EXPLORING INTERACTIONS OF ADOLESCENTS WITH AUTISM SPECTRUM DISORDER IN INSTRUCTIONAL CONTEXTS

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ABSTRACT

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The purpose of this study was to explore the communicative behaviors of adolescents with autism spectrum disorder (ASD) in educational settings. Specifically, the form and function of both verbal and nonverbal communicative acts were analyzed in whole group, small group, and independent work settings for 4 adolescents with ASD. Frequency of communicative acts was calculated with both peers and adults, and rates of communication with both groups were compared. Additionally, self-regulatory behaviors were described in all of the aforementioned educational contexts, and frequency of adult proximity was calculated in each setting.

This descriptive observational study used a general inductive approach to describe patterns in the data as they emerged. Video recorded observations were gathered in two educational settings for each participant, and then transcribed for detailed analysis. Codes were developed based on the emerging themes and then refined and revised as necessary. Inter-rater reliability was established with one additional coder to verify the accuracy of the final coding scheme.

Results showed that all four participants demonstrated a much higher frequency of adult directed communication than peer directed. Additionally, most communicative acts were categorized as responsive in nature. There was a relative absence of initiating behaviors. Self-regulatory behaviors proved challenging to quantify based on observations alone; however, one promising finding was an observed lack of maladaptive self-regulatory behaviors. Adult proximity was variable across participants. The findings of the present study are discussed with respect to prior research and potential clinical and research implications.
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INTRODUCTION

Autism spectrum disorder (ASD) is an increasingly prevalent diagnosis that poses unique educational and social challenges (CDC, 2014). It is well known that social communication is universally impacted in individuals with ASD (American Psychiatric Association, 2013). This means that individuals with ASD may have trouble building relationships, understanding the emotions of others, adjusting to various communicative contexts, and demonstrating appropriate nonverbal behaviors in social interaction (Lord & Bishop, 2015). Social interaction is imperative to success in the middle and high school environments. Research has shown that even typical students often experience extreme self-doubt during the transition to middle school as pressure to assimilate with peers increases (Adreon & Stella, 2001). Students with poor coping skills or who do not “fit in” are at an even greater risk for decreased academic achievement and increased psychological distress if they fail to effectively transition to this new environment (Chung, Elias, & Schneider, 1998).

Adolescence is a critical period of development that is quite unlike the early childhood years. Academic and social success during adolescence is highly dependent upon an ability to form and maintain relationships, a known challenge for individuals with ASD. Yet, much research exploring the social communication of individuals with ASD has focused on the early childhood years and has occurred outside of an academic context (Ashburner Ziviani, & Rodger, 2010; Chamberlain, Kasari, & Rotheram-Fuller, 2007). There is an evident gap in our knowledge related to the communicative behaviors of adolescents with ASD. In fact, there have been many calls to expand research in this area (Carrington & Graham, 2001; Chung & Carter, 2013; Humphrey & Lewis, 2008). Some estimates suggest that over 48,000 teenagers in America with ASD will reach their eighteenth birthday each year (Shattuck et al., 2012). If these
estimates are correct, there is a very large, and growing, population of adolescents with ASD who have been overlooked by both researchers and clinical advocates. These settings, while critical, are challenging to observe. Consequently, a reliable tool for quantifying social communication behaviors of this population in naturalistic academic contexts has yet to be developed. Further exploration of the potential application of such a tool is warranted as pragmatic language has been described as the most challenging aspect of language to reliably assess (Simmons, Paul, & Volkmar, 2014).

The present study seeks to add to the relative dearth of information currently available about adolescents with ASD. The concerns presented above are expansive and complex. This small scale study seeks to add to our understanding of the classroom experiences of adolescents with ASD by characterizing their specific interactional patterns in academic settings. Four adolescents with autism spectrum disorder (ASD) were observed in various middle and high school classroom settings. Most of the observations were conducted in general education classrooms, where children with ASD received instruction alongside typical peers. Others occurred in special education classrooms, where a small group of students with identified disabilities received modified instruction or help with specific academic content areas. Aspects of the participants’ interactions with teachers and peers within these environments were analyzed to describe the functioning of students with ASD in their classrooms, a context in which they spend a large majority of their time. Given the relatively advanced language and cognitive status of the participants, the focus was on intentional communicative acts. Behavioral analysis focused on self-regulatory behavior, as a means to examine adaptive functioning in the classroom. Additionally, adult proximity was quantified to assist in describing the level of independence adolescents with ASD are able to achieve in a mainstream classroom. Some evidence suggests
that students who are accompanied by a paraprofessional throughout the school day are further isolated from their peers and at an increased risk for bullying (Feldman, Carter, Asmus, & Brock, 2016; Lindsay, Proulx, Thomson & Scott, 2013). Based on these points of interest, the research questions are as follows:

1. What forms of intentional communication (verbal and non-verbal) used by adolescents with ASD in a classroom can be observed and coded, and with what frequency do these acts occur?

2. What are the functions of those observed and coded intentional communication acts?

3. What differences in intentional communication patterns can be observed across different educational contexts (whole group, small group and independent work)?

4. What self-regulatory behaviors (adaptive and maladaptive) of adolescents with ASD can be observed and coded in a classroom setting?

5. With what frequency does adult proximity occur for adolescents with ASD in a classroom setting?
LITERATURE REVIEW

Post-High School Outcomes for Individuals with ASD

While little is known about the direct educational experiences of adolescents with ASD, there is a growing wealth of research that suggests poor post-secondary outcomes for individuals with ASD (Shattuck, Orsmond, Wagner, & Cooper, 2011; Shattuck, Wagner, Narendorf, Sterzing, & Hensley, 2011; Shattuck et al., 2012). As previously mentioned, it has been estimated that 48,500 U.S. teenagers with ASD reach their eighteenth birthday each year (Shattuck et al., 2012). Our knowledge of how to best serve adolescents and young adults with autism is going to become increasingly important with such a large, and expanding, population.

Research has suggested that individuals with ASD are particularly susceptible to social and occupational challenges immediately following high school due to a high level of dependence on others for assistance during the school years, coupled with social communication deficits (Shattuck, Wagner et al., 2011). This leads to concern that perhaps our current educational models are not allowing us to prepare adolescents with ASD for success socially and professionally. In a study by Shattuck, Wagner, et al. (2011), nearly 40% of individuals with ASD between the ages of 19-23 received absolutely no services once they left high school. This reveals a concerning disconnect between the extensive amount of teacher and paraprofessional support provided in middle and high school and the lack of service provision post-high school. Our current lack of knowledge regarding how to best serve adolescents with ASD has the potential to negatively impact long-term outcomes for these individuals.

The participants in this study belong to a subset of individuals with autism who have been historically under-researched. They are successful enough in daily life to be placed in general education classrooms, yet impacted enough to require specialized supports and
accommodations. Proper intervention during the middle and high schools years could potentially help to mitigate poor post-secondary outcomes as described above.

**Defining and Diagnosing Autism**

In order to effectively examine interactional patterns of individuals with ASD and provide effective intervention, we must first understand what autism is. Leo Kanner first published information regarding symptomology and characteristics of children with autism in 1943. He detailed eleven cases of autism based on his observations, as well as copious notes kept by concerned parents. He indicated that autism was perhaps more prevalent than originally thought to be, due to lack of knowledge regarding the disorder. He suggested that many professionals were likely diagnosing the condition as schizophrenia or cognitive impairment. One child presented in the case studies was even thought to be deaf due to her lack of responsiveness and communicative attempts. Kanner indicated several characteristics that were consistent across children with autism. He reported a delay or absence of language for communication, despite an ability to name objects or repeat stereotyped utterances. He reported that all of the children exhibited an insistence on sameness, repetitive behaviors, and a preference for being alone. In addition, many children exhibited sensory seeking behaviors and dislike for loud noises (Kanner, 1943). Kanner’s work prompted further exploration of the symptomology and etiology of autism by many researchers across a variety of disciplines. As a result, awareness and understanding of autism has increased significantly over the past seven decades (CDC, 2015).

The most recent revision to the *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)* has modified the diagnostic criteria for ASD to include two main domains: social communication deficits and restricted and repetitive behaviors (RRBs) (American Psychiatric Association, 2013). To receive a diagnosis of ASD, an individual must exhibit or be reported to
previously exhibit difficulties in each of three areas of social communication which include social-emotional reciprocity, nonverbal communicative behaviors used for social interaction, and developing, maintaining, and understanding relationships and adjusting to suit various social contexts (Lord & Bishop, 2015). In addition, four principles of RRBs are described in the DSM-5. They include stereotyped or repetitive motor movements, use of objects, or speech, insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior, highly restricted, fixated interests that are abnormal in intensity or focus, and hyper- or hypo-reactivity to sensory input or unusual interest in sensory aspects of the environment (Lord & Bishop, 2015). However, significant heterogeneity exists within the population of those diagnosed with ASD. “Recent family, clinical and epidemiologic studies have suggested that autism represents the upper extreme of a constellation of traits that may be continuously distributed in nature” (Constantino et al., 2004, p. 719). Such observations account for the range of functioning observed, where some individuals may have subtle deficits and others experience severe difficulties in all aspects of everyday life.

Analogous to the variability of behavioral characteristics of individuals with ASD, the etiology of ASD is unknown, and likely variable. Some scholars have suggested that there will never be one singular explanation for the development of ASD. Happé, Ronald, and Plomin published a bold study in 2006 stating that after half a century of research there is still no definitive evidence suggesting a single cause for ASD and perhaps there never will be.

However, there is a general agreement that individuals with ASD process information in a unique way as a result of neurologic irregularities (Minshew, Williams, & McFadden, 2008; Schumann et al., 2010; Tager-Flusberg, 2007). A variety of hypotheses related to the neurodevelopment and neuroanatomical profiles of individuals with ASD have been explored.
Multiple brain imaging studies have suggested that children with ASD undergo a period of brain overgrowth during their first years of life (McFadden & Minshew, 2013; Rutter, 2011; Schumann et al., 2010). Additionally, substantial evidence has been accumulated in support of a general hypothesis that deficient connectivity within the brain is causative of ASD, although the specific connectivity concerns vary across studies (Baranek et al., 2013; McFadden & Minshew, 2013; Minshew et al., 2008; Rutter, 2011).

It has been suggested that the brain anomalies observed in ASD result in difficulty with higher order information processing (McFadden & Minshew, 2013), executive functions (Kleinhans, Akshoomoff, & Delis, 2007; Lopez, Lincoln, Ozonoff, & Zona, 2005; Pennington et al., 1997), theory of mind (ToM) (Baron-Cohen, Leslie, & Frith, 1985; Baron-Cohen, 1991), and central coherence (Happé, Briskman, & Frith, 2001). These biological and cognitive differences then manifest as the behavioral challenges sometimes seen in individuals with ASD (Frith, 2012).

One theory to explain the information processing discrepancy seen in individuals with ASD is termed weak central coherence. Neurologically typical individuals tend to extract a central meaning or gist from information, whereas individuals with ASD tend to demonstrate a preference for individual parts (Happé et al., 2001). This alone is not an impairment, but rather a different way of processing information, one that has its own inherent strengths and weakness. However, when paired with a specific deficit, such as theory of mind, weak central coherence can lead to the social communication impairments often observed in individuals with ASD (Happé et al., 2001).

The information processing differences and behavioral challenges of ASD are liable to have a direct impact on the ability to appropriately to interact with peers. The social dynamics of
middle and high school are complex, the academic curriculum becomes more demanding, and students are expected to adapt to the teaching styles of many teachers throughout the day (Adreon & Stella, 2001). Managing all these elements requires higher order information processing, executive function skills, and adaptability, skills that have been described as deficient in individuals with autism.

**Classroom Placement for Students with ASD**

Public schools in the United States underwent a significant change in 1975 with the passing of Public Law 94-142, The Education for All Handicapped Children Act of 1975 (EAHCA). EAHCA introduced the concept of free appropriate public education (FAPE) for all children, including those with disabilities, from ages 3-21. The Individualized Education Program (IEP) was introduced as standard practice, and the concept of least restrictive environment (LRE) was implemented. In 1990, Public Law 101-446 was enacted which renamed EAHCA to the Individuals with Disabilities Education Act (IDEA). This law expanded the eligibility categories to include individuals with autism. In 2004, IDEA was reauthorized (20 U.S.C. § 1400) and this law currently governs public education in the United States. Thus, students with ASD are expected to receive instruction in the least restrictive environment, alongside their typical peers to the greatest extent possible, while still making educational progress. As a result, a continuum of appropriate educational placements has emerged.

One such placement is referred to as an inclusive classroom. An inclusion model allows students with special needs to receive instruction in a general education classroom alongside typical peers. Various levels of modifications or accommodations may be provided for the students based on their needs. Modifications, such as simplified curriculum, or accommodations, such as extended time to complete assignments, may be provided. A special education teacher
may co-teach with the general education teacher, a paraprofessional may be present for the student, or the student may be assimilated in the general education classroom without additional adult support. Whatever the inclusion model may entail, general education teachers are expected to possess knowledge of various disabilities, appropriate accommodations and modifications, and effective collaborative practices. The responsibility no longer falls predominantly on the special education teacher.

Several benefits of inclusion have been explored over the years since the implementation of IDEA. Included students have access to typical peer models and they receive access to the same curriculum as their typical peers. Some research has suggested that inclusion leads to improved standardized test scores, greater mastery of IEP goals, better grades, and a more enriched educational environment overall for individuals with disabilities (Salend, 2001; Thornton, McKissick, Spooner, Lo, & Anderson, 2015)

Inclusion is not, however, always the most feasible option for some students. Sometimes a more regulated setting is desired by the student, his parents, and/or the school professionals. While policy mandates children receive their education in the least restrictive environment, placement can occur along a continuum depending on what is best for the student’s educational progress. Individuals with ASD typically function best when provided with predictable and orderly routines, and inclusion environments are often quite the opposite (Humphrey & Lewis, 2008). Mainstream middle and high school students are expected to navigate busy hallways between classes, adapt to the styles of many different teachers, and collaborate with peers in a variety of settings. Success with these types of activities requires adaptability, self-regulation, and strong communication skills. It is necessary to consider the needs of the student when
determining the most appropriate educational placement, and this includes examining communication skills.

Regardless of educational placement, it is imperative that effective interventions are provided during the middle and high school years to ensure adulthood success. As cited above, post-secondary outcomes for many young adults with autism are poor. An ability to effectively navigate social interaction is often a prerequisite for success in many careers and, of course, in forming friendships.

**Environmental mismatch.** The transitions to middle and high school have been described as a challenge for many adolescents. Multiple studies have suggested a trend, in typical students, of decreased academic achievement, increased psychological distress, and lowered self-esteem when transitioning from elementary to middle school or middle to high school (Alspaugh, 1998; Anderman & Midgley, 1997; Chung et al., 1998; Wigfield & Eccles, 1994). Middle or high school is often the first time many students are expected to move to different classrooms for each academic subject. They begin to experience increasing academic demands while also facing more complex social dynamics inherent with adolescence (Adreon & Stella, 2001). At the same time, they begin to undergo the physiological changes that occur during puberty (Adreon & Stella, 2001). All of these factors converge to create an environment quite unlike that of elementary school.

The middle and high school environments can pose an even greater challenge for individuals with ASD as compared to their typical peers. There is a significant mismatch between the social and behavioral skills required to achieve success in these environments and the social and behavioral skills of adolescents with ASD (Adreon & Stella, 2001; Portway & Johnson, 2003). As discussed earlier, individuals with ASD struggle with social-emotional
reciprocity, nonverbal social communication, adjusting to various social contexts, and restricted and repetitive behaviors (American Psychiatric Association, 2013). Unfortunately, these characteristics are more likely to be misunderstood or misinterpreted by teachers in middle and high school than in elementary school, which can lead to a cascading effect of negative outcomes (Adreon & Stella, 2001). This environmental mismatch can lead students with ASD to feel frustrated, excluded, misunderstood and bullied (Adreon & Stella, 2001; Humphrey & Lewis, 2008), which can lead to anxiety, depression, or decreased motivation (Adreon & Stella, 2001), and ultimately decrease self-efficacy, and therefore, decrease academic achievement (Poropat, 2009; Shan, Li, Shi, Wang, & Cai, 2014). Addressing the specific deficits associated with ASD more effectively has the potential to help mitigate this sequence of negative experiences.

**Classroom Research of Students with ASD**

There is a relative lack of research specifically exploring adolescents with ASD in school. There have been multiple calls for further research related to educational placements for adolescents with ASD in order to achieve a better understanding of the real-life experiences of these individuals (Carrington & Graham, 2001; Humphrey & Lewis, 2008; Shattuck, Orsmond et al., 2011). Our lack of knowledge related to the real-life experiences of adolescents with ASD at school means that they are potentially missing out on opportunities for growth and success (The National Autistic Society, 2003), as has been evidenced by the poor outcomes reported after high school. This study seeks to help begin filling this research gap by examining interactional patterns of students with autism in various classroom settings. Although research regarding social communication of adolescents with ASD at school is lacking, the following sections summarize the current research that has explored other aspects of the experiences of students with ASD at school.
Attitudes and emotions in school. The majority of research examining students with ASD in mainstream classroom settings has been accomplished through structured interviews of students, parents, and/or teachers, and has focused on attitudes and emotions rather than communication and interaction (Carrington & Graham, 2001; Chamberlain et al., 2007; Humphrey & Lewis, 2008). The three studies cited above all involved direct interviews with students with autism. Carrington and Graham interviewed two 13 year old boys with autism who reported negative feelings about being different from their peers, stress due to the school environment, and a need to hide characteristics of autism at school. Chamberlain et al. interviewed 398 children in grades 2-5, including 17 students with autism. Students with autism reported lower acceptance, companionship, and reciprocity than their peers (Chamberlain et al., 2007). Students with ASD did not, however, report significantly greater loneliness despite the lack of companionship and reciprocity. The authors suggested that this may be due to a variety of factors, including theory of mind deficits. Humphrey and Lewis interviewed 20 students with autism between the ages of 11 and 17 in secondary schools in England. Students with autism described negative school experiences, bullying, and a feeling of being misunderstood by teachers and peers (Humphrey & Lewis, 2008). Despite these reports of negative experiences, some of the students also reported that they had friends who stuck up for them when they were bullied (Humphrey & Lewis, 2008). All of these studies describe persistent difficulties in developing meaningful and supportive relationships with peers. This information helps us to understand the experiences of individuals with autism at school, but does not directly address patterns of social communication that are potentially influencing these relational breakdowns.

Behavior in the classroom. Some research suggests that students with ASD are frequently unable to actively participate in educational environments due to behavioral problems
such as noncompliance, tantrums, repetitive actions or utterances, and physical aggression, as well as emotional barriers including anxiety and depression (Ashburner et al., 2010; Strain, Wilson, & Dunlap, 2011). Furthermore, students with ASD experience bullying and teasing at school more frequently than their typical peers (Humphrey & Lewis, 2008). They are more likely to experience social isolation and reportedly consider the school environment a source of anxiety (Humphrey & Lewis, 2008).

In one study, teachers were asked to complete rating scales of elementary students’ behavioral characteristics (Ashburner et al., 2010). Results indicated that students with ASD (ages 6-10 years) exhibited significantly higher levels of behavioral and emotional difficulties at school as compared to their typical peers despite support services in the classroom. Additionally, 54% of the students with ASD were underachieving academically as compared to 8% of typically developing students (Ashburner et al., 2010). The researchers also noted that the difficulties faced by the students in this study are likely to be exacerbated in middle and high school (Ashburner et al., 2010).

Student with ASD are sometimes observed to exhibit repetitive motor behaviors that can be interpreted as unusual by peers, which may prevent them from forming friendships and possibly cause them to miss out on academic content (Koegel & Covert, 1972; Loftin, Odom, & Lantz, 2008). Repetitive motor behaviors are generally described as serving a self-stimulatory or self-regulatory purpose, as they are not used to engage in social interaction (Koegel & Covert, 1972; Loftin et al., 2008; Lovaas, Schreibman, & Koegel, 1974). These behaviors may include things such as hand flapping, rocking, or jumping. Children with autism may also be observed to exhibit other self-regulatory behaviors, such as covering their ears or eyes, resisting change, or compulsively completing ritualistic actions (Bishop et al., 2013). These communicative
behaviors can inhibit the formation of social relationships. Research examining these types of behaviors has the potential to enhance social communication for individuals with autism.

**Communication in the classroom.** There is a relative lack of research utilizing live observation techniques to obtain direct evidence of classroom communication and interaction. Additionally, a large portion of research regarding inclusive education has been conducted with preschool and elementary age students only, not adolescent age students (Ashburner et al., 2010; Chamberlain et al., 2007). It has been suggested that the difficulties observed in elementary school are likely to be exacerbated in middle and high school due to the high level of flexibility required in the upper grades (Ashburner et al., 2010).

As discussed previously, it is well known that individuals with ASD demonstrate deficits in initiating social communication (Loftin et al., 2008). Some research suggests that students who fail to initiate communication with others may miss out on learning opportunities (Koegel, Harrower, & Koegel, 1999; Loftin et al., 2008). A handful of studies that utilized naturalistic observations of individuals with ASD have been completed in specialized autism programs. These studies have provided some information about the forms and functions of expressive communication used by children with ASD in highly regulated environments (Chiang, 2009; Chiang and Lin, 2008; Drain & Engelhardt, 2013; Stone & Caro-Martinez, 1990). To the knowledge of this author, there have been no prior studies of adolescents with ASD that specifically targeted naturalistic observations for purposes of examining communication in mainstream classroom environments. Following are the results of several studies that were conducted in specialized educational environments. The results are summarized in table 1. The communicative forms and functions observed in these populations were varied, as were the age groups.
Drain and Engelhardt (2013) observed six nonverbal children with ASD between the ages of 10-15 in a special autism school in England. The children in their study demonstrated intentional communication at a rate of 51 acts per hour. 41% of the communicative acts they observed were spontaneous and generally occurred when the child wanted an object. The children used physical forms (e.g., gestures and sign language) of communication most frequently, as opposed to verbal forms. Stone and Caro-Martinez (1990) examined spontaneous communication in thirty children ages 4-13 (mean age 8.4 years) with ASD who were educated entirely in special education classrooms specifically designed for children with autism. They completed all of their observations during unstructured times, as opposed to instructional time. The children they observed initiated communication an average of 3 to 4 times per hour. Motoric acts were the most frequently used form of communication. The primary functions of their initiations were getting attention, engaging in social routines, and requesting. They directed their communication at the teacher, as opposed to a peer, most frequently. Chiang and Lin (2008) observed 34 children with ASD ages 2.2 to 16.2 years (mean age 7.7 years) from Taiwan and Australia. These naturalistic observations occurred across several settings. All Australian participants were observed at a special school for students with autism. Eleven of the Taiwanese participants were observed in a special school or a special education classroom for individuals with autism. Four Taiwanese participants were observed in general education classrooms and two were observed at home. The children demonstrated an average of 44 expressive communicative acts per hour across all of these settings. The children used unaided augmentative and alternative communication (AAC) more frequently than either aided AAC or speech. Requesting and commenting were the functions they most frequently employed. Chiang (2009) completed an additional analysis using the same population above (Chiang and Lin,
2008), comparing the form and function of spontaneous and evoked communication acts. Results showed that spontaneous communicative acts occurred more frequently than evoked. Requesting occurred more frequently than commenting for spontaneous communication and the opposite was true for evoked communication.

**Peer interaction in the classroom.** Research has suggested that students with ASD demonstrate very limited or nonexistent initiations with typical peers when explicit intervention is not provided (Koegel, Kim, Koegel, & Schwartzman, 2013). Adolescents with ASD have also been observed to interact with peers at much lower rates than adolescents with other disabilities, such as learning disabilities or specific-language impairment (Shattuck, Orsmond et al., 2011). In a study of students in second through fifth grade, children with ASD had fewer reciprocal friendships and were less well accepted than their typical peers, even when included in general education classrooms (Chamberlain et al., 2007). Such research has suggested that, “physical integration does not necessarily equate to full social inclusion” (Able, Sreckovic, Schultz, Garwood, & Sherman, 2015, p. 45). Intervention must be provided to take full advantage of the access to typical peers that is provided in inclusive academic settings.

**Adult proximity in the classroom.** Adult proximity is an additional aspect of classroom experiences to consider when examining functioning at school. Students with disabilities are often accompanied by a paraprofessional during the day, or require the assistance of a teacher frequently. Paraprofessionals can help support students during academic instruction. Research has shown that paraprofessionals, when properly trained, can effectively help teach communication skills, reduce disruptive behaviors, and increase independence for students with disabilities (Brock & Carter, 2013). Some students with ASD have reported that having an adult nearby also helps reduce their anxiety about school (Humphrey & Lewis, 2008). Research has
also suggested that students who spend the majority of their day in close proximity to a teacher or paraprofessional have very few opportunities for peer interaction (Feldman et al., 2016; Lindsay et al., 2013). Students who require paraprofessional assistance are also at an increased risk for bullying, further deteriorating opportunities for the development of peer relationships (Lindsay et al., 2013). More restrictive settings, such as special education resource rooms, do not; however, necessarily offer greater opportunities for relationship building with typical peers.

Beyond the concerns for peer interaction, students who receive high levels of adult support in middle and high school are also at an increased risk for social and occupational challenges in adulthood (Shattuck, Wagner et al., 2011). Often times, adult supports are completely eliminated following high school. This can be detrimental to young adults with ASD as they begin collegiate studies or careers (Shattuck et al., 2012).

There is an absence of evidence regarding how to best reduce adult support and proximity over time as students prepare for life after high school (Chung & Carter, 2013). Quantifying the amount of time during which a student is within close proximity of an adult and tracking changes in duration of proximity over time could prove useful in beginning to fill this gap in research. Effectively planning for times when a student may require adult support and times when support can be withdrawn to facilitate peer engagement may help to mitigate some of the poor post-secondary outcomes previously cited.

**The Role of the Speech-Language Pathologist**

Speech-language pathologists (SLPs) aim to maximize communication effectiveness for all of the individuals they serve. In order to do this effectively, SLPs aim to implement evidence-based interventions related to the specific deficits of their clients. For individuals with autism, social communication is frequently a primary area of deficit. Unfortunately, there is a
lack of evidence about how to assess and remediate social language deficits in adolescents with ASD (Adams et al., 2012; Simmons, Paul, & Volkmar, 2014). In addition, effectively assessing and quantifying pragmatic skills can be more challenging than other types of language deficits (Simmons et al., 2014). It is important that pragmatic skills are assessed in natural environments, particularly for individuals with ASD who may do better in structured standardized test scenarios than in natural conversations (Simmons et al., 2014; Volkmar, Lord, Bailey, Schultz, & Klin, 2004). Thus, an effective protocol for describing and quantifying social communication in naturalistic contexts is needed to improve assessment and intervention methods for speech-language pathologists.

Relatively little is known about effective social language intervention for adolescents with ASD (Shattuck, Orsmond et al., 2011). It is believed that explicit social skills instruction, in addition to the authentic opportunities provided in inclusive classrooms, is necessary to help students with ASD effectively communicate with peers (Able et al., 2015). In addition, opportunities to participate in small group activities can help foster social relationships (Shattuck, Orsmond et al., 2011). It can be challenging for school professionals to provide appropriate intervention without a strong understanding of the communicative impacts of autism. Thus, further research is warranted to better understand the real-life experiences of adolescents with ASD in order to develop effective assessment procedures and interventions (Shattuck, Orsmond et al., 2011).

Summary

Limited direct observation research has been conducted on communicative behaviors of children with ASD in classrooms, and even less work has been done with adolescents. The many concerns and questions posed here indicate a need for further research exploring characteristics
of individuals with ASD in the classroom to better understand how they function in these contexts. This descriptive observational study seeks to add information about the communicative profiles of adolescents with ASD in various educational environments to the lack of literature currently available. To effectively describe these social communication profiles, the present study has also begun the initial work of developing a reliable naturalistic observation tool that can be utilized in research and for clinical purposes.
METHOD

Participants

All experimental procedures for the present study were approved by the university Human Subjects Review Board at Bowling Green State University (Project #689229). Participants were recruited via administrators at local public schools. Letters detailing the proposed study were initially sent to school administrators at several schools in Ohio. Schools were required to complete a letter of support, and report that they had at least one student with ASD currently enrolled, to be included in the study. Two schools were chosen for inclusion in the study based on these criteria. The administrators of these schools identified classrooms in which at least one child with ASD received instruction. Once eligible classrooms were identified, the researcher spoke with classroom teachers regarding the nature of the research. If teachers indicated support for the study, they were asked to sign informed consent and send consent documents home to parents of students with ASD. Every teacher who was contacted agreed to participate. Each student’s teacher or principal then contacted parents by phone to discuss the research project and notify them that a parent consent document would be sent home. Parents were encouraged to contact the teacher, principal, or researchers with further questions before signing the document. Four of the five families contacted agreed to participate. Upon obtaining consent from the parents of the students with ASD, the principal or teacher reviewed an age-appropriate assent document with each of the student participants. Students were then asked to sign the assent document. Through this process, 4 students with ASD to be observed across 7 different classrooms were identified. Details regarding observational settings can be found in Table 2. Once informed consent was obtained from all participants a parent notification letter was sent home to the families of all the other students in the classrooms that were scheduled for observation. Additionally, upon observing the classrooms, it was determined that
the paraprofessionals with each student were an integral part of the classroom environment, thus it would not be possible to obtain video that excluded them. The study was then modified to obtain consent from the classroom paraprofessionals. Observations were completed in March, April, and May 2015.

The participants in this study consisted of four male adolescents, ages 13-15. Each participant has been assigned a pseudonym throughout this document. All four participants were identified as having ASD according to their current IEP. Additionally, the Childhood Autism Rating Scale (CARS) was completed with each child’s teacher to confirm ASD diagnosis (Schopler, Reichler, & Renner, 1988). The participants scored in the range of mildly/moderately to severely autistic according to the CARS. Each participant was observed in at least two different contexts that varied by classroom setting and/or academic subject. Seven different classrooms were observed across two different schools, one middle and one high school. The schools were in different school districts, but similar geographic regions of Ohio.

**Robert.** Robert is the only participant to receive all core academic instruction in a special education classroom. He was 15 years old and enrolled in seventh grade at the time of observation. According to his teacher, he previously failed seventh grade two years in a row. His failure to master seventh grade curriculum coupled with problem behaviors in general education classrooms prompted the move to a fully contained special education classroom. During observations there were 4-5 other students present in the special education classroom, as well as one teacher and one paraprofessional. The other students in the classroom were all identified with a disability under IDEA. No typical peers were present in the classroom. Since Robert receives all of his instruction in the same classroom, he was observed with only one
teacher but across two different content areas. Both math and English language arts (ELA) were observed.

According to a questionnaire completed by Robert’s teacher, he raises his hand and talks about a variety of topics in the classroom, and accurately follows multi-step directions. He struggles to maintain a topic and tends to say things in odd phrases or repeatedly says the same thing. He does not actively participate in small groups with peers. He becomes distressed by unpredictable changes to the daily schedule. He uses inappropriate language, particularly focused on sexual words and acts. He eats lunch separately with only the students in his special education class due to behavior problems in unstructured environments.

**Andrew.** Andrew received all of his instruction in general education classrooms with typical peers. He was 13 and enrolled in seventh grade at the time of observation. He was observed in math and ELA. During his math class one teacher and one paraprofessional were present. During ELA two teachers, one general education and one special education, as well as a paraprofessional were present.

According to the teacher completed questionnaire, Andrew raises his hand or moves to where an adult is when he needs help. He is able to talk about a variety of topics and maintain a topic in class, but often needs to be interrupted because he has missed a cue to stop talking. He sometimes requires additional time and cues to transition during the day. He becomes particularly distressed by changes in the classroom environment, working in new groups, unpredictable changes in his schedule, and when favorite items are not available. He struggles with multi-step directions and requires repetitions of directions, visual demonstrations, or directions broken into smaller segments. Additional processing time is also helpful. He
generally uses appropriate language, pace, and volume when speaking. He does not eat in the cafeteria because he is unable to tolerate the noise, even with ear plugs.

Edward. Edward also received all of his instruction in general education classrooms with typical peers. He was 13 and enrolled in seventh grade at the time of observation. He was observed in social studies and ELA. During social studies one teacher and one paraprofessional were present. During ELA two teachers, one general education and one special education, as well as a paraprofessional were present.

According to the teacher completed questionnaire, Edward uses a variety of strategies to get help in the classroom. He raises his hand, makes a verbal request without raising his hand, moves toward an adult for help, or sits passively waiting for an adult to offer help. He is able to maintain a topic in the classroom and actively participate in small groups with peers. He sometimes needs additional time and cues during transitions. He does not accurately follow multi-step directions. He requires additional repetitions of the directions, visual demonstrations, and additional processing time.

William. William received two periods per day of instruction in a special education classroom that was designed to provide him with academic support, similar to study hall. He received all of his core academic instruction in general education classrooms with typical peers. He was 15 and enrolled in ninth grade at the time of observation. He was observed in academic support and math. His academic support class included 6-8 other students who were all identified with a disability under IDEA, one teacher, and one paraprofessional. His math class included two teachers, one general education and one special education, as well as a paraprofessional.
According to the teacher completed questionnaire, William usually obtains help in the classroom by making verbal requests without raising his hand. He does not make eye contact when speaking to others. He often says off-topic things during class, uses odd phrases, repeatedly says the same things over and over, and exhibits delayed echolalia. He is usually able to participate in small groups with peers. He can become distressed by changes to his schedule, such as delays. He does not use active listening strategies or speak clearly during class. He often needs additional repetitions of multi-step directions.

**Data Collection**

This descriptive observational study examined the observable behaviors and interactions of adolescents with ASD in natural classroom environments. Video recorded observations were deemed least disruptive to the natural flow of classroom routines, while still producing rich data for meaningful analyses. The other option considered was live recording by the researcher of observed behaviors. This option was discarded for two primary reasons. First, the ability to refer back to data, refine and modify categories, and complete reliability coding by additional researchers would be removed. Second, other students in the observed classrooms would be more likely to identify the targeted participants during live recording. If the researcher were marking down codes each time the participant spoke or interacted with others, it would become evident that she was only recording that particular student’s behaviors. Video recording allowed the researcher to better protect the anonymity of the participants.

Observation dates and times were always pre-arranged with each classroom teacher. The researcher arrived to the classroom prior to the start of class on pre-arranged observation days. She set up a digital video camera at the back of the classroom (or where the day's activity could be easily viewed as indicated by the teacher) and placed a small wireless microphone in an area
that could help capture audio for the given lesson. The microphone was not placed directly on the student participants in order to help protect their anonymity. The researcher remained situated with the video recorder for the duration of the observed lesson in order to minimize distraction. The camera remained stationary to record a broad picture of the classroom and to help protect the anonymity of the subjects, as opposed to specifically following a given child throughout the observation. While the classroom teacher(s), paraprofessionals, and other students were captured on the video recording, their specific behaviors will not be analyzed for purposes of this project outside of their interactions with the study participants. Permissions granted via the Human Subjects Review Board did not allow for consent to analyze typical peers, teachers, or paraprofessionals. An average of approximately 2 hours (range= 1.45 to 2.67 hours) of video was obtained per participant during instructional time. Unstructured time, such as lunch or passing periods, was not included. Individual observation duration varied depending upon the teacher's schedule. Each participant was observed in a variety of instructional contexts, including whole group instruction, small group instruction, and independent work. A variety of academic content was observed as well. Details of observations are provided in the results section. The researcher aimed to minimize classroom disruption as much as possible by waiting for a lesson to conclude before discontinuing an observation and packing up the camera equipment.

The teachers and students were not asked to manipulate the environment or curriculum in any way for purposes of the study. Participants were not asked to actively participate in any particular activity or commit to any level of participation outside of their normal daily schedule, but rather carry on with activity as usual during observations. Participants were informed that
there was no "right or wrong" behavior that the researcher was looking for, and nothing that they
did for purposes of the observation would have an effect on their academic standing.

**Data Analysis**

Data analysis for this descriptive observational study followed a general inductive
approach (Thomas, 2006) to effectively describe the data. An inductive approach allows themes
to emerge from the raw data (Strauss & Corbin, 1998; Thomas, 2006). This approach is in
contrast to a deductive approach, which seeks to test whether data support a theory or hypothesis
proposed by the researcher (Thomas, 2006). The inductive, or exploratory, approach is content
driven, meaning that specific codes and categories are subject to evolving throughout the process
of data analysis based on themes that emerge from the data (Guest, MacQueen & Namey, 2012).
This is a common qualitative and/or exploratory research approach that allows relationships to be
identified and refined throughout data analysis (Carrington & Graham, 2001; Guest et al., 2012;
Thomas, 2006).

Inductive coding begins with repetitive review of the raw data to become extensively
familiar with its content. Then, the researcher attempts to identify and define common themes or
categories. As these codes are applied and reviewed the researcher may revise and refine the
categories and themes to reduce redundancy and account for un-coded portions of the data
(Thomas, 2006). As codes are refined, previously coded data is re-coded according to the new
schema.

Video data was the medium of analysis for this study. Any portion of video that lacked
clear visual or auditory quality was excluded from analysis. For example, another student may
block the camera view of the participant or a participant may be outside of the microphone
range for some portion of the observation. In addition, any portion of the video that included
non-instructional time was excluded. Non-instructional time accounted for a small proportion of the videos and primarily included transition times at the beginning or end of an instructional period. Each domain was continuously sequentially coded for all viable portions of video data (Bakeman & Gottman, 1986). The domains to be coded from each video segment include: instructional setting, intentional communication acts (verbal and nonverbal), self-regulatory behaviors, and adult proximity.

**Instructional setting.** Three categories have been defined within the domain of instructional setting. The first is “whole group.” Whole group instruction was defined as a portion of the lesson during which the teacher speaks to the whole class to provide information or elicit specific responses. Students are expected to listen to the teacher during this time and follow appropriate classroom procedures for asking questions or making comments on the lesson. The second educational setting is “small group.” Small group was defined as the participant working with one to five students on an assignment designated by the teacher. The third setting was “independent work.” Independent work was defined as a time during which the students have been directed by the teacher to work on a task independently.

During analysis, start and stop times for each instructional setting were recorded (e.g., WHOLE GROUP: start: 0:15- end: 27:13; INDEPENDENT: start: 27:13- end: 37:13). The total amount of time observed in each instructional setting, in seconds, was calculated for each participant. Then, the total amount of time in each instructional setting was calculated as a percentage of the total observation time per participant. Finally, mean percentages were calculated across all four participants.

**Intentional communication.** For purposes of this study, it is important to differentiate between intentional communication and behaviors that unintentionally communicate a message.
As a result, intentional communication has been defined as a verbal or nonverbal action that is transmitted by the participant to another individual or group of individuals in the classroom. There is a clear transmitter and receiver during intentional communication. Each intentional communication act exhibited by the participants was coded as being directed toward a teacher, a paraprofessional, or a peer. Several codes have been identified within the domain of intentional communication. These codes were developed based on the behaviors that were observed during the observations as well as existing literature.

During an initial attempt to code the data, six codes were developed under the theme of intentional communication under the assumption that each code could be exhibited either verbally or nonverbally. The codes were: request (for object, information, clarification, action), refusal/protest, initiate, maintain social routine, acknowledgement, and other. They were developed based on an amalgamation of information derived from the works of Bunning, Smith, Kennedy, and Greenham (2011) and Clifford, Hudry, Brown, Pasco, and Charman (2009). The researcher discovered that many behaviors were being placed into the “other” category, making this scheme unworkable. Two main categories, initiating and responding, emerged as the data were analyzed. In keeping with the inductive approach described above, the intentional communication codes were refined and revised. The intentional communication codes defined below reflect the final revisions made to the codes. The verbal intentional communication codes were derived from the seminal work of Martlew (1980), who outlined a set of discourse categories observed to occur in mother-child interactions. Her categories are still frequently used in pragmatic language sample analyses (Retherford, 2000). Martlew’s codes were modified as necessary to fit the purposes of this study and the developmental level of the participants. The nonverbal intentional communication codes were also grouped under the
categories of initiating and responding, but were further refined to reflect the specific nonverbal behaviors noted during the observations.

Verbal intentional communication was separated into two major categories of initiating and responding. The category of initiating was defined as spontaneous communicative acts that began a new interaction with a communicative partner. This included the codes topic introduction, restarting an old topic, eliciting response (including requests), and intruding. The category of responding was defined as communicative acts completed in reply or reaction to another speaker’s utterance or action. This included the codes acknowledging, yes/no answers, brief answers, repeating, sustaining topic, extending topic, and clarification. See Table 3 for operational definitions and examples of the aforementioned codes. In addition, verbal communicative acts could be coded as “other” for any acts not conforming to the previous codes or “false start” for attempted communications that were abandoned. Both of these codes were used with inconsequential frequency.

Nonverbal intentional communication was also divided into the two major categories of initiating and responding. These codes were developed based on the premise that all behavior communicates a message (Freeman, 1993). Research related to pragmatic language analysis has suggested that all details of an interaction must be regarded as relevant to achieve greater “real-life validity” (Friedland & Miller, 1998). The codes identified within nonverbal initiating communication were raising hand and requesting an object. The codes identified within nonverbal responding communication were yes/no answers, compliance, and non-compliance. See Table 4 for operational definitions and examples of each of the nonverbal codes.

Instances of non-compliance were coded when a participant completed an observable action that demonstrated he was listening to the message. For example, Robert’s teacher said,
“Please take out your binder.” Robert looked up from his desk and stared at her intensely, but did not take out his binder. In addition, nonverbal communication could be coded as “other” if it did not meet the criteria for any of the above codes. “Other” was used inconsequentially, suggesting that the above codes encompassed the primary observable nonverbal communicative behaviors exhibited in the observed classrooms.

To further enhance the detail with which each code reflected the pragmatic competency of the participants, each coded behavior was also rated on an expectancy scale of 1-3 (see Table 5). Research has shown that unexpected or “bizarre” utterances can result in conversational breakdown (Cummings, 2009; Friedland & Miller, 1998). Examining the “goodness of fit” of an utterance is useful in examining the social language of individuals with ASD (Cummings, 2009). A rating of 1 corresponded to a completely unexpected or inappropriate behavior or utterance. A rating of 2 corresponded to a somewhat unexpected or moderately inappropriate behavior or utterance. A rating of 3 corresponded to an expected response, behavior, or utterance that was appropriate to the context.

To establish context, both instructional setting and the intended receiver were coded with each coded intentional communicative act. The intended receiver was coded as “teacher,” “paraprofessional” or “peer.” A completely coded utterance or behavior would resemble this example:

TA: P2 shared with us his lazy eye. Your glasses change that lazy eye. It actually puts it back into place, is that correct?

P2: very slight head nod.
[whole group- teacher directed- nonverbal- yes/no answer- 3]

**Self-regulatory behaviors.** For purposes of this study, self-regulatory behaviors have been categorized as unintentional communication and further subdivided into the categories of maladaptive and adaptive. While self-regulatory behaviors communicate a need, they are
typically completed for the participant’s own comfort, not for the purpose of taking part in a communicative interaction with any particular receiver. Adaptive behaviors were defined as those that were appropriate within the classroom context and allowed the participant to regulate himself. Maladaptive behaviors were defined as those that were not acceptable within the classroom context and/or escalated the participants’ level of dysregulation. Examples of adaptive and maladaptive behaviors are provided in Table 6. As with intentional communication, self-regulatory behaviors were also coded according to instructional setting (whole group, small group, independent work) for purposes of analyzing behavioral changes in each context. One primary research question for this study was, what self-regulatory behaviors can be observed? Observing and properly categorizing the less overt self-regulatory behaviors proved quite difficult. Outcomes will be discussed in the results and discussion sections.

**Adult proximity.** The final domain within the coding scheme is adult proximity. For purposes of this study, adult proximity is defined as an adult being within an arm’s length of the participant for 3 seconds or longer. This particular definition of proximity has been utilized in previous classroom research (Conroy, Asmus, Boyd, Ladwig, & Sellers, 2007; Conroy, Asmus, Ladwig, Sellers, & Valcante, 2004). Physical presence of additional adults in a classroom can be beneficial for behavior management, but some research suggests that close physical proximity can limit peer interaction for students with disabilities, particularly when seated or standing within immediate reach of the student (Conroy et al., 2004; Feldman et al., 2016; Lindsay et al., 2013). Duration of proximity was coded separately for teachers and paraprofessionals, and the instructional setting during which the proximity occurred was also recorded. The duration of proximity for each instructional setting was compared to the total duration of the observation,
and percent of time during which an adult was within proximal distance of each participant was calculated in each instructional setting.

**Inter-Rater Reliability**

One undergraduate student was recruited as a research assistant. She transcribed and coded approximately 2 hours of the video recorded observations to validate the accuracy and reliability of the codes established by the primary investigator. A coding manual and a brief video segment from each participant were used to train the undergraduate research assistant. Upon completing the training, the research assistant was assigned video segments for each participant that were approximately 30 minutes in length each. She first transcribed these segments, then applied the codes as outlined in the coding manual and described during the training session. The video segments coded by the research assistant accounted for approximately 25% of the total data gathered. The research assistant’s fully coded transcripts were then compared to the researcher’s transcripts and percent agreement was calculated for multiple variables. The percent agreement for whom an utterance was directed toward (teacher, paraprofessional, or peer) was 94% between raters. The percent agreement for whether an utterance was a responding or initiating act was 81%. There was greater variability regarding the specific function of an utterance within the domain of responding or initiating. The extreme specificity of these codes made them more difficult to accurately apply when coding. For example, one coder may perceive an utterance as an attempt to extend a topic, while another may see it as an attempt to simply sustain a topic. Even with extensive training, the reliability criterion of 80% was not achieved for several of these codes. The agreement for those codes not meeting the criterion was as follows: 0% for new topic introduction, 17% for restarting old topic, 50% for intruding, 0% for acknowledging, 64% for brief answers, 0% for sustaining topic, 62%
for extending topic, 33% for clarification, and 67% for compliance. Two nonverbal codes did not appear in the samples coded by the undergraduate research assistant. They were as follows: raising hand and requesting object. 100% agreement was achieved for both verbal and nonverbal yes/no answers. 100% agreement was also achieved for nonverbal non-compliance. The only other code meeting the 80% criterion was eliciting verbal or nonverbal responses, which reached exactly 80% agreement. The variability in agreement with these codes led to the decision to focus on a broader dual categorization of either responding or initiating. This is discussed in more detail in the results and discussion sections. Finally, inter-rater agreement was calculated for the expectedness of each utterance. Expectedness was rated on a scale of 1-3. Agreement on the 1-3 scale was low at only 71%. When a binary system of either completely appropriate and expected (rating of 3) or a range of unexpected/inappropriate behavior (rating of 1 or 2) was applied, agreement improved to 92%. This suggests that the expectedness of communicative behavior is open to interpretation based on individual personalities and perceptions. While multiple coders may disagree on whether or not something is only “slightly unexpected” or “completely unexpected,” they can agree that something out of the ordinary has occurred. This is further discussed in the discussion section.
RESULTS

Instructional Settings

Across all participants, 58.2% of instructional time observed was classified as whole group. Independent work made up 36.4% of the observations, and 5.4% was classified as small group. See figure 1 for a graphical representation of this data. Any non-instructional time was removed from the total observed time for each participant. Non-instructional time was not coded or included in any totals during data analysis.

Robert was observed for a total of 1.54 hours. No non-instructional time was removed from the total time he was observed. 84% of the observed time for Robert was whole group instruction. The remaining 16% was independent work. No small group instruction was observed for Robert.

Andrew was observed for 2.5 hours. 2.2 minutes of non-instructional time was removed from the data for Andrew. The video recordings collected on Andrew included 71% whole group instruction, 8% small group, and 20% independent work.

Edward was observed for 1.45 hours. 1.6 minutes of non-instructional time was removed from his video recordings. Observations for Edward included 60% whole group instruction, 7% small group, and 31% independent work.

William was observed for 2.67 hours. 8.9 minutes of non-instructional time was removed. The data collected on William included 25% whole group instruction, 5% small group, and 64% independent work. Since half of the observations for William occurred in his academic support course, a much higher percentage of independent work was observed for William than any other participant.
Forms and Frequency of Intentional Communication

Verbal communication. During whole group instruction the following rates of verbal communication were observed. Robert demonstrated 96.61 acts per hour. Andrew demonstrated 22.86 acts per hour. Edward demonstrated 62.78 acts per hour. William demonstrated 47.98 acts per hour.

During independent work the following rates of verbal communication were observed. Robert demonstrated 20.74 acts per hour. However, a small sample, less than 15 minutes, of independent work was obtained for Robert. His teacher provided primarily whole group instruction. Zero acts were observed from Andrew in a sample of approximately 30 minutes. Edward demonstrated 17.71 acts per hour. William demonstrated 67.91 acts per hour.

Lesser samples of small group instruction were obtained (0-11 minutes) for each participant. No small group instruction was observed for Robert, thus no verbal communication was recorded in this instructional setting. An 11 minute sample was obtained for Andrew. He demonstrated 51.87 acts per hour. A 5 minute sample was obtained for Edward. He demonstrated zero verbal acts during the observed time. An 8 minute sample was obtained for William. He demonstrated 65.85 acts per hour.

Nonverbal communication. During whole group instruction the following rates of nonverbal communication were observed. Robert demonstrated 18.55 acts per hour. Andrew demonstrated 14.50 acts per hour. Edward demonstrated 17.12 acts per hour. William demonstrated 20.99 acts per hour.

During independent work the following rates of nonverbal communication were observed. Robert demonstrated 8.29 acts per hour. As mentioned above, a small sample, less than 15 minutes, of independent work was obtained for Robert. Andrew demonstrated zero
nonverbal acts during a sample of approximately 30 minutes. Edward demonstrated 13.28 acts per hour. William demonstrated 45.67 acts per hour.

During small group instruction the following rates of nonverbal communication were observed. As mentioned above, small samples for each participant were obtained for this instructional setting. No small group instruction was observed for Robert. Andrew demonstrated 20.75 acts per hour. Edward demonstrated 0 acts during an approximately 5 minute sample. William demonstrated 7.32 acts per hour.

Functions of Intentional Communication

Verbal functions. Functions of intentional communication were grouped under two major headings, initiating and responding. In addition, they were categorized based on whether the communication was directed toward a teacher, paraprofessional, or peer. Trends in verbal communicative partners for each educational context are represented in figure 2. All of the verbal communicative acts for each participant were categorized based on these criteria within each instructional setting.

Whole group. During whole group instruction Robert’s verbal intentional communication was directed toward his teacher 91% of the time (120 acts), and his peers 9% of the time (12 acts). He demonstrated zero intentional verbal communicative acts with the classroom paraprofessional. Overall, his verbal intentional communication could be categorized as 16% initiating (20 acts) and 82% responding (106 acts). He demonstrated 3 acts that were categorized as “other.” Within the category of initiating, he demonstrated 19 acts directed toward his teacher and 1 toward a peer. His initiations with a teacher included 4 new topic introductions, 2 restarts of previous topics, 3 attempts to elicit a verbal or nonverbal response, and 10 intrusions. His 1 act with a peer was an attempt to elicit a verbal response. Within the category of responding, he
demonstrated 95 acts directed toward his teacher and 11 toward peers. His responses to a teacher included 2 acknowledgements, 7 yes or no answers, 52 answers to questions, 5 repetitions, 11 attempts to sustain a topic, 13 attempts to extend a topic, and 5 clarifying statements. His responses to peers included 1 answer to a question, 1 repetition, 6 attempts to sustain a topic, and 3 attempts to extend a topic.

During whole group instruction Andrew’s verbal intentional communication was directed toward a teacher 90% of the time (36 acts), his paraprofessional 5% of the time (2 acts) and his peers 5% of the time (2 acts). Overall, his verbal intentional communication could be categorized as 15% initiating (6 acts) and 85% responding (24 acts). Within the category of initiating, he demonstrated 4 acts directed toward a teacher, 2 toward a peer, and 0 toward his paraprofessional. His initiations with a teacher included 1 restart of previous topic and 3 attempts to elicit a verbal or nonverbal response. His 2 acts with a peer included 1 new topic introduction and an attempt to elicit a verbal response. Within the category of responding, he demonstrated 32 acts directed toward a teacher, 2 toward his paraprofessional, and 0 toward peers. His responses to a teacher included 1 acknowledgement, 3 yes or no answers, 15 answers to questions, 5 attempts to sustain a topic, and 8 attempts to extend a topic. His responses to his paraprofessional included 1 acknowledgement and 1 yes or no answer.

During whole group instruction Edward’s verbal intentional communication was directed toward a teacher 87% of the time (54 acts), his paraprofessional 3% of the time (2 acts), and his peers 10% of the time (6 acts). Overall, his verbal intentional communication could be categorized as 29% initiating (18 acts) and 69% responding (43 acts). He demonstrated 1 act that was categorized as “other.” Within the category of initiating, he demonstrated 12 acts directed toward a teacher, 2 toward his paraprofessional, and 4 toward a peer. His initiations
with a teacher included 2 new topic introductions, 3 attempts to elicit a verbal or nonverbal response, and 7 intrusions. His initiations with his paraprofessional included 1 attempt to elicit a verbal response and 1 intrusion. His initiations with peers included 1 attempt to elicit a verbal or nonverbal response and 3 intrusions. Within the category of responding, he demonstrated 41 acts directed toward his teacher and 2 toward peers. His responses to a teacher included 7 acknowledgements, 9 yes or no answers, 17 answers to questions, 4 attempts to sustain a topic, 2 attempts to extend a topic, and 2 clarifying statements. His responses to peers included 1 acknowledgement and 1 repetition.

During whole group instruction William’s verbal intentional communication was directed toward a teacher 83% of the time (29 acts), his paraprofessional 14% of the time (5 acts), and his peers 3% of the time (1 act). Overall, his verbal intentional communication could be categorized as 37% initiating (13 acts) and 60% responding (21 acts). He demonstrated 1 act that was categorized as a false start. Within the category of initiating, he demonstrated 9 acts directed toward a teacher, 3 toward his paraprofessional, and 1 toward a peer. His initiations with a teacher included 2 restarts of previous topics, 4 attempts to elicit a verbal or nonverbal response, and 3 intrusions. His initiations with his paraprofessional included 1 new topic introduction and 2 attempts to elicit a verbal or nonverbal response. His initiation with peers included 1 attempt to elicit a verbal or nonverbal response. Within the category of responding, he demonstrated 19 acts directed toward his teacher and 2 toward his paraprofessional. His responses to a teacher included 1 acknowledgement, 4 yes or no answers, 8 answers to questions, 1 repetition, 1 attempt to sustain a topic, and 4 attempts to extend a topic. His responses to his paraprofessional included 1 answer to a question and 1 clarifying statement.
Overall, a consistent pattern of verbal intentional communication occurred during whole group instruction. All four participants favored communication with an adult as opposed to a peer. Verbal acts were directed toward an adult (teacher or paraprofessional) during 93% (range: 90%-97%) of the observed interactions. In addition, the interactions that were observed were largely responsive in nature. Verbal intentional communication during whole group instruction consisted of responding acts during 74% (range: 60%-85%) of the observed interactions. Specific types of responsive acts varied. All of the participants showed an ability to use verbal communication for a variety of intents during whole group instruction.

**Independent work.** During independent work Robert’s verbal intentional communication was directed toward his paraprofessional 40% of the time (2 acts), and his peers 60% of the time (3 acts). He demonstrated a total of 5 acts during the independent work that was observed. None of these acts were directed toward a teacher. Overall, his verbal intentional communication could be categorized as 40% initiating (2 acts) and 60% responding (3 acts). Within the category of initiating, he demonstrated 2 acts directed toward a peer. His initiation with peers included 2 new topic introductions. Within the category of responding, he demonstrated 2 acts directed toward his paraprofessional and 1 toward a peer. His responses to his paraprofessional included 1 yes or no answer and 1 answer to a question. His response to a peer was an attempt to sustain a topic.

Andrew did not demonstrate any verbal intentional communication during independent work. A sample of approximately 30 minutes of independent work was obtained for Andrew. Potential implications and explanations are explored in the discussion section.

During independent work Edward’s verbal intentional communication was directed toward a teacher 70% of the time (7 acts), his paraprofessional 10% of the time (1 act), and his
peers 20% of the time (2 acts). Overall, his verbal intentional communication could be categorized as 40% initiating (4 acts) and 60% responding (6 acts). Within the category of initiating, he demonstrated 3 acts toward a teacher, and 1 toward a peer. He did not demonstrate any initiations with his paraprofessional during independent work. His initiations with a teacher consisted of 1 restart of a previous topic and 2 intrusions. His initiation with a peer consisted of 1 intrusion. Within the category of responding, he demonstrated 4 acts directed toward a teacher, 1 act directed toward his paraprofessional and 1 toward a peer. His responses to a teacher included 4 answers to a question. His response to his paraprofessional included 1 answer to a question. His response to a peer included 1 yes or no answer.

During independent work William’s verbal intentional communication was directed toward a teacher 63% of the time (73 acts), his paraprofessional 12% of the time (14 acts), and his peers 24% of the time (28 acts). Overall, his verbal intentional communication could be categorized as 35% initiating (40 acts) and 63% responding (72 acts). Within the category of initiating, he demonstrated 20 acts toward a teacher, 10 toward his paraprofessional, and 10 toward a peer. His initiations with a teacher consisted of 3 new topic introductions, 1 restart of a previous topic, 15 attempts to elicit a verbal or nonverbal response, and 1 intrusion. His initiations with his paraprofessional included 3 new topic introductions, 6 attempts to elicit a verbal or nonverbal response, and 1 intrusion. His initiations with peers consisted of 3 new topic introductions, 5 attempts to elicit a verbal or nonverbal response, and 2 intrusions. Within the category of responding, he demonstrated 51 acts directed toward a teacher, 4 toward his paraprofessional, and 17 toward a peer. His responses to a teacher included 3 acknowledgements, 5 yes or no answers, 23 answers to questions, 4 attempts to sustain a topic, 9 attempts to extend a topic, and 7 clarifying statements. His responses to his paraprofessional
included 2 answers to questions, and 2 attempts to extend a topic. His responses to peers included 1 yes or no answer, 4 answers to questions, 1 repetition, 2 attempts to sustain a topic, 7 attempts to extend a topic, and 2 clarifying statements.

Patterns of verbal intentional communication during independent work proved to be less consistent than during whole group. Edward and William tended to direct communication toward an adult more than a peer. Their verbal communication was directed toward an adult 75%-80% of the time during independent work, while Robert tended to direct communication toward peers more than adults in this setting. The interactions that were observed were largely responsive in nature, consistent with the observations of whole group instruction. For the three participants who demonstrated verbal intentional communication during independent work, responding acts were observed during 61% (range: 60%-63%) of the interactions.

**Small group.** Robert did not receive any small group instruction during the times that were observed. Therefore, there are no data to report for Robert during verbal intentional communication during small group instruction. According to his teacher, this is reflective of typical instructional patterns in her classroom.

During small group work Andrew’s verbal intentional communication was directed toward a teacher 58% of the time (7 acts) and his paraprofessional 42% of the time (5 acts). None of his verbal intentional communication was peer directed during small group work. Overall, his verbal intentional communication could be categorized as 17% initiating (2 acts) and 83% responding (10 acts). Within the category of initiating, he demonstrated 2 acts directed toward a teacher. Both of his initiating acts were attempts to elicit a verbal or nonverbal response. Within the category of responding, he demonstrated 5 acts directed toward a teacher, and 5 acts toward his paraprofessional. His responses to a teacher included 1 acknowledgement,
3 yes or no answers, and 1 answer to a question. His responses to his paraprofessional included 2 yes or no answers, 1 answer to a question, 1 attempt to extend a topic, and 1 clarifying statement.

During small group work Edward’s verbal intentional communication was directed toward his peers 100% of the time (3 acts). Overall, his verbal intentional communication could be categorized as 67% initiating (2 acts) and 33% responding (1 act). His initiating acts with his peers included 1 new topic introduction and 1 attempt to elicit a verbal response. His response to a peer included one instance of attempting to sustain a topic of conversation.

During small group work William’s verbal intentional communication was directed toward a teacher 12% of the time (2 acts), his paraprofessional 6% of the time (1 act), and his peers 82% of the time (14 acts). Overall, his verbal intentional communication could be categorized as 12% initiating (2 acts) and 88% responding (15 acts). Within the category of initiating, he demonstrated 2 acts directed toward a teacher. Both of his initiating acts with a teacher were attempts to elicit a verbal or nonverbal response. Within the category of responding, he demonstrated 0 acts directed toward a teacher, 1 toward his paraprofessional, and 14 toward his peers. His response to his paraprofessional included 1 yes or no answer. His responses to peers included 1 acknowledgement, 8 yes or no answers, 3 attempts to sustain a topic, and 2 clarifying statements.

Patterns of verbal intentional communication during small group instruction proved to be highly variable. Andrew maintained a pattern of directing his communicative acts toward an adult. Edward and William, on the other hand, demonstrated many more acts directed toward a peer in this setting. Andrew and William maintained a pattern of communicative acts that were largely responsive in nature, consistent with the observations in other settings. Edward,
however, was an outlier in this setting. He demonstrated initiating behaviors during 67% of the small group interactions observed.

**Nonverbal functions.** Functions of nonverbal intentional communication were also grouped under two major headings, initiating and responding. In addition, they were categorized based on whether the communication was directed toward a teacher, paraprofessional, or peer. Trends in nonverbal communicative partners for each educational context are represented in figure 3. All of the nonverbal communicative acts will be discussed for each participant according to each instructional setting.

**Whole group.** During whole group instruction Robert’s nonverbal intentional communication was directed toward his teacher 96% of the time (26 acts), and his peers 4% of the time (1 act). He demonstrated zero intentional nonverbal communicative acts with the classroom paraprofessional. Overall, his nonverbal intentional communication could be categorized as 11% initiating (3 acts) and 78% responding (21 acts). He demonstrated 3 acts that were categorized as “other.” Within the category of initiating, he demonstrated 3 acts directed toward a teacher. His initiations with a teacher included 3 occurrences of raising his hand. Within the category of responding, he demonstrated 21 acts directed toward a teacher. His responses to a teacher included 2 yes or no answers, complying with a directive 6 times, and non-compliance with a directive 13 times.

During whole group instruction Andrew’s nonverbal intentional communication was directed toward his teacher 100% of the time (26 acts). He demonstrated zero intentional nonverbal communicative acts with the classroom paraprofessional or any of his peers. Overall, his nonverbal intentional communication could be categorized as 15% initiating (4 acts) and 85% responding (22 acts). Within the category of initiating, he demonstrated 4 acts directed toward a
teacher. His initiations with a teacher included 4 occurrences of raising his hand. Within the category of responding, he demonstrated 22 acts directed toward a teacher. His responses to a teacher included 3 yes or no answers, complying with a directive 18 times, and non-compliance with a directive 1 time.

During whole group instruction Edward’s nonverbal intentional communication was directed toward his teacher 94% of the time (15 acts), and his paraprofessional 6% of the time (1 act). He demonstrated zero intentional nonverbal communicative acts with his peers. Overall, his nonverbal intentional communication could be categorized as 6% initiating (1 act) and 88% responding (14 acts). He demonstrated 1 act that was categorized as “other.” Within the category of initiating, he demonstrated 1 act directed toward a teacher. His initiation with a teacher included 1 occurrence of raising his hand. Within the category of responding, he demonstrated 13 acts directed toward a teacher and 1 toward his paraprofessional. His responses to a teacher included complying with a directive 9 times and non-compliance with a directive 4 times. His response to his paraprofessional included 1 instance of non-compliance with a directive.

During whole group instruction William’s nonverbal intentional communication was directed toward his teacher 71% of the time (10 acts), and his paraprofessional 29% of the time (4 acts). He demonstrated zero intentional nonverbal communicative acts with his peers. Overall, his nonverbal intentional communication could be categorized as 93% responding (13 acts). He demonstrated 1 act that was categorized as “other.” Within the category of responding, he demonstrated 9 acts directed toward a teacher and 4 toward his paraprofessional. His responses to a teacher included complying with a directive 9 times. His responses to a
paraprofessional included complying with a directive 2 times and non-compliance with a
directive 2 times.

Two patterns of nonverbal intentional communication emerged during whole group
instruction across all four participants. The first is a tendency to direct nonverbal
communication toward an adult, primarily a teacher, during whole group instruction. Nonverbal
intentional communication was directed toward an adult for an average of 99% of occurrences
(range: 96%-100%). The second pattern is a trend toward responding acts. An average of 86%
(range: 78%-93%) of all nonverbal intentional communication observed in this setting consisted
of responding acts.

**Independent work.** During independent work Robert demonstrated only 1 nonverbal
intentional communication act. This act was directed toward his teacher, and was classified as
non-compliance. Therefore, his nonverbal intentional communication was responsive in nature
and directed toward his teacher 100% of the time; this figure is reported for completeness,
although clearly it is a minimal sample.

Andrew did not demonstrate any nonverbal communication during independent work.
No acts were recorded with a teacher, paraprofessional, or peer. This mirrors his pattern of
verbal intentional communication during independent work.

During independent work Edward’s nonverbal intentional communication was directed
toward a teacher 83% of the time (5 acts), and a paraprofessional 17% of the time (1 act). He
demonstrated zero intentional nonverbal communicative acts with his peers. Overall, his
nonverbal intentional communication could be categorized as 100% responding (6 acts). His
responses to a teacher included complying with a directive 3 times and non-compliance with a
directive 2 times. His response to a paraprofessional consisted of non-compliance with a directive 1 time.

During independent work William’s nonverbal intentional communication was directed toward a teacher 56% of the time (36 acts), a paraprofessional 41% of the time (26 acts), and his peers 3% of the time (2 acts). Overall, his nonverbal intentional communication could be categorized as 2% initiating (1 act) and 98% responding (63 acts). Within the category of initiating, he demonstrated 1 act, requesting an object, directed toward a peer. Within the category of responding, he demonstrated 36 acts directed toward a teacher, 26 toward a paraprofessional, and 1 toward a peer. His responses to a teacher included 2 yes or no answers, complying with a directive 12 times, and non-compliance with a directive 22 times. His responses to a paraprofessional included 2 yes or no answers, complying with a directive 13 times, and non-compliance with a directive 11 times. His response to a peer included complying with a directive once.

Overall, fewer nonverbal communicative behaviors were observed during independent work. However, the trend toward directing a majority of nonverbal acts toward an adult continued to emerge. For those participants who demonstrated nonverbal communication in this setting, an average of 99% (range: 97%-100%) of all acts were directed toward an adult. As was described in the whole group setting, a vast majority of these nonverbal acts were responsive in nature. An average of 99% (range: 98%-100%) of all nonverbal acts were categorized as responses during independent work.

**Small group.** As mentioned above, Robert was not observed during any small group instruction. Additionally, Edward did not demonstrate any nonverbal intentional communication
in the small group instructional setting. Thus, the data regarding nonverbal intentional communication in this setting will be described for Andrew and William only.

During small group instruction Andrew’s nonverbal intentional communication was directed toward a paraprofessional 50% of the time (2 acts), and his peers 50% of the time (2 acts). He demonstrated zero intentional nonverbal communicative acts with a teacher. Overall, his nonverbal intentional communication could be categorized as 100% responding (4 acts). His responses to a paraprofessional included 2 yes or no answers. His responses to peers also included 2 yes or no answers.

During small group instruction William’s nonverbal intentional communication was directed toward a teacher 20% of the time (2 acts), a paraprofessional 10% of the time (1 act) and his peers 70% of the time (7 acts). Overall, his nonverbal intentional communication could be categorized as 100% responding (10 acts). His responses to a teacher included complying with a directive twice. His responses to a paraprofessional included 1 yes or no answer. His responses to peers included 1 yes or no answer and 6 instances of non-compliance with a directive.

In congruence with verbal intentional communication, patterns of nonverbal intentional communication during small group instruction proved to be highly variable. Andrew directed his nonverbal communicative behaviors toward his peers half of the time and William demonstrated nonverbal communicative behaviors directed toward a peer 70% of the time in this setting. These numbers are much higher than observed in other instructional settings.

**Observable Self-Regulatory Behaviors**

Self-regulatory behaviors varied between participants. No evident pattern of behavior emerged. Without directly interviewing the participants, the researcher was unable to discern the function of any observed behaviors. Some behaviors, such as rocking in a chair, can be
interpreted to serve many different functions. Overall, a lack of overt maladaptive behavior was observed. Reports of behaviors that were observed are described below. Further consideration of potential functions of self-regulatory behaviors will follow in the discussion section.

Robert sat with his chair leaned back on the rear two legs for 73% of whole group instruction and 31% of independent work. Three discrete instances of presumably self-regulatory behavior included: rapidly spinning his calculator on his desk for 7 seconds, rapidly hitting himself on the back of his head for 10 seconds, and circling his hands in the air for 8 seconds. These behaviors may be interpreted as maladaptive, but are also described as improvements upon his previous behaviors as reported by his teacher. These behaviors did not require teacher or paraprofessional intervention or elicit any comments by other students.

Andrew demonstrated one instance of self-regulatory behavior that could be interpreted as adaptive as it did not interrupt his learning or disturb anyone else in the class. He inserted earplugs for 7 minutes during a whole group lesson. It was evident that he was still able to hear the lecture material as he responded to teacher inquiries while the earplugs were inserted. The classroom in which he did this had folding partition walls, which allowed the noise from a neighboring classroom to enter the room easily. Andrew was seated near the folding wall. Andrew inserted the earplugs when the neighboring class began to play an audiobook that could be heard through the wall. He demonstrated no overt maladaptive self-regulatory behaviors.

Edward demonstrated multiple brief behaviors that sometime required teacher or aide intervention. During whole group instruction he began tapping his lips, then placed his hand in his mouth for 30 seconds, and later pulled his shirt up over his head for 34 seconds to “hide” after answering a question incorrectly. These can be interpreted as maladaptive, since they distracted other students in the classroom and disrupted the flow of the lesson. In addition, he
was observed to play with a small deck of cards during whole group, small group, and independent work. He put the cards away only when an aide or teacher prompted him. It is impossible to know the function, whether self-regulatory or not, of playing with these cards without directly interviewing Edward.

William was the only participant who frequently displayed overt self-regulatory behaviors that fit the definition of restricted and repetitive behaviors. The most frequent of these behaviors was hand flapping. He demonstrated ten different instances of hand flapping during whole group instruction, ranging from 1-4 seconds in duration, and 28 different instances during independent work ranging from 1-16 seconds. His hand flaps were occasionally accompanied by a grunt or yelp. It is difficult to determine the function of these hand flaps without directly interviewing William, but they typically seemed to be preceded by a cognitively challenging task. In one instance, when William was unsuccessful in getting help with a task after flapping his hands, he put his hand under his shirt and began to move it around under his shirt for 90 seconds. William also demonstrated one other self-regulatory behavior. During a loud classroom rendition of “happy birthday” he tucked his head into his hood and plugged his ears tightly. After the song was completed he exclaimed, “that was loud!”

**Level of Expectedness**

Level of expectedness was rated on a 3-point scale. A rating of 1 or 2 indicated a range of unexpected or inappropriate behavior. A rating of 3 represented an entirely expected and appropriate behavior. The level of expectedness was highly variable across participants utilizing the 1-3 scale. The level of expectedness data utilizing the 1-3 scale is presented in Tables 7-12.

An additional analysis was completed when the scale was modified to represent only two rating options. The ratings of 1 and 2 were collapsed into one category called unexpected and a
rating of 3 remained as expected or appropriate. Overall, the participants were more likely to produce an unexpected or inappropriate utterance or action when attempting to initiate communication with someone than when they were responding to someone. Initiating behaviors were rated as unexpected 58% of the time, while responding behaviors were rated as unexpected 35% of the time.

**Frequency of Adult Proximity**

Frequency of adult proximity was measured by calculating the total number of seconds a teacher and/or paraprofessional was within arm’s length of a participant for 3 seconds or longer during each instructional settings and dividing this number by the total number of seconds observed in the given instructional setting (Conroy et al., 2007; Conroy et al., 2004). For example, William was observed in whole group instruction for 2,401 seconds. His paraprofessional was within proximal distance for 2,375 seconds of the observed whole group lesson. Thus, William’s paraprofessional remained within proximal distance for 98.9% of whole group instruction.

When the strict definition of proximity was applied, adult proximity varied greatly for each participant. While most participants often had an adult nearby, the teachers and paraprofessionals did not necessarily maintain a distance of one arm’s length or less during instructional time. Only William’s paraprofessional remained seated directly beside him during instruction. Other paraprofessionals sat one or two desks away from the participant, outside of the proximity range. It was not clear if the paraprofessionals made a conscious decision to distance themselves from the participants, but the literature suggests that this distinction can affect communicative patterns. When an adult remains within an arm’s length of a student there are often decreased opportunities for peer engagement and increased reliance on adult assistance.
Robert experienced the lowest overall percent time with adult proximity during whole group instruction. He was observed in a special education classroom with 4-5 other students. One paraprofessional was assigned to the classroom, but not specifically to Robert. Each of the other participants travelled to their classes with a paraprofessional assigned directly to them. Robert’s teacher placed herself within proximal distance of him during 1.9% of whole group instruction and 20.7% of independent work. As mentioned previously, Robert was not observed during any small group instruction. The classroom paraprofessional was never within proximal distance of Robert during the observed instruction.

The paraprofessional assigned to Andrew was within proximal distance of him during 7.6% of the observed whole group instruction, 2% of small group, and 2.2% of independent work. A teacher was within proximal distance of Andrew during 3.8% of the observed whole group instruction, 23.2% of small group, and 2.6% of independent work.

The paraprofessional assigned to Edward remained within proximal distance during 14.7% of the observed whole group instruction and 0.68% of independent work. She was never within proximal distance of Edward during small group instruction. A teacher was within proximal distance of Edward during 27% of whole group instruction, 6.9% of small group, and 11% of independent work.

The paraprofessional assigned to William remained within proximal distance during 98.9% of whole group instruction, 30.1% of small group, and 45.8% of independent work. A teacher was within proximal distance of William during 0.54% of whole group instruction, 1.2% of small group, and 2.3% of independent work.
DISCUSSION

This descriptive, observational small-scale study aimed to describe the communicative characteristics of adolescents with ASD in various instructional settings. While some patterns of behavior did emerge, the intent of this study was not to make generalizations to be applied broadly to individuals with ASD. Instead, the hope was to prompt further investigation on a larger scale to examine best practices related to the assessment, intervention, and education of individuals with ASD. The aspirations of this study to explore interactional patterns of adolescents with ASD required the use of a reliable observational tool. Exploration of current research revealed an absence of such a tool. Although it was not an initial aim of the study, a reliable observational coding scheme was developed by repeatedly revising and improving codes through the inductive coding process in order to effectively address the initial research questions.

Development of an Observational Coding Scheme

Observational methods were utilized in the present study in order to acquire data that was ecologically valid and representative of the real-life experiences of adolescents with ASD. Utilizing this particular methodology allowed for the opportunity to analyze interactional patterns in a rich naturalistic context. Many features of the participants’ communicative patterns were identified in utilizing this method. One key finding was the observed lack of initiating behaviors, particularly with peers. Such information could not be directly obtained using a more controlled experimental environment. However, some aspects of interaction proved easier to code than others when utilizing video recorded observations. Moreover, it is possible that this system would not easily transfer to an in vivo coding approach, although such an approach would likely be logistically more feasible for school-based clinicians. Thus work to modify the coding scheme to one that can be scored live would enhance its clinical utility. Further, additional applications of this coding scheme in other naturalistic contexts, such as lower
structure school activities like lunch, or in work settings, would be beneficial in refining and streamlining the coding and analysis processes.

In terms of developing the system such that it could be clinically applied, one reality that must be acknowledged is that a substantial amount of time was devoted to transcribing and coding the videos of the participants in this study. Each hour of video required upwards of 4 hours to reliably transcribe and code. This was due, in part, to the ongoing revisions made to the coding scheme throughout the inductive coding process. Going forward with this process that time would be reduced. Nonetheless, it is very likely that further refinement would be needed to ensure the coding scheme could be feasibly used in clinical settings, or in larger scale research. The benefits of the rich data and luxury to examine natural interactions in detail are clear, and the fact that video recordings provide opportunity for many viewings of the participants allows for a fine-grained analysis. Future research could consider applying this coding scheme during live observations to enhance its clinical potential.

Socially appropriate behavior is a critical outcome of a successful social communication intervention program. Thus it was important in this work to attempt to measure expectedness of communication behaviors observed—that is, whether behaviors were considered to line up with the expectations of the communication partners and the interactional structure of the context. Establishment of a reliable expectedness scale was a challenge. When inter-rater agreement was calculated using the 1-3 scale, agreement was below a desired level, at only 71%. Reducing the complexity of the judgement increased the accuracy. Agreement improved to 92% when the scale was collapsed into a binary system. While raters seem to be able to agree on their identification of a behavior as expected or unexpected, judging the degree of unexpectedness proved more open to interpretation. With the improved reliability achieved with the binary
rating system, the potential exists for clinical application of the system to rate social appropriateness of communicative interactions, and track progress over time during naturalistic observations. This could prove to be useful in developing appropriate treatment programs aimed at improving social appropriateness of communication.

One unexpected finding of the study was the lack of maladaptive self-regulatory behavior observed in classroom settings. The above-described concerns about lack of peer engagement opportunities suggest some degree of isolation for these students even in their inclusive classrooms. This somewhat negative finding contrasts with the positive finding that three of the four participants were able to be present and engage with the curriculum as it was presented in the typical classroom, and the fourth was successful in a more structured special needs classroom. Historically, research examining individuals with autism in classroom settings has described a high number of disruptive and inappropriate behaviors (Ashburner et al., 2010; Strain et al., 2011). It is beyond the scope of the present work to determine what factors mitigated maladaptive behaviors. Incorporating participant interviews in addition to observations could prove useful in further examining these factors in future work.

An additional aspect of interactional patterns that was critical to examine was the frequency of attempted social communication initiations made with peers and adults. The broad categories of initiating and responding proved to be very informative in examining interactional patterns, and could ultimately form a basis for treatment objectives to improve the frequency of social initiations. The more fine-grained categories grouped under initiating and responding were difficult to accurately classify. Reliably rating subtle pragmatic behaviors is a notoriously challenging task, and has been described as the most difficult aspect of language to accurately quantify (Simmons et al., 2014). However, the challenge in accurately applying these codes may
be due in part to the relatively small amount of data gathered in this study. A larger scale study may be able to further evaluate the accuracy of these sub-categories and continue to revise and refine them in order to best describe the communicative behaviors of adolescents with ASD. Possibly improvements in training manuals and/or training of coders would yield better results. If it could be achieved, such information could have clinical application, to further describe the interactional profile of individuals with ASD in order to develop individualized goals and treatment plans.

As mentioned previously, a reliable observational coding scheme was essential in effectively addressing the research questions posed in the present study. One positive outcome of this study was the development of a reliable coding scheme that can be applied in future observational research and potentially utilized for clinical assessment. Such a tool seems to be lacking in current research. Simmons et al. (2014) report on the development of a pragmatic assessment based on structured conversational protocols, with particular interest in interactional parameters such as response to requests for clarification. Such a protocol has the benefit of setting up the context to maximize the likelihood that the behaviors will be reliably elicited. In contrast to this approach, the present study looked at natural, unscripted environments. Combining these two approaches would have the potential to reveal a rich set of data documenting social communication challenges in higher functioning individuals. The benefits of a scripted protocol would be to uncover weaknesses in behaviors that might otherwise be unobserved. The benefit of coding natural interactions is to uncover everyday interaction patterns. The scripted assessment might lend itself to developing conversational intervention goals for pull-out therapy. The natural observations would inform planning of students’
educational environment, facilitating understanding upon which to base staff and peer training for optimizing inclusive social learning experiences for children with ASD.

**Clinical Application**

The notion that intervention needs to consider not just individual training but the entire environment is not new, but perhaps has yet to be applied as fully as it might in developing best practices for students with ASD. Adolescents spend a significant amount of time at school. As mentioned previously, the participants in this study had little access to peer engagement opportunities outside of their classroom experiences. They generally were not included in social times such as lunch or passing periods, and did not participate in extracurricular activities. For students like those observed in this study, a speech-language pathologist’s goal of maximizing communication effectiveness in social contexts is likely best served during instructional time. If future research demonstrates similar patterns to this study exist for many or most adolescents on the spectrum, promoting and optimizing opportunities for peer engagement in instructional settings may become an area of emphasis for speech-language pathologists.

The purpose of classroom instruction may be at odds with social communication practice. This is typically considered a time during which students are expected to receive information passively and respond when called upon. However, opportunities could be incorporated within the regular delivery of academic content via inter-disciplinary collaboration. Studies of educators’ perspectives have shown that teachers feel unprepared to teach students with ASD in mainstream classrooms (Lindsay et al., 2013). There have been some attempts to develop school-based programs aimed at improving social communication for adolescents with ASD, but evidence is still sparse (Laugeson, Ellingsen, Sanderson, Tucci, & Bates, 2014). One particular challenge in school-based settings is the lack of time for teachers to supplement the curriculum
with additional lessons to bolster social communication skills. Laugeson et al. (2014) found that teachers generally focused on the feasibility of an intervention rather than evidence. Perhaps advanced training and collaboration would lead to more opportunities for social communication within the classroom environment. Push-in services delivered via speech-language pathologists could help create opportunities for practice with peer-to-peer communication through enhanced small group instruction, for example. However, we must first develop a better understanding of the communication challenges faced by students with ASD in the classroom context, and how we can support teachers to best address their students’ needs in order to develop effective interventions (Able et al., 2015; Shattuck, Orsmond, et al., 2011).

**Future Directions**

Further exploration of these aforementioned key findings with a larger cohort and typical peer comparison group would be critical to validating the present results. The rationale for a naturalistic observation study was to access settings that were both ecologically valid and representative of the context in which the participants regularly interacted and learned (Yoder & Symons, 2010). The video recorded observations obtained for this study were ecologically valid in that they provided an opportunity to explore the real life experiences of the participants. They were representative because the environment was not manipulated in any way to affect the participants’ interactions with their teachers or peers, and they occurred over a variety of time periods and lessons. However, a weakness of this methodology was the inability to interact with the participants to gain greater insight into their experiences. Some behaviors were difficult to interpret without speaking directly to the participants. For example, if a participant began flapping his hands, the researcher could make a judgment regarding the function of this behavior based only on the externally observable behavior. As mentioned previously, the validity of these
interpretations could be improved by conducting one-on-one interviews with participants and their teachers and paraprofessionals, as well as by increasing the number and duration of observations to better understand antecedent and consequent events.

A further weakness of the design of the study was the relatively brief amount of observation per student. Observations taking place over a longer period are often used in ethnographic research, for example Baines (2012) observed and interviewed two students with ASD over the course of two years. Longer observations are limited as to the level of detail that is practicable to record, however. A rationale for the design of the present work was to establish a reliable method of quantifying communication and interaction patterns in the classroom, which offers the advantage of a high level of detail. Trade-offs between length of observation and amount of detail are inevitable. In future work, potentially combining ethnographic interviews and longer-term observation with targeted, fine-grained analysis of critical contexts would provide additional insights that neither approach by itself can yield.

The present study design also revealed some interesting concerns regarding feasibility of conducting observational research in public schools. Obtaining permission to observe in a classroom was an arduous task. As such, permission to observe students without ASD was not possible to obtain within the constraints imposed. Instead, a notification and opt-out form was provided to all of the other students in the observed classrooms. This procedure eliminated the option to compare students with ASD to their typical peers in the same classroom. Thus, a definitive conclusion that the participants in this study communicated in ways that differed from their typical peers cannot be made. While it cannot be definitively stated owing to the aforementioned limitation, based on teacher reports regarding these participants, as well as on the classroom interaction literature for typically-developing students (Bauminger, Shulman, &
Agam, 2003; Kasari, Locke, Gulsrud, & Rotheram-Fuller, 2011), it would appear that peer-to-peer interaction was more infrequent in the students with ASD than among their peers. As a major goal of inclusion is learning and socialization with peers, the potential for students with ASD to be isolated from peer interaction even within inclusive settings is of concern.
CONCLUSION

This study examined five key questions. The first three research questions explored the form and function of intentional communication in various instructional contexts. First, what are the forms of intentional communication used by adolescents with ASD in the classroom that can be observed and coded, and with what frequency do these acts occur? While all of the participants demonstrated both verbal and nonverbal communication, a preference for verbal communication in all instructional settings was evident in the data. This is to be expected given the age and cognitive status of these four students. There was variability with regard to frequency of intentional communication in each instructional setting. This variability in the data might be attributable to individual differences in the participants, based on the heterogeneous nature of those diagnosed with autism. It might also reflect unknown differences in the classroom settings, lesson material, teachers, aides, and peers; such variables are inherent in the nature of a naturalistic observational study. This study also explored the functions of the intentional communication acts used by adolescents in classroom settings, and variability across different instructional settings. All four participants showed competence in responding to others' initiations. In all instructional settings the four students observed used communication to respond more frequently than to initiate, with only one exception.

A fourth question explored self-regulatory behaviors. Specifically, the question asked what self-regulatory behaviors can be observed. This question touched on the issue of feasibility related to gathering reliable information via behavioral observations. While behaviors could be observed and counted there were limitations in being able to interpret their function via observation alone. One suggestion for adding to the richness of analysis of self-regulatory behaviors was supplementing behavioral observations with one-on-one interviews.
Finally, adult proximity was quantified. This is important because some research has suggested that adult proximity negatively impacts social engagement and peer interaction (Lindsay et al., 2013). On average, a teacher or paraprofessional was within proximal distance of a participant during about 29% of instructional time observed. This average percentage represents a wide range of values. William’s paraprofessional was within proximal distance of him during whole group instruction during nearly 100% of the time observed. The paraprofessional in Robert’s classroom, on the other hand, was never within proximal distance of him during the times observed. One recommendation for further research may be to explore changes in rate of peer interaction with and without adult proximity. In addition, research suggests that individuals with ASD often struggle if they choose to further their education at a post-secondary institution or seek employment (Taylor & Seltzer, 2011). It would be interesting to examine adult proximity over time and investigate the educational planning related to systematic increase or decrease of paraprofessional support for students with ASD. If adult proximity and assistance is provided at a very high rate in secondary school and then suddenly removed during post-secondary school, academic or occupational challenges may result.

This study was able to develop and implement a reliable coding system designed to answer the above-discussed research questions. Because measuring pragmatics and social interaction in live contexts is a challenge, this work provides a positive basis for further exploration of measurement of classroom behavior. Such information has the potential to inform clinical assessment. Gathering this type of information will allow for interventions and supports that are designed with careful baseline data. Possible use of such data might be to redesign the classroom environment and experiences such that all students have the opportunity for positive engagement.
The adolescents observed in this study were intelligent active participants in their classrooms. During observations, they demonstrated abilities to attend to instruction, ask and answer questions, and recall important details from prior lessons. Their ability to succeed as students of academic content suggests that they would potentially be able to succeed as students of social content. If provided with explicit instruction, they could perhaps improve their ability to initiate social communication with peers, and this in turn may lead to a classroom experience that yields maximum benefits from receiving education in an inclusive setting.
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### APPENDIX A: TABLES AND FIGURES

#### Tables

**Table 1**  
*Naturalistic Observation Research Summary*

<table>
<thead>
<tr>
<th>Authors</th>
<th>Participants (all had ASD)</th>
<th>Setting</th>
<th>Frequency (per hour)</th>
<th>Form</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chiang &amp; Lin, 2008</td>
<td>34 children (2-16 yrs)</td>
<td>Various schools in Australia and Taiwan</td>
<td>44 expressive acts</td>
<td>AAC</td>
<td>Requesting and commenting</td>
</tr>
<tr>
<td>Stone &amp; Caro-Martinez, 1990</td>
<td>30 children (4-13 yrs)</td>
<td>Autism classrooms (unstructured time)</td>
<td>3-4 times (initiations)</td>
<td>Motoric</td>
<td>Getting attention, engaging in social routines, requesting; Teacher directed most frequently.</td>
</tr>
</tbody>
</table>
Table 2
Observation Settings

<table>
<thead>
<tr>
<th>Participant</th>
<th>Grade</th>
<th>Age</th>
<th>Observation Settings</th>
<th>Supports</th>
<th>Total Time Observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robert</td>
<td>7</td>
<td>15</td>
<td>Math Resource ELA Resource</td>
<td>Teacher &amp; Aide Teacher &amp; Aide</td>
<td>1.54 hours</td>
</tr>
<tr>
<td>Andrew</td>
<td>7</td>
<td>13</td>
<td>Math Inclusion ELA Inclusion</td>
<td>Teacher &amp; Aide 2 Teachers &amp; Aide</td>
<td>2.5 hours</td>
</tr>
<tr>
<td>Edward</td>
<td>7</td>
<td>13</td>
<td>Social Studies Inclusion ELA Inclusion</td>
<td>Teacher &amp; Aide 2 Teachers &amp; Aide</td>
<td>1.45 hours</td>
</tr>
<tr>
<td>William</td>
<td>9</td>
<td>15</td>
<td>Academic Support Resource Math Inclusion</td>
<td>Teacher &amp; Aide 2 Teachers &amp; Aide</td>
<td>2.67 hours</td>
</tr>
</tbody>
</table>

Resource: class of 6-10 disabled peers; Inclusion: class of 15-20 typical and disabled peers
<table>
<thead>
<tr>
<th>INITIATING</th>
<th>Definition</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>New Topic Introduction</strong></td>
<td>Beginning a new topic of conversation.</td>
<td>-You know the trapezoid could also just be 3 triangles, right? -Hey, P3, I like your glasses.</td>
</tr>
<tr>
<td><strong>Restarting Old Topic</strong></td>
<td>Referring to or re-starting a previous topic.</td>
<td>-Wait, what was number 5? Oh no, we’re on number 5. -Well I was gonna say like if you would take the 1 off of the 31 and give it to the 29 they would all be 30s.</td>
</tr>
<tr>
<td><strong>Eliciting Verbal/Nonverbal Response (including requests)</strong></td>
<td>Verbalizing a deliberate invitation for a verbal or nonverbal response.</td>
<td>-[student] can you help me? -Is this graded? -What page?</td>
</tr>
<tr>
<td><strong>Intruding</strong></td>
<td>Inappropriate or mistimed intrusion into conversation. Includes interjecting irrelevant topics and exclamations.</td>
<td>-Stop saying no already! -I gotta use the restroom!</td>
</tr>
<tr>
<td><strong>RESPONDING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Acknowledging (Statements)</strong></td>
<td>Recognizing the previous speaker’s utterance without adding to the conversation. Used in reference to prior statements only (not questions).</td>
<td>-Oh yeah. -Pretty sure that’s not right. -Thanks.</td>
</tr>
<tr>
<td><strong>Yes/No Answers</strong></td>
<td>Simple yes/no responses or colloquial versions of yes/no</td>
<td>-Yeah -Nah, I don’t feel like it. -Yeah, duh!</td>
</tr>
<tr>
<td><strong>Brief Answers (Questions)</strong></td>
<td>Short utterances that answer a previous speaker’s utterance without adding to the conversation. Used in reference to a prior question only (not statements).</td>
<td>-Land on the moon. -I give up on that one. -It’s a million.</td>
</tr>
<tr>
<td><strong>Repeating</strong></td>
<td>Repetition of the previous utterance or phrase.</td>
<td>Any verbal full or partial repetition.</td>
</tr>
<tr>
<td><strong>Sustaining Topic</strong></td>
<td>Maintaining a theme/topic by reformulating material rather than adding new information.</td>
<td>-S: You’re different; P: Yes, I like being different. -T: You should all be watching the news! P: I watch it every morning before school.</td>
</tr>
<tr>
<td><strong>Extending Topic</strong></td>
<td>Maintaining a conversation/interaction by drawing out a new theme or giving new information.</td>
<td>-T: Why are you so tired? What did you do last night?; P: I did dishes and played on the computer. But I’m not going outside. -T: Right, it is the aurora borealis; P: Or you could basically say the aurora boring-alis. Because that’s what it is. It’s boring.</td>
</tr>
<tr>
<td><strong>Clarification</strong></td>
<td>Requesting additional information to clear up confusion, or to confirm accuracy of own utterance.</td>
<td>-On this? -That’s what I said. -Hmm?</td>
</tr>
<tr>
<td><strong>OTHER</strong></td>
<td>Any intentional communication acts not fitting the above categories.</td>
<td></td>
</tr>
<tr>
<td><strong>FALSE START</strong></td>
<td>Utterances that begin, but are never completed.</td>
<td>-Umm they… -The sock uh…</td>
</tr>
</tbody>
</table>
Table 4  
*Nonverbal Intentional Communication Codes*

<table>
<thead>
<tr>
<th><strong>INITIATING</strong></th>
<th><strong>Definition</strong></th>
<th><strong>Examples</strong></th>
</tr>
</thead>
</table>
| Raising Hand  | Participant raises hand followed by the verbal initiation of a new topic or reactivation of a prior topic.  
|               | This code is NOT to be used if the participant is raising his hand to respond to a question or directive. | T: Open your books to page 12 please.  
P1 raises hand.  
P1: Are we going to have homework tonight? |
| Requesting object | Participant uses his body to indicate desire for a particular object. | P3 grabs laptop from student. |

<table>
<thead>
<tr>
<th><strong>RESPONDING</strong></th>
<th><strong>Definition</strong></th>
<th><strong>Examples</strong></th>
</tr>
</thead>
</table>
| Yes/No Answers | Participants nods or shakes his head in response to a prior utterance. | P2 nods head.  
P4 shakes head. |
| Compliance     | Participant completes an action as directed or responds nonverbally as requested. | T: Open your books to page 12 please.  
P3 opens book.  
A: Keep working.  
P4 begins writing.  
S: You can’t copy my answers!  
P2 looks back to his own paper. |
| Non-compliance | Participant fails to complete an action as directed or demonstrates an absence of a response where a response is expected. | T: Open your books to page 12 please.  
P3 does not move.  
A: Keep working.  
P4 stares at the door.  
S: You can’t copy my answers!  
P2 scrunches his nose and continues to stare at student. |

<table>
<thead>
<tr>
<th><strong>OTHER</strong></th>
<th><strong>Definition</strong></th>
<th><strong>Examples</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Any nonverbal behavior not included in the above categories.</td>
<td></td>
</tr>
<tr>
<td>RATING</td>
<td>VERBAL EXAMPLES</td>
<td>NONVERBAL EXAMPLES</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>1=</td>
<td>T: How about your parents? Can they give you a look that sends the message loud and clear? P: And so kids that is the story of how I met your mother.</td>
<td>S: Just do the problem. <em>P3 laughs and slams his head on desk.</em></td>
</tr>
</tbody>
</table>
### Table 6

*Self-regulatory Behaviors*

<table>
<thead>
<tr>
<th></th>
<th>Definition</th>
<th>Verbal Examples</th>
<th>Nonverbal Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adaptive</strong></td>
<td>Participant says something or completes an action that is acceptable within the classroom context and allows him to regulate himself.</td>
<td>“May I go to the hall for a minute?”</td>
<td>Discreetly placing earplugs in ears.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“I need a break.”</td>
<td>Using an approved fidget toy.</td>
</tr>
<tr>
<td><strong>Maladaptive</strong></td>
<td>Participant says something or completes an action that is not acceptable within the classroom context and/or escalates his level of dysregulation.</td>
<td>“I hate this place!”</td>
<td>Hitting classmate.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yelping/growling</td>
<td>Hand flapping.</td>
</tr>
<tr>
<td>Participant</td>
<td>Percent Rating was Assigned</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15%</td>
<td>60%</td>
</tr>
<tr>
<td>Robert</td>
<td>Initiations</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Responses</td>
<td>6%</td>
<td>3%</td>
</tr>
<tr>
<td>Andrew</td>
<td>Initiations</td>
<td>50%</td>
<td>33%</td>
</tr>
<tr>
<td></td>
<td>Responses</td>
<td>24%</td>
<td>26%</td>
</tr>
<tr>
<td>Edward</td>
<td>Initiations</td>
<td>0%</td>
<td>62%</td>
</tr>
<tr>
<td></td>
<td>Responses</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>
Table 8
*Verbal Intentional Communication Expectedness Ratings- Independent Work*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Percent Rating was Assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Robert</td>
<td></td>
</tr>
<tr>
<td>Initiations</td>
<td>50%</td>
</tr>
<tr>
<td>Responses</td>
<td>0%</td>
</tr>
<tr>
<td>Andrew</td>
<td></td>
</tr>
<tr>
<td>Initiations</td>
<td>N/A</td>
</tr>
<tr>
<td>Responses</td>
<td>N/A</td>
</tr>
<tr>
<td>Edward</td>
<td></td>
</tr>
<tr>
<td>Initiations</td>
<td>25%</td>
</tr>
<tr>
<td>Responses</td>
<td>0%</td>
</tr>
<tr>
<td>William</td>
<td></td>
</tr>
<tr>
<td>Initiations</td>
<td>3%</td>
</tr>
<tr>
<td>Responses</td>
<td>3%</td>
</tr>
<tr>
<td>Participant</td>
<td>Percent Rating was Assigned</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Robert</td>
<td>N/A</td>
</tr>
<tr>
<td>Initiations</td>
<td></td>
</tr>
<tr>
<td>Responses</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Andrew</td>
<td>0%</td>
</tr>
<tr>
<td>Initiations</td>
<td></td>
</tr>
<tr>
<td>Responses</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Edward</td>
<td>0%</td>
</tr>
<tr>
<td>Initiations</td>
<td></td>
</tr>
<tr>
<td>Responses</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>William</td>
<td>0%</td>
</tr>
<tr>
<td>Initiations</td>
<td></td>
</tr>
<tr>
<td>Responses</td>
<td>0%</td>
</tr>
</tbody>
</table>

Table 9
Verbal Intentional Communication Expectedness Ratings - Small Group
<table>
<thead>
<tr>
<th>Participant</th>
<th>Percent Rating was Assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Robert</td>
<td></td>
</tr>
<tr>
<td>Initiations</td>
<td>0%</td>
</tr>
<tr>
<td>Responses</td>
<td>5%</td>
</tr>
<tr>
<td>Andrew</td>
<td></td>
</tr>
<tr>
<td>Initiations</td>
<td>0%</td>
</tr>
<tr>
<td>Responses</td>
<td>0%</td>
</tr>
<tr>
<td>Edward</td>
<td></td>
</tr>
<tr>
<td>Initiations</td>
<td>0%</td>
</tr>
<tr>
<td>Responses</td>
<td>0%</td>
</tr>
<tr>
<td>William</td>
<td></td>
</tr>
<tr>
<td>Initiations</td>
<td>N/A</td>
</tr>
<tr>
<td>Responses</td>
<td>0%</td>
</tr>
<tr>
<td>Participant</td>
<td>Percent Rating was Assigned</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Robert</td>
<td>N/A</td>
</tr>
<tr>
<td>Initiations</td>
<td>N/A</td>
</tr>
<tr>
<td>Responses</td>
<td>0%</td>
</tr>
<tr>
<td>Andrew</td>
<td>N/A</td>
</tr>
<tr>
<td>Initiations</td>
<td>N/A</td>
</tr>
<tr>
<td>Responses</td>
<td>N/A</td>
</tr>
<tr>
<td>Edward</td>
<td>N/A</td>
</tr>
<tr>
<td>Initiations</td>
<td>N/A</td>
</tr>
<tr>
<td>Responses</td>
<td>17%</td>
</tr>
<tr>
<td>William</td>
<td>100%</td>
</tr>
<tr>
<td>Initiations</td>
<td>0%</td>
</tr>
</tbody>
</table>
Table 12
Nonverbal Intentional Communication Expectedness Ratings- Small Group

<table>
<thead>
<tr>
<th>Participant</th>
<th>Percent Rating was Assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Robert</td>
<td>N/A</td>
</tr>
<tr>
<td>Initiations</td>
<td>N/A</td>
</tr>
<tr>
<td>Responses</td>
<td>N/A</td>
</tr>
<tr>
<td>Andrew</td>
<td>N/A</td>
</tr>
<tr>
<td>Initiations</td>
<td>0%</td>
</tr>
<tr>
<td>Responses</td>
<td>N/A</td>
</tr>
<tr>
<td>Edward</td>
<td>N/A</td>
</tr>
<tr>
<td>Initiations</td>
<td>N/A</td>
</tr>
<tr>
<td>Responses</td>
<td>N/A</td>
</tr>
<tr>
<td>William</td>
<td>N/A</td>
</tr>
<tr>
<td>Initiations</td>
<td>0%</td>
</tr>
</tbody>
</table>
Table 13

*Adult Proximity: Percent Time of Total Observed Time*

<table>
<thead>
<tr>
<th></th>
<th>Whole Group</th>
<th>Small Group</th>
<th>Independent Work</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Robert</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher</td>
<td>1.9%</td>
<td>N/A</td>
<td>20.7%</td>
</tr>
<tr>
<td>Paraprofessional</td>
<td>0%</td>
<td>N/A</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Andrew</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher</td>
<td>3.8%</td>
<td>23.2%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Paraprofessional</td>
<td>7.6%</td>
<td>2%</td>
<td>2.2%</td>
</tr>
<tr>
<td><strong>Edward</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher</td>
<td>27.0%</td>
<td>6.9%</td>
<td>11.0%</td>
</tr>
<tr>
<td>Paraprofessional</td>
<td>14.7%</td>
<td>0%</td>
<td>0.68%</td>
</tr>
<tr>
<td><strong>William</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher</td>
<td>0.54%</td>
<td>1.2%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Paraprofessional</td>
<td>98.9%</td>
<td>30.1%</td>
<td>45.8%</td>
</tr>
</tbody>
</table>
Figure 1: Instructional Settings Mean Percentages Observed

- **Whole Group**: 58.20%
- **Small Group**: 5.40%
- **Independent**: 36.40%
Figure 2: Verbal Intentional Acts

Teacher | Paraprofessional | Peer
--- | --- | ---
Whole | 87.75% | 6.75% | 5.50%
Independent | 44.30% | 21% | 34.70%
Small | 23.30% | 16% | 60.70%
Figure 3: Nonverbal Intentional Acts

- Whole:
  - Teacher: 90.25%
  - Paraprofessional: 8.75%
  - Peer: 1%

- Independent:
  - Teacher: 79.70%
  - Paraprofessional: 19.30%
  - Peer: 1%

- Small:
  - Teacher: 60%
  - Paraprofessional: 30%
  - Peer: 10%
APPENDIX B: INFORMED CONSENT FORMS

Informed Consent Form for Parents/Guardians
Classroom Engagement of Children with Autism Spectrum Disorder

Who is doing this study?
Chelsea Van Vickle, master’s student, and Dr. Lynne Hewitt are studying the classroom engagement of children with autism spectrum disorder (ASD). We are researchers at Bowling Green State University in Bowling Green, Ohio.

What is the study about?
We hope to use the information from the study to help children with ASD succeed in school, and get the right type of help when they need it. We believe that researching the ways children act in their classroom will help teachers, principals, other professionals, and parents meet the educational needs of children with ASD.

What happens in the study?
The study consists of the following activities:

1. We will ask your permission to observe your child’s classroom several times during the 2014-2015 school year. We will plan to observe your child for a total of approximately 2 hours, and we will always pre-arrange the times with your child’s teacher.

2. The observations will be videotaped. The video camera will be placed in the back of the classroom and will be operated by one of the researchers.

3. We will ask that you give permission for us to get copies of your child’s current IEP or 504 Plan (if applicable) from your child’s teacher.

4. We will administer the Childhood Autism Rating Scale (CARS), a questionnaire, in collaboration with your child’s teacher to verify ASD diagnosis. The CARS is a checklist that your child’s teacher can complete based on his/her observations. Your child will not miss any class time for the CARS.

5. If you give permission for these activities, we will then ask permission from your child before beginning any observations.

6. We will ask your child’s teacher and paraprofessional to complete a brief qualitative questionnaire about your child’s classroom communication.

How long will it take?
We will be observing during your child’s regular class time. Participation in the study will not require your child to miss any instructional time. Observations can occur anytime during the remainder of the 2014-2015 school year, but will total no more than approximately 2 hours.

Are there any risks?
There is a slight risk that your child may not want to be videotaped or not participate in the classroom on observation days. If this occurs, we will stop observing if your child’s classroom. The only other risk is to your privacy. We have the following safeguards in place: all records will be made anonymously. We will assign your child a unique identifying code for all written records, and it will be stored on a secure password protected computer. Video files will be identified with this code, and only can be viewed by Chelsea Van Vickle, Dr. Hewitt, and research assistants under their direct supervision. Once we have transferred information from an IEP or 504 Plan you provide to us to an anonymous format, the originals will be...
Can I get the results of the study?
We are happy to share the results of the study if you are interested.

Is this study required?
Taking part in this study is completely voluntary. If give permission for your child to participate in this study, you are free to terminate your child's involvement at any time. Withdrawing your child from the study will not affect your current or future relations with Bowling Green State University. Any information collected about your child to date will be destroyed if you decide to stop your child's participation.

What do people in the study get for taking part?
We are thankful for your family's help, but there are no prizes or rewards for participation. We hope you will consider the benefit to our educational community as a whole when deciding to participate.

Who gets to see my child's information?
The records and data of this study will be kept completely confidential throughout the entire process. No names will be identified in any reports or publications. All research records (consent forms, videos, data collection forms, and results) will be locked in a private office in the Bowling Green State University Speech and Hearing Clinic. The videotapes and data collection forms will not be labeled with your or your child's real name. Copies of the video recordings will not be made available to your child's teacher, and will not be used for any academic evaluation of either your child or your child's teacher.
The only people who will view this confidential information are the following:
- Chelsea Van Vickle and Dr. Lynne Hewitt
- Student research assistants under our direct supervision.

Who can answer questions about this study?
If you have any questions, you may contact Chelsea Van Vickle (847) 910-6302 (email: cvanvic@bgsu.edu) or Dr. Lynne Hewitt (419) 372-6031 (e-mail: lhewitt@bgsu.edu). You may also contact the Chair, Human Subjects Review Board, Bowling Green State University, (419) 372-7716, (e-mail: hsr@bgsu.edu), if you have any concerns or questions about you or your child's rights as a research participant.

What does it mean to sign this form?
If you sign below, you acknowledge you have read this entire letter. All of your questions have been answered, you are aware of your responsibilities, and you agree that your child can participate in this study. You will be given a copy of this form. Please return the signed form to your child's teacher.

_____________________________  ____________________________    _______________
Printed Name of Parent/Guardian  Signed Name of Parent/Guardian             Date

______________________________
Printed Name of Child

Chelsea Van Vickle, B.S.
Department of Communication Sciences and Disorders, Bowling Green State University
Lynne E. Hewitt, Ph.D., CCC – SLP
Department of Communication Sciences and Disorders, Bowling Green State University
Informed Consent Form for Teachers
Classroom Engagement of Children with Autism Spectrum Disorder

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What is the study about?
The researchers hope to use the information from the study to help children with ASD succeed in school, and receive the right type of help when they need it. We believe that providing quality research about the ways children respond to their classroom environment will be impactful in affecting educational policy and collaboration between professionals. We believe that we can much better advocate for the needs of children by equipping ourselves with knowledge, and using that knowledge to constructively influence change.

What happens in the study?
The study consists of the following activities:
1. We will ask you to send home parent/guardian consent forms to the families of students in your class who have ASD, and parent notification forms to the families of all other students in your class.
2. We will ask your permission to observe your classroom on several occasions during the current academic year. These observation times will be pre-determined by you, and should occur during a time that at least one student present in your classroom has been diagnosed with ASD.
3. The observations will be videotaped. The video camera will be placed in the back of the classroom and will be operated by one of the researchers. Small wireless microphones will be placed near the student seating areas. The researcher will arrive prior to the start of class to set-up and will remain until the end of a lesson to minimize disruption.
4. We will ask that you provide us with copies of the current IEP or 504 Plan for any child participating in the study (optional).
5. We will ask you to complete the Childhood Autism Rating Scale (CARS) with us to verify ASD diagnosis. This will take approximately 10 minutes of your time per child. The child need not be present for completion.
6. We will ask you to complete a brief qualitative questionnaire about each child enrolled in the study. This will take approximately 10 minutes of your time per child.

How long will it take?
The researchers will be observing during regular class time on several occasions during the remainder of this academic year. We plan to record each child in the study for approximately 2 hours. These observation times will not require any additional time commitment by you other than communicating with us to arrange an observation schedule.

Are there any risks?
There is a slight risk that your students may object to being videotaped or refuse to participate in the classroom on observation days. If this occurs, we will terminate the observation of your classroom. The only other risk is to your privacy, as you will become part of the video recordings. We have the following safeguards in place: all records will be made anonymously. We will assign you a unique identifying code for all written records, and it will be stored on a secure password protected computer. Video files will be identified with this code, and only can be viewed by Chelsea Van Vickle, Dr. Hewitt, and research assistants under their direct supervision. Once we have transferred information from any diagnostic or other records you provide to us to an anonymous format, the
Can I get the results of the study?
We are happy to share the results of the study if you are interested.

Is this study required?
Taking part in this study is completely voluntary. If you choose to participate in this study, you are free to terminate your involvement at any time. Your withdrawal from the study will not affect your current or future relations with Bowling Green State University. Any information collected about you or your classroom to date will be destroyed if you decide to terminate your participation.

What do people in the study get for taking part?
We are thankful for your help, but there are no prizes or rewards for participation. We hope you will consider the benefit to our educational community as a whole when deciding to participate.

Who gets to see my information?
The records and data of this study will be kept completely confidential throughout the entire process. No individual will be identified in any reports or publications. All research records (consent forms, videos, data collection forms, and results) will be locked in a private office in the Bowling Green State University Speech and Hearing Clinic. The videotapes and data collection forms will not be labeled with your real name. Copies of the video recordings will not be made available to your principal or any other evaluative staff, and will not be used for any academic evaluation of either you or your students.

The only people who will view this confidential information are the following:
- Chelsea Van Vickle and Dr. Lynne Hewitt
- Student research assistants under our direct supervision.

Who can answer questions about this study?
If you have any questions, you may contact Chelsea Van Vickle (847) 910-6302 (email: cvanvic@bgsu.edu) or Dr. Lynne Hewitt (419) 372-6031 (e-mail: lhewitt@bgsu.edu). You may also contact the Chair, Human Subjects Review Board, Bowling Green State University, (419) 372-7716, (e-mail: hsrb@bgsu.edu), if you have any concerns or questions about you or your child's rights as a research participant.

What does it mean to sign this form?
If you sign below, you acknowledge you have read this entire letter. All of your questions have been answered, you are aware of your responsibilities, and you agree that you will participate in this study. You will be given a copy of this form.

Printed Name of Teacher ____________________________   Signed Name of Teacher ____________________________    Date ____________

Chelsea Van Vickle, B.S.
Department of Communication Sciences and Disorders, Bowling Green State University

Lynne E. Hewitt, Ph.D., CCC – SLP
Department of Communication Sciences and Disorders, Bowling Green State University
Informed Consent Form for Paraprofessionals
Classroom Engagement of Children with Autism Spectrum Disorder

Who is doing this study?
Chelsea Van Vickle, master’s student, and Dr. Lynne Hewitt are studying the classroom engagement of children with autism spectrum disorder (ASD). We are researchers at Bowling Green State University in Bowling Green, Ohio.

What is the study about?
The researchers hope to use the information from the study to help children with ASD succeed in school, and receive the right type of help when they need it. We believe that providing quality research about the ways children respond to their classroom environment will be impactful in affecting educational policy and collaboration between professionals. We believe that we can much better advocate for the needs of children by equipping ourselves with knowledge, and using that knowledge to constructively influence change.

What happens in the study?
The study consists of the following activities:
1. We will observe the classrooms you work in, during times which the student with ASD in present, on several occasions during the current academic year.
2. The observations will be videotaped. The video camera will be placed unobtrusively in the classroom and will be operated by one of the researchers. You will likely be captured on the video, but your behaviors will not be analyzed or criticized for purposes of this study.
3. We will ask you to complete a brief qualitative questionnaire about each student with whom you work that is enrolled in the study. This will take approximately 10 minutes of your time per student.

How long will it take?
The researchers will be observing during regular class time on several occasions during the remainder of this academic year. We plan to record each child in the study for approximately 2 hours. These observation times will not require any additional time commitment by you. The total time completing questionnaires will be approximately 10 minutes per student.

Are there any risks?
There is a slight risk that the students may object to being videotaped or refuse to participate in the classroom on observation days. If this occurs, we will terminate the observation of the classroom. The only other risk is to your privacy, as you will become part of the video recordings. We have the following safeguards in place: all records will be made anonymously. We will assign you a unique identifying code for all written records, and it will be stored on a secure password protected computer. Video files will be identified with this code, and only can be viewed by Chelsea Van Vickle, Dr. Hewitt, and research assistants under their direct supervision. Once we have transferred information from any diagnostic or other records you provide to us to an anonymous format, the originals will be destroyed. Any written records of video or audio recordings we make will have identifying information altered or removed.

Can I get the results of the study?
We are happy to share the results of the study if you are interested.

Is this study required?
Taking part in this study is completely voluntary. If you choose to participate in this study, you are free to terminate your involvement at any time. Your withdrawal from the study will not affect your current or future relations with Bowling Green State University. Any information collected about you or your classroom to date will be destroyed if you decide to terminate your participation.
What do people in the study get for taking part?
We are thankful for your help, but there are no prizes or rewards for participation. We hope you will consider the benefit to our educational community as a whole when deciding to participate.

Who gets to see my information?
The records and data of this study will be kept completely confidential throughout the entire process. No individual will be identified in any reports or publications. All research records (consent forms, videos, data collection forms, and results) will be locked in a private office in the Bowling Green State University Speech and Hearing Clinic. The videotapes and data collection forms will not be labeled with your real name. Copies of the video recordings will not be made available to your principal or any other evaluative staff, and will not be used for any academic evaluation of either you or your students.

The only people who will view this confidential information are the following:
- Chelsea Van Vickle and Dr. Lynne Hewitt
- Student research assistants under our direct supervision.

Who can answer questions about this study?
If you have any questions, you may contact Chelsea Van Vickle (847) 910-6302 (email: cvanvic@bgsu.edu) or Dr. Lynne Hewitt (419) 372-6031 (e-mail: lhewitt@bgsu.edu). You may also contact the Chair, Human Subjects Review Board, Bowling Green State University, (419) 372-7716, (e-mail: hsr@bgsu.edu), if you have any concerns or questions about you or your child's rights as a research participant.

What does it mean to sign this form?
If you sign below, you acknowledge you have read this entire letter. All of your questions have been answered, you are aware of your responsibilities, and you agree that you will participate in this study. You will be given a copy of this form.

Printed Name of Paraprofessional   Signed Name of Paraprofessional   Date

Chelsea Van Vickle, B.S.
Department of Communication Sciences and Disorders, Bowling Green State University

Lynne E. Hewitt, Ph.D., CCC – SLP
Department of Communication Sciences and Disorders, Bowling Green State University
Student Assent to Participate in Research (Grades 6-12)

Who is doing this study?
My name is Chelsea Van Vickle and I am a graduate student at Bowling Green State University.

What is the study about?
My advisor, Dr. Lynne Hewitt, and I are asking you to be in a research study because we are trying to learn more about the ways students like you participate in class. I hope this study will help teachers, parents, speech therapists, and other adults learn the best ways to help kids have good classroom experiences. Your participation could be very important to future students.

What happens in the study?
If you agree to be in this study, two things will happen over the next few months.
- I will ask you to act like you normally would in class (Act like I am not here!)
- I will make a video of what goes on in your class when I visit. I will videotape about 2 hours of class time total.

Are there any risks?
We don’t know of any risks to kids who are in this study. If you don’t like being videotaped just tell me, and I won’t record you. I will keep the videos safe in a locked place at BGSU.

Is this study required?
If you don’t want to be in this study, you don’t have to. Being in this study is up to you and no one will be upset if you don’t want to do it or even if you change your mind later and want to stop. Being in this study will not affect your grades at school. You may talk this over with your parents before you decide whether or not to do it. Your parent gave permission for you to take part in this study. Even though your parent said “yes,” you can still decide not to do this.

What do I get for being in this study?
We are thankful for your help, but there are no prizes or rewards for participation.

Who will get to see my information?
The videos and papers from this study will be kept safe. Only Chelsea Van Vickle, Dr. Lynne Hewitt, and their assistants can see the information. We will not share the videos with your teacher, other students, or your parents.

Who can answer questions about this study?
You can ask any questions that you have about the study. If you have a question later that you didn’t think of now, your teacher or your parents can find out the answer.

What does it mean to sign this form?
Signing your name at the bottom means that you have read this entire letter or had it read to you, all of your questions have been answered, and you agree to be in this study. You will be given a copy of this form after you have signed it.

________________________   ______________________________  _____________
Signature of Student    Printed Name of Student   Date

Chelsea Van Vickle, B.S.
Department of Communication Sciences and Disorders, Bowling Green State University

Lynne E. Hewitt, Ph.D., CCC – SLP
Department of Communication Sciences and Disorders, Bowling Green State University
APPENDIX C: HUMAN SUBJECTS REVIEW BOARD (HSRB) APPROVAL

DATE: February 16, 2015
TO: Chelsea Van Vickle
FROM: Bowling Green State University Human Subjects Review Board
SUBMISSION TYPE: Revision
ACTION: APPROVED
APPROVAL DATE: February 13, 2015
EXPIRATION DATE: January 13, 2016
REVIEW TYPE: Expedited Review
REVIEW CATEGORY: Full Board

Thank you for your submission of Revision materials for this project. The Bowling Green State University Human Subjects Review Board has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

The final approved version of the consent document(s) is available as a published Board Document in the Review Details page. You must use the approved version of the consent document when obtaining consent from participants. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note that you are responsible to conduct the study as approved by the HSRB. If you seek to make any changes in your project activities or procedures, those modifications must be approved by this committee prior to initiation. Please use the modification request form for this procedure.

You have been approved to enroll 10 participants. If you wish to enroll additional participants you must seek approval from the HSRB.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. All NON-COMPLIANCE issues or COMPLAINTS regarding this project must also be reported promptly to this office.

This approval expires on January 13, 2016. You will receive a continuing review notice before your project expires. If you wish to continue your work after the expiration date, your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date.

Good luck with your work. If you have any questions, please contact the Office of Research Compliance at 419-372-7716 or hrsb@bgusu.edu. Please include your project title and reference number in all correspondence regarding this project.
DATE: January 7, 2016

TO: Chelsea Van Vickie
FROM: Bowling Green State University Human Subjects Review Board


SUBMISSION TYPE: Continuing Review/Progress Report

ACTION: APPROVED

APPROVAL DATE: January 14, 2016

EXPIRATION DATE: January 13, 2017

REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # 8

Thank you for your submission of Continuing Review/Progress Report materials for this project. The Bowling Green State University Human Subjects Review Board has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

Please note that you are responsible to conduct the study as approved by the HSRB. If you seek to make any changes in your project activities or procedures, those modifications must be approved by this committee prior to initiation. Please use the modification request form for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. All NON-COMPLIANCE issues or COMPLAINTS regarding this project must also be reported promptly to this office.

This approval expires on January 13, 2017. You will receive a continuing review notice before your project expires. If you wish to continue your work after the expiration date, your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date.

Good luck with your work. If you have any questions, please contact the Office of Research Compliance at 419-372-7716 or hrsb@bgusu.edu. Please include your project title and reference number in all correspondence regarding this project.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Bowling Green State University Human Subjects Review Board’s records.