead played with age group of children two years younger than him. Compared to the other children, he was average his first year, but the second year he was uninterested and usually needed a lot of support and was below average. However, he listened to coaches' instructions well.

Also he played catch with his dad without much support from us. We usually needed to intervene with batting because his dad gave him too many instructions and participant 2 would become frustrated (C. Nuno, personal communication, October 2011).

Mother's report:

Before my son received the current intervention, he played baseball a little, but nothing organized. He played catch and knew how to hold a baseball bat. He had basic skills. He could play with us for five minutes, but if we had tried to make him follow through, then he would have had a melt down (screaming, crying, hitting, and spitting) like for one hour and half. So we always stopped before he reached that point. Therefore, I did not think he would be able to play baseball appropriately. I thought it would be too structured for him. I believed there was nothing he could not do, but I didn't think he was ready for this because he had to understand the rules, follow the rules, and tolerate to listen to his coach, and wait for his turns. This is too organized for him. I didn't think it would happen in the near future. But he played in the

baseball league with typically developing children and attended two seasons. He did what he was supposed to do...he knew the basic rules and followed the coach. But he didn't enjoy it as much as he enjoys roller hockey. He required minimum prompts such as "Pay attention," "Stop with playing with the grass." He was struck out, then he got angry and stomped...so this happened three to four times but it was nothing big. In the league, he was not very good compared to other children. He struck out more than he hit the ball. I didn't think he was putting much effort there. But when we went to the batting cages, his position was ready and he was nailing every single ball. He just didn't put much effort at the practice in the league. Maybe if he had been a catcher, it would have probably been different because he likes to be busy (Andy's mother, personal interview, October 2011).

Soccer.

Therapist's report:

Andy played two sessions in AYSO with children around his age. His skill level (i.e., kicking, passing, dribbling, and kicking the ball in the goal) was average compared to the other children and did well

following instructions. The therapist provided him with verbal instructions to go towards the ball approximately five times for an hour long game and practice (C. Nuno, personal communication, October 2011).

Mother's report:

My son did not play soccer at all before he received the current intervention. I thought he would be able to do this because this is not as structured as baseball. I thought it would be a perfect sport for him to start with. This was the first organized sport he ever played. He played in the soccer league with typically developing children. He attended drills and played games with other children. During practice, I just had to ask the coach not to have him do it first. He needed a model. He is very visual. If you give him a long verbal instruction, he will not get it. If you show it to him, he will do it. During the game, I had to remind him which way he needed to go. He did not make that connection after the first game because they changed the goals. I just needed to say, "Now you are going this way." He would pass the ball to his team, and dribbled the ball, but never scored a goal. Now he tells his younger brother which way to

go at his (younger brother's) soccer game. He always knew who to pass to, when to block, but didn't enjoy practicing. For any sports, he only likes the games, not the practice. I think his skill was equivalent to other children. You know, there are usually two to three very good kids, he wasn't one of them, but he was pretty good (Andy's mother, personal interview, October 2011).

Other things to report from mother:

My son has been surfing since he was six...before he received ABA. He's got great balance. He surfs a couple of times a year. He attends surfers healing every year. He enjoys it a lot. He enjoys the sensation of going against the wave. I am comfortable with him going in the water by himself. If he goes too far, I tell him to come back, and he listens (Andy's mother, personal interview, October 2011).

Sean

Biking.

Therapist's report:

Sean can ride his bike with the therapists around the block in his neighborhood. His requires minimum support. He tends to go very fast down the hill, so we feel like we need to keep our eyes on him.

However, he stands up to pedal when he goes up the hill independently. He stops when the therapist tells him to stop. He smiles often (C. Nuno, personal communication, October 2011).

Father's report:

My son rode his bike with the training wheels with his mom before his ABA. He was nine at that time. He had three other ABA providers before. I thought he would be able to ride his bike without the training wheels some day. Now his bike ride is excellent. Good motion, balance... he can speed and slow down, but I don't ride bike with him. I don't allow our babysitters to ride it with him because I am concerned about the safety issues...traffic around my house. I think if he goes with his babysitters, he will go very fast and may not come back. Without traffic, I am comfortable with him riding his bike with them. His mom used to do that before this intervention started. His mom would have done that with him. But I don't now. I want to ride bikes with him in the park in the future (Sean's father, personal interview, October 2011).

Skateboarding.

Therapist's report (the current skill level):

Sean is able to go around the block with the therapists and only requires minimum prompt/encouragement from the therapists. The therapists are currently teaching him to weave around the cones to work on him controlling the board. We place four cones in the cul-de-sac area and he is required to weave around each cone. The total distance is approximately 60 feet. He can stay on the board most of the time, but his incorrect response is to miss the cone. He often smiles on the board (C. Nuno, personal communication, October 2011).

Father's report:

My son never tried skateboarding before. We never tried to teach him. I didn't know how to do it. None of the previous ABA providers taught him. I thought he had physical ability to learn it, but at that time, I didn't think he would be able to skateboard. Now he does okay. He gets on the board and pushes. He can skateboard for 50-60 feet. I don't take him out to skateboard, but he smiles and skateboards towards me when I attend his therapy. I need another person to do this with me. I want to do it with his

therapists in the future. I want him to be able to use a swivel board in the future (Sean's father, personal interview, October 2011).

Basketball.

Therapist's report (the current skill level):

Sean can shoot at a 7-foot high goal. He can alternate his hands to dribble. When we prompt him verbally, he would stead the ball. He passes a ball appropriately by using bounce pass, chest pass, or overhead pass. He often gets excited and screams while smiling. He often plays it with his classmates in school (C. Nuno, personal communication, October 2011).

Father's report:

My son and I used to shoot the goals, but the goal was 5 feet high. I didn't think he would be able to play appropriately because his ability was limited. He didn't listen to me. When I tried to place a demand on him, he would just run away. Now I know he can pass and shoot better, but the only thing I do with him is to shoot the goal. I don't think he will play with me appropriately at this point. He doesn't listen to me much, but listens to his therapists a lot...I am alone now. I think my son is pretty good

for an autistic child, but he is a not as good as a typical child. I want to play with him more in the future because I enjoy playing with him (Sean's father, personal interview, October 2011).

Other things to report from father:

I am not happy with his school because I don't think my son is learning much, but I am happy with his current ABA services. My son had three different ABA providers, but wasn't making any progress. He listens to me more now. For example, I can tell him to get something in another room and he will do it. He used to run away, scream, and broke things in the house. He made my wife and me clean up all the time. I was stressed out. His babysitters in the past told me they could not handle this kind of kid. His current babysitters are learning how to work with him from his therapists. His overall behavior has improved so much (Sean's father, personal interview, October 2011).

Kelly

Scooter riding.

Therapist's report:

After Kelly acquired a three-wheeled scooter riding, Kelly's dad took her to the park, while she rode on

her scooter. She followed her dad's directional instructions very well. Although, on the way there, dad did need to verbally prompt her twice from releasing her hands from the scooter handle bars. Dad would have to prompt her six times to step off the scooter to walk it when having to cross the street (A. Gonzalez, personal communication, October 2011).

Mother's report:

My husband and I never thought our daughter would be able to scooter because she was non-compliant and would engage in high intensity of behavior (e.g., crying and throwing herself on the ground) if we told her to do something. I expected her to allow me to teach her anything appropriate, but she just wouldn't allow me. It would have been a dream come true for us if she could do anything appropriately. We wouldn't even try to teach her any sports because we felt it was unsafe. She used to throw herself on the ground and hit her head on the pavement when we placed a demand on her. But now, she independently rides her scooter to the park with us. She stops when we tell her to at the stop sign and appropriately crosses the street without taking off. She also rides her scooter along with her sister. She usually listens to our

instruction well, but gets jealous when her sister who is two years older does something. She has to copy what she does, which is good because she never paid attention to things around her before. Since she acquired how to ride her scooter, I can tell she has great coordination. She knows how to balance and she rides it much better than her older sister (Kelly's mother, personal interview, October 2011).

Biking.

Therapist's report:

After Kelly acquired a two-wheeled with training wheels, her oldest sister joined her and the therapist on the ride. The therapist rode outside of the cul-de-sac and into the next block. She required at least two prompts to slow down due to her going up ahead of us at least five to six feet. The therapist delivered two verbal prompts to stay on the sidewalk due to her losing control of bike and riding herself into neighbor's grass. She would land into grass because she was not looking ahead. No crossing of the street was involved in this sitting (A. Gonzalez, personal communication, October 2011).

Mother's report:

We never attempted to teach our daughter how to ride

her bike due to the same reasons as scooter riding. We were concerned about her safety. We did not know how to instruct her once she threw a tantrum. Therefore, we never thought she would be able to ride her bike like her other siblings did. Since she learned how to ride it from her therapist, she bikes independently in the track at the park with us. She mostly listens to us, but likes to go down the ramp at the park. She doesn't seem to care that she could go very fast or pay attention to the traffic. Her biking skill is as good as our other daughter who is two years older than her. Therefore, her skill may be better than other kids around her age. Now her therapists are teaching her how to ride her bike without training wheels. She can ride it for 10-15 feet sometimes. My other daughter can't. She seems to enjoy it very much. We are happy with it (Kelly's mother, personal interview, October 2011).

Baseball.

Therapist's report:

Kelly played baseball with her father and three other siblings in the back yard. Her father pitched the ball to all of the children. Kelly would deviate from the taught skills when she would see other siblings

playing inappropriately. Therefore, the therapist needed to prompt her siblings to play appropriately. The therapist sometimes needed to assist Kelly from behind when batting. Kelly followed her father's instruction and did not engage in any protest behavior. She smiled and giggled throughout (A. Gonzalez, personal communication, October 2011).

Mother's report:

Like I talked about our daughter's behavior for other sport activities, she never listened to my husband and me, so we did not even think of teaching her how to play baseball. We knew she was physically capable of learning baseball, but behaviorally we had serious concerns that she might hit other children with the baseball bat or throw herself on the ground. She used to eat mud at the field at her church. Now she plays baseball with her siblings and dad in the backyard sometimes. She also played in the community league with typically developing children. She requires a lot of support when she plays baseball with her family members. If she doesn't get her way, she will scream, but she doesn't throw herself on the ground or hit her siblings. We don't feel unsafe any more and can handle her inappropriate behaviors. She

played appropriately in the league. However, she did her own things like she would run bases when it was not her turn, but I have to say other (typically developing) children were doing that too. She listened to the coach very well and often copied other children's behavior. Actually she had the best form in the league. She was the only one who knew how to hold the baseball bat appropriately. She could throw a ball strongly compared to other children in the league. We are happy with our daughter being able to participate in an activity in the community. We are thinking of enrolling her in the soccer practice soon (Kelly's mother, personal interview, October 2011).

Other things to report from mother:

We tend to think our daughter will not enjoy or be interested in anything before her therapists teach the new skill because of our daughter's history of behavior. However, she acquired how to play these sports appropriately and could even participate in the community league with typically developing children. She still screams at her siblings, but is interacting with them a lot more. Also, she seems to be paying attention to what's going on around her. We

are very happy with this ABA program (Kelly's mother, personal interview, October 2011).

Alfred

Biking.

Therapist's report:

Alfred rode a bike at the park for the first time in July 2011. He has ridden a bike at the park at least three times with his dad, mom, and his younger brother present. The therapist mostly directed Alfred and handled his behaviors. During one sitting, his mom gave him instruction, "Ready...go" and ran as he gave great effort to catch up with mom. He gave more effort to ride independently at park than around his apartments (K. Cabrera, personal communication, October 2011).

Father's report:

Let me tell you our background a little bit. I am a student in a PhD program in the United States, but we are from Indonesia. Back in 2007, it was my first year in a PhD program and my son was around 2 years old at that time. When we went back to Indonesia, we realized he had a problem. I decided to postpone my study for a year and our son began receiving therapy...speech and OT over there. He sometimes

played with bike...I mean, he would just be sitting on the seat. He moved his legs a little bit, but wouldn't try to pedal. We sent him to school there, but we didn't see a lot of progress. He had never had an exposure to any sports in his therapy or school. His therapist in Indonesia told us one of his weaknesses was sensory motor skill. At that time I believed everything they said so I thought that's why my son wouldn't pedal or try other sports. But now, I don't think that was the reason. Maybe he was not motivated. It has been 5 months since he began receiving the current ABA services. Compared to where he was at 5 months ago, he is doing very well. He still needs some assistance when he goes up the hill. But in the park, he can ride his bike very well. The other day, he saw other children on the bikes in the park and he became a bit more competitive...he tried to pass some of them. I was surprised to see it because he didn't seem to care about other children before. As far as his need for behavioral support goes, he follows my instruction if he really focuses on it...he turned 5 a couple of months ago so you know, if he wants to keep going, he just keeps going. He learned to stand up and pedal, but he still needs

some help when he goes up the hill. He easily gets unmotivated to go up. Compared to other children, I think he is still a bit behind because he is usually slows. But he made a lot of progress compared to where he was at 5 months ago. I will continue practicing it at the park every Sunday (Alfred's father, personal interview, October 2011).

Scooter riding.

Therapist's report:

Alfred rode a scooter at the park for the first time in August 2011. He has ridden a scooter at the park at least three times with his family. He pushed off and rode independently for the most part. He needed some prompting from the therapist to transition left foot on after pushing off two to three times and to stop. At that time, only the therapist directed him and handled his behaviors (K. Cabrera, personal communication, October 2011).

Father's report:

My son has never ridden a scooter before he started his ABA program. I didn't know how to ride it so I didn't try to teach him. In Indonesia, his therapist also told us that he had issues with his balance so I didn't think he would be able to ride it. Now his

scooter ride is awesome. He still has some problem with finding a brake because his brake is behind him so it takes a bit of time to find it. But he knows how to do it. He can control his speed even when he goes down the hill. Now he is not afraid of it at all. When I ask him to stop, he purposefully stops on the grass for fun. He follows my instructions more than when he rides his bike. I think he likes scooter better than bike. I think he demonstrates age-appropriate skill or more. Compared to other children around his age at the park, his balance is really good and well coordinated. When he goes down the hill, he really controls (Alfred's father, personal interview, October 2011).

Other things to report from father:

The director of ABA BEARS told us the importance of him learning how to play sports and other play skills because he can play with other children. I really agree. He is a totally different kid how compared to 5 months ago. It is a big difference. His therapists do not teach how to play sports, but also to put on his gear. It's really nice. His therapists are also teaching him basketball, football, and soccer. I do everything his therapists taught him. Before this

intervention, he didn't know how to catch a ball, but now he knows how to hold his football if we remind him, he can step forward and throw. He can't throw a long distance or throw straight yet. He is learning to bounce the basketball. The basketball is not a toy basketball. He is using a real, age-appropriate one. He is also learning to kick the soccer ball in the goal. I think these gains are contributing to other things. For example, he puts a lot of pressure on his grip when he draws. Also, it was very hard for him to hold an object very tight. He used to drop things easily. This may have something to do with his growth, but I think learning how to play sports appropriately is also related to these. We are very happy with his outcomes. He knows various things to do (Alfred's father, personal interview, October 2011).

Tyler

Biking.

Therapist's report:

Tyler rode his bike up and down the street and also around the block with his dad. His dad was riding skateboard or another bike. His dad would prompt Tyler verbally to change gears and he would listen

very well. Tyler would be smiling the entire time, and asking dad to catch him (like playing tag) (K. Villarreal, personal communication, October 2011).

Mother's report:

Our son was not able to ride his bike before he received the intervention program. His bike was sitting in the garage, then he grew up and my husband and I bought him a bigger one. But it stayed in the garage again. I never thought he would be able to ride his bike appropriately. To be honest, I always said to the therapist, "Good luck with that," every time they attempted to teach my son a new skill because we tried everything we could to teach him something before he received an ABA program, but we couldn't do it. He would not learn anything appropriately with us so we did not expect anything. My husband and I tried to teach him to ride his bike, but he would not get on the bike, threw a tantrum, or fell asleep. However, our son can ride a regular bike for five to six miles and a single-track mountain bike for two to three miles. He rides a single-track mountain bike with athletic adult males...his dad and his dad's friends! That's the skill level my son demonstrates now. They ride it at the local parks, in

the ski areas, and in the mountains. He does not require any support and listens to his father. Now he loves to be outside and he talks about it in a positive way. If we talk about things we do in the future, he shows interest, anticipates it in a positive way. This is something his dad and my son do together all the time. I think this is also a good social skill set. The next step would be for us to ride a bike at the beach. Before my son received an ABA intervention, all they (he and his dad) did was to play fighting. He was not interested in learning anything and pretend fight was their only engagement (Tyler's mother, personal interview, October 2011).

Skateboarding.

Therapist's report:

Tyler rode around the block with his dad going next to him on another skateboard or riding a bike. Tyler would sometimes try to race dad to the corner or would ask him to chase him. He would always be smiling and talking to dad (K. Villarreal, personal communication, October 2011).

Mother's report:

We provided our son with a skateboard, but he never did it. He also had a three-wheeled scooter. That's

the best he could do, he could not ride a razor. Whenever we tried to teach him something new or tell him to do something, he showed us a mad face and said, "I am not doing it" and lay down (his face was down) on the floor or protested on the floor. He would verbally threaten us by using sentences from his favorite cartoon, "If you tell me what to do, I will cut you in half....I will cut off your arms...I will beat you down." He didn't seem to care or like anything. He did not have any motivation to do anything. What he used to do was to stim with (excessively look at) his cards, watch toy story, or stay in the pillow house he made. Nothing was functional behavior. Therefore, like always, I said to his therapists, "Good luck with that" when they told me they would teach him how to skateboard. But now he can go up and down the ramps and spin the skateboard at the skateboarding park. He can also go down the steep hill in our neighborhood. At the park, he is around the boys around his age. We need to say to him, "Keep going" several times, or give him encouragement such as, "You can do it!" because he is sometimes scared of going down the ramp. With our minimum behavioral support, he ends up skateboarding

appropriately. I think his balance is great and his skill is definitely compatible to peers. At the park, his skill level was equivalent to other children there (Tyler's mother, personal interview, October 2011).

Baseball.

Therapist's report:

Tyler and his dad played catch for about 30 minutes to one hour. Participant 6 would sometimes complain about the weather being too hot, or that he was sweating and that he wanted to go inside. His dad would just ignore and continue to play. Eventually, participant 6 would stop complaining, start smiling, and engaged with his dad. He would say, "Hey, dad, get in ready position," "Great catch," or "Oh sorry, I missed it" (K. Villarreal, personal communication, October 2011).

Mother's report:

Prior to our son receiving an ABA program, my husband taught him batting, but he preferred to throw a ball. He liked to throw things at people's eyes. That's why I think his preference to throw a ball was related to this inappropriate behavior. As I mentioned earlier, we gave up on everything. We couldn't teach him

anything...we failed everything. Our son ended up learning how to play baseball appropriately with his therapists and he seemed to like to learn it, but again, I had to say, "Good luck with that" to his therapists when they started. I think he likes other things to do better than baseball, but my husband and he often play catch in front of our house. He says, "I don't want to do it" as he goes grab his glove. He knows how to do it, he is good at doing it, and he will do it. I know he plays baseball at his school. His aide reported the same thing. Initially he refuses to do it with his aide, but he will follow his teacher's instruction and he is good at it. He has got the skill, so the only behavioral issue is to get him started. He is very coordinated and very strong. He tracks the ball. I am not sure if he knows all the rules like the difference between the hit and foul...but he knows how to play baseball just like other children around his age do (Tyler's mother, personal interview, October 2011).

Other things to report from mother:

Now he enjoys surfing, skiing, and rock climbing. I think he got the balance for surfing and skiing from skateboarding. He surfs regularly. He knows how to

stand on the surfboard and is motivated to surf. He just needs some verbal encouragement from my husband and me. My husband and my daughter go skiing with him every weekend during wintertime. He can ski with or without poles. Rock climbing was not an official target in his intervention program, but behavior therapists took my husband and my son to the rock climbing gym every weekend for about six to seven months. He initially loved to climb on the objects, but it was not safe. The program supervisor explained to me that inappropriate behavior interfered with learning. He said once the behavior gets under control, learning would occur. I honestly had no idea what that meant, but now I know. My son was capable of doing a lot of things physically, but he had no motivation and confidence to do it right. He would not try anything with us. He seemed to be scared of many things. The behavioral aspect was huge and pivotal for him. He has learned how to manage his behavior through ABA and my husband and I learned how to manage his behavior as well. We feel confident to handle his behavior now. Before, we gave up on teaching him anything and just tried not to get him angry. We still see behavioral issues in him, but he

tells us, "Should I calm down, shouldn't I?...shouldn't I take deep breathing?" and he takes deep breathing independently (His therapist taught him the skill). It is exciting for us to engage in family time with him. Through watching my son's progress and parent training I received from ABA BEARS, I do not see things negatively any more, no more "Good luck with that." This ABA provider kept telling me not to put a limit on my son. Now I try not to think of the diagnosis of autism. Once I see him as a child with autism, the idea impedes all of us. I want my son to have a normal life... have a job and a partner and now I think he can do it (Tyler's mother, personal interview, October 2011).

Christopher

Rollerblading.

Therapist's report:

Christopher's dad reported that Christopher would go around the block very fast, his dad would have to run next to him the entire time. Dad mentioned that Christopher was smiling and giggling a lot (K. Villarreal, personal communication, October 2011).

Mother's report:

My son's previous ABA provider taught him how to

roll. My son was able to roll on the sidewalk a little, but he would hold on to us at incline and decline. He did not know how to use the brake. He was not able to put on his rollerblades by himself or put on his helmet and pads by himself. He could not walk from the front door to the sidewalk by himself. The previous ABA provider didn't focus on him to be independent. Now my son knows how to use brake appropriately and this is a big deal! He is very well coordinated, he can walk in his rollerblade, he can put on his rollerblade, and he can put on his helmet and pads. He can go faster when he wants to and he can slow down at both inclines and declines. I sometimes jog behind him. I am not sure if I can say he demonstrates age-appropriate skills, because some children are very good, but some children aren't around his age. You know what I mean? For example, my nephew who is 16 years old and my niece who is 17 years old cannot rollerblade. Well, I guess, my son is pretty good for his age. My husband or I often take him to rollerblade in our neighborhood. He has done that in his grandpa's neighborhood as well. He has never attempted to take off. I am very pleased

with his independence (Christopher's mother, personal interview, October 2011).

Skateboarding.

Therapist's report:

Christopher's dad reported that Christopher would go around the block and listened to his dad well. When his dad told him to stop, he would. He seemed to be aware of his environment. When he almost fell off the board, he looked a little scared because he went too fast and held onto his dad's arm. Before, he wouldn't care his speed much. Also, he would giggle or smile a lot when he was on the board (K. Villarreal, personal communication, October 2011).

Mother's report:

My son had a limited exposure to skateboarding. He has gotten on the board before, but nobody taught him how to skateboard appropriately. I didn't actually know if he would be able to skateboard because it is tough to do. I thought he would be able to get on it. I never like to put limitations on my son and hoped he would do it, but I wasn't sure how well he was going to be able to do this. After ABA BEARS taught him, he came along with this. He puts on his helmet and pads by himself. He even kicks one side of the

board to pop the other side up and pick up the board. He is very coordinated and I think he enjoys this more when it is not structured. I mean, he enjoys when his therapists do not tell him what to do...like "Go faster" or "Slow down." He goes around the block with my husband or me in our neighborhood. We have taken him to the park, too, but we were a bit concerned because there were too many people and some dogs and there was only one trail. I think he skateboards better in this neighborhood because he is familiar. He often smiles on the board. I think he requires some behavioral support like "Go right" or "Go left," but he listens to my husband and me. He has pretty good control with what he is doing. He doesn't fall down when he goes around the block. He can go down the driveway too. I would like him to go up and down the ramp in the future (Christopher's mother, personal interview, October 2011).

Baseball.

Therapist's report:

The therapist shadowed Christopher at the baseball practice in the community league. He would get bored when he was playing outfield and would start stimming (i.e., playing with grass) or would start to tense

up. He was easily redirected by the therapist for the most part. Whenever he would be up to bat, he would do well, needed some verbal reminders to hold the bat correctly, but would be able to hit the ball from a pitch while most of other kids would be pitching of off a T. Overall he did well (K. Villarreal, personal communication, October 2011).

Mother's report:

My son had never played baseball prior to the current ABA program. I thought he could play baseball. I never doubted his capability. His eye-hand coordination was very good. He has done exceptionally well. He is playing in the league for kids with special needs and most of the kids don't have autism. He requires some assistance when he practices. He sometimes cries at the beginning of the game. When he is in the field, he requires many promptings, but when he bats and throws a ball, he does not require any promptings. I think he gets bored in the field and gets angry. He plays much better than most of the older kids in the league. He requires assistance when he needs to follow the rules...like when he needs to run from the second base to the third base, but he doesn't need any assistance for catching, throwing,

and batting. ABA BEARS taught him the correct form and skills. I think learning rules requires a different skill. His coach told me that my son was extremely coordinated so he wanted him to put in the group for older kids (12-18 years old). That is great and we were very happy. This is still the first year! He is practicing with older kids in the league, but he is much better than them. I believe that he would be able to play in the league with typical kids. I think my son has ability to learn the rules, but it may take a while. We are pleased with the foundation ABA BEARS laid with the skill set for baseball. He has come a long way to learn how to swing, throw, and catch. He is not just throwing the ball, he is stepping forward and throwing the ball appropriately. But I think he needs to continue attending the games to learn the rules and it would naturally occur (Christopher's mother, personal interview, October 2011).

Basketball.

Therapist's report:

Christopher's parents reported that he played basketball very well with them. His dad, mom, and he played it for about an hour. He kept making hoops 8

out of 10 times and sometimes he would make negative vocalizations (e.g., whining) when he would miss the shot. His dad mentioned that they still needed to prompt Christopher to steal the ball from them, but overall he shot, passed, and dribble the ball very well (K. Villarreal, personal communication, October 2011).

Mother's report:

My son played basketball on a little basketball hoop before he received the current intervention program. His skill level was nothing like what he does now. He didn't demonstrate the actual skill to hold the ball appropriately and shoot. He definitely exceeded my expectation! Now he can shoot, he can dribble, he's never played in the structured setting yet, but he seems to enjoy this the most. He, my husband, and I play basketball all the time. This became a recreational thing for our family. He would want to play this. He requires minimum assistance. For example, he becomes interested in something else like a lawn equipment or blower during playing basketball. So we have to tell him to pay attention or play game. Then he will come back. But I know he enjoys it. I think his skill is close to age-appropriate. He is

getting to the point where he steals the ball from us and alternates his hands to dribble. He would bounce the ball much more independently. When we had some guests and they were in the backyard. He would want to play basketball with them...he held the ball, looked at them, and kind of waited for them to join him...you know what I mean? We are using a 10-feet standard goal, he does a jump shot, makes many goals, and smiles after he makes goals! That's what I mean he exceeded my expectation (Christopher's mother, personal interview, October 2011).

Other things to report from mother:

My son's therapists have been teaching him how to play soccer as well. Now he has more clear understanding to kick to other people, dribble the ball, and kick it in the goal. He is physically well coordinated. He plays in the community league for kids with special needs, but his skill is nowhere near age-appropriate. When we play, he even steals the ball, but in the league, he doesn't. He doesn't' know the rules and I think he has a fear in the crowd...with other kids around his age. He is able to pass the ball to others very well during the practice, but in the game, it's not his independent

decision. I want him to get more skills and am going to enroll him in the league next week, but he is not competitive. He definitely gained a lot of skills, but I don't think he likes it very much. I don't think he has a concept of winning and losing...it may help him understand the concept of the game more (Christopher's mother, personal interview, October 2011).

Findings from the Generalization Sessions

The parents reported that their children either never had exposure to these sports or, if they did, the parents were unable to teach their children how to engage in the activities appropriately before their children received the current intervention program. A few of the parents believed in their children's physical ability to perform the sports; however, not all of them necessarily exhibited high expectations because of their children's problematic behaviors. After treatment, though the numbers of generalization sessions varied, all of the participants reached the acquisition criterion for some sport skills as presented in the results of the general training sessions (see Table 1). Evidence of substantial generalization was also apparent. The parents of Andy, Sean, and Christopher

reported that their children had played at least one sport activity in the community league. They reported that the behavioral support their children required from them was minimum and their children listened to their coach. The parents of James, Alfred, and Tyler reported that their children engaged in their acquired sport activities with their family members and/or the family's friend during their community outings or with peers at school. They also reported that they felt their children listened to them and the behavioral support that their children required was minimal.

All of the parents described frequent negative behaviors prior to the current intervention. They also reported that their children's low attention or less successful performance might be related to their children's preference. For example, Andy's mother commented that her son's batting and catching abilities were superior, but he exhibited lower attention during the game. However, no parents reported that their children engaged in high-intensity protest behaviors, self-stimulatory behaviors, and/or physical prompts during the generalization activities. The type of behavioral support that the parents provided in the later stages of general training and in the generalization sessions

consisted of simple verbal prompts such as "Slow down/Go faster," "Pay attention, " "You can do it," or "Stop,". and they served the same functions of encouragement and reminding that similar prompts with typical children often serve. Many of the parents reported their children's positive behaviors such as smiling and giggling during the activities. The parents of James, Andy, Tyler, and Christopher also indicated that their children requested or initiated the activity. Other common reports from the parents are that all of them were satisfied with not only their children's progress in sport skills but also their child's overall behavior and that this progress contributed to increased high-quality family time. For example, James' mother mentioned that it was extremely difficult for the family to engage in any activities with him before training, but now her son enjoys community outings and even selects a picture of the theme park that he wants to visit. In conclusion, the evidence indicated that James, Andy, Kelly, Alfred, Tyler, and Christopher successfully performed their acquired sport skills across people (i.e., the coach in the community league, parents, siblings, and peers) and locations (e.g., the field for the community league, parks, beach, and school).

In summary, six out of seven children demonstrated success with performing their acquired sport skills in the community setting. Most of the parents reported a high level of satisfaction with the level of sport skills their children had acquired, and with how much impact it had on improving their quality of life after their children received the current intervention program.

Factors Affecting the Intervention Outcomes

In addition to the factors that might have affected the results of general training sessions, the generalization phase may be affected by numerous factors. In this section, factors that might have helped the children to acquire the sport skills and successfully generalize their acquired skills as well as factors that might have hindered the children's progress are identified. These factors are presented in Table 3 and some of the general factors are briefly defined below:

Parental involvement. Parents view the acquisition of sport skills as important to their child's development. And they believe their child will be capable of learning the skills and will enjoy the activities.

Level of functioning. High functioning would involve independent living skills, social skills, and age-appropriate academic skills.

Negative ABA experience. The child previously received an ABA-based program; however, parents did not feel that the program maximized their child's gains

Negative school experience. The child was expelled from school or parents did not feel that the school placement was appropriate for their child

Negative parent attitude toward therapist. Parents do not interact with the therapist positively (e.g., in an unfriendly/aggressive manner, lack of communication)

Therapist skill. High skill involves adapting one's teaching style to the need of the child at any given time.

Child preference. The child shows evidence of liking or preferring a particular skill. Alternatively, a child may indicate a lack of interest in a particular skill.

Table 3. The Factors that Might have Affected the Results

Participants (age)	Positive Factors that might have affected the results	Negative Factors that might have hindered progress
James (8)	hours of therapy parent training parental involvement physical ability preference therapist skill weekly team meeting	age aggression level of functioning negative ABA experience negative school experience protest SIB self-stimulatory behavior
Andy (7)	level of functioning hours of therapy parent training parental involvement physical ability preference therapist skill verbal weekly team meeting	age aggression elopement negative school experience non-compliance protest self-stimulatory behavior
Sean (9)	parent training physical ability preference therapist skill weekly team meeting	age aggression cultural value elopement level of functioning lack of parental involvement loss of mother low attention negative ABA experience negative school experience not toilet trained parents' attitude toward therapist parent's negativity protest self-stimulatory behavior

Participants (age)	Positive Factors that might have affected the results	Negative Factors that might have hindered progress
Kelly (4)	age level of functioning having four other siblings hours of therapy parent training parental involvement physical ability preference therapist skill weekly team meeting	cultural value elopement having four other siblings limited communication skill limited language skill non-compliance parent's negativity protest self-stimulatory behavior
Alfredo (4)	age low level of disruptive behavior parent training parental involvement physical ability preference therapist skill weekly team meeting	limited communication skill limited language skill not toilet trained
Tyler (8)	level of functioning parent training parental involvement physical ability preference therapist skill	age low attention regulation negative ABA experience negative school experience non-compliance non-responsiveness parent's negativity self-stimulatory behavior

Participants (age)	Positive Factors that might have affected the results	Negative Factors that might have hindered progress
Christopher (7)	being an only child cultural value hours of therapy parent training parental involvement physical ability preference therapist skill	age aggression being an only child elopement level of functioning lack of coping skill limited communication skill limited language skill negative ABA experience non-compliance not toilet trained parents' attitude toward therapist protest self-stimulatory behavior SIB

There are common factors for each category for the children who successfully generalized their acquired sport skills in the community settings. The common positive factors for James, Andy, Kelly, Alfred, Tyler, and Christopher include the following six factors: parental training, parental involvement, physical ability, preference, therapist skill, and weekly meeting. It is important to notice that five out of these six factors were also present for Sean. However, lack of parental involvement seemed to contribute to the fact that he was the only participant who did not reach mastery criterion

for generalization. This analysis suggests that the five common factors may contribute to children mastering the skills; however, parental involvement may be the most influential factor for children to generalize the skills successfully. Meanwhile, for James, Andy, Sean, and Christopher, a high level of disruptive behavior such as protest, aggression, elopement, and non-compliance seems to have a negative impact in learning and it seems related to their age with one exception, Tyler. In addition, each child has their own unique set of positive and negative factors.

James

In addition to the common positive factors that were discussed above, James received an average of 40 hours of intervention per week. He received the most hours of any participating children in ABA BEARS. This number of hours may have been necessary in order to improve problematic behaviors that were reinforced in negative ABA and school experiences. James frequently engaged in high intensity aggression toward the therapist (e.g., hitting, biting, scratching, pinching, and pushing) and toward himself (e.g., head banging, running into walls, picking his face) as well as protest (e.g., crying, screaming) and self-stimulatory behaviors (e.g., flapping hands, pushing

his index finger by his eyes, and jumping)(ABA BEARS, 2010a). His age, level of functioning, and high level of disruptive behavior might have hindered him in making progress in the program.

Andy

Andy was seven years old and had negative school experiences. Although he demonstrated limited communication and language skills at the onset of the current intervention, his level of functioning and hours of therapy (i.e., approximately 30 hours per week) might have helped him develop these skills. In particular, these positive factors helped him in comprehending rules and the concept of organized activities (i.e., roller hockey, soccer, and baseball). He often engaged in self-stimulatory behavior (e.g., scripting from the movies/TV, flapping hands), protest (e.g., crying, screaming), aggression (e.g., hitting, kicking), and non-compliant behavior (ABA BEARS, 2008a). Even though he engaged in high intensity disruptive behaviors, all of the positive factors might have contributed to help him play in the community league with typically developing children. In addition, his high level of skills allowed him to extend his ability to sports that were not targeted

(i.e., roller hockey and ice hockey) during generalization sessions.

Sean

Sean was nine years old, not toilet trained, and did not exhibit many skills after he received an ABA-based intervention from two other providers for six years. He was expelled from school due to his high level of disruptive behaviors. As noted previously, Sean's mother passed away during this study. Only his mother was involved in his program until she was hospitalized. His father expressed that he had been having a difficult time taking over the responsibilities. In addition, the current situation might have affected the father's attitude and/or valuing of the child's schooling. He often expressed concerns regarding the school system and its quality of academic instruction. Sean's self-stimulatory behavior consisted of flapping his fingers in front of his eyes, vocalizations, spinning and flapping objects, and mouthing objects (C. Nuno, personal communication, November 2011). He often engaged in non-compliant and elopement behaviors when demand was placed (C. Nuno, personal communication, November 2011). Sean's therapists and supervisor have expressed that it was challenging to work with his father. Sean demonstrated the highest number of negative factors

and this may explain why he was not able to generalize his acquired skills.

Kelly

Kelly began receiving approximately 30 hours of intervention per week at a younger age than the other participants. She was not toilet-trained; however, it did not seem to have a negative impact on her progress. She is the youngest of the five siblings. Therefore, she had numerous opportunities to interact with her siblings, but at the same time, her inappropriate behavior tended to be reinforced by other siblings (e.g., her siblings may reinforce her poor quality of performance compared to the therapist's standard). Her limited communication and language skills seemed to delay the pace of acquiring the new skills because the therapists were not able to verbally explain the procedures. In addition, her mother often mentioned, "I don't think she will like it" or "She doesn't like anything" every time the therapist attempted to introduce a new skill. Although she demonstrated a total of nine negative factors, she successfully generalized the skills. She was the youngest of the five siblings; therefore, she had opportunities to play with her siblings. The presence of four siblings and her young

age at the onset of the interventions might be key positive factors for this child.

Alfredo

It should be noted that Alfredo received the current intervention for 15 hours per week and his data was used for this study in his sixth month while the rest of the participants received intervention for more than one year. However, he was successful with generalizing his scooter riding. The strongest contributors to the results for Alfredo might be his young age and not exhibiting a high level of disruptive behavior.

Tyler

Tyler only received on average of two sessions per week of the current intervention. However, he required the lowest number of generalization training sessions to acquire the sport skills. He demonstrated the same types of disruptive behaviors; however, the level of intensity was lower than other participants (K. Villarreal, personal communication, November 2011). Tyler's father was highly involved with his outside activities. With his parents' involvement and his own interest, he enjoyed not only the sports he learned (i.e., regular biking, skateboarding, baseball), but also other activities such as mountain biking, skiing, rock climbing, and surfing.

Christopher

Christopher demonstrated the same number of negative factors as Sean and each factor was similar to Sean's. However, the factors that might have led to different results for these children were cultural value and parental involvement. Christopher's parents exhibited a high level of interest in, and personal valuing of, his sport skills. For Christopher, being an only child seemed to have a positive impact on his progress. His parents worked full time and often mentioned that it would have been extremely difficult for them to be involved in his program if they had had more children. At the same time, it made it difficult for Christopher to interact with other children because of his limited communication skill and other disruptive behaviors. Christopher's therapists and supervisor have expressed that it was often challenging to interact with his parents.

CHAPTER FOUR

DISCUSSION

The ultimate goal of this study was to investigate whether children with ASD would generalize the acquired sport skills to community activities. Many of the previous studies have failed to demonstrate successful engagement in acquired skills within community settings. However, this study showed that the current intervention is successful not only in teaching sport skills to children with ASD, but also in having them demonstrate skill mastery within organized, community sports activities. Based on the collected data and analysis, there are several findings that should be discussed.

These findings support previous studies regarding the importance of replacing socially inappropriate behavior with more socially appropriate behaviors. The literature review pointed out how numerous findings indicate that self-stimulatory behaviors may prevent individuals with ASD from responding appropriately and interfere with learning (Cunningham & Shreibman, 2008; Levinson & Reid, 1993; Lovaas, Newson, & Hickman, 1987; Turner, 1999). In addition, excessive self-stimulatory behaviors and other problematic behaviors can cause a greater amount of

parental strain and stress (Lecavalier, Leone, & Wiltz, 2006; Lyons, Leon, Roecker Phelps, & Dunleavy, 2009). In the literature review for this study, the effectiveness of several behavior techniques and physical activities in decreasing problematic behaviors were discussed. However, a focus on sports skills seemed particularly promising in reducing socially inappropriate behaviors because acquisition of these skills supports long-term intervention goals such as generalization to non-therapeutic environments and improvement of family interactions. In this study, all of the parents reported that they had previously experienced tremendous difficulties handling their children's problematic behaviors. For example, James and Kelly's mothers said their children engaged in non-compliant behavior, aggressive behavior (e.g., hitting and throwing self on the floor) towards himself and others, and protest behaviors (i.e., screaming, crying). Sean's father mentioned that his son engaged in property destruction. Tyler's mother also mentioned that her son engaged in high intensity self-stimulatory behavior (i.e., excessively looking at the cards) the majority of the time. This study did not focus on investigating the reduction of self-stimulatory behavior; however, it is important to

note that the therapists often recorded that the child's self-stimulatory behaviors negatively impacted their quality of performance during general training sessions and frequency with which therapists and parents mentioned such behaviors decreased over the training and generalization period. In addition, the majority of parents commented on how happy they were to see the children's outcomes not only with sports but also with respect to their overall behavior and they specifically stated that these changes improved the quality of family time together.

These findings support previous studies that investigated the effectiveness of behavior intervention involving the ABA method with children with ASD (Grindle, Kovshoff, Hastings, & Remington, 2009; Lovaas, 1987; Wong, Kasari, Freeman, & Paparella, 2007). However, it is important to notice that five out of seven children in this study had experienced an ABA intervention from other ABA providers prior to receiving the current intervention from ABA BEARS. These participants' parents stated that the previous intervention was not effective for their children. Therefore, the results of the current study also showed that not every ABA program is effective in providing the same quality of results. The difference

between the participants' previous ABA providers and ABA BEARS may indicate the potential of the programming to achieve long-term benefits for these children. This is an extremely important issue to explore further. For example, all of the children in the current intervention were taught how to retrieve their gear (e.g., helmet and pads for knees and elbows) and put them on appropriately and were required to retrieve the materials for the sport (e.g., baseball bat, balls, skateboard). Christopher's mother expressed how happy she was to observe her son getting his rollerblades, put them on, and putting his safety gear on independently. She also mentioned that her son's previous ABA provider did not teach him these skills at all. In summary, this study indicates that not every ABA program is effective in teaching children with ASD and it is extremely important for children with ASD and their families to receive high quality services.

Finally, there are other important points to note. The first point is that the sport programs at ABA BEARS are designed to continue teaching children the new skills. Therefore, even though children demonstrate enough skills to play sports, most of the sports programs are not discontinued during their treatment hours. For example, even though the child is able to ride a skateboard in the

neighborhood, the therapists may continue teaching the child how to do tricks on the ramp depending on the family's expectation and the child's preference. Also, the acquired activity may be used to reward the child when he or she engages in appropriate behavior during the treatment hours. The second point concerns the age at which training was initiated. Extensive research discussed in the literature review for this study shows that it is extremely important for autistic children to receive quality intervention programs when they are at a younger age (i.e., two to five years old). In this study, only Kelly and Alfred were in this age range. The data showed that older children tended to engage in non-compliant behavior, protest behavior, aggressive behavior, or low attention with longer duration and/or higher intensity. The data for basketball show that James (eight years old) required 53 general training sessions to acquire the skill and Christopher (seven years old) required 84 sessions while Sean (nine years old) required 156 sessions. The data for biking show that James required 53 sessions to acquire the skill while Sean required 82 sessions. In addition, Sean's father reported some positive changes in his son's behavior; however, he indicated that he is still not comfortable with instructing his son alone in

community. Therefore, these phenomena may support the argument that it becomes significantly difficult for the therapists and parents to manage more severe behavior as the age at initial intervention increases and it is very important for these children to receive quality intervention at a younger age as research suggests. However, the current study also shows that quality intervention can achieve success even with delayed intervention.

Based on the common positive factors discussed (see Table 3), there are three tentative conclusions we can draw with regard to provide children with ASD with a successful intervention. The first conclusion is that the quality of the intervention program, including level of therapists' skill and the intensity of parent training is is an important determinant of outcomes. ABA BEARS provides all of the therapists with a high intensity of training. The Regional Director provides a new therapist with in-office training: practical training and theoretical training. Approximately 40 hours of in-office training are provided. In this controlled setting, therapists practice the skills they will need to effectively run sessions. This controlled training helps therapists to support children's learning in the field by

providing a structured environment. In the field trainings, a new therapist overlaps with a senior level therapist to directly work with the child. The overlapped sessions are implemented until the new therapist is able to independently run therapy sessions. At ABA BEARS, each child has a team to work on the skills and each team consists of a program supervisor, at least one senior level therapist, and generally two to three behavior therapists. All of the team members, the child, and the child's parents are required to attend a weekly or biweekly team meeting. Parents are considered vital for the team and they provide suggestions and feedback. In addition, all of the parents are provided with parent training on a regular basis by the program supervisor. The main purpose of the team meeting is to focus on maintaining treatment reliability by ensuring consistency across therapists. The purpose of the parent training is to transfer instructional control to the parents. There are two forms of parent training that typically occur. The first is from the senior level therapist who provides the caregivers with hands-on training during general training sessions. This was reported in the therapists' report. The second is from the program supervisor who provides them with support and motivation while addressing deficits in

follow through and strategies to use during non-therapeutic hours. As the parents of James, Alfred, and Tyler stated, this type of support from the supervisor has a significant impact on parents' motivation and attitude. These elements of the services provided may contribute to the high quality of an ABA intervention. In addition, parent training plays a significant role in quality intervention. Each of these components may play a significant role in producing positive results for children with ASD.

The second conclusion is that the family's level of expectation/involvement is important. Some families may not value their children learning sports. For example, Sean acquired basketball, biking, and skateboarding during the data collection period. However, Sean's therapist reported that his parents rarely participated in general training sessions. Although Sean acquired the skills to bike and skateboard in his neighborhood with his therapists, he had not reached the generalization phase where he engages in biking with his family members yet. Sean's mother passed away during this study and this death in the family seemed to have a significant impact on Sean's progress in generalizing the sports skills with his family members.

The third conclusion is that children's preferences may be key to outcomes. Each child typically has a preference for specific sports over others. Some parents indicated whether they felt their children enjoyed the learned sports or not. For example, Andy's mother mentioned that her son did not seem to like to play baseball and rollerblade. She also mentioned that even though her son did not like rollerblading, it helped him learn to play roller hockey, which he truly enjoys, and it would also help him play ice hockey, which he had been interested in. His ability to see the relevance of rollerblading to roller hockey helped with his motivation for rollerblading and may even have increased his enjoyment of this activity, both of which appear to have led to significant success with it despite initial lack of interest. Also, Tyler's mother indicated that her son seemed to enjoy more individual activities (i.e., biking, skateboarding) compared to an organized activity (i.e., baseball) even though he was capable of learning both types of activities. Therefore, Tyler developed more interest in other individual activities such as skiing, mountain biking, rock climbing, and surfing. These results are consistent with the number of general training sessions to acquisition for Andy and Tyler as described

earlier. Skills in areas of less initial interest required a greater number of sessions to reach criterion. Therefore, it is important to provide children with opportunities to learn a variety of sports so that they can explore their interests. Once the child exhibits a preference for a specific sport, then parents should encourage them to take it to the next level.

There are limitations to the current intervention program. The majority of training sessions were generally provided by one or two therapists. Therefore, it was not possible to simulate organized sports such as baseball or soccer in their backyard and it appeared to affect the quality of performance for some children who did not demonstrate high levels of communication/language skills. According to the parental reports, Andy initially needed verbal reminders to understand the concept and the rules of the game, and Christopher did not understand them completely. Future research needs to seek an effective way to teach the concept and the rules of the games for non-verbal children.

In conclusion, the results of the current study indicate that the ABA BEARS intervention successfully demonstrated 1) evidence of experimental change across treatments for all children participating in the study,

and 2) evidence of generalization for the majority of children in the study. These data show that the ABA method and the quality intervention programs at ABA BEARS are effective for teaching lifetime sport skills to children with ASD. It appears to be clear that requiring a high standard of performance including independence, team support for parents, and parental involvement are the essential elements for intervention success. In addition, the progress of children in acquiring sports skills appears to contribute to their well-being and overall QOL by improving family interactions.

APPENDIX

INSTITUTIONAL REVIEW BOARD APPROVAL

CALIFORNIA STATE UNIVERSITY
SAN BERNARDINO

Academic Affairs
Office of Academic Research • Institutional Review Board

September 23, 2011

CSUSB INSTITUTIONAL REVIEW BOARD
Full Board Review
IRB# 11010
Status
APPROVED

Ms. Junko Uehara Moran
c/o: Prof. Robert Ricco
Department of Psychology
California State University
5500 University Parkway
San Bernardino, California 92407

Dear Ms. Moran:

Your application to use human subjects, titled "An ABA-based Intervention to Teach Age-Appropriate Sport Skills to Children Diagnosed with Autism Spectrum Disorder" has been reviewed and approved by the Institutional Review Board (IRB). The attached informed consent document has been stamped and signed by the IRB chairperson. All subsequent copies used must be this officially approved version. A change in your informed consent (no matter how minor the change) requires resubmission of your protocol as amended. **Your application is approved for one year from September 23, 2011 through September 22, 2012. One month prior to the approval end date you need to file for a renewal if you have not completed your research. See additional requirements (Items 1 – 4) of your approval below.**

Your responsibilities as the researcher/investigator reporting to the IRB Committee include the following 4 requirements as mandated by the Code of Federal Regulations 45 CFR 46 listed below. Please note that the protocol change form and renewal form are located on the IRB website under the forms menu. Failure to notify the IRB of the above may result in disciplinary action. You are required to keep copies of the informed consent forms and data for at least three years.

1) Submit a protocol change form if any changes (no matter how minor) are made in your research prospectus/protocol for review and approval of the IRB before implemented in your research.
2) If any unanticipated/adverse events are experienced by subjects during your research,
3) To renew your protocol one month prior to the protocols end date;
4) When your project has ended by emailing the IRB Coordinator/Compliance Analyst.

The CSUSB IRB has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval notice does not replace any departmental or additional approvals which may be required.

If you have any questions regarding the IRB decision, please contact Michael Gillespie, IRB Compliance Coordinator. Mr. Michael Gillespie can be reached by phone at (909) 537-7588, by fax at (909) 537-7028, or by email at mgillesp@csusb.edu. Please include your application approval identification number (listed at the top) in all correspondence.

Best of luck with your research.

Sincerely,

Sharon L Ward, Ph.D.

Sharon Ward, Ph.D., Chair
Institutional Review Board

SW/mg

cc: Prof. Robert Ricco, Department of Psychology

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