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# Using contingency contracting to improve social interactions between students with ASD and their peers

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*University of Iowa*

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USING CONTINGENCY CONTRACTING TO IMPROVE SOCIAL INTERACTIONS  
BETWEEN STUDENTS WITH ASD AND THEIR PEERS

by

ABDULLAH ABDULMOHSEN ALWAHBI

A thesis submitted in partial fulfillment  
of the requirements for the Doctor of Philosophy  
degree in Teaching and Learning (Special Education) in the  
Graduate College of  
The University of Iowa

December 2017

Thesis Supervisor: Associate Professor Youjia Hua

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Graduate College  
The University of Iowa  
Iowa City, Iowa

CERTIFICATE OF APPROVAL

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PH.D. THESIS

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This is to certify that the PhD. thesis of

Abdullah Abdulmohsen Alwahbi

has been approved by the Examining Committee for  
the thesis requirement for the Doctor of Philosophy degree  
in Teaching and Learning (Special Education) at the December 2017 graduation.

Thesis Committee:

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Youjia Hua, Thesis Supervisor

---

Suzanne Woods-Groves

---

Allison Bruhn

---

Shawn Datchuk

---

Catherine Welch

To those who guided me through this work.

To get what you love, you must first be patient with what you hate.

Abu Hamid Al Ghazali

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## **ABSTRACT**

An ABC multiple-baseline design across participants was applied in this study to evaluate the effect of peer training implemented without prompting and reinforcement and the effect of combining contingency contracting with peer training on promoting social interactions among students with ASD and their peers. Three students with ASD and six typically developing peers enrolled in an inclusive elementary school participated in the study. Ten-minute observations were conducted during recess time to collect data on the participants' social interactions. The data obtained showed that peer training alone did not result in improvement in social interactions. However, upon the introduction of contingency contracting, which facilitated the use of prompting and reinforcement, the participants engaged in a significantly higher number of social interactions. The findings about the effect of peer training and contingency contracting were consistent across the participants. The study results suggest several implications for practice and directions for future research.

## **PUBLIC ABSTRACT**

Students with autism spectrum disorder (ASD) have severe impairment in social skills, which affects all areas of development. Researchers have indicated peer-mediated intervention (PMI) may improve social skills of children with ASD. PMI involves training carefully selected nondisabled peers to teach academic or social skills to students with disabilities using strategies such as modeling, prompting, and reinforcement in an inclusive education setting. However, a review of the literature suggests that PMI in and of itself may be beneficial, but not sufficient, to enhance social interaction among students with ASD and their peers. The literature suggests that incorporating components that encourage student interaction in the PMI procedures may enhance its effectiveness.

The purpose of this study was to compare the effects of peer training and peer training with contingency contracting on the frequency of social interactions between children with ASD and their nondisabled peers. I chose contingency contracting in the study because it involves the use of systematic prompting and reinforcement to increase student interaction. Three students with ASD and six typically developing peers enrolled in an inclusive elementary school in Saudi Arabia participated in the study. I conducted the study using a multiple-baseline design across participants. The results showed that peer training alone did not improve or maintain the social interactions between the participants. When the intervention included contingency contracting, the frequency of social interactions significantly increased.

## TABLE OF CONTENTS

LIST OF TABLES.....	xi
LIST OF FIGURES.....	xii
CHAPTER ONE: INTRODUCTION.....	1
CHAPTER TWO: LITERATURE REVIEW.....	9
Socialization Characteristics of Individuals with ASD.....	9
Acquisition and Performance of Social Behaviors.....	12
The Need for Interventions to Teach Social Skills to Students with ASD.....	14
Considerations for Planning and Implementing Successful Social Skills Interventions.....	16
A Framework for Effective Social Skills Interventions.....	22
A Combined Social Skills Intervention for Students with ASD.....	24
PMI for Students with ASD.....	24
Contingency Contracting.....	29
CHAPTER THREE: METHODOLOGY.....	42
Participants and Setting.....	42
Participants.....	42
Students with ASD.....	42
Peers.....	43
Setting.....	43
Materials.....	44
Experimental Design.....	44
Dependent Measures.....	48
Definition of peer initiations.....	48
Definition of appropriate social responses.....	49
Reliability.....	51

Experimental Conditions.....	52
Baseline.....	52
Peer training alone.....	53
Peer training and contingency contracting.....	53
Intervention Fidelity.....	55
CHAPTER FOUR: RESULTS.....	56
Peers' Social Initiations.....	56
Fahad's peers.....	57
Saud's peers.....	57
Sattam's peers.....	59
Conclusion.....	59
Students' with ASD Social Responses.....	60
Fahad.....	60
Saud.....	60
Sattam.....	61
Conclusion.....	63
Percentages of Correct Social Responses from Students with ASD.....	63
CHAPTER FIVE: DISCUSSION.....	66
Research Focus, Purpose, and Results.....	66
Limitations.....	69
Practical Implications.....	71
Directions for Future Research.....	73
REFERENCES.....	75
APPENDIX A: Frequency Recording Sheet.....	87
APPENDIX B: Contingency Contract for Students with ASD.....	88
APPENDIX C: Contingency Contract for Peers.....	89
APPENDIX D: Training Session for Peers Checklist.....	90

APPENDIX E: Contingency Contracting Checklist.....91

APPENDIX F: Contract Review and Renegotiation Checklist.....92

## LIST OF TABLES

Table 1: Studies about the Use of Contingency Contracting with Students without Disabilities.....	31
Table 2: Studies about the Use of Contingency Contracting with Students with Disabilities...	37
Table 3: Reliability of Data on the Social Responses from the Students with ASD .....	51
Table 4: Reliability of Data on the Social Initiations from the Peers .....	52
Table 5: Numbers of the Students' with ASD Correct Responses .....	64
Table 6: Percentages of the Students' with ASD Correct Responses.....	64

## LIST OF FIGURES

Figure 1. Interaction of sequential effects (solid arrows) and non-sequential effects (dashed arrows) in social interaction.....	23
Figure 2. An example of the ABC multiple-baseline design.....	45
Figure 3. Frequency of social behaviors initiated by the peers across the three phases.....	58
Figure 4. Frequency of social responses to the peers' initiations across the three phases.....	62

## CHAPTER ONE: INTRODUCTION

In response to years of advocacy against the exclusion of students with disabilities from the public school system, Congress passed Public Law No. 94-142 (i.e., The Education for All Handicapped Children Act) in 1975 (Hulett, 2009). According to Hulett (2009), the Act, renamed the Individuals with Disabilities Education Act (IDEA) in 1990, placed great emphasis on providing a free and appropriate public education (FAPE) in the least restrictive environment (LRE) for all students with disabilities. Since its passage, the Act has elicited arguments for and against placing students with disabilities in the different settings within the LRE such as general education classrooms, full-time special education classrooms, and special schools (Crockett & Kauffman, 1999; Yell, 2006).

Empirical research on inclusive education has had a significant role in supporting or contradicting the arguments regarding the setting and placement of students with disabilities during schooling (Crockett & Kauffman, 1999; Fuchs & Fuchs, 1994; Lindsay, 2007). A considerable body of this research has focused on the effects of educating students with disabilities in inclusive settings on social competence and development. A fair amount of the research revealed that students with disabilities attending inclusive schools are more able to observe and learn social behaviors from typical peers. As a result, they are more likely to learn social skills needed to form lasting friendships and relationships with peers than students in segregated settings (Rafferty, Piscitelli, & Boettcher, 2004; Wiener & Tardif, 2004).

Despite these findings regarding the possible positive effects of inclusive education on social skills of students with disabilities, students with autism spectrum disorders (ASD) may need specially designed interventions in order to benefit from inclusive education because they are more likely to have profound deficits in social and cognitive development (Camargo et al.,



2014). In fact, according to the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5; American Psychiatric Association [APA], 2013), individuals with ASD have persistent impairments in social communication and interaction. These impairments include difficulty in sharing social experiences with other people, establishing and maintaining relationships with peers, exhibiting social behaviors appropriate to different social contexts, and displaying verbal and nonverbal behaviors necessary to regulate social interactions (APA, 2013).

In addition to the social deficits, individuals with ASD exhibit stereotypic and habitual behaviors, interests, and activities that may restrict their ability to engage in various social situations (APA, 2013). They also have limited cognitive abilities important for understanding and predicting the mental states and the actions of other people, which restricts their ability to empathize with people (Aspy, 2012; Baron-Cohen, Leslie, & Frith, 1985). Moreover, many individuals with ASD are unable to form a complete picture of a complex social event or situation and struggle to generalize newly acquired skills to new contexts (Aspy, 2012; Happé & Frith, 2006; Reynhout & Carter, 2011). Furthermore, some children with ASD tend to pay attention to less relevant stimuli rather than recognizing the most important cues that distinguish a social event, such as paying attention to a toy in a group play activity but not to verbalizations from peers (Lovaas & Schreibman, 1971; Ploog, 2010).

As defining characteristics of ASD, the deficits in social communication and social interaction are perhaps the most interfering characteristics that hamper development in different domains of functioning (APA, 2013). Indeed, if they remain untreated, these deficits contribute to poor academic achievement and limit the ability of many individuals with ASD to lead independent and fulfilling lives when they reach adulthood (Howlin, Goode, Hutton, & Rutter, 2004; Welsh, Parke, Widaman, & O'Neil, 2001). These social impairments can also increase the

likelihood for social withdrawal, anxiety, depression, obsessional disorders, tempers, suicidal thoughts, maladaptive behavior, and aggression (Bellini, 2006b; Charlop & Erickson, 2013; Green, Gilchrist, Burton, & Cox, 2000).

The impairments in social functioning and their consequences underline the need for providing effective social skills interventions to students with ASD (Camargo et al., 2014; Mesibov & Shea, 1996). Components of successful social skills interventions include the use of strategies that (a) promote not only the acquisition and performance of social skills but also the generalization of the skills across different contexts (Billini, 2011), (b) involve the use of modeling and social reinforcement (Billini, 2011), (c) include adjusting the physical and social environment to facilitate social interactions (Billini, 2011; Thiemann & Kamps, 2008), and (d) increase students' motivation to interact with adults and peers (Taylor, 2013). Incorporating all these components, peer-mediated intervention (PMI) has become a paradigm of teaching social skills to students with ASD (Rogers, 2000).

As the name implies, PMI involves training carefully selected peers without disabilities to teach academic or social skills to students with disabilities using strategies like modeling, prompting, and reinforcement in naturalistic environments and with minimal guidance from adults (Bellini, 2006a; Webber & Scheuermann, 2008). Supported by a tremendous amount of research on its effects, PMI has been one of the most recommended interventions for students with ASD (National Autism Center [NAC], 2015; National Professional Development Center on Autism Spectrum Disorder [NPDC], 2014; Reichow & Volkmar, 2010). Reviews of the literature on PMI (e.g., Chan et al., 2009; Reichow & Volkmar, 2010) have suggested the effectiveness of different peer-mediated strategies, such as peer initiation training, peer modeling, and integrated play groups, in promoting a wide range of social behaviors and skills (e.g., social initiations,

social responses, joint attention, and turn taking) of students with ASD. Depending on the purpose and context of these interventions, PMI researchers incorporated different components into the interventions. However, the PMI utilized in the studies all share similar features that include (a) recruiting peers who possess adequate social skills, (b) training the peers on their roles and responsibilities using different strategies such as modeling and role play, and (c) establishing opportunities to facilitate social interactions (Carter, Sisco, & Chung, 2012; Chan et al., 2009). The benefits of PMI are also highlighted in literature on social development. The literature shows that children engage in a greater amount of social interaction when interacting with peers because they share similar thoughts and interests (Guralnick, 1981). Children are also more likely to imitate the social behaviors of peers rather than of adults due to the effects of peer pressure, attention, and affiliation (Greenwood & Hops, 1981; Peck, Cooke, & Apolloni, 1981).

Although PMI has been shown to be effective in many studies, some literature on PMI has raised several concerns over the use of this type of instruction to teach social skills to students with ASD. One area of concern about using PMI to teach social skills is the inconsistency in the results obtained in research on peer-mediated strategies for students with ASD. In their review of social skills intervention research done with a high level of experimental rigor, Camargo et al. (2014) found that a considerable number of PMI studies involving participants with ASD revealed mixed or negative results. In other words, some PMI studies showed that interventions mediated by peers had no effects on some of the participants or on some of the behaviors of interest. Possible explanations for the conflicting findings revolve around the effect of multiple-treatment interference (Kazdin, 2011). That is, the participant receives a combination of two or more treatments, and receiving a treatment package restricts the conclusion about the contribution of each treatment (Kazdin, 2011). A large number of studies

that revealed positive effects of PMI included other strategies that were incorporated into PMI. Examples of these strategies included adult prompting during peer interactions (Banda, Hart, & Liu-Gitz, 2010; Krebs, McDaniel, & Neeley, 2010), visual prompts and scripts (Harper, Symon, & Frea, 2008; Owen-DeSchryver, Carr, Cale, & Blakeley-Smith, 2008), and goal setting (Hughes et al., 2013).

Some studies have supported the conclusion that these strategies contribute to the effects of PMI on improving social outcomes. For example, in their study, Sainato, Goldstein, & Strain (1992) found that simply training peers without disabilities to interact with students with ASD had no effects on the social interactions among the students. However, when the researchers combined peer training with self-management, the treatment package did have positive effects on the social behaviors of the students. Similar findings were obtained in other studies in which PMI resulted in improvement in social skills for students with ASD when it was combined with other approaches such as self-management (Labbe-Poisson, 2009) and visual prompts (Ganz et al., 2012; Thiemann & Goldstein, 2004). The findings reported in these studies support the conclusion that peer training in and of itself might be necessary, but not sufficient, to facilitate social interactions among students with ASD and their peers (McConnell, 2002).

The other explanation for the inconsistent results about the effects of PMI on social skills of students with ASD relates to factors that maintain social interactions. Individuals involved in a social interaction should demonstrate some sort of social competence in order to maintain the interaction (McFall, 1982). Social interactions among children should allow one partner involved in a social exchange to elicit positive responses from the other partner (Bellini, 2006a). In other words, the entire experience of a social interaction should be positive to all children involved in the interaction. If one child has an unpleasant experience interacting with another child, the child

having the experience will be less motivated to interact with the other child in the future (Romanczyk, White, & Gillis, 2005).

Because children with ASD lack reciprocity and have difficulty appreciating social reinforcers provided by trained peers, it is possible that these children and their peers will have social experiences that are not enjoyable. In such situations, both the children with ASD and their peers will be less interested in further social exchanges (DiSalvo & Oswald, 2002; Romanczyk et al., 2005). To enhance the motivation of both the children with ASD and their peers to engage in a social interaction, Taylor (2013) recommended pairing social consequences with tangible items and activities that the children prefer and using social interactions to promote the value of the preferred items and activities.

One intervention that has the potential for improving social interactions between students with ASD and their peers is contingency contracting, also referred to as behavioral contracting, (Cooper, Heron, & Heward, 2007). According to Cooper et al. (2007), a contingency contract is a written document that involves at least two parties (e.g., the teacher and the students) and that shows (a) individuals involved in the contract, (b) the skill or behavior of interest, (c) the conditions under which the skill or behavior should be performed, and (d) the type and amount of reinforcement the client will receive. A critical element of contingency contracting is to provide an opportunity for the student involved in the contract to negotiate and agree to the criteria for acceptable performance and to the type and amount of the reward contingent upon the performance (Cooper et al., 2007).

Incorporating contingency contracting in PMI may make social interaction between children with ASD and their peers more reinforcing, thus improving the effectiveness of the intervention. First, contingency contracts allow for pairing tangible rewards with social

consequences and for using social interactions to promote the value of preferred items and activities, which helps improve social motivation of students (Bellini, 2006a; Taylor, 2013). Second, because contingency contracts are permanent products that are reviewed and renegotiated on a regular basis, they help students remain on task (Cooper et al., 2007). Third, due to the fact that contingency contracts are written documents and sometimes include pictures, symbols, and other visual aids (Cooper et al., 2007), they are subsumed under the umbrella of visually based instruction, a type of instruction that has been evidenced to promote social skills in students with ASD (Ganz & Flores, 2008). Moreover, contingency contracting may allow for teaching skills related to self-determination, which in turn promotes student participation and adherence to rules specified in the contract (Maag, 2004).

In spite of its features and its effects on social outcomes for student with disabilities, the amount of research on the use of contingency contracting with students with ASD is relatively small (Bowman-Perrott, Burke, Marin, Zhang, & Davis, 2015). Moreover, no research to date has examined the effectiveness of combining peer training with contingency contracting in improving social interactions. In addition, although a large body of research has revealed the benefits of providing social skills interventions to students with ASD in inclusive settings, little, if any, research on social skills interventions for students on the autism spectrum has been done in Saudi Arabia. The Saudi Ministry of Education has recently placed emphasis on inclusive education by encouraging schools to provide learning environments where students with disabilities can socially interact with their general education peers (Ministry of Education, 2001). However, there is a need to evaluate interventions that may benefit students with ASD in these environments (Alquraini, 2011). The current study is the first intervention study that focuses on

social interactions among students with ASD and their typically developing peers in Saudi Arabia.

The purpose of this study was to expand the research base on PMI and on contingency contracting in two ways. First, the study was conducted to evaluate the effect of training peers on improving social interactions among the peers and students with ASD. Second, the study examined the effect of combining peer training with contingency contracting on the students' social skills. The research questions that guided the study were as follows:

1. What is the effect of peer training on the frequency of social initiations from peers of students with ASD?
2. What is the effect of peer training on the frequency of social responses from the students with ASD?
3. What is the effect of combining contingency contracting with peer training on the frequency of social initiations?
4. What is the effect of combining contingency contracting with peer training on the frequency of appropriate responses to social initiations?

## **CHAPTER TWO: LITERATURE REVIEW**

The purpose of this chapter is to provide detailed information about several topics related to socialization in individuals with ASD. In particular, the chapter includes sections that provide discussions of (a) socialization characteristics of individuals with ASD, (b) acquisition and performance of social behaviors, (c) the need for interventions to teach social skills to students with ASD, (d) considerations for planning and implementing successful social skills interventions, (e) a framework for effective social skills interventions, and (f) a review of the literature on PMI and contingency contracting.

### **Socialization Characteristics of Individuals with ASD**

Since the initial work of Leo Kanner (1943) pertaining to ASD, marked and enduring impairment in social interaction and communication has been a hallmark of ASD. In fact, persistent social impairment has been a core characteristic that is pronounced in the current diagnostic definitions of ASD and that distinguishes ASD from other developmental disorders and disabilities such as intellectual disabilities, language disorders, and pragmatic communication disorders (APA, 2013; Simpson, Myles, & LaCava, 2008). Social deficits can be present and obvious in children as early as ages 12 to 24 months (APA, 2013). As infants, children with ASD exhibit a lack of interest in interaction with others and have a preference to engage in solitary activities (APA, 2013). The deficits in social interaction during infancy are manifested by poor joint attention and by a lack or absence of nonverbal, social-communication behaviors necessary to regulate interactions with others (APA, 2013). Examples of the lack of nonverbal social behaviors that infants with ASD show include not responding to their names, not orienting bodies toward a communicative partner, poor eye contact, little to no social



smiling, not sharing play with others, infrequent vocalizations, and little to no imitation of adults (APA, 2013; Espe-Sherwindt, 2012).

As children with ASD get older, not only do they continue to have the same deficits, but they also have other social impairments that become obvious when they engage in more complex social situations (APA, 2013). Children with ASD show little to no social reciprocity and empathy, and they have difficulty contributing to a social exchange through the use of verbal and nonverbal social behaviors and skills (APA, 2013). They also lack motivation to share interests, emotions, and social activities with others and fail to initiate or respond to social interactions (APA, 2013). Moreover, if children with ASD engage in social interactions with peers or adults, they usually have difficulty adjusting their behaviors to fit different social contexts and display abnormal social behaviors such as not maintaining eye contact, showing nonverbal behaviors that are not congruent with verbal behaviors, not modulating their tone of voice based on the context, and talking about something that is not related to the topic of conversation (APA, 2013; Bellini, 2011).

In addition to these social characteristics, individuals with ASD have a variety of behavioral and cognitive deficits that hinder their ability to cope with the complexity of social interactions (APA, 2013). Many individuals with ASD (a) have language disorders; (b) exhibit stereotypic and habitual patterns of motor movements, speech, activities, and interests; (c) show excessive adherence to routines; (d) are under- or over-responsive to sensory input; and (e) display self-injurious and aggressive behaviors (APA, 2013). These behavioral characteristics restrict the ability to interact and communicate with different people and across various contexts (Szakacs, 2009). Like these challenging patterns of behaviors, cognitive impairments of

individuals with ASD contribute to the difficulty in adapting behavior to accommodate to different social contexts (Aspy, 2012).

One cognitive deficit that interferes with successful social interaction is limited theory of mind (Baron-Cohen et al., 1985). According to Aspy (2012), theory of mind is “the cognitive ability to understand mental states, including thoughts, beliefs, intentions, desires, perceptions, and feelings, and to apply this understanding to predict the actions of others” (Theory of Mind, para. 1). Individuals with ASD have difficulty understanding how other people feel or perceive the world, and they usually fail to understand what other people believe, desire, want, and need, which in turn limits their ability to predict others’ behaviors (Aspy, 2012; Baron-Cohen et al., 1985). Therefore, when individuals with ASD engage in a social activity or are involved in a social situation, they usually perceive the world from their own point of view and ignore necessary social cues and prompts that enable them to empathize with people (Aspy, 2012).

Another cognitive impairment that impacts socialization in individuals with ASD is weak central coherence (Happé, 1999). Many individuals with ASD are unable to form a complete picture or meaning of a complex social event or situation (Aspy, 2012; Happé & Frith, 2006). They usually lack the ability to connect different parts of social events necessary to understand the whole meaning of the events (Aspy, 2012; Happé & Frith, 2006). This weak central coherence also makes it difficult for individuals with ASD to generalize what they learn to new environments and with different people (Reynhout & Carter, 2011). In addition to limited theory of mind and weak central coherence, individual with ASD have impaired executive functioning that results in limited mental control processes (e.g., inhibition, working memory, and cognitive planning and organizing) necessary to perform an executive task (Russell, Saltmarsh, & Hill,

1999; Verté, Geurts, Roeyers, Oosterlaan, & Segeant, 2006). Impaired executive functioning can pose an obstacle to performing various social tasks such as initiating an activity or talking about one's experiences and telling one's stories in an organized way (Aspy, 2012). Finally, many individuals with ASD over-select stimuli (Lovaas & Schreibman, 1971); they tend to pay attention to less relevant stimuli rather than recognizing the most important cues that distinguish a complex social event, such as paying attention to a toy in a group play activity, while ignoring verbalizations from peers (Ploog, 2010).

### **Acquisition and Performance of Social Behaviors**

Literature on child development (e.g., Bruner, 1974; Vygotsky, 1978) shows that children without developmental delay learn and acquire a wide range of skills in different areas of development during infancy and early childhood without the need for any sort of systematic instruction. Socialization is one developmental area in which children learn many new skills without receiving structured instruction. A critical factor contributing to learning new social behaviors is what Bandura (1971) called observational learning\_ a process that involves observing behaviors of other individuals (e.g., parents, siblings, peers, and teachers) and storing the characteristics (e.g., topography and magnitude) of the observed behaviors as mental images in memory. However, children decide whether or not to perform observed behaviors based on their knowledge about the appropriateness of the behaviors and on their recognition of the possible consequences of the behaviors (Bandura, 1971).

In addition to the appropriateness of observed behaviors in a given context and their possible consequences, several other factors mediate learning social skills through observation. Bandura (1971) stated that

In any given instance lack of matching behavior following exposure to modeling influences may result from either failure to observe the relevant activities, inadequate coding of modeled event for memory representation, retention decrements, motoric deficiencies, or inadequate conditions of reinforcement. (p. 8).

In other words, the amount of attention a child pays to the model being observed, the child's cognitive ability to retain the way the observed behavior is performed, the child's motor ability to perform the behavior, and the child's motivation to display the behavior affect the learning of social skills and behaviors (Bandura, 1971).

Despite the way children learn and perform social behaviors, the performance of an observed and learned behavior does not necessarily mean the behavior is a social response. Determining whether a given behavior is socially acceptable or not is a function of the context in which the behavior is exhibited (Maag, 2004). Telling jokes, for example, can be a social behavior in a given event (e.g., party) but can be an inappropriate behavior in another event (e.g., funeral). Social skills, therefore, are considered as complex skills and behaviors that are socially and culturally acceptable and that allow an individual to achieve interpersonal goals in a positive manner (Ladd & Mize, 1983; Read, 1994). The fact that one should realize social and cultural rules related to a given context and determine how a social goal will be appropriately achieved in that context suggests the importance of social competency, which requires successfully integrating and organizing cognitive, perceptual, and behavioral components (Crick & Dodge, 1994; McFall, 1982).

Cognitive components revolve around the knowledge about and understanding of social and cultural rules related to a given social situation (Crick & Dodge, 1994; McFall, 1982). When involved in a social situation, individuals recognize a variety of contextual cues related to that

situation and interpret them based on past experiences, their knowledge about social values and customs, or social schemas (Crick & Dodge, 1994). Once they perceive the social situation, people recognize their repertoire of social behaviors appropriate to the situation and choose the most appropriate behavior that will help them elicit positive responses and avoid negative outcomes (Crick & Dodge, 1994; McFall, 1982). Perceptual components are concerned with the ability to evaluate, monitor, and understand one's behaviors and the thoughts and feelings of others (Bellini, 2006a; Crick & Dodge, 1994). Put another way, when engaging in a social exchange, one thinks about how to behave appropriately and about whether there is a need to adjust behaviors to suit the context (Bellini, 2006a). Finally, behavioral components relate to the execution of a set of verbal and nonverbal behaviors congruent with one another and based on one's knowledge and perception (Bellini, 2006a).

### **The Need for Interventions to Teach Social Skills to Students with ASD**

Prompted by a notion that it would enhance socialization in students with disabilities and by scientific certainty supporting that notion, inclusive education has become a worldwide common educational practice (Buysse et al., 2002; Camargo et al., 2014; Hullet, 2009; Rafferty et al., 2004; Wiener & Tardif, 2004). In spite of positive social outcomes for many students with disabilities that have been reported in the scientific literature on inclusive education, students with ASD are far less likely to socially benefit from inclusive education than other students without receiving social interventions (Mesibov & Shea, 1996). In fact, Rogers (2000) reviewed the literature on the social benefits of teaching students with ASD along with their peers without disabilities and concluded that “while inclusive school experiences are heavily emphasized as an important means of increasing interactions of children with autism and typical peers, physical integration does not necessarily foster social integration” (p. 406).

One fact suggesting the need for systematic instruction to teach social skills to students with ASD relates to their cognitive characteristics and to the way those characteristics hamper typical social learning. For example, Varni, Lovaas, Keogel, and Everett (1979) analyzed and compared observational learning in children with ASD and typically developing children and found that regardless of their ages, the children with ASD had difficulty attending to major and relevant stimuli of observational situations. Therefore, they stated that, unlike their peers without disabilities, the children with ASD were unable to learn social behaviors by simply observing models. As a result, Varni et al. (1979) recommended the use of structured interventions to help children with ASD acquire and perform desirable social behaviors.

Over and above the inability to learn social behaviors by observing models, the profound impact of social impairments upon the quality of individuals' with ASD lives is another factor underling the importance of providing social skills interventions to students with ASD. Indeed, the social development of children with ASD is the most critical determinant of future adjustment and prognosis for these children (as cited in Charlop & Erickson, 2013). If remaining untreated, social deficits in children with ASD can hinder development in other areas of functioning and can lead to health consequences (APA, 2013). Longitudinal research has revealed a positive relation between academic performance and social competence by indicating that impairment in social development contributes to poor academic achievement (Welsh et al., 2001). Poor academic performance, limited literacy skills, and social skill delays in turn limit the ability of many individuals with ASD to lead independent and fulfilling lives when they reach adulthood (Howlin et al., 2004).

Along with the consequences that may result from difficulty in socialization are emotional and behavioral problems. Having limited social skills, individuals with ASD are likely

to experience failed social situations, and the repeated exposure to such situations can be a source of social anxiety to them (Bellini, 2006b). Furthermore, social dysfunctioning in people with ASD restricts their ability to develop satisfactory relationships and friendships and increases the likelihood for social withdrawal and depression (Bellini, 2006b; Tantam, 2000). In addition to social anxiety and depression, other possible emotional and behavioral consequences of having inadequate social skills include obsessional disorders, tempers, suicidal thoughts, maladaptive behavior, and aggression (Charlop & Erickson, 2013; Green et al., 2000).

Deficits in social communication and interaction have a negative impact not only on children with ASD but also on their families. Ludlow, Skelly, and Rohleder (2011) interviewed parents of children diagnosed with ASD and stated that the majority expressed primary concerns about their children's lack of social skills. According to Ludlow et al. (2011), these parents suffered from low self-esteem as they attributed the lack of and difficulty in interacting with their children to inadequate parenting. Ludlow et al. (2011) also mentioned that some of the parents expressed continuous feelings of rejection and loss when their children did not respond to them or interact with them. Therefore, improving social skills in their children is among the main priorities of these parents (Azad & Mandell, 2016).

In short, the wide range of social deficits children with ASD have, the inability of these children to typically acquire and perform social behaviors, and the negative impact of social impairment on the quality of children's with ASD and their families' lives all underline the need to provide effective interventions to teach social skills to children with ASD.

### **Considerations for Planning and Implementing Successful Social Skills Interventions**

As the amount of research on the consequences of not treating social impairment in people with ASD has increased, so too has the amount of literature on social skills interventions

(Reichow & Volkmar, 2010). Although a vast number of interventions have been evaluated and discussed in this literature, a need still exists to design better interventions (Bellini, 2006a). A variety of meta-analyses and systematic reviews of the literature on social skills interventions for students with disabilities, including students with ASD, have revealed some shortcomings that limit the effectiveness of many such interventions. Examples of these shortcomings include a lack of consideration for unique strengths and needs of students with disabilities (Quinn, Kavale, Mathur, Rutherford, & Forness, 1999), a mismatch between an intervention and the type of skill deficits (e.g., acquisition, performance, or fluency deficits; Gresham, Sugai, & Horner, 2001), and a lack of training for maintaining and generalizing newly acquired skills (Bellini, Peters, Benner, & Hopf, 2007).

Critical to dealing with these limitations and to maximizing the effectiveness of social skills interventions is conducting comprehensive assessment as part of an intervention (Bellini, 2006a). Assessment should provide information from different sources on a student's current levels of functioning in different developmental areas and be based on multiple formal and informal procedures (Bellini, 2006a; Hagiwara, Cook, & Simpson, 2008). In other words, assessment for designing an effective social skills intervention should be based upon using formal assessment strategies such as standardized tests and informal assessment procedures such as observations, functional behavioral assessment, and interviews with the student's family and teachers (Bellini, 2006a). The assessment should also provide information not only about the current level of social functioning but also about the levels of functioning in communication, cognition, academic performance, motor and sensory abilities, and behavior. Such assessment provides invaluable information on several aspects needed to implement successful social skills interventions (Bellini, 2006a).



Information gathered from thorough assessment helps design and implement a successful social skills intervention that suits the targeted type of social deficits (Bellini, 2006a; Gresham et al., 2001; Ladd & Mize, 1983). Gresham et al. (2001) classified skill deficits into three main categories, and they stated that social skills interventions might vary in terms of their components and characteristics depending on the skill deficit. One category of skill deficits relates to acquisition of social skills, which refers to the absence of knowledge about performing a social behavior or to the lack of ability to determine the most appropriate behavior for a given social situation (Gresham et al., 2001). Another type of skill deficits revolves around a person's unwillingness or inability to perform a social behavior that is in the person's behavioral repertoire due to factors such as a lack of motivation, sensory sensitivities, anxiety, depression, or movement differences (Bellini, 2006a; Gresham et al., 2001). A deficit in skill fluency is another category, and it refers to performing a social skill with some inaccuracy due to a lack of opportunities to practice newly learned behaviors (Gresham et al., 2001).

Furthermore, comprehensive assessment procedures provide information about the levels of functioning in other developmental domains and about individual strengths and needs (Bellini, 2006a; Taylor, 2013). Such information is of great importance in planning a successful social intervention given the overlap between developmental domains, the wide range of social impairments in individuals with ASD, and the differences in the symptoms and severity among these individuals (APA, 2013; Simpson et al., 2008). For example, progress in one area of development (e.g., communication, language, or behavior) influences progress in socialization; a social skills intervention for a child who cannot speak will likely be different than an intervention for a child without a language disorder, and a social intervention for a student with

challenging behaviors will differ from an intervention for a child who does not exhibit such behaviors (Bellini et al., 2007; Gresham et al., 2001; Quinn et al., 1999; Taylor, 2013).

In addition to these benefits, thorough assessment provides other information needed to plan and implement effective interventions for students with ASD. According to the National Research Center (NRC; 2001) and to Iovannone, Dunlap, Huber, and Kincaid (2003), research has revealed several components that should be included in any educational practices for students with ASD. These components include the consideration of family needs, priorities, and involvement; the evaluation of gaps between a student's chronological and developmental age; and the provision of supportive environments. Without the implementation of different assessment procedures, incorporating these elements into social interventions is difficult. Finally, ongoing assessment enables implementers of social skills interventions to make appropriate decisions regarding the effectiveness of the interventions and to modify the interventions as needed (Bellini, 2006a).

As mentioned previously, selecting an intervention to teach social skills to students with ASD should be guided by information gathered from assessments. Such information is likely to suggest that there is no single teaching strategy that is effective for every student with ASD. However, the literature on teaching students with ASD has revealed several trends that should be considered regardless of the social skills intervention used. One implication from this literature is that social skills interventions should involve moving a targeted student from initial to advanced levels of skill mastery (Gresham et al., 2001; Ladd & Mize, 1983). Put another way, teaching strategies should focus not only on social skill acquisition but also on social skill performance and fluency.

To help a student with ASD acquire a social skill and then fluently perform it, Bellini (2006a) recommended finding a balance between social assimilation interventions and social accommodation interventions. Based on Bellini (2006a), social assimilation interventions promote skill acquisition, are usually based on one-on-one instruction, and are highly structured, such as discrete trial teaching. Social accommodation interventions, on the other hand, include the adjustment of physical and social environments so that the student can practice and perform acquired skills with a high level of success (Bellini, 2006a). Examples of social accommodation interventions include PMI, peer support strategies, and self-monitoring (Bellini, 2006a).

Another trend found in the literature on teaching social skills to students with ASD is the recommendation to use interventions that incorporate elements and principles of applied behavior analysis (ABA), such as the use of prompting, modeling, and reinforcement. Indeed, in their synthesis of interventions used to improve social skills for students with ASD, Reichow and Volkmar (2010) stated that “there is much support for interventions based on ABA, and the use of these techniques should continue to be used in practice” (p. 159). The recommendation by Reichow and Volkmar (2010) has been frequently mentioned in reviews of evidence-based practices for students with ASD such as those done by the NRC (2001), NAC (2015), and NPDC (2014).

In addition to these implications, research has also suggested the importance of motivation in social development and competence (Romanczyk et al., 2005). Because of their lack of interest in social interactions and the prolonged interaction failure, many children with ASD are likely to be less motivated to engage in a social exchange with other people (APA, 2013; Bellini, 2006a). To maximize the effectiveness of a social skills intervention, learners with ASD should be given the opportunity to experience successful and enjoyable social interactions

(Taylor, 2013). Although one way to provide such interactions is to have a partner (peer, sibling, or teacher) give frequent social reinforcers (e.g., smiles and compliments), tangible reinforcers should be provided at an initial phase of the intervention to students with ASD along with social reinforcers to increase the level of their social motivation (Taylor, 2013).

Research has also shown that the more specific the social behavior is, the more effective the social skills intervention is likely to be (Bellini, 2006a; Quinn et al., 1999). Therefore, instead of targeting broad social skills, such as those related to friendship and social problem solving, social skills intervention should focus on more specific social behaviors such as turn taking, joint attention, social initiations, answering questions, greeting, perspective taking, and eye contact (Bellini, 2006a; Quinn et al., 1999; Reichow & Volkmar, 2010). This recommendation is particularly important for teaching social skills to students with ASD given the cognitive characteristics (e.g., impaired executive functioning and stimulus over-selectivity) of these students.

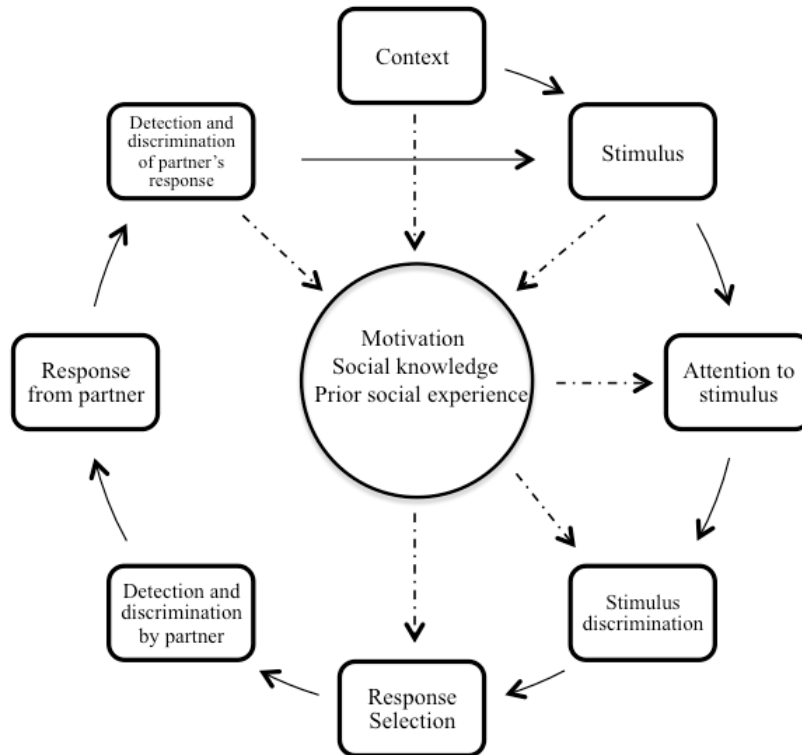
In sum, thorough assessment should be conducted before, during, and after the implementations of social skills interventions. Comprehensive assessment provides important information about several aspects that help implementers design a successful intervention. These aspects include (a) using teaching strategies that suit the targeted skill deficit, (b) creating environments that are socially supportive, (c) targeting social behaviors appropriate to students' developmental age and level of functioning, and (d) considering strengths and needs of students. In addition to these considerations, social skills interventions should focus on specific social behaviors, incorporate ABA strategies, and increase the level of students' social motivation.

## **A Framework for Effective Social Skills Interventions**

As indicated previously, a successful social skills intervention should involve moving the learner with ASD from lower to advanced levels of skill mastery. Romanczyk et al. (2005) provided a framework for designing interventions that help promote the performance of acquired social skills in students with ASD. The framework is based on a behavioral molecular analysis approach and on an ecological model, and it is derived from literature on social competence and development. As shown in Figure 1, social interactions involve the dynamic interaction of different sequential and non-sequential effects. Sequential effects refer to the “processes that by virtue of their occurrence in time affect each other in a sequential manner to form a response chain” (Romanczyk et al., 2005, p. 180). An example of a sequential effect is asking a question to get a response from another person. Non-sequential effects refer to the factors that are not part of the response chain but affect the chain such as previous social experiences. For example, an individual may or may not choose to answer a question based on prior experience answering similar questions.

Sequential effects include the context, stimulus, discrimination of the stimulus, response selection, detection of the response by a communication partner, response from the partner, and detection of consequences of the response. Non-sequential effects, on the other hand, include social history, social motivation, social knowledge, and social schemas. The interaction between these effects is illustrated by the following description of a social interaction. A social interaction takes place in a context that involves a variety of stimuli and cues, and an individual engaging in that interaction detects the cues and constructs a schema of the social situation based on the individual’s social history. Within that context, a social stimulus (e.g., a greeting from another

person) is presented. The individual may or may not pay attention to and discriminate the stimulus depending on prior social history and on how socially motivated the individual is.



*Figure 1.* Interaction of sequential effects (solid arrows) and non-sequential effects (dashed arrows) in social interaction.

If the individual is aware of the stimulus, the individual selects a response to perform based upon previous reinforcement history, the goal of interaction, and social knowledge. After the response is given, a communication partner detects and discriminates it and then responds to it. The individual finally determines whether or not the partner's response is positive (i.e., helping the individual realize a social goal). The partner's response serves as a new stimulus in the context and affects the individual's social motivation; if the response from the partner is positive, the individual is more motivated to give further responses, and vice versa. The entire experience of the social exchange accumulates the social and reinforcement history of the individual and affects social motivation.

The implications of the framework suggest the importance of having students with ASD practice learned social skills in natural contexts in which such skills are necessary (Romanczyk et al., 2005). Because individuals with ASD have difficulty processing social information, it is critical to provide a student with ASD some information about the context in which the student is expected to interact (Romanczyk et al., 2005; Taylor, 2013). Such information helps the student construct a social schema and have some relative social knowledge (Romanczyk et al., 2005). It is also important to consider teaching and involving peers with whom the student will interact so that the peers can help the student pay attention to social stimuli. Teaching and including peers also ensures that peers elicit appropriate responses from the student with ASD and that they respond positively to the student's social behaviors, which helps to enhance social motivation (Romanczyk et al., 2005).

### **A Combined Social Skills Intervention for Students with ASD**

The previous practical considerations and the proposed framework require combining and integrating several strategies to promote social behaviors for students with ASD (Bellini, 2006a; Theimann & Kamps, 2008). The intervention implemented in this study involves combining two performance enhancement strategies (i.e., PMI and contingency contracting) that help improve social behaviors of students with ASD. PMI and contingency contracting help address factors that may limit social performance and provide opportunities to practice existing acquired social skills (Bellini, 2006a). The following sections provide a discussion about the rationale behind the use of these strategies as well as a review of related literature.

### **PMI for Students with ASD**

Supported by theoretical explanations of social development, the use of PMI to teach social skills to students with ASD has elicited intense interest from researchers (Rogers, 2000).

The literature on child development shows that children become more socially active when they interact with peers, compared to their interactions with adults (Guralnick, 1981). Children usually exhibit a higher number of social behaviors when they interact with peers as they are stimulated by sharing thoughts and interests (Guralnick, 1981). Children are also more likely to imitate the social behaviors of peers rather than of adults due to the effects of peer pressure, attention, and affiliation (Greenwood & Hops, 1981; Peck et al., 1981). Therefore, serving as models, peers can have greater effects on the acquisition of skills than adults (Peck et al., 1981).

Using PMI with students with ASD helps incorporate features that promote social outcomes by enhancing the learner's ability to maintain and generalize social behaviors. Instruction involving peers allows teachers to teach social skills in naturalistic settings and facilitates the use of typical stimuli and social reinforcers (Bellini, 2006a; Rogers, 2000; Thiemann & Kamps, 2008). In addition to providing supportive physical environments, involving peers in social skills interventions enables teachers of students with ASD to modify social environments. Because students with ASD display abnormal patterns of behavior, their peers realize, and usually misunderstand, these behavioral abnormalities. As a result, they become less interested in interacting with students with ASD even if the students with ASD do not exhibit challenging behaviors (DiSalvo & Oswald, 2002). Training students to interact with their peers with ASD helps the students to be more confident and interested in social interactions with their peers with ASD (Carter et al., 2012; DiSalvo & Oswald, 2002).

A considerable amount of research has focused on the use of peer-mediated strategies to teach social skills to students with ASD. Examples of these strategies include peer tutoring (Laushey and Heflin, 2000), peer modeling (Krebs et al., 2010), integrated play groups (Zercher, Hunt, Schuler, & Webster, 2001), peer initiation training (Banda et al., 2010), and group-oriented



contingencies (Kohler et al., 1995). Some of PMI research has been conducted to evaluate the effect of adding a peer component to other interventions commonly used with students with ASD such as social stories (Dodd, Hupp, Jewell, & Krohn, 2007), incidental teaching (McGee, Almeida, Sulzer-Azaroff, & Feldman 1992), self-regulated strategy development (Assro-Saddler & Back, 2014), and discrete trial teaching (Radley, Dart, Furlow, & Ness, 2015). The social skills that were targeted in this research included social initiations, responses to initiations, turn taking, and joint attention (Chan et al., 2009). Systematic reviews and meta-analyses of research on social skills interventions for students with ASD has revealed strong evidence for the effect of PMI and peer supports on improving social outcomes and concluded that “interventions that train peers to deliver treatment has much support and should be considered a recommended practice for all individuals with ASD” (Reichow & Volkmar, 2010, p. 160).

There are several concerns over the use of PMI to teach social behaviors to students with ASD. First, a considerable body of research demonstrating the effects of PMI on improving social outcomes for children with ASD included other strategies that were incorporated into PMI. For example, in a recent study done by Hughes et al. (2013), the purpose was to evaluate the effect of PMI on promoting social interactions between three high school students with ASD and their peers. Hughes et al. (2013) conducted a series of training sessions that included teaching the peers to use appropriate ways to interact with the students with ASD. The training sessions also included teaching the peers to set social interaction goals and to self-monitor their progress toward achieving the goals. Although the intervention resulted in improvement in social interactions, it is impossible to determine the effects of PMI alone. In other words, the combination of PMI and self-management limited the conclusion that PMI in and of itself was effective. The same conclusion applies to other studies in which researchers combined other

strategies such as adult prompting during peer interactions (Banda et al., 2010; Krebs et al., 2010), and visual prompts and scripts (Harper et al., 2008; Owen-DeSchryver et al., 2008), with PMI.

Other research studies support the fact that PMI, when implemented alone, might have little to no effect on improving social skills for students with ASD. For example, Sainato et al. (1992) examined the effects of training peers to use social interaction strategies with three elementary school students with ASD. Sainato et al. (1992) found that peer training was not sufficient to enhance the use of the strategies. Therefore, the researchers trained the peers to use self-management techniques to evaluate their use of the social interaction strategies. The researchers found that the peers' use of the social interaction strategies improved only after the introduction of the self-management intervention. Similar findings were obtained in other recent studies that focused on PMI. For instance, Labbe-Poisson (2009) evaluated the effect of training students with ASD to use self-management strategies on improving social interactions with their peers. Labbe-Poisson (2009) also trained peers without disabilities to interact with the students. The researcher found that the self-management intervention alone led to increases in social interactions among the students and that combining the intervention with PMI contributed to a small amount of improvement in the social skills of the students.

Other studies support the same conclusion about the effectiveness of PMI when peer training was combined with visually based interventions. In their research, Thiemann and Goldstein (2004) trained peers without disabilities to interact with students with ASD. According to the authors, the training slightly increased the frequency of some social skills for some of the students with a high level of prompting from adults. However, when the researchers trained the students with ASD to use written scripts that showed social phrases and statements, the

interactions among the students improved further and the amount of adult prompting decreased. Similarly, Ganz et al. (2012) trained typically developing peers to interact with a student with ASD using visual scripts that included written social responses. Using a changing condition, multiple baseline design, Ganz et al. (2012) stated that the treatment package (i.e., peer training and visual script) was more effective than the peer training alone in promoting social interactions between the students.

In addition to these findings, there are other ethical and practical issues concerning PMI. Greenwood (1981) argued that having peers teach students with disabilities requires the peers to do additional work that they do not need to do. Therefore, instruction involving peers should not be used unless the peers benefit from it (Greenwood, 1981). Another concern about PMI relates to the fact that many students with ASD have difficulty appreciating social reinforcers (e.g., a smile or compliment) from trained peers (Taylor, 2013). Moreover, peers, regardless of the amount of training they get, may not find interacting with students with ASD a pleasant experience due to the lack or inappropriateness of social responses from students with ASD (Carter et al., 2012; DiSalvo & Oswald, 2002). Therefore, incorporating tangible reinforcement into PMI is of great importance as it can help to address the social motivation of students with ASD and their peers (Taylor, 2013).

Contingency contracting is an intervention that has the potential to address concerns regarding the use of PMI. First, the use of contingency contracts ensures that peers being encouraged to interact with students with ASD will benefit from engaging in the interaction by getting tangible rewards. Second, because contingency contracts allow for pairing tangible rewards with social consequences and for using social interactions to promote the value of the

preferred items and activities, they help improve social motivation of both the students with ASD and their peers (Bellini, 2006a; Taylor, 2013).

### **Contingency Contracting**

As described earlier, a contingency contract is a written document that specifies individuals involved in the contract, tasks assigned to each individual, rewards, and conditions for receiving the rewards. Every person involved in the contract should have the opportunity to review, negotiate, and agree upon the content of the contract (Cooper et al., 2007). Several theoretical explanations and practical implications support the use of contingency contracts. First, contingency contracting is based on the principle of rule-governed behavior. Every person involved in the contract verbalizes and writes rules in which a specified behavior (i.e., a task) leads to a specified consequence (i.e., a reward; Cooper et al., 2007). Because the delivery of rewards indicated in the contract is usually delayed, a person for whom the contract is developed self-manages a targeted behavior in order for that person to get a reward (Cooper et al., 2007).

Second, because a contingency contract is a permanent product that is reviewed by two or more individuals on a regular basis, the contract serves as a prompt for the individual to keep engaging in targeted behaviors (Cooper et al., 2007). Third, according to Maag (2004), because students involved in a contract have the opportunity to negotiate and agree on the components of the contract, the students are likely to have a sense of ownership of their behaviors. That sense of ownership ensures active student participation and more adherence to rules specified in the contract (Maag, 2004). Moreover, when involved in a contract, students are likely to follow rules because they feel that the intervention is fair. In other words, students' adherence to their tasks is enhanced because they know that tasks are assigned not only to them but also to their teachers and because they choose the rewards they would like to receive (Maag, 2004).

In addition to these factors supporting the use of contingency contracting, there are other reasons that are applicable to students with ASD. Based on Quill (1997), many students with ASD have a visual style of learning and benefit from visually cued instruction. One of the reasons behind the preference for using visually cued instruction is that visual cues, such as written words and pictures, can serve as environmental prompts that are permanently available to the student (Quill, 1997). Due to the fact that contingency contracts are written documents and sometimes include pictures, symbols, and other visual aids (Cooper et al., 2007), they can address some relative strengths and needs of students with ASD. Furthermore, the literature on teaching social skills to students with ASD has underlined the need for interventions that are easy to implement by the parents of children with ASD (McCauley & Prelock, 2012; Rogers, 2000). Such interventions help promote social outcomes because they can be administered at home where students spend most of their time (McCauley & Prelock, 2012). Although it may be time consuming to develop, contingency contracting is easy to implement and does not require a large amount of training (Bowman-Perrott et al., 2015; Janz, Becker, & Hartman, 1984; Maag, 2004).

Not until the late sixties did researchers start evaluating the effect of contingency contracting (Cantrell, Cantrell, Huddleston, & Wooldridge, 1969). At that time, most of the research was done with clients attending counseling and therapeutic settings to help them adhere to treatments and therapies for physical and behavioral conditions, such as being overweight, smoking, drug abuse, and alcoholism (Janz et al., 1984). The positive results obtained in medical research led to the use of contingency contracting in other fields including education. Cantrell et al. (1969) did one of the first studies that focused on the use of contingency contracts with students. The purpose of the study was to determine the impact of home-school contingency

contracts on improving student academic behavior such as completing homework, participating in classroom activities, getting on the school bus, and staying in class. Cantrell et al. (1969) stated that the contracts resulted in a considerable improvement in the students' behavior.

Since then, educational research on contingency contracting has expanded to include students without disabilities and students with special needs. Research on the use of contingency contracts with students without disabilities has involved participants attending different types of educational settings, of different ages, and from different backgrounds (see Table 1 for information about the studies). Regular public schools were the settings where contingency contracts were implemented in the vast amount of this research (e.g., Allen, Howard, Sweeney, & McLaughlin, 1993; Arwood, Williams, & Long, 1974; Trice, 1990). The intervention in other studies took place at vocational and educational training facilities for high-school students who dropped out of school (Kelley & Stokes, 1982; Kelley & Stokes, 1984), a parochial school (Williams, Long, & Yoakley, 1972), a special residential home (Sheridan & Deering, 2009), and students' homes (e.g., Miller & Kelley, 1994; Wahler & Fox, 1980; Welch, 1985). The participants in the studies ranged in age from 5 to 21 years and came from varied academic, family, and social backgrounds.

Table 1

*Studies about the Use of Contingency Contracting with Students without Disabilities*

Reference <sup>a</sup>	Participants <sup>b</sup>	Setting	Intervention procedure	Outcome variables	Results
Allen et al. (1993)	3 (gender NR <sup>c</sup> ); 2 <sup>nd</sup> and 3 <sup>rd</sup> grade	Regular school	Individually developed, teacher-student contracts	On-task behavior	Positive

Table 1-continued.

Arwood et al. (1974)	4 (gender NR); 9 <sup>th</sup> grade	Regular school	Classroom-wide contracts developed based on students' opinions about tasks and rewards	On-task behavior Social interaction	Mixed <sup>d</sup>
Besalel-Azrin, Azrin, and Armstrong, (1977)	8 males; 2 females; 10-12 years old	Regular school	Classroom-wide contracts developed based on students' opinions about tasks and rewards	Adherence to classroom rules	Positive
Cantrell et al. (1969)	(Number of participants NR); (gender NS); 1 <sup>st</sup> to 7 <sup>th</sup> grade	Regular school Home	Individually developed, teacher-student and parent-child contracts	School-related behavior at home	Positive
Kelley and Stokes (1982)	12 males; 1 female; 16-21 years old	Vocational training facility	Individually developed, teacher-student contracts	Homework completion	Positive
Kelley and Stokes (1984)	7 males; 1 female; 16-21 years old	Vocational training facility	Individually developed, teacher-student contracts	Studying for exams	Positive
Kidd and Saudargas (1988)	1 female; 1 male; 6 <sup>th</sup> and 3 <sup>rd</sup> grade	Regular school	Individually developed, teacher-student contracts	Percentage of math problem completed correctly	Positive
Kieffer and Goh (1981)	48 (Gender NR); elementary school	Regular school	Individually developed, teacher-student contracts	Motivation to take tests	Positive
Martini-scully, Bray, and Kehle (2000)	2 females; 8 years old	Regular school	Individually developed, teacher-student contracts	Challenging behavior	Positive

Table 1-continued.

Miller and Kelley (1994)	2 females; 2 males; 9-11 years old	Home	Individually developed, parent-child contracts	Homework completion	Mixed
Navarro, Aguilar, Aguilar, Alcalde, and Marchena (2007)	3 males; 8-14 years old	Regular school	Individually developed, teacher-student contracts	Challenging behavior	Positive
Self-Brown and Mathews (2003)	18 (gender NR); 4 <sup>th</sup> grade	Regular school	Individually developed, researcher-student contracts	Math skills	Positive
Sheridan and Deering (2009)	1 male; 12 years old	Residential home	Individually developed, teacher-student contracts	Aggression Safety behavior	Positive
Smith (1994)	8 males; 4 females; k-7 <sup>th</sup> grade	Regular school Home	Individually developed, teacher-student and parent-child contracts	School-related behavior at home Parent-teacher communication	Positive
Trice (1990)	96 (gender NR); high school	Regular school	Individually developed, school counselor-student contracts	Truancy Challenging behavior	Positive
Wahler and Fox (1980)	4 males; 5-8 years old	Home	Individually developed, parent-child contracts	Oppositional behavior Aggression Rule violating	Mixed
Welch (1985)	1 male; 16 years old	Home	Individually developed parent-child contracts	Tempers Curfew regulations	Mixed



Table 1-continued.

Williams and Anandam, (1973)	(Number of participants NR); (gender NS); 7 <sup>th</sup> grade	Regular school	Classroom-wide contracts developed based on students' opinions about tasks and rewards	Social and academic behaviors	Positive
Williams et al. (1972)	4 (gender NR); high school	Regular school	Classroom-wide contracts developed based on students' opinions about tasks and rewards	On-task behavior Social interactions Challenging behaviors	Positive

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<sup>a</sup>Studies are listed in alphabetical order. <sup>b</sup>Based on the information available, chronological age, grade, or school level is reported to indicate students' ages. <sup>c</sup>NR= not reported. <sup>d</sup>Mixed results are those indicating the intervention was not effective for some of the participants or some of the outcome variables.

The researchers of these studies focused on different academic, social, and behavioral outcomes. Academic behaviors targeted in some of the studies included on-task academic behavior (Allen et al., 1993; Arwood et al., 1974; Williams et al., 1972), homework and assignment completion (Cantrell et al., 1969; Kelley & Stokes 1982; Miller & Kelley, 1994; Smith, 1994; Williams & Anandam, 1973), studying for examinations (Kelley & Stokes, 1984), math skills (Kidd & Saudargas, 1988), and setting and working toward academic goals (Self-Brown & Mathews, 2003). Social behaviors included skills related to social interactions such as appropriate social initiations and responses (Arwood et al., 1974). Examples of behavioral outcomes addressed in the studies are truancy (Trice, 1990), disruptive behaviors (e.g., loud talking and throwing objects; Martini-scully et al., 2000; Navarro et al., 2007), non-compliance (Wahler & Fox, 1980; Welch, 1985), and aggression (Sheridan & Deering, 2009; Wilkinson, 2003). In addition to these behaviors, two studies focused on students' motivation and parent-teacher interaction and communication (Kieffer & Goh, 1981; Smith, 1994). The focus of one

study was on safety behavior such as using a seatbelt and on property destruction (Sheridan & Deering, 2009).

The development of the interventions in the studies included all components and procedures of creating a contingency contract; all involved parties (i.e., the contractors and students) negotiated and agreed upon the tasks and rewards and signed written contracts. The procedures of developing a contract in the majority of the studies (e.g., Allen et al., 1993; Cantrell et al., 1969; Trice, 1990) included having a teacher, parent, or school counselor individually negotiate the tasks and reward with the students. In three studies (i.e., Arwood et al., 1974; Besalel-Azrin et al., 1977; Williams et al., 72), class-wide contingency contracts were developed by having the students attending the same classroom answer surveys or checklists as a means of negotiating the responsibilities indicated in the contracts. These contracts were individually modified for each student, if needed. The researchers of the studies generally focused on the use of rewards as a result of completion of tasks. In four studies, the researchers used punishment techniques such as response cost (Martini-scully et al., 2000; Sheridan & Deering, 2009; Williams & Anandam, 1973), time out (Wahler & Fox, 1980; Welch, 1985), and a loss of recess time or getting extra homework (Kidd & Saudargas, 1988) in combination with reinforcement techniques.

The results obtained in the majority of the studies showed positive outcomes of implementing contingency contracting. Only the authors of four studies reported mixed results; contingency contracting had no effect on some of the participants (Arwood et al., 1974; Miller & Kelley, 1994) or on some behaviors (Wahler & Fox, 1980; Welch, 1985). Some authors (e.g., Besalel-Azrin et al., 1977; Navarro et al., 2007; Welch, 1985; Wilkinson, 2003) evaluated the effect of the contracts on maintenance and found that the participants were able to maintain the

behaviors of interest. Several studies included findings about the participants' opinions about the intervention. The students involved in the contracts expressed a high level of satisfaction and happiness regarding contingency contracts as a result of being freely able to negotiate the tasks, rewards, and criteria for receiving the rewards (Besalel-Azrin et al., 1977; Martini-scully et al., 2000). In another study, the authors stated that the students thought the intervention was fair because they were able to choose the reinforcers and the criteria for acceptable performance (Wilkinson, 2003). Parents and teachers were also satisfied and happy with the effectiveness of the intervention and with the ease of implementation (Besalel-Azrin et al., 1977; Martini-scully et al., 2000; Miller & Kelley, 1994; Wilkinson, 2003).

A smaller amount of research on contingency contracting for students with disabilities has been done (see Table 2 for information about the studies). The majority of the authors of this research focused on students with emotional and behavioral disorders (EBD; Allen & Kramer, 1990; Diaddigo & Dickie, 1978; Hess, Rosenberg, & Levy, 1990; Newstrom, McLaughlin, & Sweeney, 1999; Ruth, 1996). Fewer researchers included participants with ASD (Fausett, 2014; Hawkins et al., 2011; Mruzek, Cohen, & Smith, 2007), students with attention deficit and hyperactivity disorders (ADHD; Flood & Wider, 2002; Gurrad, Weber, & McLaughlin, 2002), and students with learning disabilities (LD; Hess et al., 1990; Ruth, 1996). A smaller number of students with intellectual disabilities, communication disorders, and health impairments participated in some of the studies (Fausett, 2014; Hess et al., 1990; Ruth, 1996). All the studies but two took place in inclusive settings. Hawkins et al. (2011) implemented the contingency contracting in a special education school and at the students' homes, and Diaddigo and Dickie (1978) conducted their study at a private residential school. The participants with disabilities ranged in age from 7 to 16 years.

Regarding the students with ASD, the targeted behaviors for which contingency contracting was implemented were following classroom rules (Mruzek et al., 2007), non-compliance, physical aggression, verbal aggression, in-seat behavior, inappropriate interaction behaviors (e.g., touching the hair of peers; Hawkins et al., 2011), social initiations, and responses to social initiations (Fausett, 2014). The outcomes for the other students with disabilities included improving on-task behavior (Flood & Wider, 2002; Gurrad et al., 2002), in-class participation (Gurrad et al., 2002), homework completion (Ruth, 1996), school attendance (Hess et al., 1990; Ruth, 1996), appropriate social behaviors such as talking calmly and cooperating (Ruth, 1996), writing skills such as using correct capitalization and punctuation (Newstrom et al., 1999), reducing challenging behaviors (Diaddigo & Dickie, 1978), and personal hygiene and grooming habits such as combing hair and washing hands (Allen & Kramer, 1990).

Table 2

*Studies about the Use of Contingency Contracting with Students with Disabilities*

Reference <sup>a</sup>	Participants <sup>b</sup>	Setting	Intervention procedure	Outcome variables	Results
Allen And Kramer (1990)	1 male; 12 years old; EBD	Regular school	An individually developed contract between the student and school consultant	Personal hygiene and grooming	Positive
Diaddigo and Dickie (1978)	1 male; 10 years old; EBD	Private residential school	Contract between the student and teacher	Challenging behavior	Positive

Table 2-continued.

Fausett, 2014	3 males; 1 female; 2 <sup>nd</sup> – 5 <sup>th</sup> grade; ID <sup>c</sup> and ASD	Regular school	An individually developed contract between the students and teachers	Social interactions	Mixed <sup>d</sup>
Flood and Wider (2002)	1 male; 11 years old; ADHD	Regular school	An individually developed contract between the student and teacher	Off-task behavior	Positive
Gurrad et al (2002)	1 male; 12 years old; ADHD	Regular school	An individually developed contract between the student and teacher	Off-task behavior Participation in class	Positive
Hawkins et al. (2011)	4 males; 8-13 years old; ASD	Special education school Home	Individually developed home-school contracts	Off-task behavior Aggression Antisocial behavior	Mixed
Hess et al. (1990)	10 males; 3 females; LD, EBD, and CD <sup>e</sup>	Regular school	Individually developed contracts between the students and teachers	Truancy	Positive
Mruzek et al. (2007)	2 males; 9 and 10 years old; ASD	Regular school	Contracts between the students and teachers	Adherence to rules of conduct	Positive

Table 2-continued.

Newstrom et al. (1999)	1 male; 9 <sup>th</sup> grade; EBD	Regular school	An individually developed contract between the student and teacher	Writing skills	Positive
Ruth, (1996)	35 males; 8 females; 7-12 years old; EBD, LD, and HI <sup>f</sup>	Regular school	Individually developed contracts between the students, teachers, and psychologists	Academic and behavioral goal setting and achievement	Positive

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<sup>a</sup>Studies are listed in alphabetical order. <sup>b</sup>Based on the information available, chronological age, grade, or school level is reported to indicate students' ages. <sup>c</sup>ID= intellectual disability. <sup>d</sup>Mixed results are those indicating the intervention was not effective for some of the participants or some of the outcome variables. <sup>e</sup>CD= communication disorders. <sup>f</sup>HI= health impairment.

The procedures for creating contingency contracts for students with disabilities are similar to those done for typically developing students. However, the procedures used to develop the contracts, especially for students with ASD, were more specific in terms of the components of the contracts. Mruzek et al. (2007), for example, conducted a functional assessment and interviewed the students with ASD, their parents, and their teachers to determine the targeted tasks assigned to the students and to choose preferred rewards. Hawkins et al. (2011) developed both school and school-home contracts for the students with ASD to maximize the effect of the intervention and to facilitate generalization. Fausett (2014) added other components to the contingency contracting to help students remember the tasks by having the students engage in modeling and imitation sessions with their teachers to practice their social skills and by having them watch a short video regularly that showed the students negotiating the contracts. In the other studies involving students with disabilities, the contracts were developed individually with

each student and involved teachers and school psychologists in addition to the students.

However, due to the high number of participants, Ruth (1996) did not have them all negotiate the contracts, and Hess et al., (1990) used checklists to determine the reinforcers for the students. In two studies, the researchers combined contingency contracting with group consultation (Hess et al., 1990) and with functional communication training (Flood & Wider, 2002).

The majority of the studies showed that contingency contracting was effective in promoting outcomes of interest. However, Hawkins et al. (2011) and Fausett (2014) reported mixed results. In particular, teacher-student contracts were not effective for some of the students with ASD in these studies, but after adding school-home contracts (Hawkins et al., 2011) and modeling and imitation sessions (Fausett, 2014), the contracts did have an effect on the students' behaviors. Only one study (i.e., Fausett, 2014) included information on the students' ability to maintain the skills acquired, and the study showed that the contracts had a positive impact on maintenance. The results obtained in the research on using contingency contracting with students with ASD are consistent with those reported in Bowman-Perrott's et al. (2015) meta-analysis, which showed combining contingency contracting with other interventions or adding another component to contracts can enhance the effectiveness of the intervention.

One component that can be added to contingency contracting and that can promote outcomes of students with ASD is the involvement of other individuals such as parents (Hawkins et al., 2011) and siblings (Wahler & Fox, 1980; Welch, 1985) in the contract. Despite the great benefits of their involvement in interventions used with students with ASD (Chan et al., 2009), no study to date has focused on the involvement of peers in behavior contracts for students with ASD. The current study expanded the research base on PMI and on contingency contracting by

evaluating the effect of a treatment package that includes both interventions. The questions that guided the study were as follows:

1. What is the effect of peer tainting on the frequency of social initiations from peers of students with ASD?
2. What is the effect of peer training on the frequency of social responses from the students with ASD?
3. What is the effect of combining contingency contracting with peer training on the frequency of social initiations?
4. What is the effect of combining contingency contracting with peer training on the frequency of appropriate responses to social initiations?



## CHAPTER THREE: METHODOLOGY

### Participants and Setting

**Participants.** Four students with ASD were nominated by their teachers and the school principal to participate in the study. The teachers and principal selected these students because of their limited social skills. In conformity with the Institutional Review Board (IRB) regarding minimizing the risks associated with participating in the study and to protect the participants, one of the students was excluded from the study because he exhibited inappropriate behaviors toward his peers. In addition to the students with ASD, six typically developing peers participated in the study. The school principal and some general education teachers nominated the nondisabled peers based on several criteria suggested by Neitzel (2008). These criteria were (a) the students had to have adequate social and communicative skills, (b) the students had to be willing to participate, and (c) instructional time for interventions would not conflict with their schedules. I obtained written consent from the students' parents and oral assent from the students before starting the study. The following section provides more information about the participants' demographics and characteristics.

***Students with ASD.*** Three boys diagnosed with ASD participated in the study and received the interventions implemented in the study. Fahad was nine years old and was diagnosed with ASD based on the Gilliam Autism Rating scale ([GARS], Gilliam, 1995). GARS showed that the severity of Fahad's ASD was within the high level. The school records indicated that Fahad had an IQ of 59 based on the Stanford-Binet Intelligence Scale (5<sup>th</sup> edition) and that he had language disorders and hyperactivity. In terms of his social skills, Fahad avoided interacting with peers during his non-instructional time; instead, he engaged in solitary play. As for his academic skills, Fahad was unable to read and write and exhibited difficulty in learning

elementary mathematics. Saud was 11 years old and was diagnosed with ASD based on GARS. The severity level of the diagnosis was moderate. Saud had an IQ of 78 based on the Stanford-Binet Intelligence Scale (5<sup>th</sup> edition), and he demonstrated adequate literacy and language skills. Although Saud was able to speak, he rarely interacted with other students and lacked motivation to communicate with his peers. Sattam was eight years old and had moderate ASD based on GARS. The school psychologist indicated that he was unable to administer an intelligence test for Sattam because of Sattam's high level of repetitive behaviors. Sattam had language disorders and limited academic and social skills. The students with ASD engaged in a social program where they had opportunities to interact with trained peers. However, the school principle stated that the program was of little effect.

**Peers.** Six boys without disabilities participated in the study. The age of the nondisabled peers in the study ranged from 11 to 12 years. The students were sixth graders, had been nominated by the school as an example of what other students should be, and were above average in terms of their academic skills. Some of the peers had previously participated in social skills programs where they were prompted by teachers to interact with students with ASD.

**Setting.** The study took a place in an inclusive elementary school located in the west side of Riyadh, Saudi Arabia. The school had a population of about 600 students and 45 teachers, ten of whom were special education teachers. The school had two special education programs designed to educate students with ASD and students with ADHD. About 20 students with ASD attended the school and received special education in self-contained classrooms. The self-contained classrooms met the criteria set by the Ministry of Education in Saudi Arabia (2001). They included a maximum of five students and were equipped with materials necessary to provide effective individualized and small-group instruction such as small round activity tables.

The students with ASD had an opportunity to spend recess time with their general education peers. However, due to the large number of students attending the school, the students with ASD were placed in a special recess area. This area included two large playgrounds; each was about 32 feet long and 20 feet wide. Each playground had a variety of play materials and equipment such as swing sets and soccer balls and goals. Every school day, a small number of general education students, about 20 students, were allowed to enter the playground and spend time with the students with ASD.

### **Materials**

The materials that I used to implement the intervention included a laptop to type the contract, a projector to display the contract to the students, pencils to sign the contracts, and A4 white copy paper to print the contracts and the lists of the reinforcers. The materials needed to collect data were pencils, forms for frequency recording (see Appendix A), and intervention fidelity checklists.

### **Experimental Design**

Given the critical role single-case research has played in evaluating effectiveness of interventions that are used in applied settings such as schools (Horner et al., 2005), I used a single-case research design to answer the research questions. Compared to other research designs, not only are single-case research designs more feasible in applied settings, but they are also more practical in the sense that researchers are able to determine a functional relation between an independent variable and one or more dependent variables using a small number of participants (Horner et al., 2005; Kazdin, 2011). The latter point makes the use of single-case research designs more advantageous to researchers interested in working with low-prevalence populations such as individuals with disabilities (Horner et al., 2005; Kazdin, 2011).

Specifically, the design of the study was an ABC multiple-baseline design across three participants (Alberto & Troutman, 2013; Baer, Wolf, & Risley, 1968), in which A, B, and C designate the baseline, peer training alone, and peer training with contingency contracting, respectively. Figure 2 shows a hypothetical graph that reflects the design. I chose this design for several reasons. First, the changing conditions (i.e., ABC) would allow me to compare the effects of two interventions (i.e., peer training alone and peer training with contingency contracting). Second, the use of the multiple-baseline design across participants would also help to demonstrate a functional relation between the interventions and skills while controlling for other possible factors that might lead to changes in the skills (i.e., threats to internal validity), given the number of participants I had.

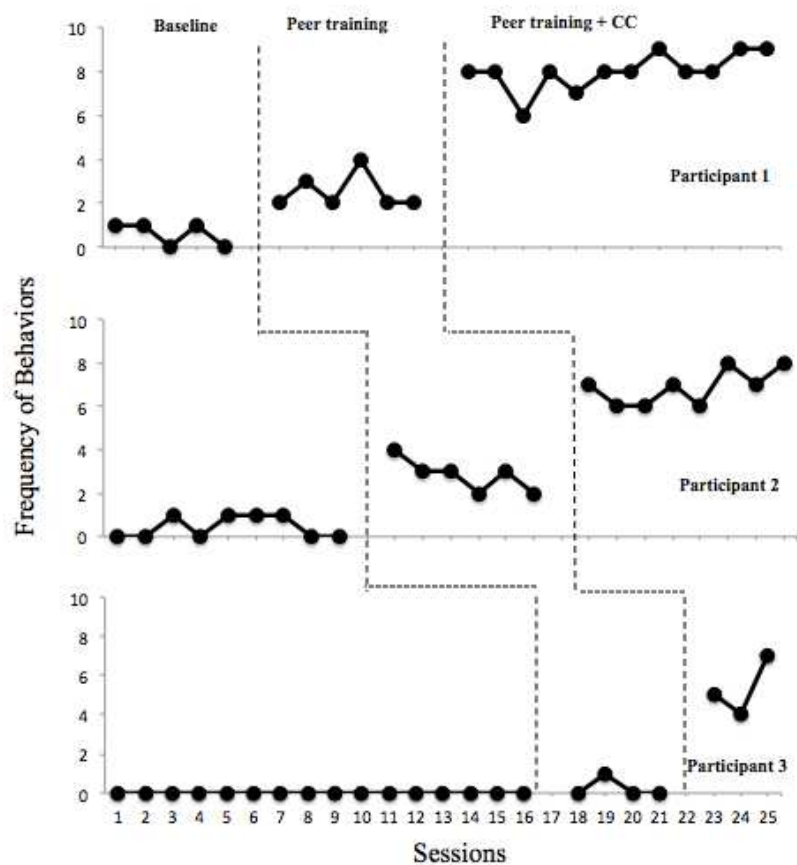


Figure 2. An example of the ABC multiple-baseline design.

Because there were three tiers and three different start points for each intervention condition, the design would demonstrate the effects of peer training implemented alone and the effects of peer training combined with contingency contracting at three different points in time (Cooper et al., 2007; Horner et al., 2005). The number of demonstrations would be sufficient to establish a functional relation between each intervention and the social behaviors of the participants (Kazdin, 2011). Peer training was implemented for the first participant when baseline data collected during 4 to 5 sessions revealed a stable or descending trend in the target skills. Prior to implementing peer training for the second participant, I waited until a clear trend in the skills of the first participant was evident in at least 4 to 5 sessions. I repeated the same procedure with the third participant. The introduction of contingency contracting with peer training followed the same procedures.

In addition to these experimental advantages, the use of the multiple-baseline design across participants was more appropriate to answer the research questions than the use of other single-case research designs (i.e., reversal design and altering-treatment design) in which the focus is usually on comparing the effectiveness of different interventions or on conducting a component analysis of an intervention (Kazdin, 2011). Furthermore, the targeted skills required the use of the multiple-baseline design across participants because social skills and behaviors such as initiating interactions with other individuals and responding to social initiations are sometimes irreversible and cannot be unlearned once they have been acquired (Kazdin, 2011). In addition, social interaction among students is a social phenomenon that is sometimes maintained by contingencies that exist in the environment (e.g., friendship, peer attention, and acquaintance). Therefore, social skills can no longer be affected by the intervention once they have been acquired (Zucker, Rutherford, & Prieto, 1979). The fact that the multiple-baseline design across

participants does not require a return to a baseline phase to establish a functional relation between the intervention and changes in the target skills gives the design an advantage over other single-case research designs, such as a reversal design (Kazdin, 2011).

Despite the advantages of using a multiple-baseline design across participants, there may be some possible concerns with the design of the study. It is possible that changes in social interactions for one participant during an intervention phase will bring about changes in the same behavior for the other participants during a baseline phase due to the effects of observational learning and imitation (Kazdin, 2011). To limit the effects of observational learning and imitation, I included participants with ASD who attended different classrooms and who had no interaction with one another during non-instructional activities. Moreover, because the design requires a delay in introducing the intervention to the second and third participants, it is possible that these participants may not receive a sufficient amount of instruction or that the number of data points collected during intervention phases for the participants will be too small to establish a functional relation between the intervention and the dependent variables (Kazdin, 2011). To deal with these concerns, I started the study at the beginning of the semester to ensure that each student received a sufficient amount of instruction and that the intervention phase for each participant included at least five data points. Finally, the ABC multiple-baseline design does not allow for reaching a valid conclusion about the unique effect of an intervention preceded by another due to the sequence in which the interventions are provided (Kazdin, 2011). That is, the design does not allow for ruling out the effect of the intervention implemented in the B phase (Kazdin, 2011).

## **Dependent Measures**

I conducted 10-min observations to collect data on the target behaviors. The number of observations in each phase was at least five. I used event recording to collect data on the peers' social initiations and on the social responses from the students with ASD. Event recording is recommended to collect information about behaviors that have a clear beginning and ending point and that occur at a steady rate such as most social behaviors (Cooper et al., 2007; Kazdin, 2011; Maag, 2004). Moreover, event recording has been a common recording strategy used in studies focusing on social skills and behaviors of students with ASD (e.g., Harper et al., 2008; Kamps, Barbetta, Leonard, & Delquadri, 1994; Kamps, Dugan, Potucek, & Collins, 1999; Laushey & Heflin, 2000; Owen-DeSchryver et al., 2008; Petursdottir, McComas, McMaster, & Horner, 2007).

**Definition of peer initiations.** The dependent variables in the study were social initiations by the peers and social responses to social initiations by the students with ASD. A social initiation is operationally defined as a communicative behavior that meets the following criteria (Banda et al., 2010; Beukelman & Mirenda, 2005; Harper et al., 2008; Krebs et al., 2010; Laushey & Heflin, 2000; McKinnon & Krempa, 2002; Owen-DeSchryver et al., 2008).

First, the behavior takes any form of verbalization, vocalization, or gesture. A verbalization is a verbal social initiation that is expressed in a complete word or sentence. Examples of a verbalization are verbal greetings, calling a student's with ASD name, asking a student with ASD a question, or offering assistance. Verbalizations that do not qualify as social initiations include any incomplete word or sentence such as saying "how are" instead of saying "how are you?". A vocalization is an initiation expressed with a voluntary sound that substitutes for speech including any sound used to attract attention or to elicit agreement. Vocalizations that

are not counted as social responses include all sounds that are involuntarily produced such as coughing or sneezing. A gesture is an initiation that is expressed via gross or fine body movements, facial expressions, eye movements, or posture. Examples of a gesture include waving one's hand to indicate a greeting or tapping a student with ASD on shoulder to get his attention. Any gesture that includes gross or fine physical movements that are involuntarily produced such as jumping involuntarily will not be counted as a social response. If two or more communicative behaviors occur simultaneously (e.g., saying "hi" while waving hands), the behaviors are counted as one response.

Second, The behavior triggers a response from a student with ASD. That is, the behavior should be exhibited in a way that elicits a response from the student with ASD. Examples are asking an initial question, asking a question that pertains to a response from a student with ASD, or a greeting. Non-examples include making a statement that does not elicit a social response (e.g., saying "I agree with you") or giving an answer to a question that does not require the student with ASD to give further comments.

Third, The behavior is clearly directed toward a student with ASD. A social initiation is considered clearly directed to a student with ASD if the peer initiates while looking at, turning his head toward, orienting his body toward, or standing or sitting within three feet of the student with ASD. A response that is directed to a peer other than the student with ASD is not counted as a social initiation. If one of the school's faculty or staff encourages or prompts the peer to interact with the student with ASD, the behavior will not be considered an initiation.

**Definition of appropriate social responses.** A social response to a peer's social initiation is operationally defined as a communicative behavior that meets the following criteria (Banda et al., 2010; Beukelman & Mirenda, 2005; Harper et al., 2008; Krebs et al., 2010;



Laushey & Heflin, 2000; McKinnon & Krempa, 2002; Owen-DeSchryver et al., 2008). First, The behavior takes any form of verbalization, vocalization, or gesture. A verbalization is a reply that is expressed in a complete word or sentence. Examples of a verbalization are saying “yes” or “no” in response to a peer’s question or saying “I am doing fine” in reply to a peer who asks “how are you today?”. Verbalizations that do not qualify as social responses include any incomplete word or sentence such as saying “ I am doing” instead of saying “ I am doing fine”. A vocalization is a reply expressed with a voluntary sound that substitutes for speech such as the sound “uh-huh” to indicate agreement or laughing when a peer tells a joke. Vocalizations that are not counted as social responses include all sounds that are involuntarily produced such as coughing or sneezing. A gesture is a reply that is expressed via gross or fine body movements, facial expressions, eye movements, or posture. Examples of a gesture include nodding one’s head to indicate agreement, waving one’s hand to indicate a reply to a greeting, looking at a peer in response to being addressed by the peer, and raising one’s eyebrows to indicate surprise at a comment. Any gesture that includes gross or fine physical movements that are involuntarily produced such as jumping involuntarily will not be counted as a social response. If two or more communicative behaviors occur simultaneously (e.g., saying “wow” while raising eyebrows), the behaviors are counted as one response.

Second, The behavior is a contingent response. That is, the behavior should be exhibited within eight seconds of the peer’s initiation toward the student with ASD. Examples of a contingent response are answering a question or responding to a request. Non-examples of a contingent response are answering a question asked by one peer to another peer (i.e., not to the student with ASD), giving an answer without being asked a question, or giving an answer more than eight seconds after the peer’s’ initiation.

Third, The behavior is clearly directed toward a peer who initiates a social interaction. A response is considered clearly directed to a peer if the student with ASD gives the response while looking at, turning his head toward, orienting his body toward, or standing or sitting within three feet of the peer giving the initiation. A response that is directed to a peer other than the one initiating is not counted as a social response.

If the student with ASD responds to one of the school’s faculty or staff, the behavior will not be considered a social response. In addition, if one of the school’s faculty or staff encourages or prompts the student with ASD to interact with peers, the behavior will not be considered a social response.

**Reliability**

To evaluate the reliability of data, two observers independently and simultaneously recorded the data in each condition. Special education teachers who had expertise in data collection served as the reliability coder, and the reliability coders and I sat within 8 to 10 feet of the participants when observing them. The inter-observer agreement was calculated using the total agreement method by dividing the smaller frequency by the larger frequency and multiplying by 100. Table 3 and Table 4 present the reliability data. I also plotted the data recorded by the secondary observer in Figures 3 and 4 because of the large variability of the reliability data.

Table 3

*Reliability of Data on the Social Responses from the Students with ASD*

Student	Baseline		Peer training		Contingency contracting	
	Range	Mean	Range	Mean	Range	Mean
Fahad	100%-100%	100%	75%-100%	92%	78%-100%	84%

Table 3-continued.

Saud	0%-100%	67%	67%-100%	83%	43%-83%	67%
Sattam	100%-100%	100%	75%-100%	87%	58%-73%	65%

Table 4

*Reliability of Data on the Social Initiations from the Peers*

Peers	Baseline		Peer training		Contingency contracting	
	Range	Mean	Range	Mean	Range	Mean
Fahad's peers	100%-100%	100%	60%-100%	78%	55%-100%	78%
Saud's peers	0%-100%	67%	67%-100%	83%	62%-100%	76%
Sattam's peers	50%-100%	83%	83%-100%	91%	60%-65%	62%

### Experimental Conditions

**Baseline.** Prior to the implementation of peer training and contingency contracting, the observers collected baseline data following the procedures described under the Experimental Design section of this paper. The collection of baseline data took place during 10-min probe periods of recess time, which lasted for about 30 minutes. During the baseline phase, the participants did what they typically do during recess time. There were opportunities for the participants to interact with one another, and there were some prompts directed to the participants by teachers to encourage the students to interact. As stated previously, the observers sat or stood within 8 to 10 feet of the participants. When asked by the students about their presence at the recess area, the observers indicated that they were observing how students play during recess.

**Peer training alone.** I conducted 3 to 4 sessions of peer training immediately after the last session of the baseline; each session lasted for approximately 30 minutes. There was no data collection during the peer training. Peer training involved teaching the typically developing peers to work with the students with ASD (Kamps, Locke, Delquadri, & Hall, 1989). In the first session, I explained and discussed the characteristics of students with ASD with their peers. The discussion included topics such as impairments and deficits that students with ASD have, the needs of students' with ASD, and how one can help them meet these needs. The discussion ended with answering questions the students had. In the following sessions, I modeled how and when the students should prompt, model, and provide corrective feedback to or praise the students with ASD. Finally, the students and I acted out how to interact with the students with ASD, and I pretended to be the student with ASD (Chan et al., 2009). I continued conducting the training sessions until the peers were able to implement the teaching strategies (i.e., prompting, modeling, and providing feedback) appropriately. After the last session of peer training, I started data collection similar to the baseline condition.

**Peer training and contingency contracting.** During this phase, I implemented the contingency contracting along with peer training. I created a contingency contract for each student with ASD (see Appendix B) and for each peer (see Appendix C). I followed the steps for creating a behavior contract as recommended by Walker and Shea (1984) with each student. In a small classroom, I sat with the student around a small table, developed rapport with the student, and indicated the purpose of the meeting. I then explained what a contract was and gave multiple examples of a contract. I explained the meaning of a contract and gave examples until the student gave a correct example of a contract. Using a laptop and projector, I showed a form that included the components of the contract, and I explained each component to the student and talked about

what we were going to write in the contract. I then discussed the task with the student; the task assigned to the students with ASD was to interact with peers, and the task assigned to their peers was to help the student with ASD interact by prompting, modeling, and providing feedback about social behaviors. After discussing the task, I discussed the reinforcers with the student by asking the student to choose preferred activities or items from a list that showed a variety of activities and items.

For the purpose of providing a preferred item or activity every week, I wrote the reinforcers that the student would select, and then I ranked the reinforcers in the student's order of preference. I negotiated the ratio (i.e., how well the student needs to perform the task to get the reward) of task to reinforcer with the student. Specifically, I discussed the criteria for getting the reinforcer, and when the student could get the reinforcer until we came to an agreement. After the discussion of the reward, the student and I agreed on a date to review and renegotiate the contract. We reviewed the contract every day and renegotiated it every week. I typed the contract using a laptop while a large screen showed the contract so that the student could see. I printed a copy of the contract for the student, signed the contract, had the student sign the contract, gave verbal affirmation of the contract terms, and elicited the students' verbal affirmation. Finally, I congratulated the student for making the contract and told him we would meet every week to renegotiate the contract and to provide the reward. I also told the student that we would meet every day to review the contract and the task record included in the contract. The observers collected data on the dependent variables after writing the contract and did not interact with the students unless a student displayed self-injurious behavior or aggressive behavior directed toward other students.

## **Intervention Fidelity**

I collected data on intervention fidelity using three checklists. The first checklist (see Appendix D) includes important steps for selecting and training peers to work with students with ASD suggested by Neitzel (2008). I used the checklist in every training session. The second checklist (see Appendix E) includes the steps for creating contingency contracts as suggested by Walker and Shea (1984) and was used during the creation of contingency contracts. The last checklist (see Appendix F) was used to collect information on the fidelity for 20% of the weekly renegotiation sessions.

The intervention fidelity for peer training was collected during all training sessions and was 100% for all sessions. The fidelity for the creation of the contracts was measured for every participant except for Fahad's peers because I was unable to find a teacher to observe the session and collect the needed information. The intervention fidelity regarding the development of the contract was 100% for Saud, Sattam, and their peers. The fidelity regarding the weekly renegotiation sessions was evaluated during at least 20% of the sessions, and the integrity for renegotiating the contract was 100% for every student and in each session.

## CHAPTER FOUR: RESULTS

I analyzed the data using single case research design visual analysis. Visually analyzing data in single case research has an advantage over the use of statistical analyses in helping researchers identify interventions that only result in profound effects, a highly desirable kind of effects in applied research and settings (Baer, 1977; Kazdin, 2011). The visual analysis focused on data patterns both within and across the participants. Within each participant, I analyzed the trends, the levels, and the variability of the data (Kazdin, 2011; Kratochwill, et al., 2010). I created the trend lines using the split-middle method (Lane & Gast, 2014). I also analyzed the immediacy of changes observed in the behaviors and the overlap of the data between the experimental conditions (Kazdin, 2011). In addition, I analyzed the consistency of the data patterns to evaluate whether the intervention effects were replicated across the participants (Kazdin, 2011; Kratochwill, et al., 2010). According to the quality indicators of single case research designs recommended by Horner et al. (2005), the conclusion regarding the functional relation between the intervention and the dependent measures was based on the demonstration of the intervention effects at three different points of time.

The following sections provide details about what the analyses revealed regarding the changes observed in the number of social initiations by the peers and in the frequency of the students' with ASD correct social responses to the initiations. In addition, the percentages of correct social responses by the students with ASD were calculated and are addressed in the following sections.

### **Peers' Social Initiations**

Figure 3 presents the frequency of social behaviors initiated by the peers across the three phases. There were two peers assigned to work with every student with ASD. The following

sections provide a detailed description of the results about the performance of Fahad's, Saud's, and Sattam's peers.

**Fahad's peers.** During the baseline phase, the data pattern of social initiations from Fahad's peers was stable without a trend. The peers exhibited no social initiations in the first and last two sessions of the phase. The number of social initiations ranged from 0 to 2 with a mean of 0.40. After the implementation of peer training, the frequency of social initiations increased and ranged from 0 to 5 with a mean of 2.40. However, because the peers did not display any social initiation in the last two sessions of the peer training phase, the data pattern in this phase showed a descending trend. Upon the introduction of contingency contracting, Fahad's peers immediately increased the social initiations, in comparison to the peer training condition. The initiations ranged from 5 to 20 with a mean of 14 initiations, and the data pattern in this phase showed an ascending trend.

**Saud's peers.** The baseline frequency of social initiations by Saud's peers indicates a slightly increasing trend. The frequency ranged from 0 to 5 with a mean of 2.33, which reveals little variability in the data. After receiving training, the peers initiated social behaviors without noticeable improvement in the frequency of the initiations, compared to the baseline. The frequency ranged from 0 to 5 ( $M = 1.6$ ) with little variability. There was overlap between the baseline and peer training data, and the trend of the social behaviors was decreasing. When the contingency contracting was conducted, the peers showed improvement in the frequency of social initiations. The frequency of social initiations ranged from 13 to 24 ( $M = 18.3$ ) with no overlap with the baseline and peer training data. The immediacy of change in the behaviors was evident, given the large difference in the frequency of social initiations between the three phases. The trend of the behaviors during the contingency contracting phase was significantly ascending.



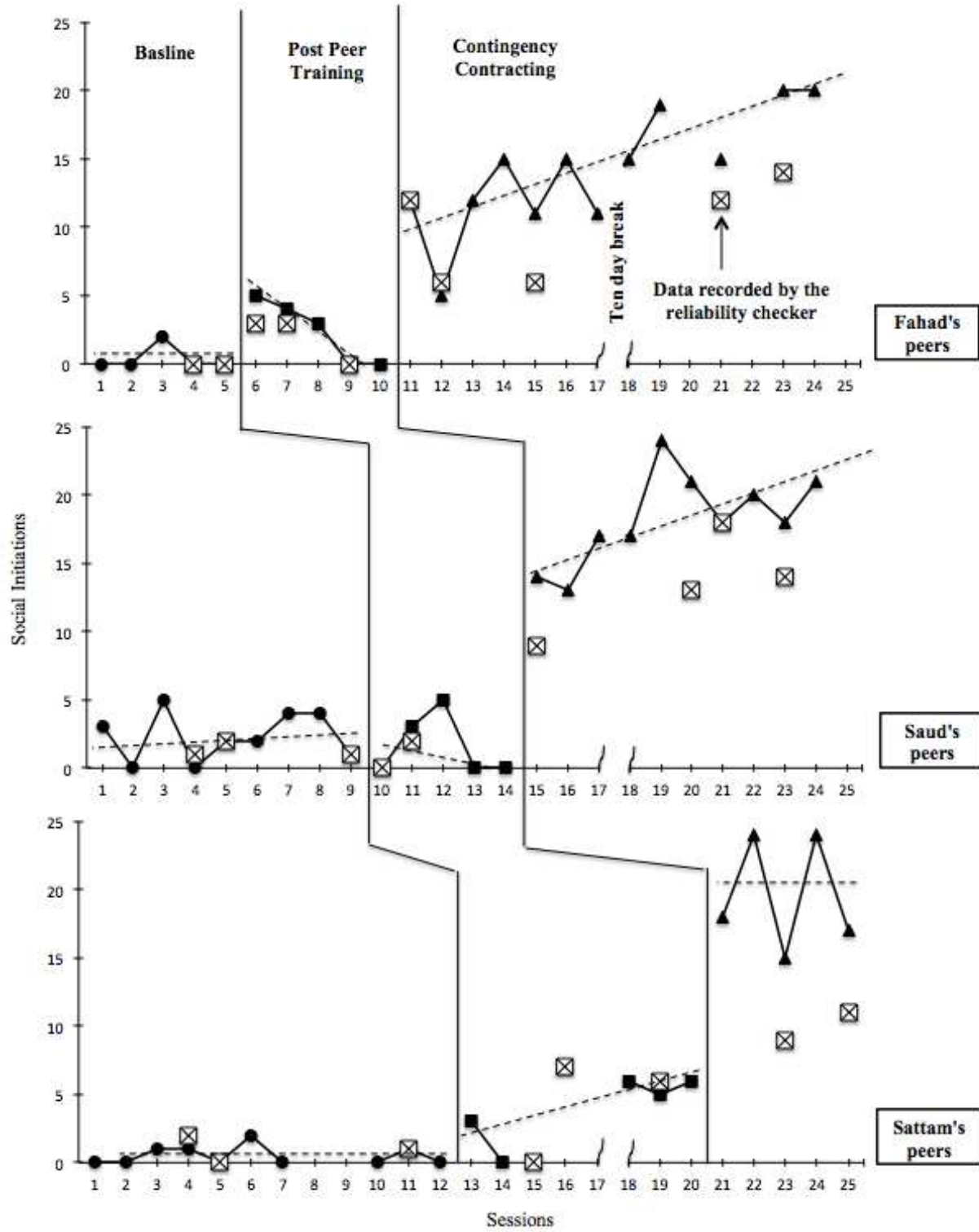


Figure 3. Frequency of social behaviors initiated by the peers across the three phases.

**Sattam's peers.** The data path was flat with no trend and with little variability during the baseline. The number of social initiations ranged from 0 to 2 with a mean of 0.50. After receiving training, the peers did not immediately increase the number of social initiations. The social initiations during the peer training sessions ranged from 0 to 7 with a mean of 4.50, with little overlap in the baseline and peer training data. The data pattern in this phase was slightly divergent and the trend of the data was increasing. Although the trend of the peer training data was increasing, the start of the contingency contracting led to a rapid change in the level of social initiations. There was a flat line with no trend during the contingency contracting phase and the students' social initiations ranged from 15 to 24 ( $M = 19.6$ ).

**Conclusion.** The data for the three groups of peers indicate similar patterns of change regarding the effects of peer training and contingency contracting. All the peers initiated a small number of social behaviors during the baseline. The number of social initiations slightly increased for the groups when they received training. However, the number of social initiations from Fahad's and Saud's peers started to decrease in the peer training condition. Sattam's peers showed little improvement throughout the peer training phase, but the improvement was gradual and minimal. There was a large amount of overlap between the baseline and peer training data for the three groups of peers. The data pattern across the peer groups suggests peer training had little effect on the peers' social initiations. The number of social initiations from all the peers significantly increased when the peers signed their contracts. The patterns of change observed in the frequency of social initiations during the contingency contracting phase were consistent across the three groups with no overlap between the contingency contracting data and the data collected in the preceding phases. The consistency in the patterns of the contingency contracting

data across the peers supports the conclusion that there was a functional relation between contingency contracting and the improvement in the peers' social initiations.

### **Students' with ASD Social Responses**

Figure 4 displays the data on the frequency of social responses from the students with ASD across the baseline, peer training, and contingency contracting phases. The following sections provide a detailed description of the results about the performance of the students with ASD.

**Fahad.** Fahad had few opportunities to respond to social initiations during the baseline phase. The social responses ranged from 0 to 2 with a mean of 0.40. The baseline data for Fahad were stable. When his peers received training, the level of social responses for Fahad increased during the first three sessions of the peer training phase. However, the peers stopped initiating in the last two sessions. As a result, the trend of Fahad's social behaviors was descending. The number of correct social responses ranged from 0 to 4 ( $M = 2$ ). When contingency contracting was implemented, Fahad and his peers engaged in more social interactions. Thus, Fahad had a higher number of social responses compared to the numbers in the baseline and peer training phases. The change of Fahad's social responses was immediate as he exhibited a total number of 21 responses at the beginning of the contingency contracting phase, compared to two social responses in the last three sessions of the peer training phase. Fahad's social behaviors in this phase ranged from 4 to 18 with a mean of 11.33. The contingency contracting data showed an ascending trend and did not overlap with data obtained in previous phases.

**Saud.** There were a small number of opportunities for Saud to respond during the baseline phase. His responses to the peers' social initiations ranged from 0 to 2 with a mean of 1.2. The range and mean suggest a relatively stable data pattern with no variability. When his

peers received training, Saud started to respond more frequently as his peers initiated more social behaviors. However, his responses decreased at the end of the phase, making the data overlap with the previous phase. The range of the responses in this phase was 0 to 5 with a mean of 1.6, indicating little variability in the data. There was a descending trend for Saud's social responses in this phase. Upon the introduction of contingency contracting, Saud started to have higher social initiations, leading him to respond more frequently. In fact, the improvement of Saud's social behaviors was noticeable as he exhibited 36 social responses in the first three sessions of the contingency contracting phase. The contingency contracting data did not overlap with data collected in the other phases. The data in this phase showed an ascending trend and had a moderate level of variability. The social responses during this phase ranged from 8 to 19 with a mean of 13.6.

**Sattam.** Sattam's rate of social responses was small during the baseline. His social responses ranged from 0 to 2 ( $M = 0.4$ ), and the baseline data showed a slightly decreasing trend with no variability. During the peer training condition, he had more opportunities to have social interactions with peers. Therefore, his social behaviors slightly improved and ranged from 0 to 5 ( $M = 3.3$ ). The trend of the peer training data was ascending, and the data had little overlap with the baseline data. The change in the social responses for Sattam was noticeable when contingency contracting was implemented. His responses during the contingency contracting condition improved and ranged from 12 to 22 with a mean of 16.4. The data had a moderate level of variability and did not overlap with data obtained in the baseline and peer training phases. The data pattern showed an ascending trend during this phase.

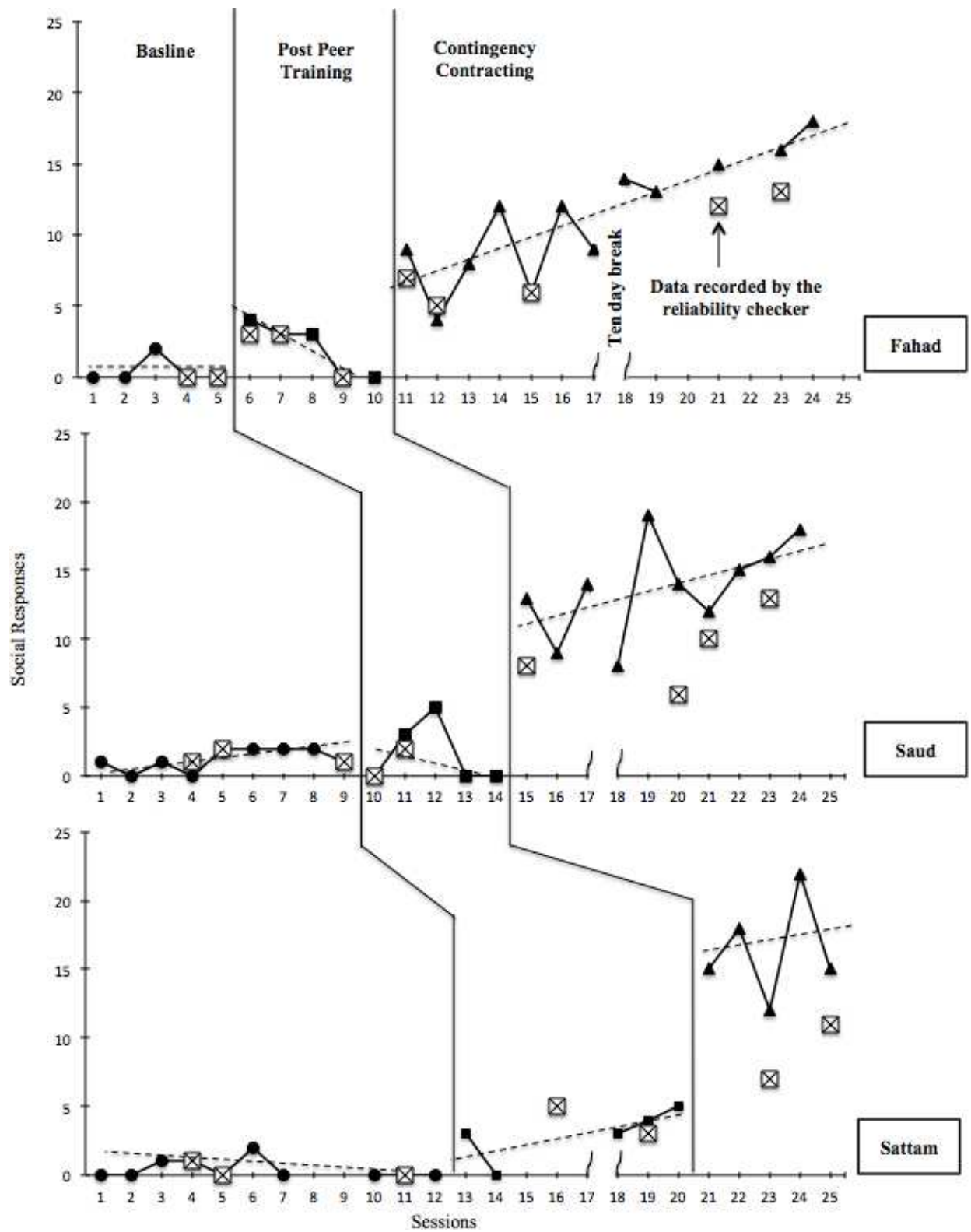


Figure 4. Frequency of social responses to the peers' initiations across the three phases.

**Conclusion.** Taken together, the data for the three participants with ASD indicate similar findings regarding the effects of peer training and contingency contracting. All the students with ASD exhibited a small number of social responses during the baseline. The number of social responses slightly increased for the three students when their peers received training. However, the number of social responses from Fahad and Saud started to decrease in the peer training condition. Sattam showed gradual improvement throughout the peer training phase. There was some overlap between the baseline and peer training data for the three students. The consistency in the data patterns across the students shows that peer training had little effect on the students' social responses because the peers did not provide many opportunities for them to reciprocate. The frequency of social responses from all the students significantly increased when they signed their contracts. The patterns of change observed in the frequency of social responses during the contingency contracting phase were consistent across the three students, with no overlap between the contingency contracting data and the data collected in the previous phases. The consistency in the patterns of the contingency contracting data across the students suggests a functional relation between contingency contracting and the high frequency of social responses from the students with ASD.

### **Percentages of Correct Social Responses from the Students with ASD**

The purpose of this section is to show the percentages of correct social responses from the students with ASD to the peers' initiations. The data will help to determine the effect of the interventions on the rate of the students' with ASD social behaviors, regardless of the number of social initiations they had. I calculated the percentages of correct social responses by dividing the number of social responses by the number of social initiations and multiplying by 100. Table 5

and Table 6 display the number and the percentages of correct responses for Fahad, Saud, and Sattam, respectively.

Fahad’s peers socially initiated in one session during the baseline. Fahad was able to respond to all the peers’ initiations. Fahad continued to show high percentages of correct responses when his peers had training and when they started to initiate more frequently. Fahad also continued to respond to a higher number of initiations during the contingency contracting phase.

Table 5

*Numbers of the Students’ with ASD Correct Responses*

Student	Baseline		Peer training		Contingency contracting	
	Range	Mean	Range	Mean	Range	Mean
Fahad	0-2	0.4	0-4	2	4-18	11
Saud	0-2	1	0-5	1.6	8-19	14
Sattam	0-2	0.4	0-5	3	12-22	16

Table 6

*Percentages of the Students’ with ASD Correct Responses*

Student	Baseline		Peer training		Contingency contracting	
	Range	Mean	Range	Mean	Range	Mean
Fahad	- <sup>a</sup>	-	75%-100%	85%	67%-100%	79%
Saud	20%-100%	65%	-	100%	47%-93%	75%
Sattam	0%-100%	75%	50%-100%	77%	75%-92%	84%

<sup>a</sup>The student socially responded in one or two sessions.

Saud had a moderate average percentage of correct responses during the baseline. When his peers received training, Saud had an opportunity to respond in two sessions with 100% correct responses. As he started to receive more initiations in the contingency contracting phase, lower percentages of correct responses were evident. The average percentage of Sattam's correct responses was 75% during the baseline. During the peer training condition, Sattam was able to respond to his peers' initiation with relatively high percentages of correct responses. Sattam had higher percentages of correct responses when contingency contracting was implemented, compared to preceding phases.

The percentages of the students' with ASD correct social responses to social initiations did not change as a result of the improvement in the peers' social initiations. In other words, the students with ASD were able to show high percentages of correct social responses throughout the baseline, peer training, and contingency contracting phases.



## CHAPTER FIVE: DISCUSSION

This chapter includes a discussion of the focus, purpose, and findings of the study in the context of research on PMI for children with ASD. I will offer some explanations for the changes observed in the participants' social interactions throughout the study. I will also discuss some practical implications and directions for future research at the end of the chapter.

### **Research Focus, Purpose, and Results**

The current study extended the research on PMI by demonstrating (a) the effect of peer training that was implemented without adult prompting and reinforcement on promoting social interactions between students with ASD and their peers, (b) the effect of adding components (i.e., visual prompts and reinforcement) that may enhance the effectiveness of PMI, and (c) the effect of the change in peers' social initiations on the social behaviors of students with ASD. The results showed that peer training without adult prompting and reinforcement did not result in noticeable improvement in social interactions among the participants. However, when the participants signed their contracts, which helped to provide them with prompts and reinforcement, they engaged in a significantly higher number of interactions. The increase in the frequency of the peers' social initiations improved the number of social responses from the students with ASD. That is, the students with ASD were able to respond to more frequent and complex social initiations.

The study findings are consistent with results obtained in other research that show PMI in and of itself may be essential but insufficient to improve social interactions between students with ASD and their peers (Ganz et al., 2012; Labbe-Poisson, 2009; McConnell, 2002; Sainato et al., 1992; Thiemann & Goldstein, 2004). In this research, including the current study, peer

training did not significantly improve social initiations from the typically developing peers, and in turn it did not promote social interactions with the students with ASD.

There are several reasons that may be responsible for the limited effects when peer training was implemented alone. First, according to Crick and Dodge (1994), social interaction is a circulating process that starts with encoding and interpreting social cues and ends with enacting a social behavior. Crick and Dodge (1994) stated that children evaluate the outcomes of their social behaviors in a given context, and based on the outcomes they decide whether to perform the same behaviors in similar social contexts. The lack of improvement in the peers' social performance during the peer training phase could be explained by the lack of social cues (e.g., responses from the students with ASD or adult prompting) or by undesired social outcomes of the peers' social initiations.

Second, literature on ASD shows that many children with ASD do not appreciate social reinforcers (e.g., a smile or compliment) from peers, even if the peers have training (Taylor, 2013). Moreover, the literature reveals that peers, regardless of the amount of training they get, may not find interacting with students with ASD a pleasant experience due to the lack or inappropriateness of social responses from students with ASD (Carter et al., 2012; DiSalvo & Oswald, 2002). Therefore, the literature suggests that the use of tangible rewards during social training and instruction is of great benefit as it can help to address the lack of social motivation for both students with ASD and their peers (Taylor, 2013).

In order to capitalize on the benefits of PMI, I implemented contingency contracting in the study because it serves as a visual prompt and facilitates the use of reinforcement (Cooper et al., 2007). The peer initiations improved when the PMI was combined with reinforcement and prompting provided via contingency contracting. Ultimately, the students with ASD benefited

from the increased initiations because they had more opportunities to engage with the peers as demonstrated in the study. These findings are consistent with other research suggesting the importance of using prompts and reinforcement (e.g., Harper et al., 2008; Owen-DeSchryver et al., 2008) in maximizing the effect of interventions designed to enhance social interaction between students with ASD and their peers. The results are also consistent with research conclusions that PMI must include additional components in order to be effective (e.g., Sainato et al., 1992; Thiemann & Goldstein, 2004).

Another important finding of the study is that the students with ASD exhibited high levels of appropriate responses to their peers' social initiations, even with the increasing number and complexity of the initiations. The high percentages of appropriate responses may be surprising in view of the fact that many children with ASD have difficulty adjusting their behaviors to fit varying social contexts (APA, 2013). The high reciprocation from the students with ASD may have shown the benefits of PMI. Literature on child development reveals that children are more socially active when they interact with others of their own age because they are stimulated by similar thoughts and interests (Guralnick, 1981). Children imitate and learn many social behaviors from their peers because of the effects of peer pressure, attention, and affiliation (Greenwood & Hops, 1981; Peck, Cooke, & Apolloni, 1981). The peers might have modeled different social responses to the students with ASD, and the students with ASD might have learned the responses via observational learning (Bandura, 1971). Therefore, involving peers in social skills interventions can effectively facilitate the acquisition of social skills (Peck et al., 1981).

Finally, although it was not addressed in the research questions, it is worth mentioning that two of the students with ASD, Saud and Sattam, started to initiate social interactions with

their peers. In addition, the teachers of the students with ASD noticed that the students became happier and more excited than the other students who did not participate in the study. Moreover, some of the peers were able to use different strategies, other than those taught in the training sessions, to help the students with ASD keep engaging in the interactions. For example, Saud's peers brought some snacks that Saud liked in multiple sessions during the contingency contracting condition to maintain the interactions with him. In addition to these observations, the special education teachers and administrators noticed the improvement in the students' behaviors when contingency contracting was conducted. Therefore, they adopted the materials used with the study sample and used them with students with ADHD.

### **Limitations**

The current study has several limitations. The first limitation relates to the reliability of the study data. Low levels of reliability were evident in multiple sessions in the baseline because of the extremely low frequency of target behaviors (Thorndike & Thorndike-Crist, 2010) and in the contingency contracting condition. As shown in Figures 3 and 4, there was some variability between the study data and the data collected by the reliability checker in some sessions. In spite of the variability, the overall data pattern suggested a functional relation between contingency contracting and the dependent measures. Although low reliability averages are not unusual in research focusing on social skills (e.g., Banda et al., 2010; Kohler et al., 1995), the reliability averages were lower than the minimum acceptable value of reliability averages (i.e., 0.80; Kratochwill et al., 2010). In addition, I used the total agreement method to estimate the reliability, but this method has some limitations. According to Kazdin (2011), the total agreement method does not help researchers determine whether observers agreed upon a

particular occurrence of the behavior. Therefore, the observers in this study may have recorded different occurrences of the social behaviors, even when the reliability level was high.

The second limitation relates to treatment fidelity and to social validity. There was no information on treatment fidelity for Fahad's peers because I could not find another person to observe me while I was signing the contract with the peers. So there was no way to determine the accuracy and conformity of implementing the contracts (Smith, Daunic, & Taylor, 2007). As a result, it is difficult to determine the accuracy of delivering the intervention. A related limitation is that I did not collect social validity data because I had to finish the study earlier than it was planned; the Ministry of Education asked school districts to start final examinations earlier than it was officially determined. Without such information, it is difficult to determine the social validity of the intervention with regard to the goals, effects, and acceptability of the intervention procedures (Gresham & Lopez, 1996).

The third limitation pertains to the generalizability of the study findings. In comparison to typical students with ASD, the three students who participated in the study had higher social skills. Therefore, the study results may apply only to students with ASD who have already acquired social skills but who need to be provided with opportunities to perform the acquired skills. In addition to these limitations, the data collection for some of the participants was not continuous due to the students' repeated absences from school and to a ten-day school vacation. Collecting continuous data is a key feature of the research design and is essential for reaching valid conclusions about intervention effects (Kazdin, 2011). The patterns of the participants' social interactions might have been different if I had collected the data continuously (Kazdin, 2011).

Furthermore, because of time constraints, I was not able to evaluate the effect of the study interventions on generalization and maintenance of the social behaviors. Therefore, it is difficult to determine the effect of the interventions on the participants' abilities to maintain and generalize social interactions in new and different contexts. Because an ultimate goal of applied research is to evaluate interventions that result in enduring improvement without having subjects continue receiving the interventions (Baer et al., 1968), the lack of information about generalization and maintenance may limit the conclusion about the intervention effects.

Finally, The order of the interventions limits the conclusion about the study. Because the focus of the study was to evaluate the effects of two interventions, it is possible that the order in which the participants received peer training and contingency contracting may have influenced the results (Kazdin, 2011). It is possible that the observed effect of contingency contracting was a result of how the two interventions were implemented in the study.

### **Practical Implications**

One of the most distinctive characteristics of children with ASD is persistent impairment in socialization (APA, 2013). Many children with ASD are unable to socially reciprocate and empathize with other people without receiving special social skills interventions (APA, 2013; Mesibov & Shea, 1996). Moreover, many children with ASD show no motivation to engage in social interactions and find it difficult to adapt to new social situations (APA, 2013). These social deficits can lead to further deficits in other areas of development and can result in emotional and social consequences, such as low self-esteem, depression, and social withdrawal, for both children with ASD and their families (Bellini, 2006b; Charlop & Erickson, 2013; Green et al., 2000; Ludlow et al., 2011; Tantam, 2000).

These social deficits, the difficulty to typically acquire and perform social behaviors, and the negative impact of social impairment underline the need for specially designed instruction to teach social skills to students with ASD. Supported by theoretical explanations of social development and by a strong research base, the use of PMI to teach social skills to students with ASD has become a popular practice (Rogers, 2000). Interventions involving and mediated by peers help to modify both the physical and social environments (Bellini, 2006a). They also facilitate the use of typical stimuli and social reinforcers, which in turn promotes social outcomes for students with ASD (Bellini, 2006a; Rogers, 2000; Thiemann & Kamps, 2008).

The results of the study suggest that educators should be aware that placing students with ASD in inclusive settings does not necessarily promote social integration (Rogers, 2000). In fact, students with ASD need specially designed interventions in order to socially benefit from inclusive education (Mesibov & Shea, 1996). Crucial to planning effective social interventions is the consideration of modifying the social environment by facilitating opportunities where students with ASD can successfully interact with their general education peers. Creating a supportive social environment requires providing special instruction to both students with ASD and their peers.

Because students with ASD often exhibit aberrant behaviors, their peers may have negative attitudes towards them, thus avoiding interacting with them (DisSalvo & Oswald, 2002). Therefore, it is important to educate general education students about the characteristics of ASD and to teach them how to appropriately interact with students with ASD. It is also important to remember that in order to maximize the effectiveness of peer training, teachers should use other interventions alongside peer training to help general education peers maintain

interaction with students with ASD. Contingency contracting like the one demonstrated in the study can be a good strategy.

In addition to the importance of training and prompting peers, teachers should be aware that students with ASD and their peers might lose interest in maintaining social interactions. Students with ASD usually show no motivation to interact with peers, and as a result, the peers may not find the interactions enjoyable, thus avoiding further interactions (Taylor, 2013). Students with ASD may also be less interested in social interaction due to the continuous interaction failure and to the difficulty to understand others' communicative behaviors. Therefore, to enhance the effectiveness of a social skills intervention, students with ASD and their peers should be given the opportunity to experience successful and enjoyable social interactions (Taylor, 2013). Teachers can provide tangible rewards at initial phases of the intervention to students with ASD and their peers to make the interaction enjoyable, thus increasing the level of the students' social motivation (Taylor, 2013). As reported in the current study, one way to provide tangible rewards is to implement contingency contracts similar to those used in the study.

### **Directions for Future Research**

The study findings suggest several directions for further research. First, the purpose of the study was to improve social interaction between students with ASD and their peers without disabilities. Social interaction involves reciprocity between two parties. That is, each party involved in an interaction should be able to appropriately initiate and respond. However, the focus of the study was on the frequency of social responses from the students with ASD. Future research is needed to determine the effects of peer training and contingency contracting on the frequency of social initiations from students with ASD. Second, there is a large body of research



addressing the unique effect of PMI, including peer training, on improving social skills for students with ASD (Chan et al., 2009; Reichow & Volkmar, 2010). There is a need for more research to determine the unique effectiveness of contingency contracting on promoting social interactions among students with ASD and their typically developing peers.

Third, as mentioned earlier, I was not able to evaluate the effect of the study interventions on generalization and maintenance of the social behaviors. Because interventions used in applied settings such as schools should bring about permanent improvement without continuous provision of the interventions (Baer et al., 1968), future research is required to determine the effect of peer training and contingency contracting on maintaining and generalizing social interactions. Fourth, the participants of the study were elementary school students with a high level of social skills. ASD is characterized by social deficits that persist across the lifespan and by a broad spectrum of developmental impairments (APA, 2013). The persistence of social impairment for a lifetime underlines the need for social interventions for youths and adolescents with ASD (Walton & Ingersoll, 2013). More work is needed to address the effectiveness of the interventions on social interaction between older students and between students with different demographics and characteristics.

Fifth, I did not gather information on social validity of the study findings and interventions. Therefore, additional research is needed to evaluate the social importance of the intervention effects and the acceptability of the intervention. Finally, given the increasing number of students with ASD attending school and the heavy workload of special education teachers, it is important to evaluate the easiness, usefulness, and cost-effectiveness of contingency contracting in future research.

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**APPENDIX A**  
Frequency Recording Sheet

Date:

Observer:

Student with ASD

Name:

Unprompted social responses		Total:
Prompted social responses		Total:

Peers

Names:

Unprompted social initiations		Total:
Prompted social initiations		Total:

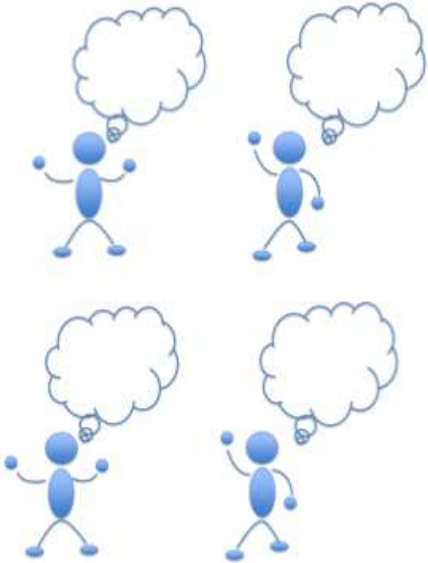
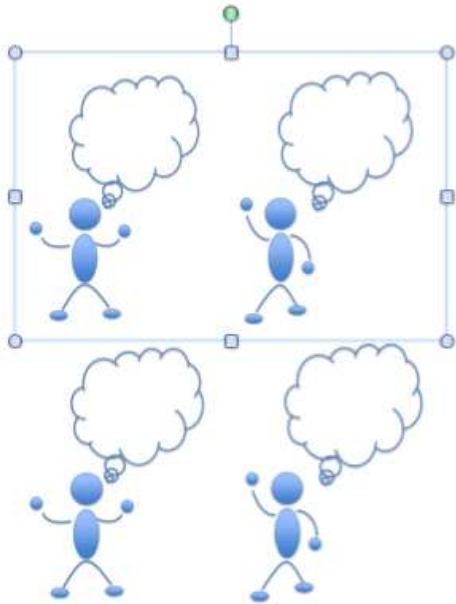
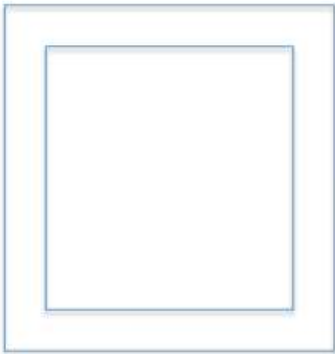
**APPENDIX B**  
Contingency Contract for Students with ASD



**My Behavior Contract**



I,....., agreed with ..... on getting the reward shown below for interacting with my friends ..... and..... during recess for ..... minutes



Name:  
Signature:

Name:  
Signature:

**APPENDIX C**  
Contingency Contract for Peers

<b>Contract</b>									
<b>Task</b>					<b>Reward</b>				
<b>Who:</b> (the student)					<b>Who:</b> (the teacher)				
<b>What:</b> (the task)					<b>What:</b> (the task)				
<b>When:</b>					<b>When:</b>				
<b>How well:</b> (criteria for acceptable performance)					<b>How much:</b> (the reward)				
<b>Signature:</b>					<b>Signature:</b>				
<b>Date:</b>					<b>Date:</b>				
This is an agreement between (student's name) and (my name). The contract begins on ( / / ) and ends on ( / / ). It will be reviewed every day and renegotiated every week.									
<b>Task Record</b>									
M	T	W	TH	F	M	T	W	TH	F



**APPENDIX D**  
**Training Session for Peers Checklist**

Students' names:

Observer's name:

Date:

Steps	Check if the step was implemented	Note
The training session is arranged in a quiet area.		
The trainer has all materials needed for training.		
The trainer teaches peers to recognize and appreciate individual differences including similarities and differences of ASD.		
The trainer talks with peers about the goals and rationale for the intervention as well as what is expected of them.		
The trainer teaches peers how to interact (e.g., look, wait, and listen).		
The trainer teaches peers how to prompt, model, and provide feedback.		
The trainer demonstrates the interaction skills in a role play with peers.		
The trainer has peers use the skills in a role play with each other.		
The trainer provides prompts and suggestions to peers as needed during the role play.		

**APPENDIX E**  
Contingency Contracting Checklist

Students' names:  
Observer's name:  
Date:

Steps	Check if the step was implemented	Note
The teacher establishes and maintains rapport with the students.		
The teacher explains the purpose of the meeting.		
The teacher explains the meaning of a contract.		
The teacher gives examples of a contract.		
The teacher discusses the task assigned to each student.		
The teacher and students agree on tasks.		
The teacher discusses possible reinforcers with students.		
The teacher negotiates the ratio of the task to the reinforcer with the students.		
The teacher identifies the time to get the reinforcer with the students.		
The teacher sets the date for renegotiation.		
The teacher prints a copy for each student.		
The teacher reads the contract with the students		
The teacher gives verbal affirmation and elicits affirmation from students.		
The teacher signs the contract and has every student sign it.		
The teacher congratulates the students.		

**APPENDIX F**  
**Contract Review and Renegotiation Checklist**

Students' names:  
 Observer's name:  
 Date:

Steps	Check if the step was implemented	Note
The teacher establishes and maintains rapport with the students.		
The teacher explains the purpose of the meeting.		
The teacher reviews the contract with the students.		
The teacher asks the students if they have difficulty and frustration with implementing the contract.		
The teacher addresses the students' difficulty and frustration		
The teacher discusses the performance of the students and whether they meet the agreed upon criteria.		
The teacher gives the agreed upon reinforcers to the students.		
The teacher renegotiates the ratio of the task to the reinforcer with the students, if needed.		
The teacher encourages the students and reminds them about the tasks, reinforcers, and next meeting.		
The teacher reads the contract with the students		
The teacher gives verbal affirmation and elicits affirmation from students.		
The teacher congratulates the students.		