SOCIAL SKILLS, ACADEMIC ACHIEVEMENT, AND POSTSECONDARY OUTCOMES AMONG STUDENTS WITH AUTISM SPECTRUM DISORDER

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ABSTRACT

SOCIAL SKILLS, ACADEMIC ACHIEVEMENT, AND POSTSECONDARY OUTCOMES AMONG STUDENTS WITH AUTISM SPECTRUM DISORDER

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The prevalence of Autism Spectrum Disorder (ASD) has increased rapidly in recent years, resulting in an influx of students with ASD in schools. Notably, the majority of students with ASD are currently functioning cognitively in the average to above average range and are learning alongside their typically developing peers. Nonetheless, students with ASD are experiencing extremely poor postsecondary outcomes compared to their typically developing peers and peers with other disabilities (Shattuck, Narendorf, Cooper, Sterzing, Wagner, & Taylor, 2012). In order to improve outcomes for students with ASD at this level, there is a need to identify and examine how characteristics of students with ASD predict their post-high school endeavors (Taylor & Seltzer, 2011). While academic achievement is typically considered to be an important predictor of postsecondary success, social skill deficits are universally pervasive among students with ASD and may also affect their school-related experiences and outcomes. The purpose of this study was to empirically explore evidence for categorizing social skills among students with ASD, including specifically a distinction between academic- or work-related social skills (WRSS) and interpersonal social skills (IPSS), and the relationships between these social skills, academic achievement, and postsecondary education and employment outcomes among high-functioning students with ASD. Data were drawn from the National Longitudinal Transition Study – 2 (NLTS2). Exploratory Factor Analysis (EFA) was used to examine the different underlying social skills factors, and Structural Equation Modeling (SEM) was used to examine the relationships between the specific social skills, academic achievement,

and postsecondary outcomes. Results revealed that WRSS and IPSS appear to represent distinct social skills among students with ASD. Additionally, WRSS significantly predicted academic achievement, as well as enrollment and persistence in postsecondary education. IPSS was significantly related to postsecondary employment and was also shown to partially predict persistence in postsecondary education. Academic achievement was significantly related to all three postsecondary outcomes. Findings emphasize the importance of continuing to support the academic needs of students with ASD, as well as highlight specific social skills to prioritize in intervention efforts for students with ASD. Future directions in research and clinical implications are discussed.

To the families and individuals whom I have been fortunate to meet and work with over the years, for opening their lives to me and inspiring my work

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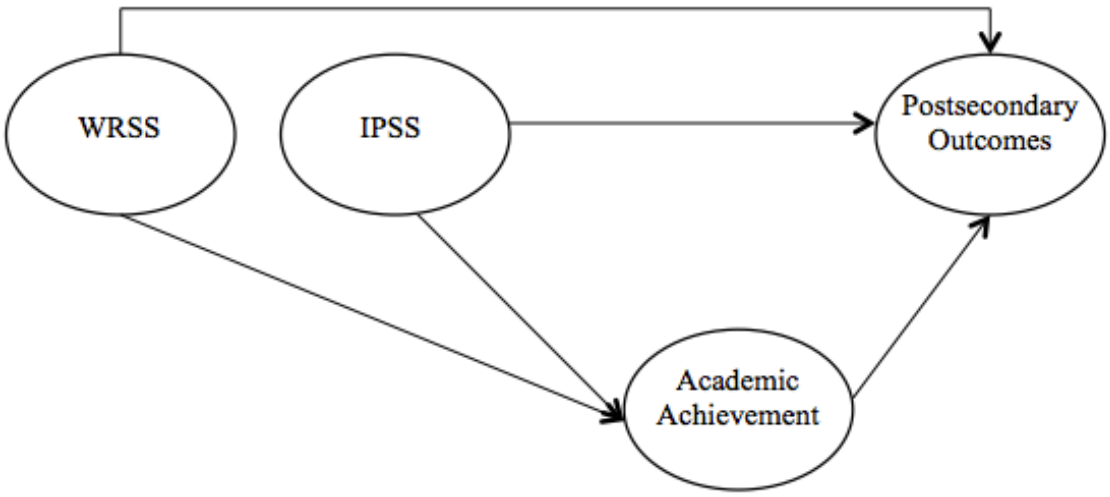
CHAPTER 1: INTRODUCTION

Purpose

The purpose of this study was to examine the relationships between specific social skills, academic achievement, and postsecondary outcomes among high-functioning secondary school students with Autism Spectrum Disorder (ASD). Two specific types of social skills that have been identified within the existing literature and are considered important in the school setting for the student population in general are academic- or work-related social skills (WRSS) and interpersonal social skills (IPSS). Evidence for the distinction between these social skills among students with ASD was explored. Additionally, the extent to which these social skills predicted academic achievement and postsecondary education and employment outcomes was examined. Finally, the extent to which academic achievement predicted postsecondary outcomes was investigated. A conceptual model of the relationships that were examined in this study is depicted in Figure 1.

Figure 1

Conceptual Framework



Background

ASD is a pervasive neurodevelopmental disorder characterized by social and communication deficits and a restricted and repetitive pattern of thinking and behavior (American Psychiatric Association, 2013). The prevalence of ASD has drastically increased in the past decade, particularly in the most recent years. Most recently, it has been estimated that one in 68 children is diagnosed with ASD, a prevalence rate that has increased 30% from the estimated rate of one in 88 children just two years prior (Centers for Disease Control and Prevention [CDC], 2014). Thus, ASD has become one of the fastest growing disabilities in the country (Sansosti & Sansosti, 2013). This is believed to be the result of several different factors, including increased awareness of ASD, changes to the diagnostic criteria, and improvements in assessment procedures and measures (Posserud, Lundervold, Lie, & Gillberg, 2009).

ASD as it is understood today has evolved from Kanner's (1943) original narrow definition of infantile autism to encompass social impairment across all levels of intellectual functioning. In other words, individuals on the autism spectrum not only vary in symptom manifestation and severity, but also levels of intellectual ability. Within the field of ASD research and practice today, "high-functioning" ASD is a term that is often used to refer to individuals with ASD who demonstrate normative or above average cognitive functioning (Bauminger-Zviely, 2013; Venter, Lord, & Schopler, 1992). Thus, "high-functioning" in this study refers to individuals with ASD who presumably exhibit average or above average intellectual ability.

The number of these more cognitively able children with ASD has been rapidly increasing in recent years. Currently, and contrary to decades ago, it is estimated that the majority of individuals with ASD exhibit average to above average intellectual functioning.

Specifically, current estimates suggest that between 52-70% of children with ASD have intellectual abilities in the average to above average range (Baker, 2014; CDC, 2014; Chakrabarti & Fombonne, 2005; Estes, Rivera, Bryan, Cali, & Dawson, 2011; Lai, Lombardo, & Baron-Cohen, 2014; Whitby & Mancil, 2009). Thus, those with ASD who do not have cognitive deficits currently make up at least half or more of the ASD population, compared to only one-third of children with ASD one decade ago (CDC, 2014; VanBergeijk, Klin, & Volkmar, 2008). Essentially, high-functioning individuals with ASD have become the fastest growing subgroup on the autism spectrum.

Given the nature of the increasing prevalence of ASD, there has been an influx of students with ASD in schools. According to findings from recent epidemiological studies, the number of students with ASD in schools has increased over 200% in the past decade (Data Accountability Center, 2012). Additionally, the increasing number of students with ASD in schools occurs in the context of a growing emphasis on an inclusive model of education (Sansosti & Sansosti, 2013). Namely, federal legislation outlined in the Individuals with Disabilities Education Act (IDEA, 2004) requires schools to provide students with disabilities a free and appropriate education in the least restrictive environment. Given that the majority of current students with ASD are functioning cognitively in the normative or above average range, students with ASD are participating in the general education curriculum and learning alongside their typically developing peers in the same academic and social environment at significantly higher rates than in the past (Data Accountability Center, 2012; Dugan, Kamps, Leonard, Watkins, Rheinberger, & Stackhaus, 1995; Howlin, 2013).

Subsequently, a “great wave” of half a million adolescents and young adults with ASD are expected to begin transitioning from high school to postsecondary life over the next decade

(Smith & Lugas, 2010). Transitioning after high school can be difficult for the student population in general, and this transition period seems to be of even greater risk for students with ASD, especially those who are high-functioning (Howlin, 2013). The available research suggests that students with ASD experience remarkably poor rates of success with the level of autonomy or independence expected of adolescents and young adults at the transition age (Schall, Wehman, & Carr, 2014). In fact, students with ASD experience some of the lowest rates of participation in postsecondary education and employment, even in comparison to students with other disabilities (Shattuck et al., 2012; Wagner, Newman, Cameto, & Levine, 2005). Previous studies have indicated that less than 40% of students with ASD ever attend college, and only 25% to 50% of adults with ASD participate in competitive employment (Shattuck et al., 2012). Additionally, even fewer graduate with a degree, and those who are employed are often working below their level of education and have difficulty maintaining stable employment (Shattuck et al., 2012). Finally, many high-functioning young adults with ASD are at risk for not participating in any productive activities after high school (Howlin, 2013; Taylor & Seltzer, 2011). For example, Taylor and Seltzer (2011) found that young adults with ASD who demonstrated average cognitive abilities were three times more likely to be disengaged from any postsecondary activities compared to those with intellectual disabilities. These findings are concerning and suggest that many young adults with ASD, including those who are high-functioning, are experiencing remarkably poor outcomes after high school.

Importance

The importance of examining outcomes for individuals with ASD has been long-standing. In fact, in Kanner's (1943) classic paper in which ASD was originally identified and defined, the need for future research to examine the participants' outcomes in adolescence and

adulthood was noted. Kanner and other researchers in the past tended to study outcomes associated with ASD symptomology (i.e., social, language, and behavioral outcomes) and cognitive changes in adolescence and adulthood (Eisenberg, 1956; Lockyer & Rutter, 1969; Rumsey, Rapoport, & Sceery, 1985). Although these studies improved the understanding of ASD and generated substantial evidence to support the pervasiveness of the disorder, researchers today call for the need to examine functional outcomes associated with achieving independence and self-sufficiency, including employment, independent living, and postsecondary education (Chiang, Cheung, Hickson, Xiang, & Tsai, 2012; Howlin, Goode, Hutton, & Rutter, 2004; Venter et al., 1992).

Participating in productive postsecondary activities can be extremely important to an individual's quality of life, as it can increase one's independence, self-efficacy, contribution to society, and overall life satisfaction (Hendricks, 2010; Stodden & Mzurek, 2010). As the higher-functioning population of students with ASD continues to grow, participating in postsecondary activities has become increasingly possible. Individuals with ASD have in fact expressed aspirations and goals to participate in postsecondary activities (Camarena & Sarigiani, 2009; Hendricks, 2010; Howlin, 2013; Volkmar et al., 2014). However, many young adults with ASD continue to lag behind their typically developing peers and peers with other disabilities in achieving postsecondary success (Shattuck et al., 2012). There is a great need for research to better understand the unique strengths and difficulties of high-functioning students with ASD, as well as examine how specific characteristics may predict their post-high school endeavors. Identifying factors that can help improve positive outcomes for high-functioning students with ASD and prepare them to become successful and independent citizens who can effectively

participate in and contribute to society post-school remains an important educational priority (Howlin, 2013; Taylor & Seltzer, 2011).

Rationale

There is broad agreement among educators, policymakers, and the public that educational systems should graduate students who are not only proficient in core academic subjects, but also able to work well with others in socially acceptable, responsible, and respectful ways (Greenberg et al., 2003). Some researchers argue that one reason students leaving high school are unprepared for postsecondary experiences is that schools tend to focus on academic achievement and pay too little attention to the development of social skills that are essential for adult life (Schall et al., 2014). Within recent years, the push for implementing social skills instruction within the school curriculum has been gradually growing. Researchers, policymakers, and educators alike are beginning to recognize the importance of social-emotional skills for students' educational success. For example, the Collaborative for Academic, Social, and Emotional Learning (CASEL), a leading national organization in the development of evidence-based social-emotional learning programs, has pushed for districts across the United States to incorporate social-emotional skills instruction in preschool through high school. Some researchers have suggested that students who struggle to develop social competencies tend to experience poor outcomes in a variety of social, emotional, and academic areas (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011).

However, schools have historically and currently face more pressure and federal guidelines to attend to the academic needs of students in order to prepare them for life after secondary school (Common Core, 2009; Durlak et al., 2011; ESSA, 2015). For example, accountability standards for academic outcomes have been emphasized in key federal legislation

policies to ensure that schools are teaching students essential academic skills to the thresholds deemed necessary for postsecondary education and employment success (ESSA, 2015). More recent federal programming continues to highlight the importance of improving students' literacy and math skills, as these academic skills have been deemed crucial for college and career readiness (Common Core, 2009). This legal emphasis on academic achievement often leads to a reduced focus on social skills instruction, which may be especially important for students with ASD, who universally experience social skills deficits.

Despite the importance of addressing social skills in school, educators continue to work with limited time and resources to address all important academic and social-emotional areas. Teachers commonly express concerns that teaching social skills takes away from valuable academic instruction time (Ostmeyer & Scarpa, 2012). The identification of specific social skills that are particularly important for school and postsecondary success may help increase the feasibility of intervention efforts. Specifically, this may help stakeholders identify, prioritize, and target relevant skill areas that can produce multiple benefits. Increased attention to possible types of social skills that may be particularly important in the school setting is crucial given the competing demands and limited resources in the school setting.

A trend in the literature has focused on examining specific types of social skills in the school setting that may be especially important for school-related outcomes. For example, many researchers have distinguished between WRSS and IPSS. Generally, WRSS have been conceptualized as social skills that are important for engaging in and completing academic tasks and include skills such as listening, following directions, staying on task, and being organized. On the other hand, IPSS have been defined as social skills necessary for interacting positively with others, such as playing cooperatively, offering help, sharing, and respecting peers. This

study examined these specific social skills (i.e., WRSS and IPSS) among secondary school students with ASD, as well as whether there were differences in the extent to which these different types of social skills predicted academic and postsecondary education and work outcomes.

CHAPTER 2: LITERATURE REVIEW

This review of the literature is divided into four main parts. First, several theoretical frameworks relevant to the present study are discussed. Second, conceptualizations of specific types of social skills important in the school setting are described (i.e., WRSS and IPSS). Third, the available research on the relationships between these specific social skills, academic achievement, and postsecondary outcomes are summarized. Finally, an overview of social skills specifically among students with ASD is provided. This review of the literature provides a foundation for the need to answer the specific research questions of the current study regarding the examination of WRSS and IPSS and the relationships to academic achievement and postsecondary outcomes among high-functioning secondary students with ASD described at the end of this section.

Theoretical Framework

This study rests on the assumption that the school environment is social in nature. Thus, students' social abilities are considered to be integral in facilitating their learning experiences at school and in their postsecondary education endeavors. Theoretical foundations linking social behavior and achievement have been established by Bandura (1977) and Vygotsky (1978). Bandura's (1977) social learning theory asserts that learning is a cognitive process that is situated in a social environment. In other words, learning is influenced by social environmental factors, and individuals learn through observation, imitation, listening to, and interacting with others. Thus, having strong social skills may enable students to learn more effectively by interacting with teachers and peers in their social environment. For example, students can learn important skills, such as "academic enabling behaviors" (DiPerna & Elliot, 2000). These "academic enabling behaviors," such as sharing, turn-taking, helpfulness, and cooperativeness, may help

foster the development of effective relationships with teachers and peers that can enhance students' learning experiences, which in turn contribute to their academic successes.

Another theory relevant to the current study is Vygotsky's (1978) social development theory. Like social learning theory (Bandura, 1977), social development theory posits that learning is a social process. Specifically, Vygotsky argues that socialization and collaboration with others is essential in order for children to learn and develop new skills. A key idea of social development theory is that children who work with others learn more skills and develop more novel ideas than those who work alone (Vygotsky, 1978). This is because students who work together will undergo greater cognitive development and acquire more knowledge through their interactions by learning from one another's different experiences, perspectives, and ideas. Thus, students who have better social skills may be better able to effectively interact and collaborate with their teachers, supervisors, and peers, allowing them to learn from others and further benefit from experiences at school and in their postsecondary activities.

More recently, some researchers have proposed a social stressor model to explain a mechanism by which poor social skills predict poor academic achievement outcomes (Juvonen, Wang, & Espinoza, 2011). According to the social stressor model, students who experience distress with their social relationships become inhibited in their cognitive processing and achievement (Juvonen et al., 2011). Thus, students who do not possess appropriate social skills may be hindered in their ability to form meaningful relationships or become rejected by their peers and teachers at school, which can cause them to experience distress within these relationships. This distress can interfere with students' cognitive processes and academic functioning, which can lead to academic disengagement and in turn, poor academic outcomes. This theory may be particularly relevant to students with ASD, who by definition experience

pervasive social interaction difficulties. Often, high-functioning students with ASD tend to be cognitively cognizant of their social difficulties but may lack the ability to engage in appropriate social interactions with others, which can increase feelings of distress. Research does in fact suggest that high-functioning students with ASD tend to recognize their social difficulties and experience internalizing problems, such as distress, anxiety, and depression as a result (Bauminger-Zviely, 2013), which can interfere with their academic functioning.

Finally, Tinto's (1993) interactionalist theory provides a theoretical perspective to explain components necessary for postsecondary success. Specifically, Tinto (1993) argues that academic systems and social systems are independent but complementary processes that are both necessary for students' success in postsecondary life. In other words, students who experience both academic and social success are more likely to persist and succeed in postsecondary environments. This is because students who experience increased levels of academic and social success are more likely to feel integrated and committed to their environment. This commitment is thought to then lead to greater persistence and ultimately graduation. Thus, students who earn passing grades and have meaningful social interactions and relationships with faculty and peers may be more likely to persist and succeed in postsecondary education environments. Overall, Tinto believed that postsecondary success is a function of both students' academic and social systems.

Defining Social Skills

Social skills are a broad construct that can encompass a range of traits, abilities, and behaviors, and therefore have been defined differently across studies (Caldarella & Merrell, 1997; Laugeson & Ellingsen, 2014; McClelland & Scalzo, 2006). As a result, there are numerous existing definitions of social skills. Historically, common definitions of social skills were: "the

ability to interact with others in a given social context in specific ways that are socially acceptable or valued and at the same time personally or mutually beneficial" (Combs & Slaby, 1977, p.162), "those responses that within a given situation, prove effective or, in other words, maximize the probability of producing, maintaining, or enhancing positive effects for the interactor" (Foster & Ritchey, 1979, p.626), and "the specific component processes that enable an individual to behave in a manner that will be judged as competent" (Schlundt & McFall, 1985, p.23). Although varied in specific definition, these definitions suggest that social skills have generally been conceptualized as positive behaviors and cognitive processes that facilitate an individual's interactions with others.

The broad conceptualizations and various definitions of social skills underscore the difficulty in accurately defining and measuring social skills. This has created challenges in both research and practice regarding social skills assessment and intervention efforts. Often, the broad definitions and lack of consensus on a consistent definition leads to assessments and interventions that target too wide a range of social skills that may not be socially significant or related to important social outcomes (Gresham, 2002). This has been especially true within the field of ASD research. Specifically, some researchers have noted that the lack of a consistent definition of social skills has posed significant difficulties in the identification of consistent treatment goals and priorities for students with ASD, as well as the measurement of intervention effectiveness and efficacy (Laugeson & Ellingsen, 2014). While the field has advanced in the development of social skills interventions for students with ASD, often these interventions target a wide range of social skills, such as initiating conversation, recognizing emotions and/or facial expressions, providing empathic responses or compliments, and various others (Laugeson & Ellingsen, 2014). Researchers and practitioners often fail to specify or define which specific

social skills were selected or to explain why particular social skills were targeted in a given intervention (Laugeson & Ellingsen, 2014). Thus, some researchers have argued the need to identify a more concrete definition of social skills within the context of socially important outcomes (Gresham, 2002).

A current widely accepted definition of social skills stems from a social validity approach and defines social skills as socially significant behaviors that can enhance social functioning and are predictive of and/or correlate with important social outcomes (Brewster, 2004; Gresham, 2002). Important social outcomes have been identified as peer acceptance, friendships, positive feelings of self-worth, academic achievement, and positive adaption to school, home, and community environments, as judged by significant others who regulate these environments (Gresham, 2002). Therefore, with specific regard to the school setting, social skills may be important social behaviors that are predictive of school-related outcomes, such as academic achievement and postsecondary experiences, as judged by significant others, such as teachers and parents, who regulate the school environment. This definition of social skills has substantially influenced much of the recent development in social skills research and practice (McClelland & Scalzo, 2006).

Types of Social Skills Important in the School Setting

Based on the development of a social validity definition of social skills, some researchers have begun to identify specific social skills that are related to important social outcomes. Specifically, some researchers have begun to examine social skills that may be particularly important in the school setting and for school-related outcomes. For example, "academic enabling behaviors" have been identified and described as "attitudes and behaviors that allow a student to benefit from classroom instruction" (DiPerna & Elliot, 2000). Academic enabling

behaviors encompass a range of skills, including interpersonal social skills, motivation, study skills, and engagement (Elliott, DiPerna, Mroch, & Lang, 2004). These researchers theorize that all of these social skills are important within the academic school setting because they influence the development and use of students' academic skills and can influence academic achievement outcomes (Elliot et al., 2004).

However, academic enabling behaviors still encompass a range of social skills considered together, and it is unclear which specific skills may be particularly important for school-related outcomes. Some researchers have moved beyond general conceptualizations of social skills and have begun to identify and define specific aspects of social skills that may be especially important in the school setting. For example, a common trend in the existing literature has focused on differentiating between and examining the effects of two types of social skills that are critical for school success among the student population in general: academic- or work-related types of social skills (WRSS), which are important for academic and classroom success, and interpersonal types of social skills (IPSS), which are important for interacting positively with others in school.

Many researchers have differentiated between WRSS and IPSS in the school setting. For example, Wentzel (1993) distinguishes between academically-relevant social skills and social behavior. Academically-relevant social skills are conceptualized as a set of academically desirable social skills, such as demonstrating an interest in schoolwork, working independently/engaging in independent learning behavior, and showing concern with evaluation/demonstrating a desire for achieving positive evaluations from teachers on academic work. On the other hand, social behaviors are conceptualized as prosocial skills, such as sharing, cooperating, helping other students when they have a problem, refraining from starting fights,

and refraining from breaking rules. Wentzel (1993) argues that academically-relevant social skills and social behavior are considered to be independent from one another but that both types of social skills are important classroom social skills that predict students' academic achievement outcomes.

Similarly, Cooper and Farran (1988, 1991) distinguish between two types of "learning-related social skills," which they define as positive social behaviors that contribute to successful school performance: work-related skills and interpersonal skills. Cooper and Farran, as well as more recent researchers, have defined work-related skills as social skills that tap the domains of independence, social responsibility, self-regulation, and cooperation (McClelland et al., 2000). Social skills such as listening, following directions, participating appropriately in group work, turn-taking, staying on task, and organizing work materials are examples of work-related skills (Cooper & Farran, 1988; McClelland et al., 2000). These social skills may be especially important for students to follow teacher directions and benefit from academic instruction. Interpersonal skills, on the other hand, are conceptualized as social skills that allow a student to interact positively with others and include specific skills such as playing cooperatively, sharing, and respecting other children (McClelland et al., 2000). It is thought that these skills can influence a student's sociometric status and peer acceptance, both of which can influence students' learning experiences at school (McClelland & Scalzo, 2006). These researchers argue that both work-related skills and interpersonal skills are necessary but distinct social skills that are important for success within the school environment.

The trend in examining different types of social skills that are important in the school setting can further be observed in a meta-analysis of reviewed empirical studies, manuals, and assessment tools published over two decades (Caldarella & Merrell, 1997). These researchers

found that the most frequently occurring social skills categories across studies were peer relations, self-management, academic, compliance, and assertion. Of these five distinct types of social skills, academic social skills, which aligns with WRSS, and peer relations social skills, which aligns with IPSS, were two of the most common categories of social skills that emerged in the studies reviewed. Specific social skills that were found to be consistently associated with the academic social skills construct were: accomplishes tasks independently/displays independent study skills, completes individual seatwork/assigned tasks, listens to and carries out teacher directions, produces work of acceptable quality for ability level/works up to potential, uses free time appropriately, is personally well-organized/brings required materials to school/arrives at school on time, appropriately asks for assistance as needed/asks questions, and ignores peer distractions while working/functions well despite distractions. Social skills that were most commonly associated with the peer relations category across studies were: compliments/praises/applauds peers, offers help or assistance to peers when needed, invites peers to play/interact, participates in discussions/talks with peers for extended periods, stands up for rights of peers/defends peers in trouble, is sought out by peers to join activities/everyone likes to be with, has skills or abilities admired by peers/participates skillfully with peers, is sensitive to feelings of peers/empathy/sympathy, has good leadership skills/assumes leadership role in peer activities, makes friends easily/has many friends, and has sense of humor/shares laughter with peers.

Although WRSS and IPSS may seem interdependent to some degree, researchers have statistically examined and distinguished between constructs that parallel WRSS and IPSS in the school setting. For example, Caldarella and Merrell (1997) found that although some social skills overlapped and appeared in multiple dimensions across the five common social skills categories,

there was a clear distinction between the academic social skills and peer relations social skills domains, as no specific social skills were shared between these two categories.

Additionally, many researchers have statistically distinguished between WRSS and IPSS constructs in their development of social skills rating scales. Specifically, in the development of the Cooper Farran Behavioral Rating Scales (CFBRS), factor analysis was conducted to statistically demonstrate that work-related skills and interpersonal skills are distinct subscales assessing different types of social skills (Cooper & Farran, 1988, 1991). Furthermore, Merrell (1993) identified academic behavior and peer relationships as distinct social skills that both measure a student's social competence in the school setting in his development of the School Social Behavior Scale (SSBS). Bronson (1994, 1996) provides further support for the distinction between WRSS and IPSS in the development of the Bronson Social and Task Skill Profile (BSTSP), in which mastery behaviors parallel the concept of WRSS and are defined as social skills that include a student's ability to organize, regulate his or her own behavior, and use self-direction to complete tasks, while social behaviors align with IPSS and are defined as social skills that allow a student to participate positively with others. Finally, Walker and McConnell (1995) developed the Scales of Social Competence and School Adjustment (SSCSA), in which WRSS and IPSS are differentiated among peer-preferred social behavior, which are social skills that address peer values and relationships and include social skills such as inviting peers to play, sharing, and compromising, and school adjustment behavior, which are social skills such as displaying independent study skills and listening carefully to teacher directions. Aside from having strong psychometric properties, the research and development of these school social skills rating scales provides empirical evidence to support the distinction between WRSS and IPSS in the school setting.

Ultimately, these findings provide both theoretical and empirical support to suggest that WRSS and IPSS represent distinct types of social skills that are particularly important for school success among the student population in general. Essentially, WRSS are conceptualized as social skills that promote students' academic success, while IPSS are conceptualized as social skills that facilitate positive social interactions with others. WRSS and IPSS may both be important for and predictive of students' academic performance at school and their postsecondary outcomes.

Social Skills, Academic Achievement, and Postsecondary Outcomes

In addition to differentiating between WRSS and IPSS as distinct types of social skills that are important in the school setting, researchers have also examined these two types of social skills and their unique contributions to specific school-related outcomes, including academic achievement and postsecondary outcomes, as well as the relationship between academic achievement and postsecondary outcomes. Research to support the relationships between social skills (i.e., WRSS and IPSS), academic achievement, and postsecondary outcomes are summarized below. Much of the available research has focused on the student population in general. The current study extended on the existing literature by exploring these relationships specifically among students with ASD.

Social Skills and Academic Achievement

The relationship between social skills in general and academic achievement has been well established in the existing literature, suggesting a strong relationship between a student's ability to socially navigate the school environment and his/her ability to succeed academically. In general, students with better social skills tend to demonstrate higher levels of academic achievement, while students who struggle to develop social competencies have been shown to experience poor academic outcomes (Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo,

2000; Durlak et al., 2011; Gresham, Vance, & Chenier, 2013; Malecki & Elliot, 2002; Ray & Elliot, 2006). Although there is much empirical evidence to support a relationship between social skills and academic achievement, much of the available research has focused on social skills considered broadly without identifying specific skills that may be particularly related to academic achievement (Estes et al. 2011; Wentzel, 1993).

A few researchers have examined specific types of social skills (i.e., WRSS and IPSS) and the extent to which they predict students' academic achievement outcomes. Findings from these studies have generally indicated that WRSS are predictive of academic achievement, while IPSS are not (Cooper & Farran, 1988; Cooper & Speece, 1988). For example, Cooper and Farran (1988) examined the unique contributions of work-related skills, which align with WRSS, and interpersonal skills, which align with IPSS, on students' academic achievement outcomes among 650 kindergarten students. These researchers found that work-related skills significantly predicted students' academic achievement outcomes at the end of the school year, while interpersonal skills did not. In similar studies, Cooper and Speece (1988) found that poor work-related skills was the most significant predictor of referrals for special education and low levels of academic achievement among first grade students, and Speece and Cooper (1990) found that students who demonstrated poor work-related skills were more likely to demonstrate poor academic achievement outcomes. More recently, McClelland et al. (2000) examined the unique contributions of work-related skills and interpersonal skills to students' academic achievement at the beginning of kindergarten and at the end of second grade among 540 kindergarten students. These researchers found that work-related skills significantly predicted students' academic achievement outcomes in reading and math at both time points. However, interpersonal skills

were not significantly related to any academic achievement outcomes in kindergarten and demonstrated a weak positive relationship with reading achievement at the end of second grade.

The relationships between WRSS, IPSS, and academic achievement have also been examined among older students over time. Pecjak, Levpuscek, Zuljan, Kalin, & Peklaj (2009) examined differences in the relationships between students' academic social skills (i.e., WRSS), interpersonal social skills (i.e., IPSS), and academic achievement outcomes among third and seventh grade students. These researchers found that academic social skills, such as completing tasks and assignments independently, listening, and following teachers' directions, more strongly predicted students' grade point averages (GPA) at the end of the school year than did their interpersonal social skills, such as complimenting or praising others, offering help to other students when needed, and inviting others to play or interact.

Together, these findings converge to suggest that WRSS and IPSS demonstrate unique patterns of predictability for students' academic achievement outcomes, with more evidence suggesting that WRSS demonstrate stronger predictability of academic achievement outcomes than do IPSS among the typically developing population of students. Students who demonstrate higher levels of WRSS may be better able to follow classroom rules and meet teachers' expectations, which can facilitate their academic learning experiences and create a conducive learning environment necessary for academic achievement. However, while having poor WRSS may be more detrimental to students' academic achievement outcomes than having poor IPSS, the importance of IPSS on academic achievement cannot yet be discounted. Although Cooper and Farran (1988) found that IPSS were not significantly predictive of academic achievement among kindergarten students, McClelland et al. (2000) and Pecjak et al. (2009) found that IPSS demonstrated a weak positive relationship with academic achievement among students in higher

grade levels (i.e., second graders and third and seventh grade students respectively). Thus, although IPSS have been found to be less predictive of academic achievement outcomes than WRSS, they may become more relevant as students age, especially within the increasing social demands of secondary school.

Academic Achievement and Postsecondary Education

The relationship between academic achievement and success in postsecondary education has also been well studied and established in the literature. In fact, academic achievement is commonly considered to be a "traditional predictor" of success in postsecondary education environments (Robbins et al., 2004). Postsecondary education institutions typically use academic achievement as a fundamental criterion when selecting qualified students for admission. In other words, selection for postsecondary education opportunities is typically based on measures of students' previous academic achievement, such as high school GPA and/or standardized test scores on state and national achievement tests. Thus, students who achieve higher levels of academic achievement may then be more desirable to postsecondary education institutions and thus, more likely to have the opportunity to enroll in a postsecondary education program. As a result, academic achievement may be an important predictor of student participation in postsecondary education experiences.

Many researchers have in fact found that academic achievement consistently predicts student enrollment in a variety of postsecondary education institutions, including two- and four-year universities (Garland et al., 2011). These findings were consistent even among diverse populations of students, including those from various socioeconomic statuses (SES) and ethnic backgrounds (Camara & Ecternacht, 2000; Engberg & Wolniak, 2010; Hein et al., 2013; Perna, 2000; Zarate & Gallimore, 2005). There is also preliminary evidence to suggest that academic

achievement predicts college attendance for students with ASD (Chiang et al., 2012). Thus, empirical evidence tends to consistently indicate that students with higher academic achievement outcomes are more likely to enroll and participate in postsecondary education opportunities.

In addition to predicting college enrollment, academic achievement in high school has been found to be a predictor of future academic success in college. Specifically, high school GPA and standardized achievement test scores, such as those on the American College Testing Program (ACT) or the Scholastic Aptitude Test (SAT), are consistently found to be two important predictors of academic success in college (Kobrin, Patterson, Shaw, Mattern, & Barbuti, 2008). For example, in a large-scale study examining over 100,000 students from 100 different postsecondary education institutions, high school GPA and standardized test scores in reading, math, and writing were the strongest predictors of students' first-year college GPAs (Kobrin et al., 2008). Futhermore, Zheng, Saunders, Shelley, & Whalen (2002) found that even when compared to other factors, such as background and demographic variables, high school GPA was the strongest predictor of college GPA. Thus, students who achieve higher levels of academic achievement in high school appear to be are more likely to continue succeeding academically in college.

Students who continue to experience academic success may be more likely to persist in postsecondary education environments and/or graduate from college. Given that academic success is necessary for graduation, it logically follows that academic achievement is an important predictor of postsecondary education persistence and graduation. In a study of over 10,000 students, researchers found that high school GPA not only significantly predicted a student's chances of being accepted to a postsecondary education institution, but also their likelihood of graduating from a postsecondary education institution (French, Homer, Popovici, &

Robins, 2015). Thus, taken together the available literature suggests that academic achievement is an important predictor of not only student enrollment in postsecondary education opportunities, but also the ability to persist in and/or graduate from a postsecondary education program.

Social Skills and Postsecondary Education

While much research attention has focused on traditional predictors of postsecondary education success (i.e., academic achievement), there has been comparatively less research conducted to examine the importance of social skills for predicting students' postsecondary education outcomes (Dymnicki et al., 2013; Robbins et al., 2004). There is evidence, however, to suggest that academic achievement alone may not be a strong predictor of postsecondary education success, especially in regard to college graduation (Schuh, 1999). Although findings from the existing literature suggest that high school GPA and standardized test scores are consistent predictors of postsecondary academic success, the available data have generally yielded moderate prediction results. For instance, traditional predictors of academic achievement, such as GPA and standardized test scores, have only been shown to account for a modest amount of variance (25%) of students' academic achievement in college (Astin, 1993; Sparkman et al., 2012). Furthermore, some researchers have found that high school GPA and achievement scores are unrelated to college graduation (Schuh, 1999; Sparkman et al., 2012). These mixed findings within the existing literature suggest that academic achievement is only one component of postsecondary education success, and examination of additional factors that may be important for students' postsecondary education outcomes is needed.

There is research evidence to suggest that social skills are a particularly important factor contributing to students' postsecondary education outcomes for the student population in general.

In a review of over 100 studies, researchers found that social skills added significantly more predictive power to college GPA beyond traditional academic achievement predictors (Robbins et al., 2004). These researchers also found that the predictive strength of traditional academic achievement measures was reduced when social skills variables were taken into account. Thus, it appears that social skills are another important factor contributing to students' postsecondary education outcomes.

While research examining social skills as a predictor of postsecondary education success is limited, even fewer studies have examined specific social skills (i.e., WRSS and IPSS) in relation to students' postsecondary education outcomes. Based on the existing literature, which suggests a positive relationship between students' WRSS and academic achievement outcomes, as well as a positive relationship between academic achievement and postsecondary education success in terms of enrollment and persistence, it logically follows that students' WRSS may be related to postsecondary education success by means of their academic achievement outcomes. In other words, students who demonstrate better WRSS and are thus more likely to achieve higher levels of academic achievement may have a greater likelihood of enrolling and persisting in postsecondary education institutions. Thus, WRSS may be a particularly important social skill that contributes to students' postsecondary education outcomes by means of their academic achievement outcomes.

There is also emerging evidence to suggest that IPSS may be important for postsecondary education success. Some researchers have argued that IPSS can be particularly important and predictive of students' successful transition between significant educational periods (e.g., preschool to elementary school, elementary school to secondary school, secondary school to postsecondary school) (Hein & Smerdon, 2013). As such, students' IPSS may become

particularly important as students transition to postsecondary experiences. Postsecondary education environments are also often highly social in nature and pose greater social demands. Students at the postsecondary level function at higher social levels with increased social interactions than do students in earlier grades (Volkmar & Wiesner, 2009). Thus, having strong IPSS may allow students to successfully interact and develop meaningful relationships with peers and professors that are especially important in postsecondary education settings.

Developing and maintaining positive relationships in college can facilitate a greater sense of acceptance and belongingness and promote a supportive and collaborative learning environment, which is important for college retention and graduation. Research suggests that students who are more involved in campus activities and have contact with professors and peers are more likely to feel connected with others and ultimately stay in school, whereas feeling isolated from a social community has been linked to higher rates of dropping out of college (Robbins et al., 2004). Thus, students with better IPSS may be better able to form effective relationships with professors and peers in college, increasing their feelings of belongingness and connectedness in postsecondary education institutions, which facilitates greater persistence and higher graduation rates. On the other hand, students with poor IPSS may struggle to establish important relationships and the crucial sense of belongingness that is important for facilitating persistence in postsecondary education environments and may be more likely to drop out.

Some researchers have in fact found that students who have better IPSS demonstrate greater persistence in postsecondary education environments compared to students with poor IPSS (Dymnicki, Sambolt, & Kidron, 2013). Specifically, these researchers found that students who possess better social awareness and relationship skills not only demonstrate higher academic achievement in college, but also tend to exert greater persistence in the demands of

postsecondary school and work environments (Dymnicki et al., 2013). Sparkman et al. (2012) found that students who demonstrated greater empathy and the ability to understand others' feelings were more likely to graduate from college than students who did not display these IPSS. Finally, in a large-scale study examining 800 students, researchers found that those who were rated by teachers to demonstrate strong IPSS, such as cooperating with peers, sharing, helping others, and understanding others' feelings, were twice as likely to graduate from college (Jones, Greenberg, & Crowley, 2015). Thus, IPSS may be particularly important for postsecondary education success in terms of persistence and graduation. Although WRSS may be related to students' academic achievement and postsecondary enrollment and persistence to some degree, IPSS may be more important and predictive of college persistence.

Social Skills and Postsecondary Employment

The relationship between social skills in general and postsecondary employment success has been established among the typically developing population of students. Social skills are often included in various work standards, suggesting the value of social skills to prospective employers. In a study of over 400 employers, researchers found that employers rated teamwork and collaboration as very important social skills for new hires to demonstrate (Casner-Lotto & Barrington, 2006). Given that employers are often seeking candidates with appropriate and agreeable social interaction skills, students who demonstrate strong social skills tend to be more desirable to employers, making them more competitive and therefore likely to obtain employment opportunities (Hein et al., 2013).

IPSS in particular may become especially important in relation to students' postsecondary employment success. In a recent study of 800 students, researchers found that students' social skills, particularly those resembling IPSS, in kindergarten significantly predicted

success with obtaining employment in young adulthood, including full-time career opportunities (Jones et al., 2015). These researchers found that students who were rated by teachers to demonstrate better IPSS such as cooperating with peers, sharing, helping others, and understanding others' feelings, were 46% more likely to have a full-time job at age 25 compared to those with poor IPSS. These findings highlight the importance of IPSS in relation to postsecondary job obtainment for the student population in general.

In sum, findings from the available research suggest that WRSS and IPSS may both be important for various school-related and postsecondary outcomes. For example, there is empirical evidence to suggest that WRSS in particular predict students' academic achievement outcomes. Although academic achievement has been shown to predict college enrollment and persistence to some degree, persistence in a postsecondary education institution has been shown to be related to additional non-academic factors, such as a student's sense of belongingness and commitment to a school community. Given that having strong IPSS allows students to create meaningful connections and relationships with others that are important in a postsecondary education environment, IPSS may then be more predictive of student persistence in a postsecondary education program than WRSS and academic achievement factors. Finally, there is evidence to suggest that IPSS may also better account for student success related to postsecondary employment opportunities. There is a need to examine both WRSS and IPSS as potential predictors of students' school-related and postsecondary successes across different outcomes, especially among students with ASD whose social skills are especially debilitating. Further examination of WRSS and IPSS in relation to different education and employment outcomes may help stakeholders prioritize treatment goals when working to improve the postsecondary outcomes of students with ASD.

WRSS, IPSS, and School-Related Outcomes Among High-Functioning Students with ASD

All students with ASD, including those with normative cognitive abilities, struggle with a variety of social skills. In fact, social and communication difficulties are thought to be the biggest challenge for high-functioning students with ASD, who otherwise function at cognitively similar levels as their typically developing peers (Bauminger-Zviely, 2013; Laugeson & Ellingsen, 2014). Although individuals with ASD experience social deficits since early childhood, adolescents and young adults with ASD face increasingly complex social demands and expectations and are thus often held to a higher expectation of social proficiency, which can make their social impairments more salient as they grow older. Researchers do not yet know which particular social skills are most impacted in individuals with ASD or which specific social deficits are the most debilitating (Laugeson & Ellingsen, 2014); however, social skills deficits are thought to be a primary reason why students with ASD experience poor outcomes.

While students with ASD struggle with a variety of social skills, there are characteristic social skills deficits that high-functioning students with ASD commonly share (Bauminger-Zviely, 2013). These common social skills difficulties among students with ASD may categorically align with the WRSS and IPSS constructs that have been identified among the general student population. Given that WRSS and IPSS have been distinguished as distinct types of social skills that are relevant in the school setting among the student population in general, examining these particular social skills among students with ASD may be a productive first step to understanding more about the social functioning of students with ASD in school, as well as how impairments in these specific social skills may affect their school-related performance and outcomes. Although WRSS and IPSS specifically have not yet been examined among individuals

with ASD, there is evidence to suggest that individuals with ASD experience difficulties with both types of social skills.

For example, it is well documented in the existing literature that students with ASD typically experience significant difficulties with executive functioning skills (Bauminger-Zviely, 2013; Loveland & Tunali-Kotoski, 2005). These difficulties can adversely affect students' WRSS at school and in their postsecondary activities. For example, high-functioning students with ASD typically have difficulty staying organized, which can affect their ability to keep track of assignments, complete homework and exams, and allocate their time effectively (Loveland & Tunali-Kotoski, 2005). They may also experience difficulties with focusing their attention and following teachers' directions (Volkmar & Wiesner, 2009). These difficulties with executive functioning skills suggest that students with ASD may experience difficulties with WRSS at school.

Researchers have suggested that difficulties with these skills can negatively affect the academic learning experiences and academic skills of students with ASD at school (Bauminger-Zviely, 2013). This adverse effect may become even more problematic in secondary and postsecondary education environments, where cognitive, academic, and organizational demands are greater than in earlier grades, and students are expected to use these skills more independently and with greater proficiency (Volkmar & Wiesner, 2009). Thus, difficulties with WRSS among secondary students with ASD can negatively affect their academic achievement and postsecondary education outcomes. Specifically, students with ASD who demonstrate poor WRSS may experience lower levels of academic achievement and a lesser likelihood of enrolling and persisting in postsecondary education environments, similarly to their typically developing peers.

Difficulties with IPSS are thought to be the characteristic social skills difficulties that individuals with ASD experience. For example, individuals with ASD experience difficulties with verbal and nonverbal social communication skills, which can significantly hinder their IPSS. Specifically, individuals with ASD often struggle with initiating or responding to social interactions or may engage in one-sided conversations and be overly verbose in their conversations with others, perseverating on their personal topics of interest (Bauminger-Zviely, 2013). They may also experience difficulties with expressing their own emotions, understanding others' perspectives and feelings, and displaying empathy appropriately towards others (Bauminger-Zviely, 2013; Laugeson & Ellingsen, 2014). Additionally, students with ASD have great difficulty using and interpreting nonverbal communication cues, such eye contact, facial expressions, and/or hand gestures. These social communication difficulties can hinder students' IPSS, making it challenging for students with ASD to relate to, appropriately interact with, and/or form meaningful relationships with their teachers, peers, supervisors, and/or co-workers (Laugeson & Ellingsen, 2014). Difficulties with IPSS may become even more pronounced and impairing as the social demands in adolescence and adulthood become more nuanced and exceedingly complex (Volkmar & Wiesner, 2009). Thus, these difficulties with social communication skills and IPSS among secondary students with ASD can negatively affect their school and postsecondary experiences. Specifically, similarly to their typically developing peers, students with ASD who demonstrate poor IPSS may experience lower rates of success in their postsecondary education and employment activities as a result.

Overall, having poor executive functioning and social communication skills can pose significant challenges for the development and use of appropriate WRSS and IPSS among students with ASD. Additionally, as the academic and social demands increase and become

exceedingly complex in secondary school and beyond, deficits with WRSS and IPSS among students with ASD may become particularly debilitating on their academic and postsecondary outcomes. Given that the pervasive social impairments of students with ASD may become more profound and likely to jeopardize their school experiences, performance, and outcomes, examination of these particular social skills in relation to school-related outcomes becomes especially important at the secondary and postsecondary level.

To date, very few studies have been conducted to explore social skills as a predictor of outcomes among adolescents and young adults with ASD, despite the fact that these individuals characteristically experience difficulties in this area. The research conducted so far suggests that there may be a relationship between social skills and school-related outcomes among students with ASD that is similar to that of typically developing students. For example, in one recent study, researchers examined the relationship between social skills and academic achievement specifically among students with ASD. Estes et al. (2011) examined patterns of academic achievement in relation to the intellectual and social abilities of 30 high-functioning students with ASD from ages 6 to 9 years old. These researchers found that students' social skills were predictive of academic achievement, even after controlling for IQ. In fact, the strongest relationship was identified between students' social skills at age 6 and their academic achievement outcomes at age 9. These findings provide preliminary evidence to suggest that the relationship between social skills and academic achievement among students with ASD manifests similarly to that of their typically developing peers, in that better social skills predict higher academic achievement outcomes. However, additional research is needed to examine this relationship with specific social skills and at the secondary and postsecondary level.

A few studies have been conducted to examine predictors of postsecondary success among students with ASD. One recent study was conducted to identify factors related to participation in postsecondary education among students with ASD. These researchers examined a nationally representative sample of 430 students with ASD, and results indicated that several factors predicted attendance in a postsecondary education institution, including parental expectations, high school type, annual household income, and academic achievement (Chiang et al., 2012). Another similar study was conducted to examine factors related to employment success among students with ASD, and these researchers found that students with ASD who were rated by teachers to demonstrate stronger social skills in general were more likely to obtain employment opportunities after high school (Chiang et al., 2013). Many researchers have theorized that social skills deficits are a primary reason why individuals with ASD face challenges in obtaining and maintaining employment due to difficulties interacting appropriately with customers, co-workers, and/or supervisors. (Wehman, Smith, & Schall, 2009).

Overall, these studies provide preliminary evidence to suggest that social skills and academic achievement may be two important factors related to the postsecondary education and employment outcomes of students with ASD. However, research to date has not yet examined the distinction of specific types of social skills (i.e., WRSS and IPSS) among students with ASD. In addition, previous research has tended to focus on predictors that are immutable to change, such as cognitive ability, gender, family income, and other demographic variables. Furthermore, the previously reviewed studies focused on single outcome measures at a time. To date, research examining specific social skills and academic achievement in relation to a variety of functional postsecondary outcomes considered together has not yet been conducted among students with ASD.

To summarize, research examining social skills as predictors of postsecondary outcomes is in its infancy stages, and there is less available research specifically among students with ASD. Given their characteristic social skills deficits, students with ASD may particularly struggle in the increasingly complex social demands of secondary and postsecondary environments. For example, they may experience difficulties approaching professors, interacting with peers, or self-advocating for their unique educational needs (Boutot & Smith Myles, 2011). Additionally, their social difficulties may hinder their ability to connect with others, reducing their feelings of belongingness and sense of community that is important in postsecondary environments. Researchers are currently beginning to examine predictive factors of postsecondary participation among students with ASD to better understand and improve their transition to postsecondary life. Because students with ASD experience a variety of social skills impairments, it is important to examine which specific skills may be especially relevant for their school-related outcomes. The present study seeks to extend on the existing literature by examining specific social skills in relation to to a wider range of school-related outcomes than have been explored thus far. The identification of specific types of social skills that may be important for different outcomes among students with ASD is especially urgent, as their social difficulties may contribute to issues with academic and postsecondary success.

Research Questions and Hypotheses

1) What are the underlying constructs of parent- and teacher-rated social skills among a sample of high-functioning secondary school students with ASD?

It was hypothesized that there would be two distinct social skills constructs representing WRSS and IPSS among high-functioning students with ASD based on previous empirical

evidence to suggest that WRSS and IPSS are distinct domains of social skills among the student population in general.

2) To what extent do WRSS and IPSS predict academic achievement in high school among high-functioning students with ASD?

WRSS and IPSS were expected to be positively related to academic achievement, such that students who demonstrated higher WRSS and IPSS would be more likely to achieve higher academic achievement outcomes. WRSS was expected to demonstrate a stronger relationship with academic achievement than IPSS among high-functioning secondary students with ASD.

3) To what extent do WRSS, IPSS, and academic achievement in high school predict enrollment in postsecondary education among high-functioning students with ASD?

It was hypothesized that WRSS, IPSS, and academic achievement in high school would be positively related to enrollment in postsecondary education, such that students who demonstrated higher WRSS, IPSS, and academic achievement would be more likely to enroll in a postsecondary education program. Academic achievement was hypothesized to be the strongest predictor of students ever enrolling in any postsecondary education institution. It was also hypothesized that academic achievement would mediate the relationship between WRSS and postsecondary education enrollment, as well as IPSS and postsecondary education enrollment. Mediation occurs when the relationship between two variables is indirectly altered due to the presence of a third variable (Kline, 2011). In other words, WRSS and IPSS were expected to be related to postsecondary education enrollment by means of academic achievement.

4) To what extent do WRSS, IPSS, and academic achievement in high school predict persistence in postsecondary education among high-functioning students with ASD?

It was hypothesized that WRSS, IPSS, and academic achievement in high school would be positively related to persistence in postsecondary education, such that students who demonstrated higher WRSS, IPSS, and academic achievement would be more likely to persist in a postsecondary education program. Although IPSS was hypothesized to demonstrate the weakest relationship to postsecondary education enrollment, it was expected to be the strongest predictor of persistence in a postsecondary education institution in comparison to WRSS and academic achievement.

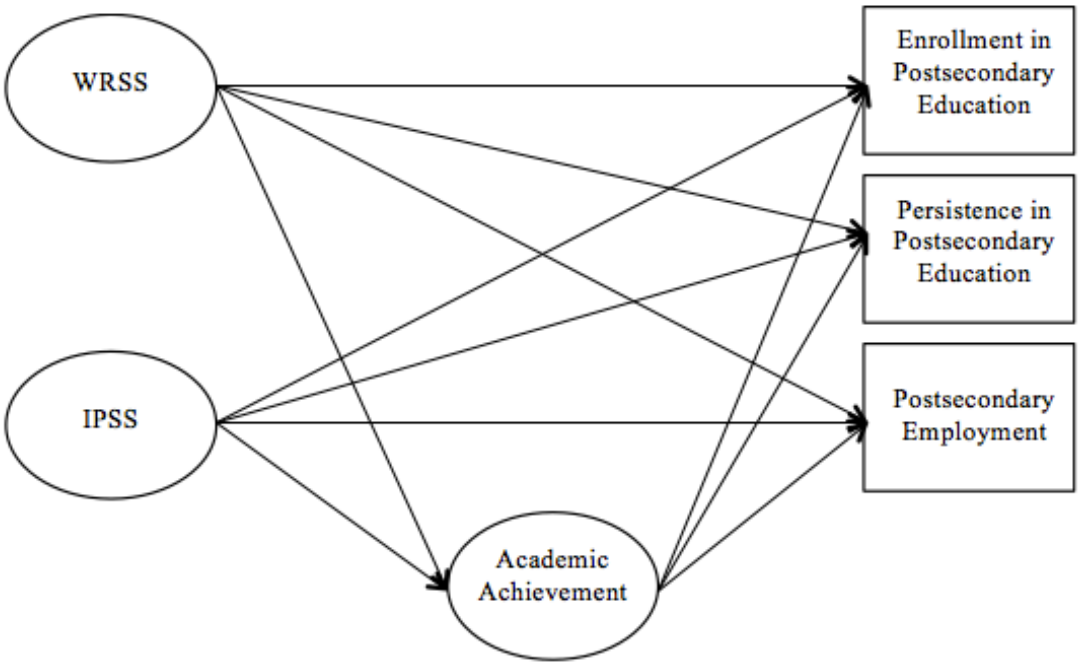
5) To what extent do WRSS, IPSS, and academic achievement in high school predict participation in postsecondary employment among high-functioning students with ASD?

It was hypothesized that WRSS, IPSS, and academic achievement in high school would be positively related to postsecondary employment, such that students who demonstrated higher WRSS, IPSS, and academic achievement would be more likely to have obtained paid employment after high school. IPSS was hypothesized to be the strongest predictor of postsecondary employment in comparison to WRSS and academic achievement. Academic achievement was hypothesized to demonstrate the weakest relationship to postsecondary employment.

The structural framework and hypothesized relationships in the current study are depicted in Figure 2.

Figure 2

Structural Framework



CHAPTER 3: METHODS

Design

Data Source

This study is a secondary analysis of data from the National Longitudinal Transition Study – 2 (NLTS2), funded by the National Center for Special Education Research within the Institute of Education Sciences (IES) and the United States Department of Education. The NLTS2 is comprised of a nationally representative sample of secondary school students receiving special education services who were between the ages of 13 and 16 and in seventh grade or above at the start of the study in 2000. It contains information about students' experiences in secondary school and their transition to postsecondary activities. Data were gathered in five waves, with the first wave collected during the 2000-2001 academic year and the fifth wave collected during the 2008-2009 academic year, resulting in longitudinal data that were collected across a total of 10 years. Data were collected through multiple means, including parent and/or youth telephone interviews or mail questionnaires, direct assessments of students, teacher surveys, school program surveys, school information surveys, and student transcripts (SRI International, 2000).

NLTS2 Data Collection

The NLTS2 sample was developed with the goal of including a nationally representative sample of students across each of the 13 federal special education disability categories possible at the secondary level. The sample was identified using a two-stage process (SRI International, 2000; Wagner et al., 2005). First, a stratified random sample of Local Educational Agencies (LEA) and state-supported schools that served students receiving special education in at least one grade from seventh through twelfth grade were invited to participate. The district sample was

stratified to ensure that low-frequency districts (e.g., large urban districts) were sufficiently represented in the sample. Thus, stratification was designed to account for geographic region, size/student enrollment, and wealth of the LEA/community. These recruitment efforts yielded 500[1] school districts and 40 special schools (i.e., schools that primarily served students with hearing, vision, and multiple impairments). In the second stage of the sample identification process, the participating schools provided rosters of all students receiving special education services. The roster was stratified by primary disability category, as reported by the school districts. Students on the roster who were receiving special education, between the ages of 13 and 16, and in seventh grade or above on December 1, 2000 were randomly selected to comprise the NLTS2 student sample. The final NLTS2 sample of selected and eligible students totaled 11,280 participants.

Participants

Participants in this study were a subset of the sample from the NLTS2. Given the focus of this study on students with ASD with typical cognitive functioning (i.e., without intellectual disabilities), students who were identified as having a diagnosis of "autism" and were confirmed as not having a diagnosis of "mental retardation" in Wave 1 of the Parent Interview were selected. Then, only those who participated in the Wave 1/Wave 2 Direct Assessment were included. As part of the NLTS2, participants completed either the direct assessment or an alternate assessment based on their level of functioning (Wagner, Newman, Cameto, & Levine, 2006). A screening process was used to determine whether each participant would take the direct or alternate assessment. Specifically, a phone or in-person screening interview was conducted with the school staff member who was most familiar with the participant's educational

[1] Per IES Disclosure Review Board requirements, all unweighted sample sizes included in this

programming. In order to participate in the direct assessment, the participant needed to be identified as able to: understand directions given in English, large print, Braille, or sign language, consistently and reliably respond, and work with an examiner who conducted the assessment. If the participant was determined to be able to meet these requirements with accommodations provided if necessary, he/she was eligible to participate in the direct assessment. Students with sensory, physical, behavioral, or cognitive disabilities who were unable to meet these requirements participated in an alternate assessment (Wagner et al., 2006). Thus, given that the sample in this study only consisted of students with ASD who were reported as not having a diagnosis of "mental retardation" and participated in the direct assessment (i.e., had appropriate cognitive skills to complete the assessment), the sample likely represents students with ASD who were higher-functioning in general. Finally, participants who had data regarding variables of interest (described in Measures and Variables section) in the Wave 1 Parent Interview, Wave 1 Teacher Survey, and Wave 5 Parent/Youth Interview were included.

The final sample (N = 410) consisted of 84.6% male (n = 350) and 15.4% female (n = 60) participants. Regarding race/ethnicity, 72.5% were White (n = 300), 17.9% were African American (n = 70), 6.1% were Hispanic (n = 30), 2.2% were Asian/Pacific Islander (n = 10), 0.5% were American Indian/Alaska Native, and 0.7% were Multiracial/Other. Ages at the start of the study in Wave 1 were as follows: 40.9% were 13- and 14-years-old (n = 170), 21.8% were were 15-years-old (n = 90), 26.0% were 16-years-old (n = 110), and 11.0% were 17-years-old (n = 50). Age data were missing for fewer than 10 participants and are not reported here as a result of IES rounding guidelines. As related to SES, household income was over $50,000 for 50.2% of students (n = 210), between $25,001 and $50,000 for 25.7% of students (n = 110), and under $25,000 for 16.7% of students (n = 70); income data were missing for 7.4% of students (n = 30).

Measures and Variables

The variables in this study were created by using items from multiple measures from the NLTS2, including the Wave 1 Parent Interview, Wave 1 Teacher Survey, Wave 1/Wave 2 Direct Assessment, and Wave 5 Parent/Youth Interview.

Social Skills

Social skills data were gathered from the Wave 1 Parent Interview and Wave 1 Teacher Survey. The Wave 1 Parent Interview was conducted at the start of the NLTS2 in 2001. It consisted of a 60-minute phone interview or mail questionnaire completed with a parent or guardian of each participant. Parents answered questions about student and family characteristics, satisfaction with school programs, student activities outside of school, and student activities after high school.

Parents were asked a total of 14 questions regarding the participant's social skills. Specifically, parents were asked the frequency with which the participant joins group activities without being told to, makes friends easily, ends disagreements calmly, seems self confident in social situations, starts conversations rather than waiting for others to start, receives criticism well, behaves at home in a way that causes problems for the family, controls temper when arguing with peers, keeps working at something until he/she is finished, and speaks in an appropriate tone at home on a scale of "never," "sometimes," and "very often." Additionally, parents were asked how well the participant is good at being well organized, being sensitive to other people's feelings, and having a sense of humor on a scale of "not at all good," "not very good," "pretty good," and "very good."

The Wave 1 Teacher Survey was conducted in 2002. A self-administered questionnaire was mailed to the teacher who taught the participant's first general education academic class of

the week. The purpose of this was to assess a range of subjects taken by students with disabilities and to avoid potential biases in having a student, parent, teacher, or principal select the teacher to answer the questionnaire. General education teachers were asked questions regarding background information on the participant's class, classroom practices and curricula, accommodations and/or modifications provided to the participant, and the participant's academic, social, and behavioral performance in that classroom.

Teachers were asked a total of 19 questions regarding the participant's social skills. Specifically, teachers were asked how well the participant gets along with other students, follows directions, controls his/her behavior to act appropriately in class, and asks for what he/she needs in order to do his/her best in class on a scale of "not at all well," "not very well," "well," or "very well." Teachers were also asked to rate the frequency with which the participant does each of the following skills on a scale of "rarely," "sometimes," "usually," or "almost always": completes homework on time, takes part in group discussions, stays focused on class work, withdraws from social contact or class activities, and works to the best of his/her ability. Furthermore, teachers were asked to rate how often the participant responds orally to questions, works independently, works with a peer partner or group, and presents in front of the class on a scale of "never or rarely," "sometimes," and "often." Finally, teachers were asked to rate the frequency with which the participant argues with others, appears lonely, acts impulsively, fights with others, gets easily distracted, and acts sad or depressed on a scale of "never," "sometimes," and "very often." Given that these items measured negative student behaviors, with higher ratings reflecting more undesirable social behavior, they were reverse scored so that higher ratings reflected greater levels of positive social skills in order to maintain consistency with the other social skills items included in the measure.

Preliminary WRSS. A preliminary WRSS latent variable was developed based on previous theoretical and empirical evidence. Specifically, items from the Wave 1 Parent Interview and Wave 1 Teacher Survey that were present in at least three or more of the previously reviewed empirically validated WRSS constructs in the existing literature (Bronson, 1994; Caldarella & Merrell, 1997; Merrell, 1993; Cooper & Farran, 1988; Walker & McConnell, 1995; Wentzel, 1993) were selected as preliminary indicators of WRSS. A total of seven items were selected: being well organized, works independently, follows directions, asks for what he/she needs in order to do his/her best in class, completes homework on time, stays focused on class work, and works to the best of his/her ability. Preliminary indicators selected for the preliminary WRSS latent variable and the alignment with previous theoretical and empirically validated measures are presented in Table 1.

Table 1

Preliminary WRSS Indicators and Alignment with Previously Established Measures

Preliminary WRSS Indicator	Previous Measure and Corresponding Item
Well organized (P)	"Organization of work projects" (CFBRS, 1991) "Is personally well organized" (Caldarella & Merrell, 1997) "Is organized" (SSCSA, 1995)
Works independently (T)	"Works independently" (Wentzel, 1993) "Works independently" (CFBRS, 1991) "Accomplishes tasks independently/displays independent study skills" (Caldarella & Merrell, 1997) "Completes school assignments or other tasks independently" (SSBS, 1993) "Displays independent study skills" (SSCSA, 1995)
Follows directions (T)	"Follows directions" (CFBRS, 1991) "Listens to and carries out teacher directions" (Caldarella & Merrell, 1997) "Listens to and carries out directions from teachers" (SSBS, 1993) "Listens carefully to teacher instructions and directions for assignments" (SSCSA, 1995)

Table 1 (cont'd)

Asks for needs to do best in class (T)	"Demonstrates a desire for achieving positive evaluations from teachers on academic work" (Wentzel, 1993) "Appropriately asks for assistance as needed/asks questions" (Caldarella & Merrell, 1997) "Asks appropriately for clarification of instructions/asks for help in an appropriate manner" (SSBS, 1993)
Completes homework on time (T)	"Completion of homework activities" (CFBRS, 1991) "Completes assigned tasks" (Caldarella & Merrell, 1997) "Completes assignments on time" (SSBS, 1993) "Successfully completes tasks" (BSTSP, 1996)
Stays focused on class work (T)	"Staying on task" (CFBRS, 1991) "Ignores peer distractions while working/functions well despite distractions" (Caldarella & Merrell, 1997) "Is not distracted from tasks" (BSTSP, 1996) "Attends to assigned tasks" (SSCSA, 1995)
Works to best ability (T)	"Produces work of acceptable quality for ability level/works up to potential" (Caldarella & Merrell, 1997) "Produces work of acceptable quality for his/her ability level" (SSBS, 1993) "Produces work of acceptable quality given her/his skill level" (SSCSA, 1995)

Note. P = parent-rated social skill, T = teacher-rated social skill.

Preliminary IPSS. Similarly, a preliminary IPSS latent variable was developed based on previous theoretical and empirical evidence. Items from the Wave 1 Parent Interview and Wave 1 Teacher Survey that were present in at least two or more of the previously reviewed empirically validated IPSS constructs in the existing literature (Bronson, 1994; Caldarella & Merrell, 1997; Merrell, 1993; Cooper & Farran, 1988; Walker & McConnell, 1995; Wentzel, 1993) were selected as a preliminary indicators of IPSS. A total of seven items were selected: joins group activities without being told to, makes friends easily, starts conversations rather than waiting for others to start, being sensitive to other people's feelings, gets along with other students, does not argue with others, and does not fight with others. Preliminary indicators selected for the IPSS latent variable and the alignment with previous theoretical and empirically validated measures are presented in Table 2.

Table 2

Preliminary IPSS Indicators and Alignment with Previously Established Measures

IPSS Indicator	Previous Measure and Corresponding Item
Joins group activities (P)	"Joins peer activities" (Caldarella & Merrell, 1997) "Enters appropriately into ongoing activities with peers" (SSBS, 1993) "Plays or shares activities with peers" (SSCSA, 1995)
Makes friends easily (P)	"Makes friends easily" (Caldarella & Merrel, 1997) "Makes friends easily with other children" (SSCSA, 1995)
Starts conversations (P)	"Is good at initiating conversations with peers" (SSBS, 1993) "Initiates conversations with peers in informational situations" (SSCSA, 1995)
Sensitive to others' feelings (P)	"Is sensitive to feelings of peers/empathy/sympathy" (Caldarella & Merrell, 1997) "Is sensitive to feelings of other students" (SSBS, 1993)
Gets along with others (T)	"Cooperates with others" (Wentzel, 1993) "Playing cooperatively, interacting positively with peers" (CFBRS, 1991) "Participates skillfully with peers" (Caldarella & Merrell, 1997) "Cooperates in interactions with peers" (BSTSP, 1996)
Does not argue (T)	"Does not start arguments" (Wentzel, 1993) "Is not argumentative with others" (BSTSP, 1996)
Does not fight (T)	"Does not start fights" (Wentzel, 1993) "Uses language rather than physical force to influence others" (BSTSP, 1996)

Note. P = parent-rated social skill, T = teacher-rated social skill.

Preliminary reliability analyses were conducted to examine reliability of the preliminarily developed WRSS and IPSS latent variables. Specifically, internal consistency (i.e., Cronbach's alpha) among the variables was examined to assess the extent to which the selected items of each latent variable were correlated. In other words, internal consistency measures the extent to which items meant to assess the same construct yield similar scores. Researchers have generally proposed a criterion of a Cronbach's alpha between 0.70 and 0.95 to indicate strong internal consistency (Kline, 2011; Nunnally & Bernstein, 1994). Results indicated that the preliminary WRSS construct demonstrated strong internal consistency ($\alpha = 0.90$), and the preliminary IPSS

construct demonstrated lower but moderate internal consistency ($\alpha = 0.50$). Subsequent statistical analyses using EFA and SEM were conducted to strengthen and validate the development of these WRSS and IPSS latent variables (see Data Analysis and Results sections).

Academic Achievement

Data regarding students' academic achievement were pulled from the Wave 1/Wave 2 Direct Assessment. The Wave 1/Wave 2 Direct Assessment was conducted in either Wave 1 in 2002 or Wave 2 in 2004 during the wave in which the participant was between 16- to 18-years-old. This was done to limit the variability in academic performance attributable to age differences. The Direct Assessment was developed by a group of experts in assessment and measurement over a six-month timespan in 2000 and consisted of academic achievement measures and questions about students' self-concept. As previously discussed, participants were screened for eligibility prior to participating in the Direct Assessment. Only one direct assessment was conducted per participant for whom a Wave 1 Parent Interview or mail questionnaire had been completed (Wagner et al., 2006).

Academic achievement was conceptualized as an endogenous latent variable constructed using four measured indicators from the Wave 1/Wave 2 Direct Assessment. The measured indicators of academic achievement were participants' standard scores on four academic subtests from the research edition of the Woodcock-Johnson Tests of Achievement, Third Edition (WJ-III): Synonym-Antonym, Passage Comprehension, Calculation, and Applied Problems. These subtests were shorter versions of the standard WJ-III assessment battery developed for use in the NLTS2 by the original WJ-III developers. The standard WJ-III battery is a comprehensive, norm-referenced, individually administered assessment of the academic skills that is commonly used in school settings. It has strong psychometric properties, including median reliability

coefficient alphas for all age groups ranging from 0.81 to 0.94 (Mather & Woodcock, 2001). Information regarding subtest content and procedures of the WJ-III research edition are described below:

Synonym-Antonym. Students' skills in word reading, vocabulary, and understanding of words with similar or opposite meanings were assessed in the Synonym-Antonym subtest. Students were asked to read a word and provide another word with the same meaning and then provide a word with the opposite meaning (Wagner et al., 2006).

Passage Comprehension. In the Passage Comprehension subtest, students' ability to make inferences from written text was assessed. First, students were shown a phrase and asked to select a matching graphic representation. Students then read short text passages and were asked to provide a missing key word in the context of the passage (Wagner et al., 2006).

Calculation. Students' mathematics computation skills were assessed in the Calculation subtest. They were asked to perform addition, subtraction, multiplication, division, geometry, trigonometry, logarithms, and calculus operations using whole numbers, negative numbers, percentages, decimals, and fractions on a written worksheet (Wagner et al., 2006).

Applied Problems. Students' ability to solve practical mathematical problems was assessed in the Applied Problems subtest. Students were asked to listen to math problems read aloud and solve relatively simple calculations using pencil and paper and/or a calculator (Wagner et al., 2006).

A preliminary reliability analysis was also conducted to examine the internal consistency of the academic achievement latent variable (i.e., Cronbach's alpha). Academic achievement demonstrated strong internal consistency ($\alpha = 0.80$).

Postsecondary Outcomes

Data regarding students' postsecondary outcomes were pulled from the Wave 5 Parent/Youth Interview. The Wave 5 Parent/Youth Interview was conducted in the final wave of the NLTS2 data collection in 2009. This interview was similar to the Wave 1 Parent Interview but was conducted with the participant if the parent deemed the participant as able to answer the questions independently. Participants answered questions about their postsecondary experiences. Mail questionnaires were administered to participants who were unavailable by phone. Parents completed the interview for participants who were deemed as unable to respond for themselves or those who could not be reached by phone or mail. Notably, Wave 5 contained data from the most recent wave in which a response was received from either the youth or parent. Three final outcome variables were examined in this study: enrollment in postsecondary education, persistence in postsecondary education, and postsecondary employment.

Enrollment in Postsecondary Education. Enrollment in postsecondary education was an observed endogenous variable defined as ever being enrolled in a postsecondary education institution (i.e., vocational/technical school, two-year/community college, or four-year college/university). It was created based on an existing variable in the NLTS2: young adult has ever attended a postsecondary institution since leaving high school (if reported in any wave). Participants who were reported by the student or parent by Wave 5 to have ever attended a vocational/technical school, a two-year/community college, or a four-year college/university since leaving high school (if reported in any wave) were coded as having been enrolled in postsecondary education (1 = Yes), while all others were coded as not having yet been enrolled in postsecondary education (0 = No).

Persistence in Postsecondary Education. Persistence in postsecondary education was an observed endogenous variable defined as currently pursuing a degree from any postsecondary education institution or having graduated from any postsecondary education institution. It was created based on information from two existing variables from the NLTS2: 1) young adult currently attends a postsecondary institution and 2) attendance status of young adults who have attended any postsecondary institution. Participants who were reported by the student or parent by Wave 5 to either be currently enrolled in a vocational/technical school, a two-year/community college, or a four-year college/university or whose attendance status was selected as having left vocational/technical school, a two-year/community college, or a four-year college/university because he/she graduated/completed the program were coded as persisting in postsecondary education (1 = Yes). Participants whose attendance status was reported as having left postsecondary school for all other reasons besides graduating (i.e., transportation problems, didn't have time, poor grades, didn't like school, wanted to travel, couldn't get along with teachers/students, or some other reason) and were not currently enrolled in a vocational/technical school, a two-year/community college, or a four-year college/university by Wave 5 were coded as not persisting in postsecondary education (0 = No). Those who never enrolled in any postsecondary education institution were considered not applicable and coded as "missing."

Postsecondary Employment. Postsecondary employment was an observed endogenous variable defined as ever being competitively employed since leaving high school. It was created based on an existing variable in the NLTS2: young adult worked for pay other than work around the house since leaving high school (if reported in any wave). Participants who were reported by the student or parent by Wave 5 to have worked for pay other than work around the house since leaving high school were coded as achieving employment (1 = Yes), while all others were coded

as not having yet achieved employment (0 = No). A summary of the preliminary latent variables and observed outcome variables in this study and the selected indicators from the NLTS2 is depicted in Table 3.

Table 3

Summary of Hypothesized Latent and Observed Variables and Indicators

Construct	Variable Type	Indicators
Preliminary WRSS	Latent	Well organized Works independently Follows directions Asks for needs to do best in class Completes homework on time Stays focused on class work Works to best of ability
Preliminary IPSS	Latent	Joins group activities Makes friends easily Starts conversations Gets along with others Sensitive to others' feelings Does not argue Does not fight
Academic Achievement	Latent	Synonym-Antonym standard score Passage Comprehension standard score Calculation standard score Applied Problems standard score
Enrollment in Postsecondary Education	Observed	Attended a vocational/technical school, a two-year/community college, or a four-year college/university since leaving high school
Persistence in Postsecondary Education	Observed	Currently enrolled in a vocational/technical school, a two-year/community college, or a four-year college/university and/or Left because graduated
Postsecondary Employment	Observed	Worked for pay other than work around the house since leaving high school

Data Analysis

Exploratory Factor Analysis (EFA) and Structural Equation Modeling (SEM) were the primary methods of data analysis selected to answer the research questions in this study. The

dataset was randomly divided in half, resulting in an EFA sample (n = 200) and a SEM sample (n = 200). EFA and SEM were conducted using Mplus Version 8 (Muthén & Muthén, 2017). However, several steps were conducted prior to executing these analyses, including data preparation and preliminary analyses, using the Statistical Package for the Social Sciences, Version 24 (SPSS).

Data Preparation and Preliminary Analyses

Initial stages of data analysis consisted of data preparation and preliminary analyses. Prior to conducting EFA or SEM, it was important that the quality, accuracy, and appropriateness of the data were checked to ensure that the data met the necessary assumptions and to rule out issues that may hinder statistical analyses. For example, to perform EFA and SEM, univariate and multivariate normality are required, as well as an absence of outliers, within the data (Brown, 2002; Kline, 2011). Descriptive statistics were conducted to screen and examine the distributions of each of the variables.

Additionally, missing data were examined. There is much debate in the literature regarding the handling of missing data in EFA and SEM analyses. It has been suggested that missing data under 5% will not cause issues with data analyses (Tabachnick & Fidell, 2007). Upon examining missingness of the variables in this study, missing values ranged from 0-2.5% on the social skills and academic achievement indicators, with the exception of two social skills indicators, for which 15%-17% of the data were not present. Missing data percentages for outcome variables tend to be larger in longitudinal research (Kline, 2011), as was the case in this study in which 21-23% of data were missing on the outcome variables.

A common and statistically sound approach to handling missing data is to use the robust maximum likelihood estimation method (MLR) in EFA and SEM analyses (Muthén, Muthén, &

Asparouhov, 2015). This estimation method uses a Full Information Maximum Likelihood (FIML) method to address missing data, which uses all available or observed information to estimate the model instead of removing or imputing missing values (Kline, 2011; Muthén et al., 2015). Thus, this method functions similarly to imputation methods in that a computation of the model is based on all available information. This estimation method was selected over the most commonly used maximum likelihood (ML) model estimation fitting function because ML operates under specific assumptions, including use of continuous data and multivariate normality (Brown, 2002). Given that the social skills indicators in this study were not continuous, and therefore cannot meet the normality assumption of ML, and the presence of missing data, MLR using FIML was used in the current study. MLR has been shown to be appropriate for use with categorical variables (Muthén et al., 2015). This estimation method was also selected based on current expert recommendations that highlight it as the preferred method for handling missing data due to its ability to perform well and accurately compute models with larger amounts of missing data (Muthén et al., 2015).

It is important to note that an assumption of FIML is that data are either missing completely at random (MCAR) or missing at random (MAR) (Muthén et al., 2015). MCAR means that missing data are not dependent on the value of a specific variable. For example, students with poor social skills would be no more likely to be missing data on social skills questionnaire items than those with better social skills. The MAR assumption is less restrictive and assumes that missing data may be dependent on other variables, and missing not at random (MNAR) means that missing data are related to a dependent variable. Expert statisticians have noted that there is no true method to determine missing data mechanisms, especially given the complexities of using national datasets and performing secondary analyses (Brown, 2002; Kline,

2011; Muthén et al., 1997). Instead, data in this study were examined and assumed to be MCAR or MAR given that the majority of the social skills indicators and all academic achievement indicators demonstrated low levels of missingness between 0-2.5%, and the larger amounts of missing data were primarily due to the nature of longitudinal data collected over time. Cases in which data across all variables were missing were removed from the EFA and SEM. Fewer than ten cases with missing data were removed from both EFA and SEM analyses and are not reported here as a result of IES rounding guidelines.

Furthermore, in order to identify a smaller number of underlying factors amongst a larger set of variables, the variables must be correlated with each other. Typically in EFA, the Pearson correlation matrix, which represents the relationships between variables using Pearson r coefficients, is analyzed (Baglin, 2014). However, Pearson correlations are based on the assumption that the variables are continuous. Given the categorical nature of the variables in this study, a polychoric correlation matrix was used for analysis in the EFA, which is the recommended alternate measure of correlation for variables that are not measured on an interval scale (Baglin, 2014).

Finally, sample size is thought to be an important consideration in EFA and SEM. The issue of sample size, however, is often subjective and not straightforward given that an exact minimum for EFA and SEM cannot easily be determined analytically (Kline; 2011; Pearson & Mundfrom, 2010). Determining the necessary sample size for EFA and SEM can depend on several factors and thus, there are varying recommendations and several guiding rules of thumb in the literature, making it difficult to apply one rule to all situations (Muthén & Muthén, 2002). In general, researchers suggest having at least 100-200 cases for EFA and SEM (Comrey & Lee, 1992; Kline, 2011). Comrey & Lee (1992) found that the necessary sample size to achieve

statistically sound agreement between sample and population estimates is about 100. Based on their study examining sample size and power when using SEM when data are not continuous and contain missing data, Muthén and Muthén (2002) recommend using a sample size of at least approximately 175 participants. The samples used to conduct EFA and SEM in this study met these recommendations.

Exploratory Factor Analysis (EFA)

Prior to examining the hypothesized relationships between specific social skills, academic achievement, and postsecondary outcomes, EFA was conducted to strengthen the development and validate the social skills latent variables in the current study. EFA is a multivariate statistical method used to identify the minimum number of underlying factors (i.e., latent variables) that represent a larger number of measured variables. Measured, or observed, variables are those that can be directly observed and are therefore directly measurable (e.g., items from a questionnaire). Latent variables are those that cannot be directly observed and therefore must be inferred from measured variables. Essentially, the goal of EFA is to determine the smallest number of interpretable latent factors that can adequately explain the correlations among a set of observed variables. In addition to understanding the dimensionality of a set of variables, another goal of EFA is to isolate variables that do not measure the dimensions well (Muthén & Muthén, 2009). Thus, EFA was the data analysis method selected to improve the development of the WRSS and IPSS latent constructs in the current study based on the set of selected social skills items.

EFA using the principal factor analysis method was conducted using all 14 preliminary social skills indicators of WRSS and IPSS, selected based on alignment with previously developed theoretical and empirical evidence. Experts note that conducting EFA to study

intended dimensionality requires using carefully selected indicators that have been shown to measure certain domains, not just any set of variables (Muthén & Muthén, 2009). Therefore, it was important that the set of indicators was carefully selected with the aim of measuring specific content areas prior to using EFA. Indicators selected for EFA in this study were those that aligned with empirically validated WRSS and IPSS constructs in the existing literature (Bronson, 1994; Caldarella & Merrell, 1997; Merrell, 1993; Cooper & Farran, 1988; Walker & McConnell, 1995; Wentzel, 1993). Given that individual items from the NLTS2 dataset were selected for use as indicators rather than established composite scales, EFA allowed for further examination of the underlying factor structure of social skills. Specifically, in addition to examining evidence for the preliminarily hypothesized factors corresponding to WRSS and IPSS, EFA allowed for consideration of potential alternative latent factors that may better represent the data. EFA was conducted using the following steps: 1) factor extraction, 2) factor rotation, and 3) interpreting and naming the factors.

Factor Extraction. Per recommendations within the literature, multiple criteria were used to determine the number of factors to retain, given that there is no one adequate method. Many researchers recommend examining the scree plot in conjunction with the Kaiser-Guttman rule (Brown, 2006; Fabrigar et al., 1999; Yong & Pierce, 2013). The Kaiser-Guttman rule states that factors that have eigenvalues, which represent the amount of variance accounted for by a factor, greater than 1.0 are likely to be meaningful (Brown, 2006). Additionally, researchers recommend reviewing the scree plot, which is a line graph of eigenvalues and factors (Brown, 2006; Fabrigar et al., 1999; Yong & Pierce, 2013). When examining the scree plot, it is suggested that the number of points above the break (i.e., point of inflexion) can help determine

the number of factors to retain. Both eigenvalues and the scree plot were reviewed to help determine the number of factors to retain.

Additionally, several goodness-of-fit indices were used to evaluate the EFA and determine the appropriate number of factors to retain. These indices included the χ^2 Test of Model Fit, Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and the Standardized Root Mean Square Residual (SRMR). The χ^2 statistic is a test of the null hypothesis that the hypothesized model is representative of the general population (Kline, 2011). Thus, a small and nonsignificant χ^2 is recommended, as a small value would suggest a small difference between the actual sample and the estimated model, and a nonsignificant value would result in accepting the null hypothesis that the hypothesized model fits the sample data well enough to generalize the results to the general population (Kline, 2011). However, the χ^2 statistic is typically distorted with larger sample sizes and therefore should not be the only criterion used to determine the best fit of the hypothesized factor models (Kline, 2011). The RMSEA is less affected by sample size (Kline, 2011) and assesses model fit based on the degrees of freedom, with 0 suggesting a perfect fit. Researchers recommend a RMSEA value of 0.08 or lower to suggest acceptable fit and 0.05 or lower to indicate good fit (Fabrigar et al., 1999). The CFI and TLI represent the proportion of fit between the hypothesized model to the null model, or a one-factor model (Kline, 2011), with 1 representing the best fit; thus, CFI and TLI values that exceed 0.90 indicate acceptable fit and values that exceed 0.95 indicate good fit (Kline, 2011). The SRMR is a measure of the difference between the observed correlation and the predicted correlation, and researchers recommend a value of 0.08 or lower to suggest acceptable fit and 0.05 or lower to indicate good fit (Fabrigar et al., 1999). These several fit

indices were examined because different indices reflect different aspects of model fit (Kline, 2011).

Factor Rotation. Factor rotation was conducted on the retained factors to make them more interpretable (Floyd & Widaman, 1995). Rotation procedures can either be orthogonal, in which factors are uncorrelated, or oblique, in which factors are allowed to correlate. Oblique rotation was used in this study given that the social skills factors were expected to correlate. When oblique rotation is conducted, results yield a pattern coefficient matrix and a structure coefficient matrix for interpretation. The structure coefficient matrix provides correlations regarding the relationships between each variable and factor. The pattern coefficient matrix provides standardized coefficients that represent the relationship between each variable and factor, while controlling for other variables in the model. When conducting oblique rotation, interpretation of the pattern coefficient matrix over the structure coefficient matrix is recommended (Pedhazur & Schmelkin, 1991). Thus, pattern coefficient loadings for each indicator were examined.

Interpreting and Naming the Factors. Finally, factors were interpreted using factor loadings from the pattern coefficient matrix to determine whether items in each factor fit together conceptually based on theoretical and empirical evidence. As noted in the existing literature, explicit and widely accepted guidelines for including items in latent constructs do not yet exist (Brown, 2006). Thus, guidelines are generally used as rules of thumb rather than rigid rules due to the absence of empirical data establishing these values as strict cutoffs (Brown, 2006). In this study, the decision to interpret the factors was based on the significance and size of factor loadings and the number of items present in each factor. Typically, items with significant loadings greater than 0.40 on a factor are considered to be indicative of that particular factor

(Ferguson & Cox, 1993; Floyd & Widaman, 1995). For items that load onto more than one factor, it is recommended that items with a loading greater than 0.40 on the primary factor and less than 0.30 on another factor are retained on the primary factor (Brown, 2006). Additionally, if fewer than three items loaded on a factor, then that factor should be removed from the model. Thus, in this study, variables that poorly measured factors (i.e., non-significant loadings less than 0.40) and factors that were poorly measured (i.e., on which fewer than three items loaded) were dropped.

Results from the EFA were used to meaningfully inform subsequent SEM analysis intended to identify the extent to which these specific social skills predict academic achievement and postsecondary outcomes.

Structural Equation Modeling (SEM)

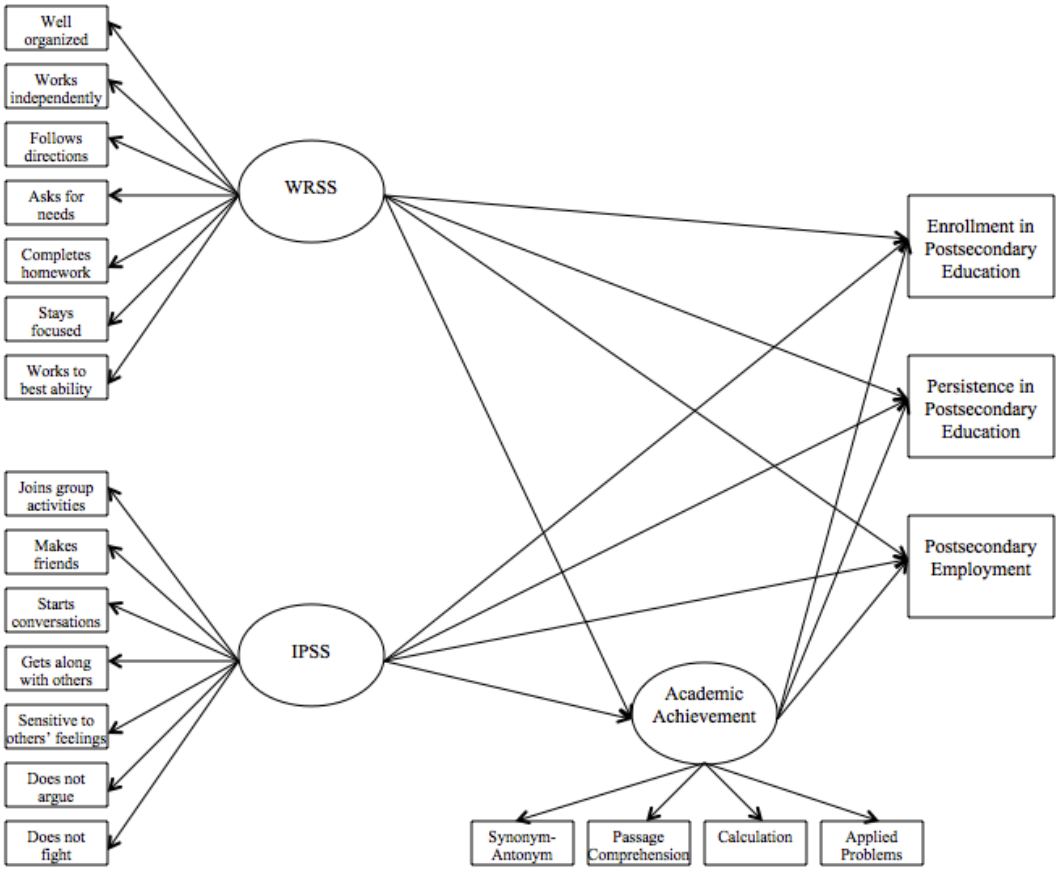
After the latent structure of social skills was established, SEM was conducted to examine the hypothesized relationships between specific social skills, academic achievement, and postsecondary outcomes. SEM is a hypothesis-driven, multivariate analysis technique that allows researchers to assess and understand complex relationships that exist among theoretical constructs and observed outcomes. It was selected as the appropriate statistical procedure because using it allows researchers to examine the degree to which a theoretical model is supported by the sample data, as well as the hypothesized relationships between measured and latent variables that were critical to this study (Bollen & Long, 1993). The core of SEM analysis consists of four sequential steps: 1) model specification, 2) model identification, 3) model estimation, and 4) model testing (Bollen & Long, 1993; Kline, 2011).

Model Specification. Model specification is the first step of SEM and occurs prior to data analysis (Bollen & Long, 1993). It involves using theoretical and empirical evidence to

develop a model, including variables of interest and the hypothesized relationships among them (Kline, 2011). Figure 3 provides a diagram of the proposed model in the current study.

Figure 3

Hypothesized Structural Model



Model Identification. Next, model identification was determined to assess whether the proposed model was capable of producing a unique solution that could be estimated using SEM. In other words, model identification is necessary to determine whether it is theoretically possible to produce an estimate for each parameter (Bollen, 1989). Models need to be overidentified or just-identified to be considered identified (Kline, 2011). An overidentified model yields several possible solutions, while a just-identified model yields only one solution. An underidentified

model, however, does not provide enough information for the model parameters to be estimated and thus fails to yield a unique solution. There are several approaches for assessing model identification prior to data analysis, including algebraic techniques and rules of thumb (Bollen, 1989). Specifically, Bollen's (1989) *t* rule states that a structural model is identified when there are more known than unknown pieces of information. The number of knowns can be calculated using $p(p + 1)/2$, where p is the number of observed variables in a model. The number of unknowns is equal to the number of free parameters to be estimated in a model (i.e., the relationships between the exogenous and endogenous variables, relationships between endogenous variables, factor loadings, errors in the equations, variance/covariance of the exogenous variables). Using the *t* rule, the model of the proposed study was overidentified (i.e., has more knowns than unknowns).

Some researchers have also developed rules of thumb to help with model identification. To determine whether a measurement model is identified, the "three measure rule" is often used (Bollen, 1989). The "three measure rule" states that the model is likely to be identified if there are two or more latent variables, each with three or more indicators (Bollen, 1989; O'Brien, 1994). This condition was satisfied in the current study given that there were three latent variables, each with three or more indicators.

The most commonly used rule of thumb to determine whether the structural model is identified is known as the "recursive rule" (Bollen, 1989). The recursive rule states recursive models are always identified (Bollen, 1989). A structural model is recursive when the relationships specified in the model are unidirectional. This condition was satisfied in the current study.

Model Estimation. Model estimation is the third step of SEM and involves estimating the parameters of the theoretical model in such a way that the values yield a covariance matrix as close as possible to the observed covariance matrix (Kline, 2011). A computer tool is used to conduct this analysis. As previously discussed, although ML is the most commonly used model estimation fitting function (Muthén et al., 1997), it operates under specific assumptions (e.g., normality) that were not met in this study. Thus, MLR was the estimation method used in the current study given that it is appropriate for use with categorical data and has been shown to perform well with missing data (Brown, 2002; Muthén et al., 2015).

Model Testing. Model testing involves analysis and examination of the model fit for both the measurement model and the structural model. The measurement model is the part of the model in which the latent factor structure is tested and defined. Thus, as part of the measurement model, researchers pre-specify hypothesized relationships between directly observed indicators and the underlying theoretical construct they are intended to measure (i.e., latent variable) (Kline, 2011). Using Confirmatory Factor Analysis (CFA) to estimate the measurement model is the recommended first step prior to testing the full structural model (Brown, 2006). The measurement model that was specified in this study was guided by results of the EFA. Thus, CFA was used to examine and confirm the social skills structure of the model that was established from the EFA, as well as the academic achievement factor. Strength and significance of factor loadings and several goodness-of-fit indices, including χ^2, RMSEA, CFI, and TLI were assessed.

After the latent structure of the model was established, SEM was conducted to answer research questions two through five regarding the hypothesized relationships between specific social skills, academic achievement, and postsecondary outcomes. The structural model is the

part of the model in which the relationships between latent variables and other measured variables are defined. This allowed for examination of direct and indirect effects of latent variables and specified outcomes of interest. Several indices were used to assess fit of the proposed model, including the χ^2, RMSEA, CFI, and TLI.

CHAPTER 4: RESULTS

Preliminary Analyses

Descriptive statistics were conducted to examine the distributions of each of the variables and are presented in Tables 4 and 5. Data for the social skills indicators in the proposed study were treated as ordered categorical data. When Likert-type indicators have at least five response categories, it is acceptable to treat the data as continuous and to screen for normality (Lubke & Muthén, 2004). However, the social skills data used in this study did not sufficiently meet this recommendation and were therefore treated as ordinal data. When SEM consists of categorical data, the recommended practice is to examine measures of central tendency for the indicators in the model (Muthén, du Toit, Spisic, 1997). These descriptive statistics, including means, standard deviations, minimums, and maximums are calculated and summarized in Table 4.

Table 4

Descriptive Statistics of Categorical Indicators

Indicator	Mean	Med.	Mode	SD	Min.	Max.
Well organized (P)	2.56	3	3	1.06	1 (not good)	4 (very good)
Works independently (T)	2.52	3	3	0.61	1 (never/rarely)	3 (often)
Follows directions (T)	3.11	3	3	0.73	1 (not well)	4 (very well)
Asks for needs (T)	2.86	3	3	1.00	1 (not well)	4 (very well)
Completes homework (T)	3.03	3	4	1.05	1 (rarely)	4 (almost always)
Stays focused (T)	2.83	3	3	0.96	1 (rarely)	4 (almost always)
Works to best ability (T)	3.12	3	4	0.97	1 (rarely)	4 (almost always)
Joins group activities (P)	0.72	1	1	0.70	0 (never)	2 (very often)
Makes friends (P)	0.58	0	0	0.70	0 (never)	2 (very often)
Starts conversations (P)	0.95	1	1	0.71	0 (never)	2 (very often)
Sensitive (P)	2.75	3	3	1.02	1 (not good)	4 (very good)
Gets along with others (T)	3.01	3	3	0.76	1 (not well)	4 (very well)
Does not argue (T)	2.62	3	3	0.58	1 (never)	3 (very often)
Does not fight (T)	2.85	3	3	0.40	1 (never)	3 (very often)

Note. P = parent-rated social skill, T = teacher-rated social skill.

Descriptive statistics, including means, standard deviations, minimums, maximums, skewness, and kurtosis for the continuous indicators (i.e., academic achievement) are depicted in

Table 5. The assumption of normality is considered to be met if all skewness scores fall within the standard range of +2.00 to -2.00 and all kurtosis scores fall within the standard range of +7.00 to -7.00 (Curran, West, & Finch, 1996). Skewness statistics ranged from -0.69 to -0.14, and kurtosis statistics ranged from -0.70 to 0.10. Thus, the continuous variables in this study were considered normally distributed.

Table 5

Descriptive Statistics of Continuous Indicators

Indicator	Mean	SD	Min.	Max.	Skewness	Kurtosis
Synonym-Antonym	93.34	20.76	41	151	-0.25	-0.70
Passage Comprehension	83.11	23.54	40	147	-0.14	-0.40
Calculation	90.29	22.94	39	154	-0.48	0.10
Applied Problems	84.51	19.15	40	116	-0.69	-0.42

Finally, descriptive statistics for the postsecondary outcome variables were examined. Results demonstrated appropriate variability among the outcome measures. Specifically, 45.8% of the sample had ever been enrolled in a postsecondary education institution, while 31.1% had not. Additionally, of the students who had ever enrolled in a postsecondary education program, 35.5% were considered to have persisted in postsecondary education, while 10.3% did not persist. Regarding postsecondary employment, 43.3% of the sample had ever had a paid job since leaving high school, while 32.9% had not.

Exploratory Factor Analysis

Research Question 1

The first research question in this study was focused on examining the underlying constructs of parent- and teacher-rated social skills among the sample of high-functioning secondary school students with ASD. EFA using principal axis factoring was conducted to address this question, as well as provide stronger statistical examination of the potential number

of constructs underlying the 14 preliminarily selected parent- and teacher-rated social skills among students with ASD. As previously mentioned, a randomly selected half of the total sample (n = 200) was used for these analyses.

The polychoric correlation matrix of the variables was examined to assess the factorability of the items. Correlations ranged from -0.44 to 0.77. Items were deemed appropriate for further analyses given that all items correlated at least 0.40 with one other item, suggesting reasonable factorability.

Initial analysis based on examination of eigenvalues greater than one, a scree plot, and fit statistics generally indicated a three-factor solution. Examination of eigenvalues revealed that the fourth potential factor was the last to have an eigenvalue greater than one (first = 4.74, second = 2.27, third = 1.89, fourth = 1.19, fifth = 0.95). However, examination of the scree plot indicated a break immediately after the third factor. Additionally, goodness-of-fit statistics of a three-factor model indicated good model fit (χ^2 = 59.72, df = 52, p = 0.22; RMSEA = 0.02; CFI = 0.99; TLI = .99; SRMR = 0.06). Finally, statistical comparison of models indicated significant improvement in fit of a three-factor model solution over a two-factor model solution (χ^2 = 74.03, df = 12, p < 0.001) but no significant differences between a three- and four-factor model solution (χ^2 = 16.03, df = 11, p = 0.14).

However, in the initial EFA two items with poor psychometric properties were identified. As previously discussed, researchers typically recommend a minimum factor loading of 0.40 on any factor (Ferguson & Cox, 1993; Floyd & Widaman, 1995). “How well the participant is good at being well organized” and “how often the participant works independently” did not have factor loadings greater than 0.40 on any factor. Subsequently, these two items were dropped

from further analyses based on recommendations in the existing literature (Fabrigar, Wegener, MacCallum, & Strahan, 1999; Muthén & Muthén, 2009).

An EFA was then conducted using the remaining 12 social skills items. Results indicated a three-factor solution with no further problematic items. Specifically, examination of eigenvalues revealed that the third potential factor was the last to have an eigenvalue greater than one (first = 4.61, second = 2.23, third = 1.89, fourth = 0.86). Additionally, examination of the scree plot indicated a break immediately after the third factor. Furthermore, goodness-of-fit statistics indicated very good model fit ($\chi^2 = 40.10$, $df = 33$, $p = 0.18$; RMSEA = 0.02; CFI = 0.99; TLI = 0.99; SRMR = 0.05). Finally, statistical comparison of models indicated significant improvement in fit of a three-factor model solution over a two-factor model solution ($\chi^2 = 77.24$, $df = 10$, $p < 0.001$) and no significant difference between a three- and four-factor model solution ($\chi^2 = 14.16$, $df = 9$, $p = 0.12$), suggesting no significant improvement of a four-factor model over a three-factor model. Together these results suggested a three-factor model as the best fitting model.

In the final EFA model, the three factors closely aligned with previously hypothesized WRSS and IPSS constructs. The first factor contained five items: follows directions (0.71), asks for what he/she needs in order to do his/her best in class (0.61), completes homework on time (0.87), stays focused on class work (0.88), and works to the best of his/her ability (0.82). This factor was conceptualized as an exogenous latent variable and labeled WRSS given that the items were associated with social skills considered to be important for classroom success.

The second factor and third factors contained items related to the participant's interpersonal social skills but differed by rater. Specifically, the second factor consisted of four items: joins group activities without being told to (0.62), makes friends easily (1.01), starts

conversations rather than waiting for others to start (0.60), and is sensitive to other people's feelings (0.40). This factor was conceptualized an exogenous latent variable and labeled Parent-Rated Interpersonal Social Skills (P-IPSS) given that the IPSS items in this factor were all parent-rated.

The third factor consisted of three items: gets along with other students (0.71), does not argue with others (1.31), and does not fight with others (0.53). This factor was conceptualized as an exogenous latent variable and labeled Teacher-Rated Interpersonal Social Skills (T-IPSS) given that the items that loaded onto this factor were all teacher-rated.

Reliability analyses were then conducted to examine the internal consistency of each of the three factors. As previously noted, within the literature a criterion of a Cronbach's alpha between 0.70 and 0.95 indicates strong internal consistency (Kline, 2011; Nunnally & Bernstein, 1994). Results indicated that WRSS ($\alpha = 0.87$), P-IPSS ($\alpha = 0.71$), and T-IPSS ($\alpha = 0.68$) all demonstrated strong internal consistency. The factor loadings of each item are summarized below in Table 6 and depicted in Figure 4.

Table 6

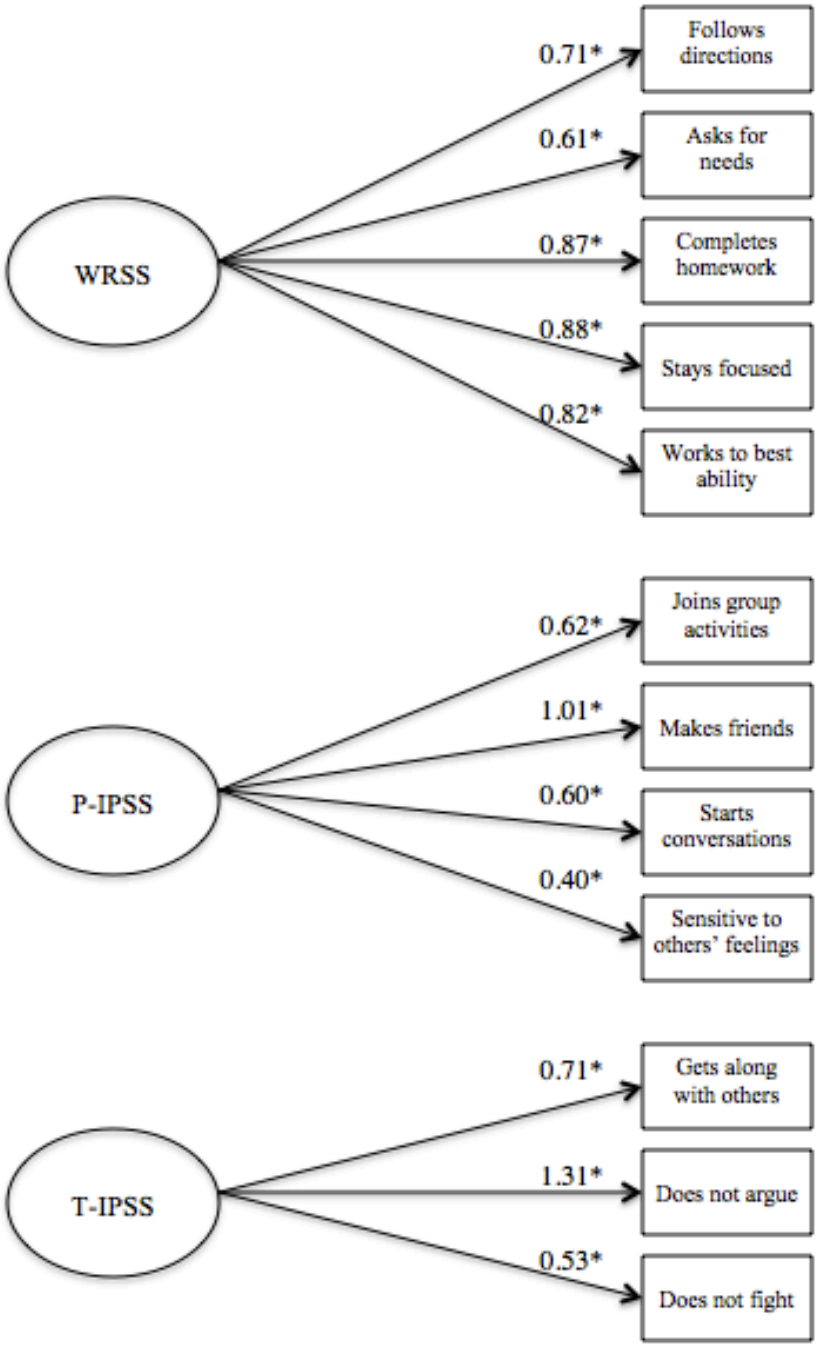
Exploratory Factor Analysis Loadings on Underlying Social Skills Constructs

Item	WRSS	P-IPSS	T-IPSS
Follows directions (T)	**0.705***	-0.051	0.284
Asks for needs (T)	**0.605***	0.113	0.192
Completes homework (T)	**0.874***	0.004	-0.098
Stays focused (T)	**0.883***	0.015	-0.001
Works to best ability (T)	**0.821***	0.027	0.076
Joins group activities (P)	-0.081	**0.617***	-0.215
Makes friends (P)	-0.067	**1.012***	0.002
Starts conversations (P)	0.010	**0.596***	-0.051
Sensitive to others' feelings (P)	0.024	**0.400***	0.182
Gets along with others (T)	0.025	0.059	**0.705***
Does not argue (T)	-0.587	0.001	**1.306***
Does not fight (T)	0.011	0.306	**0.528***

Notes. P = parent-rated social skill, T = teacher-rated social skill. *$p < 0.05$.

Figure 4

Full EFA Model



Note. All factor loadings were significant (*$p < 0.05$).

Structural Equation Modeling

Measurement Model

Prior to running the full SEM, the measurement model was tested to confirm the hypothesized three-factor social skills structure of the model that was established from the EFA, as well as the academic achievement factor. Thus, the measurement portion of the model specified a total of four latent constructs: WRSS, P-IPSS, T-IPSS, and academic achievement. WRSS was specified using five indicator scores: follows directions, asks for what he/she needs in order to do his/her best in class, completes homework on time, stays focused on class work, and works to the best of his/her ability. P-IPSS was specified with four indicators: joins group activities without being told to, makes friends easily, starts conversations rather than waiting for others to start, and is sensitive to other people's feelings. T-IPSS was specified using three indicators: gets along with other students, does not argue with others, and does not fight with others. Lastly, academic achievement was specified using four standard scores on the Synonym-Antonym, Passage Comprehension, Calculation, and Applied Problems academic achievement scales.

As expected based on EFA results, the CFA fit the data well (RMSEA = 0.04, CFI = 0.97, TLI = 0.97). As previously noted, it was expected that the chi-square fit statistic would be significant due to the sample size ($\chi^2 = 161.16$, $df = 98$, $p < 0.001$) (Kline, 2011). Additionally, all loadings were greater than the recommended 0.40 and significant ($p < 0.001$). Information about the specific loadings in the measurement model, standard error (SE), and communalities is summarized in Table 7.

Table 7

Confirmatory Factor Analysis Loadings and Communalities

	Unstandardized	SE	Standardized	R^2
WRSS				
Follows directions (T)	1.00	0.00	0.84	0.70
Asks for needs (T)	1.03	0.05	0.87	0.75
Completes homework (T)	1.05	0.06	0.88	0.78
Stays focused (T)	1.09	0.05	0.92	0.84
Works to best of ability (T)	1.14	0.06	0.97	0.93
P-IPSS				
Joins group activities (P)	1.00	0.00	0.52	0.27
Makes friends (P)	1.59	0.26	0.82	0.68
Starts conversations (P)	1.17	0.17	0.61	0.37
Sensitive to other' feelings (P)	0.65	0.14	0.50	0.12
T-IPSS				
Gets along with others (T)	1.00	0.00	0.90	0.81
Does not argue (T)	0.85	0.17	0.76	0.58
Does not fight (T)	0.92	0.16	0.82	0.68
Academic Achievement				
Synonym-Antonym	1.00	0.00	0.91	0.82
Passage Comprehension	0.96	0.07	0.87	0.75
Calculation	0.93	0.07	0.84	0.71
Applied Problems	1.03	0.09	0.94	0.88

Notes. P = parent-rated social skill, T = teacher-rated social skill. All factor loadings were significant ($p < 0.001$).

Structural Model

As hypothesized, the structural model fit the data well (RMSEA = 0.04, CFI = 0.96, TLI = 0.95). As previously noted, it was expected that the chi-square fit statistic would be significant due to the sample size ($\chi^2 = 233.34$, df = 134, $p < 0.001$) (Kline, 2011). Additionally, the majority of the direct effects specified in the model were significant.

Research Question 2. The second research question was aimed at examining the extent to which WRSS and IPSS predicted academic achievement in high school among high-functioning students with ASD. WRSS and IPSS were expected to demonstrate positive relationships with academic achievement, such that students who demonstrated higher WRSS

and IPSS would be more likely to achieve higher academic achievement outcomes, and WRSS was expected to demonstrate a stronger relationship with academic achievement than IPSS. As hypothesized, WRSS was significantly and positively related to academic achievement ($\beta = 0.30$, $p < 0.05$), suggesting that students with ASD who demonstrated better WRSS were more likely to have higher academic achievement outcomes. However, neither P-IPSS ($\beta = 0.04$, $p = 0.65$), nor T-IPSS ($\beta = 0.18$, $p = 0.22$) were significantly predictive of academic achievement.

Research Question 3. The third research question was focused on understanding the extent to which WRSS, IPSS, and academic achievement in high school predicted enrollment in postsecondary education among high-functioning students with ASD. It was hypothesized that WRSS, IPSS, and academic achievement in high school would be positively related to enrollment in postsecondary education. Academic achievement was hypothesized to be the strongest predictor, as well as a mediator, of student enrollment in postsecondary education. As hypothesized, academic achievement was the strongest predictor of enrollment in postsecondary education ($\beta = 0.61$, $p < 0.001$). WRSS was also shown to have a significant and positive relationship with enrollment in postsecondary education ($\beta = 0.31$, $p < 0.05$). Academic achievement was not shown to be a significant mediator of WRSS and enrollment in postsecondary education ($\beta = 0.06$, $p = 0.40$), suggesting that WRSS was uniquely related to student enrollment in a postsecondary education institution. P-IPSS ($\beta = 0.03$, $p = 0.80$) and T-IPSS ($\beta = 0.11$, $p = 0.94$) were not significantly predictive of postsecondary education enrollment, and academic achievement was not shown to significantly mediate the relationship between P-IPSS and enrollment in postsecondary education ($\beta = 0.03$, $p = 0.65$) nor T-IPSS and enrollment in postsecondary education ($\beta = 0.12$, $p = 0.19$).

Research Question 4. The fourth research question was aimed at examining the extent to which WRSS, IPSS, and academic achievement in high school predicted persistence in postsecondary education among high-functioning students with ASD. It was hypothesized that WRSS, IPSS, and academic achievement in high school would be positively related to persistence in postsecondary education, and IPSS was hypothesized to be the strongest predictor of persistence in comparison to WRSS and academic achievement. Results indicated that WRSS ($\beta = 0.56$, $p < 0.05$), academic achievement ($\beta = 0.34$, $p < 0.05$), and P-IPSS ($\beta = 0.22$, $p < 0.05$) demonstrated significant positive relationships with persistence in postsecondary education. However, contrary to hypothesized, WRSS demonstrated a stronger positive relationship with persistence than P-IPSS or academic achievement. T-IPSS was not shown to significantly predict persistence in postsecondary education ($\beta = 0.17$, $p = 0.19$).

Research Question 5. The fifth research question sought to examine the extent to which WRSS, IPSS, and academic achievement in high school predicted participation in postsecondary employment for high-functioning students with ASD. It was hypothesized that WRSS, IPSS, and academic achievement in high school would be positively related to postsecondary employment obtainment. IPSS was hypothesized to be the strongest predictor of postsecondary employment obtainment in comparison to WRSS and academic achievement, and academic achievement was hypothesized to demonstrate the weakest relationship to participation in postsecondary employment. Results indicated that academic achievement ($\beta = 0.35$, $p < 0.001$), P-IPSS ($\beta = 0.21$, $p < 0.05$), and T-IPSS ($\beta = 0.11$, $p < 0.05$) demonstrated significant and positive relationships with postsecondary employment. Contrary to the hypothesis, academic achievement demonstrated the strongest relationship with postsecondary employment. WRSS was not shown to be a significant predictor of postsecondary employment ($\beta = 0.11$, $p = 0.53$).

The factor loadings and path estimates for the final structural model are depicted in Table 8, and the final structural model is displayed in Figure 5.

Table 8

Parameter Estimates for the Full Structural Equation Model

	Unstandardized	Standardized	SE	R^2
Factor Loadings				
WRSS				
Follows directions (T)	1.00**	0.84**	0.04	0.70**
Asks for needs (T)	1.03**	0.87**	0.03	0.75**
Completes homework (T)	1.05**	0.88**	0.03	0.78**
Stays focused (T)	1.09**	0.92**	0.02	0.84**
Works to best of ability (T)	1.15**	0.96**	0.02	0.93**
P-IPSS				
Joins group activities (P)	1.00**	0.50**	0.06	0.27**
Makes friends (P)	1.53**	0.77**	0.07	0.68**
Starts conversations (P)	1.34**	0.67**	0.07	0.37**
Sensitive to others' feelings (P)	0.66**	0.50**	0.07	0.12*
T-IPSS				
Gets along with others (T)	1.00**	0.91**	0.11	0.81**
Does not argue (T)	0.83**	0.75**	0.08	0.58**
Does not fight (T)	0.90**	0.82**	0.08	0.68**
Academic Achievement				
Synonym-Antonym	1.00**	0.90**	0.02	0.82**
Passage Comprehension	0.95**	0.85**	0.02	0.75**
Calculation	0.97**	0.86**	0.02	0.71**
Applied Problems	1.06**	0.94**	0.02	0.88**
Direct Effects				
WRSS → Academic Achievement	0.31*	0.30*	0.12	
P-IPSS → Academic Achievement	0.08	0.04	0.10	
T-IPSS → Academic Achievement	0.18	0.18	0.14	
Academic Achievement → Enrollment	0.68**	0.61**	0.06	
WRSS → Enrollment	0.37*	0.31*	0.12	
P-IPSS → Enrollment	0.05	0.03	0.10	
T-IPSS → Enrollment	0.13	0.11	0.16	
Academic Achievement → Persistence	0.38*	0.34*	0.12	
WRSS → Persistence	0.67*	0.56*	0.24	
P-IPSS → Persistence	0.44*	0.22*	0.16	
T-IPSS → Persistence	0.14	0.17	0.28	
Academic Achievement → Employment	0.39**	0.35**	0.09	
WRSS → Employment	0.13	0.11	0.18	
P-IPSS → Employment	0.42*	0.21*	0.11	
T-IPSS → Employment	0.12*	0.11*	0.21	

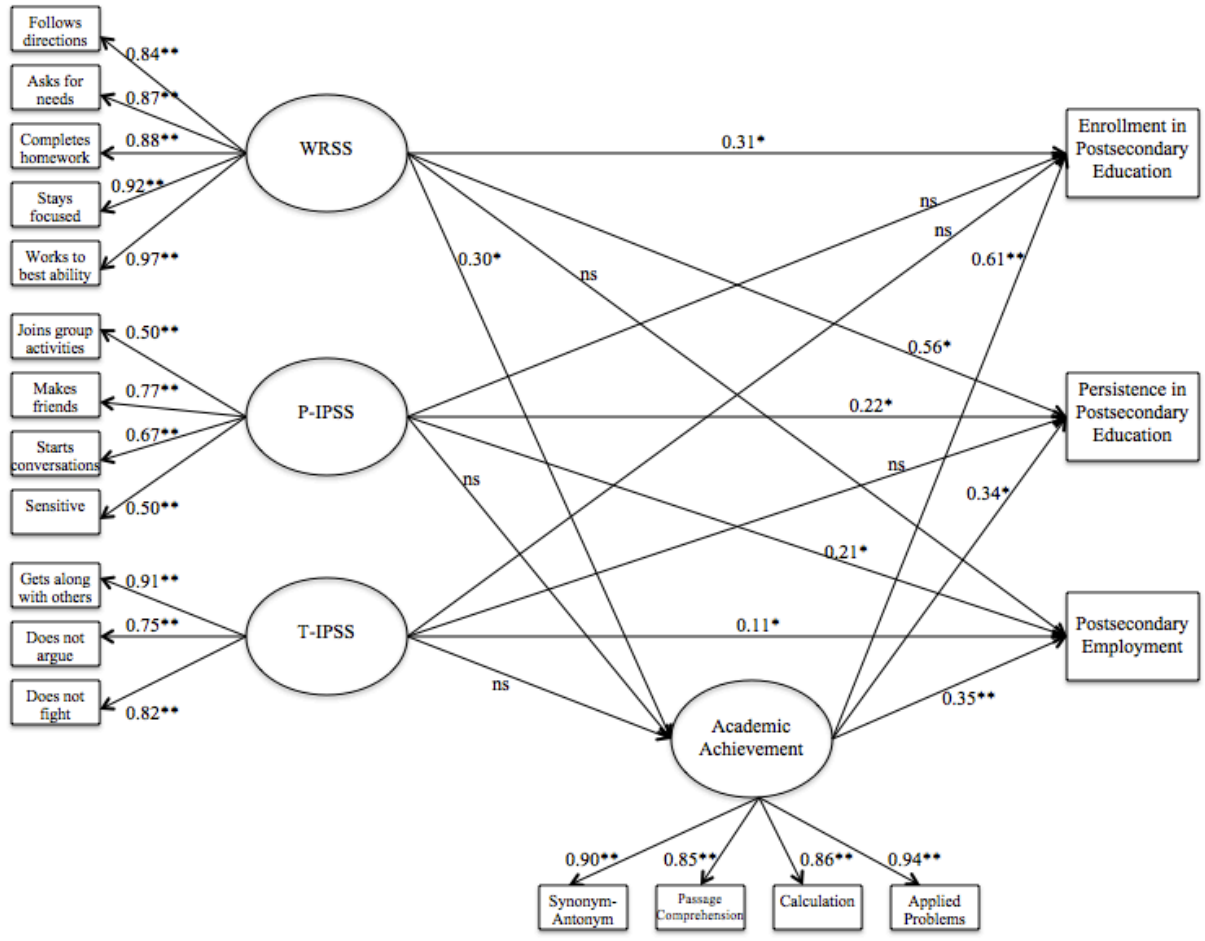
Table 8 (cont'd)

Indirect Effects			
WRSS → Academic Achievement → Enrollment	0.07	0.06	0.07
P-IPSS → Academic Achievement → Enrollment	0.05	0.03	0.06
T-IPSS → Academic Achievement → Enrollment	0.12	0.12	0.08

Notes. P = parent-rated social skill, T = teacher-rated social skill. $^{**}p < 0.001$, $^{*}p < 0.05$.

Figure 5

Full SEM Model with Standardized Estimates

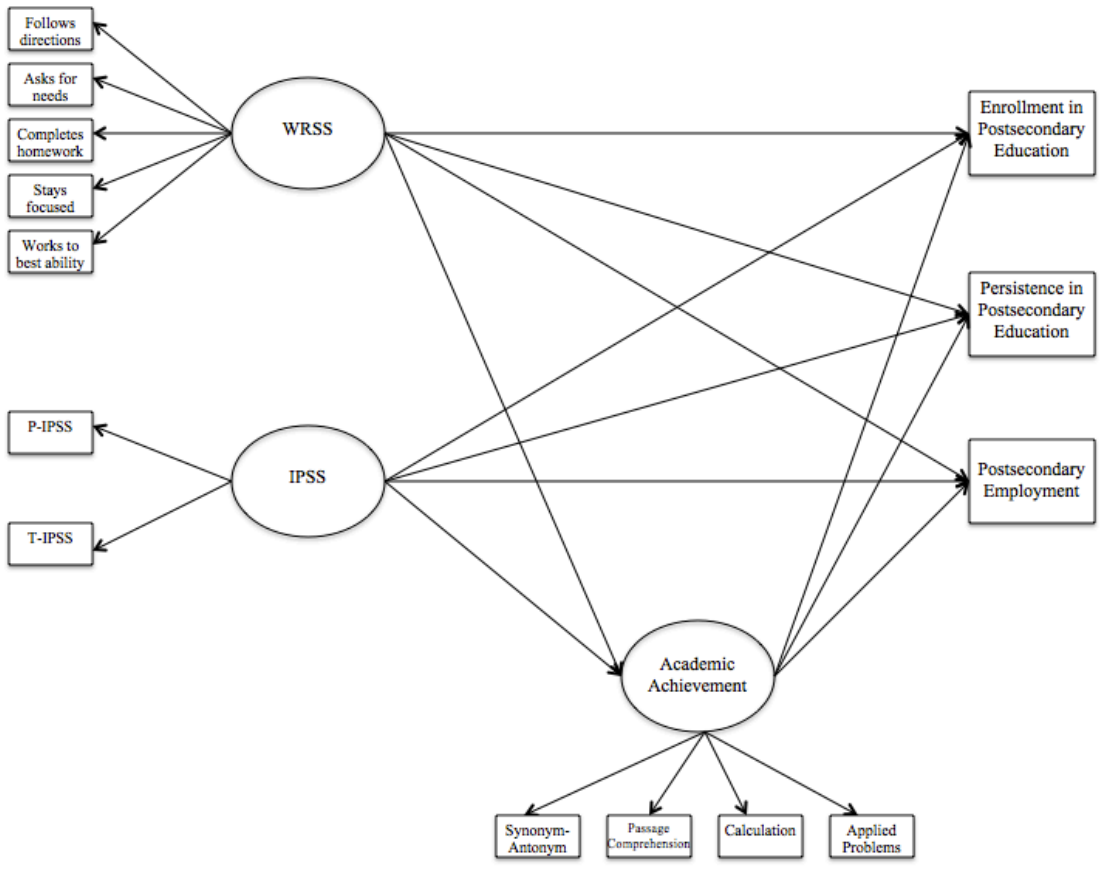


Post-hoc Analysis

A post-hoc analysis was conducted to examine an alternative way to conceptualize the social skills latent variables in the current study. Specifically, results from EFA analyses indicated a three-factor model, and the factors were named WRSS, P-IPSS, and T-IPSS. The post-hoc analysis focused on testing an alternative model with two latent variables, WRSS and IPSS, in which IPSS was defined using a combined score from items that loaded on P-IPSS and a combined score from items that loaded on T-IPSS as measured indicators. In SEM, alternative models are compared with the original model using goodness-of-fit statistics. Figure 6 depicts the alternative model that was tested in the post-hoc analysis.

Figure 6

Alternative Model



Results indicated that the alternative model demonstrated good model fit ($\chi 2 = 64.29$, df = 41, $p = 0.01$; RMSEA = 0.04; CFI = 0.99; TLI = 0.98). However, P-IPSS as an indicator demonstrated poor psychometric properties and did not load the recommended 0.40 or greater on the IPSS latent variable (0.28), suggesting that P-IPSS poorly measured the hypothesized underlying factor. T-IPSS demonstrated a factor loading of 0.80. A reliability analysis was conducted to examine the internal consistency of the IPSS latent variable, which demonstrated moderate ($\alpha = 0.54$) but lower internal consistency than P-IPSS ($\alpha = 0.71$) and T-IPSS ($\alpha = 0.68$) as distinct latent factors. Overall, results provided weak support for treating IPSS as a single latent construct measured by P-IPSS and T-IPSS.

Additionally, as previously discussed, experts in factor analysis and SEM recommend removing variables that poorly measure factors (i.e., have non-significant loadings less than 0.40) from further analyses. However, removing P-IPSS would result in defining IPSS using a single indicator. Experts also strongly caution against using single-indicator latent variables (Bollen, 1989; Kline, 2011), and overall, factors with fewer than three indicators are typically considered to be poorly measured. Ultimately, elimination of the indicator or factor would not allow for a model that could appropriately carry out the analyses and examine the relationships of interest that were pertinent to the current study. As a result, the original model, which demonstrated very good model fit, was accepted as a better fitting model than the alternative model. Results and related limitations are further discussed in the Discussion section below.

CHAPTER 5: DISCUSSION

The transition from high school to postsecondary life appears to be a particularly challenging period for students with Autism Spectrum Disorder (ASD), including those who are high-functioning. Students with ASD are achieving particularly low rates of participation in meaningful postsecondary activities, such as higher education and employment. However, little is known about factors that may be affecting their transition to life after high school. Two areas commonly considered to be important for educational and postsecondary success are academic achievement and social skills, yet students with ASD universally experience social skill deficits that may affect their school-related experiences and outcomes. To date, little research has been conducted to explore the different relationships between social skills, academic achievement, and postsecondary outcomes among students with ASD.

Using national longitudinal data and Exploratory Factor Analysis (EFA) and Structural Equation Modeling (SEM) techniques, a fundamental goal of this study was to extend previous research and examine important alterable factors that may be related to the school functioning and postsecondary successes of high-functioning students with ASD. This study is a unique contribution to the existing literature because it is the first known empirical examination of the categorization of specific social skills important in the school setting, specifically a distinction between academic- or work-related social skills (WRSS) and interpersonal social skills (IPSS), among students with ASD. Additionally, the findings from this study provide greater insight about the relationships between these specific social skills, academic achievement, and postsecondary education and employment outcomes among high-functioning students with ASD. A closer examination of the findings from the current study, as well as directions for future research and practice, is discussed below.

Underlying Social Skills Constructs

The goal of the first research question in the current study was to examine the underlying factors among a number of parent- and teacher-rated social skills. Three latent factors emerged and were named Work-Related Social Skills (WRSS), Parent-Rated Interpersonal Social Skills (P-IPSS), and Teacher-Rated Interpersonal Social Skills (T-IPSS). As hypothesized, the items clustered to align with previously established WRSS and IPSS constructs, suggesting that WRSS and IPSS represent distinct domains of social skills among high-functioning students with ASD, similarly to what has been found among the student population in general. This is consistent with both previous theoretical and empirical evidence, in which many researchers have statistically differentiated between WRSS and IPSS. Specifically, the five items that hung together on the first factor (follows directions, asks for what he/she needs in order to do his/her best in class, completes homework on time, stays focused on classwork, and works to the best of his/her ability) were all academically desirable social skills that are important for engaging in and completing academic tasks and aligned with previously developed WRSS definitions and constructs.

However, two separate IPSS factors emerged, grouped by rater. One possible reason for this finding can be explained within the context of the literature on parent and teacher ratings of student behavior. There is evidence to suggest that patterns of agreement between parents and teachers of typically developing students do not apply to parents and teachers of students with ASD (Jepsen, Gray, & Taffe, 2012). Specifically, researchers have generally found that parents and teachers demonstrate low to moderate agreement at best on the behaviors of students with ASD, especially regarding social and communication skills (Azad, Reisinger, Xie, & Mandell, 2015; Murray, Ruble, Willis, & Molloy, 2009). Furthermore, agreement between parents and

teachers has been shown to be even lower when rating specific items of social skills (Murray et al., 2009).

Some researchers argue that parent and teacher ratings of social skills tend to differ because interpersonal social skills are context dependent (Bishop & Baird, 2001). Thus, differences in parent and teacher ratings of students' social skills may be because students are behaving differently in different social contexts. For example, given that the social demands of a home environment often differ from that of a school environment, students may demonstrate varying interpersonal skills depending on where they are or with whom they are interacting. Thus, the separate IPSS constructs (i.e., parent-rated and teacher-rated) may reflect students' different prosocial behavior at home and at school.

Apart from context, and despite evidence to suggest that parents and teachers demonstrate differences in their ratings of social behavior among individuals with ASD, a more likely explanation for these findings is that there may be more distinct types of IPSS, as suggested from results of the post-hoc analysis. The post-hoc analysis examining the conceptualization of P-IPSS and T-IPSS as a single IPSS construct did in fact suggest that two factors better explained the data, providing evidence to support that P-IPSS and T-IPSS likely measured different aspects of IPSS. As noted in the literature, prosocial skills like IPSS are a very broad construct that encompass a range of traits, abilities, and behaviors (Caldarella & Merrell, 1997; Laugeson & Ellingsen, 2014; McClelland & Scalzo, 2006). As a result, IPSS have often been defined differently across studies and have generally included various domains of prosocial behavior, a few of which include cooperation, empathy, helpfulness, and assertion (Dunfield, 2014; Gresham, Elliott, Cook, Vance, & Kettler, 2010). It is possible that IPSS are still considered too broadly and can be distinguished even further into more specific social skills.

For example, the four items that hung together on P-IPSS (joins group activities without being told to, makes friends easily, starts conversations rather than waiting for others to start, is sensitive to other people's feelings) may be measuring a different aspect of IPSS than the items on the T-IPSS factor (gets along with other students, does not argue with others, does not fight with others). Future research is needed to further investigate the distinction of specific social skills, particularly IPSS, among students with ASD.

Social Skills and Academic Achievement

The second research question in this study was focused on understanding the relationships between specific social skills and academic achievement among high-functioning secondary students with ASD. It was hypothesized that WRSS and IPSS would demonstrate unique patterns of predictability on the academic achievement outcomes of students with ASD and that WRSS specifically would be more strongly related to academic achievement than IPSS. As expected, WRSS was the strongest predictor of academic achievement, such that students with ASD who demonstrated better WRSS attained higher academic achievement outcomes. However, neither P-IPSS nor T-IPSS were significantly related to academic achievement.

These findings add to the established literature base on the link between social skills and academic achievement by identifying WRSS as a particularly important aspect of social skills for academic achievement among students with ASD. Although extensive research has been conducted to suggest a strong relationship between students' ability to socially navigate the school environment and their ability to succeed academically, much of the available research has demonstrated that social skills in general contribute to academic achievement outcomes without identifying specific aspects of social skills that may be especially important (Estes et al., 2011). These findings highlight the particular importance of WRSS for academic achievement among

the population of students with ASD and suggest that having poor IPSS may not be as detrimental to academic achievement as having poor WRSS.

These findings are also consistent with the initial research that has been conducted to examine WRSS and IPSS in relation to academic achievement among the typically developing population of students that largely suggests WRSS are related to academic achievement, while IPSS are not (Cooper & Farran, 1988; Cooper & Speece, 1988; McClelland et al., 2000). This suggests that the unique pattern of predictability of WRSS and IPSS to academic achievement appears to be similar among typically developing students and students with ASD. One reason WRSS may be especially important for students' academic achievement outcomes is that students who demonstrate higher levels of WRSS are likely spending more time engaged in and benefiting from academic tasks. They may also be better able to ask for help when needed, follow classroom rules, and meet teachers' expectations, which can help create a conducive learning environment necessary for academic achievement success (McClelland et al., 2000).

Although findings from previous studies and the current study have not established a prominent relationship between IPSS and academic achievement, it is possible that IPSS are more related to other important school factors aside from academic achievement, which were not examined in the current study. For example, students with better IPSS have been shown to develop better peer relationships, have fewer behavior problems, receive more help and acceptance from teachers, exhibit lower levels of delinquency, and demonstrate higher self-confidence at school (Darling-Churchill & Lippman, 2016). Thus, although IPSS may not be directly related to academic achievement, they may be related to other important factors that set a critical foundation for educational success and improve a student's ability to function successfully within a school environment (Campbell et al., 2016). Future research should take

additional school factors into consideration in order to further examine the importance of IPSS on the school-related functioning of students with ASD.

Social Skills, Academic Achievement, and Enrollment in Postsecondary Education

The goal of the third research question in this study was to examine WRSS, IPSS, and academic achievement as predictors of enrollment in postsecondary education among high-functioning students with ASD. It was hypothesized that academic achievement would be the strongest predictor of enrollment in a postsecondary education institution and that academic achievement would also mediate the relationships between WRSS and enrollment, as well as IPSS and enrollment. As expected, academic achievement was the strongest predictor of enrollment in a postsecondary education institution in this sample of high-functioning students with ASD, suggesting that those who demonstrated higher academic achievement scores were more likely to enroll in higher education. This finding supports what is widely known in the available literature, in which many researchers have consistently found that academic achievement predicts postsecondary education enrollment across diverse populations of students (Engberg & Wolniak, 2010; Garland et al., 2011), including students with ASD (Chiang et al., 2012). This finding was expected given the nature of the college admission process, in which academic achievement scores like GPA and standardized test scores are a primary criterion used when selecting qualified students for admission (Robbins et al., 2004). In other words, students with higher academic achievement scores tend to be more desirable to postsecondary education institutions and thus may receive more opportunities to enroll in a postsecondary education program. Overall, this finding provides further support for the established literature base that considers academic achievement to be a "traditional predictor" of enrollment in higher education (Robbins et al., 2004). It also highlights the importance of continuing to support the academic

needs of students with ASD in high school in order to facilitate successful transitioning to a postsecondary education program.

Contrary to the expectation, academic achievement in this study did not mediate the relationships between WRSS or IPSS and postsecondary education enrollment. Interestingly, WRSS demonstrated a significant positive relationship to postsecondary education enrollment, suggesting that WRSS uniquely contributes to enrollment in higher education among students with ASD apart from academic achievement. This finding highlights the particular importance of WRSS for college enrollment among students with ASD, as those who demonstrated better WRSS were more likely to enroll in any postsecondary education institution. This may be because students with higher levels of WRSS are more academically motivated and engaged and thus may be more likely to continue to seek additional educational opportunities after high school. On the other hand, those with lower levels of WRSS may not demonstrate the motivation or desire to continue pursuing educational options after high school, which becomes an option rather than a requirement at the postsecondary level. These results suggest that, in addition to facilitating students' academic achievement outcomes, teaching and helping students with ASD develop appropriate WRSS is another important component that can support their transition to higher education.

Social Skills, Academic Achievement, and Persistence in Postsecondary Education

In addition to examining predictors of enrollment in postsecondary education, another goal of this study was to understand factors that are related to students' persistence in postsecondary education. Thus, the fourth research question was focused on examining the relationships between specific social skills, academic achievement, and persistence in postsecondary education. It was hypothesized that WRSS, IPSS, and academic achievement

would predict postsecondary education persistence and that IPSS in particular would demonstrate the strongest relationship to persistence in a postsecondary education institution. Findings provided partial support for these hypotheses. Specifically, WRSS was shown to be the strongest predictor of persistence in a postsecondary education institution, suggesting that students with better WRSS were more likely to remain enrolled in or graduate from a postsecondary education institution. Academic achievement and P-IPSS were also significantly positively related to persistence; however, T-IPSS did not significantly predict persistence.

Consistent with the existing research base on what is known about the student population in general, academic achievement was found to explain a moderate amount of variance in postsecondary education persistence among students with ASD. This is likely because students who achieve higher levels of academic achievement in high school are more likely to continue succeeding academically in college (Kobrin et al., 2008; Zheng et al., 2002), facilitating greater persistence and a higher likelihood of graduating (French et al., 2015). Previous researchers have found that poor academic performance is one common reason that some students leave college after the first year (Friedman & Mandel, 2011). Additionally, given that attaining a certain level of academic achievement is necessary for graduation, it logically follows that academic achievement is one important factor related to students' persistence in postsecondary education.

Notably, although academic achievement was found to be the strongest predictor of enrollment in postsecondary education followed by WRSS, WRSS was found to be a stronger predictor of persistence in a postsecondary education institution among students with ASD. In fact, while academic achievement explained a moderate amount of variance in postsecondary education persistence, WRSS explained almost as much variance in postsecondary education persistence as academic achievement accounted for in postsecondary education enrollment. This

finding underscores the magnitude of the importance of WRSS for persistence in a postsecondary education environment among students with ASD.

The importance of WRSS may be explained given the nature of a postsecondary education environment and the level of independent functioning required at the postsecondary level. Students in college are generally expected to function with greater independence than required in middle or high school. For example, students in higher education typically receive much less scaffolding and support from their parents and teachers and instead are expected to demonstrate greater independent effort in their learning activities. Thus, students with ASD who have better WRSS may be more prepared to persist in the educational demands of a postsecondary education environment. These students may be more focused on trying to perform well and may exhibit greater independence, initiative, and intrinsic motivation in their postsecondary education endeavors that allows them to persist and ultimately graduate. Additionally, they may be better able to seek the supports they need to succeed in a postsecondary education program. These findings align with the literature that suggests academic motivation may be more important than aptitude for college retention and graduation at the postsecondary level (Friedman & Mandel, 2011). Thus, although academic achievement may be important for facilitating the transition of students with ASD to a postsecondary education program, teaching and developing students' WRSS may be especially important for improving a student's likelihood to persist and ultimately graduate from higher education.

Although previous research has suggested that IPSS is particularly important and predictive of persistence in college among the general student population, findings from the current study indicated a weak relationship between IPSS and postsecondary education persistence among students with ASD. A few explanations are possible for these results. First,

IPSS may not be as strong of a predictor of college persistence for students with ASD as it appears to be for students in general. Researchers have argued that, for the student population in general, those with better IPSS are better able to develop meaningful relationships with their peers and professors and are more involved in campus activities, which facilitates feelings of belongingness and commitment to a postsecondary education institution (Dymnicki et al., 2013; Jones et al., 2015; Robbins et al., 2004). As a result, students with better IPSS are expected to be better able to persist in the highly social demands of a postsecondary education institution. However, although many students with ASD want to make friends, it is possible that students with ASD are not prioritizing interpersonal relationships as prominently as the postsecondary student population in general. Instead, students with ASD, who tend to demonstrate more literal and practical ways of thinking, may be prioritizing the academic purpose of postsecondary education over social experiences, which may also explain the particular importance of WRSS for persistence and graduation. Although research on postsecondary students with ASD is in its infancy stages, some college students with ASD have reported primarily practical reasons for attending college, such as obtaining a degree (Drake, 2014). Others have expressed the desire to attend college for the enjoyment of learning, especially to learn more about topics of interest (Drake, 2014). Some students with ASD have also been found to prefer more personal time and space in college than their typically developing counterparts (Madriaga, 2010). Taken together these findings suggest that students with ASD may not be prioritizing or requiring the same level of interpersonal connections as their typically developing peers to feel connected to and persist in their postsecondary education programs.

Furthermore, P-IPSS in particular was shown to significantly explain a small amount of variance in persistence in postsecondary education, while T-IPSS was not. This may be because

parents are generally more aware and knowledgeable about their children's IPSS, especially in settings outside of a structured school environment, while teachers are often only able to observe IPSS in the classroom. Additionally, teachers at the secondary level and beyond typically teach specific subjects and may only get to know students in that particular class. In particular, it is possible that the teacher who rated the participant's IPSS in this study may not have known the student's IPSS well, given that NLTS2 selected the teacher who taught the participant's first general education academic class of the week to rate the items. Given that postsecondary education environments are often highly social in nature and involve activities both in and outside of the classroom setting, P-IPSS overall may have been a more accurate measure of students' ability to make friends and get along with others in a postsecondary education environment.

Finally, the weak relationship between IPSS and postsecondary education persistence may be reflective of possible measurement issues related to the IPSS constructs. Most of the IPSS indicators demonstrated appropriate variation and minimal skewness. However, one item in P-IPSS (makes friends easily) was slightly skewed in the positive direction, and two items in T-IPSS (does not argue with others, does not fight with others) were skewed in the negative direction, indicating that most participants in this sample did not often make friends easily and rarely argued or fought with others. As a whole, the IPSS constructs met appropriate technical standards and demonstrated enough sensitivity to show expected patterns to other outcomes of interest in this study; however, the lack of expected relationships between IPSS and postsecondary education persistence should be interpreted somewhat cautiously, and future research using measures with stronger variation and sensitivity may more accurately capture the nature of these relationships.

These findings should also be interpreted in light of the measurement of the persistence variable in this study. Persistence in this study was defined as being currently enrolled in or having graduated from any postsecondary education institution by the last wave of data collection, and those who left a postsecondary education institution for any other reason besides graduating and were not currently enrolled were considered to not persist. It is possible that this persistence variable did not capture a fully accurate representation of persistence. For example, different reasons for leaving a postsecondary education institution were not examined. Additionally, information regarding whether those who left or were not currently enrolled by the last wave of data collection had ever returned to pursue postsecondary education was not available, just as it was not possible to determine whether those who were currently enrolled by the last wave of data collection ultimately graduated or dropped out of postsecondary education. Research among the student population in general has suggested that college education can often be pursued in a nonlinear fashion, including being paired with work or interspersed with breaks and periods of nonattendance (Arnett, 2000). Thus, future research should continue to examine different ways to conceptualize persistence in postsecondary education in order to more accurately capture postsecondary education success among students with ASD.

Social Skills, Academic Achievement, and Postsecondary Employment

The last research question in this study was aimed at examining specific social skills and academic achievement as predictors for obtaining employment after high school. It was hypothesized that IPSS would be the strongest predictor of postsecondary employment obtainment in comparison to WRSS and academic achievement, and academic achievement was hypothesized to demonstrate the weakest relationship to participation in postsecondary employment. Contrary to expected, academic achievement demonstrated the strongest

relationship to postsecondary employment. P-IPSS and T-IPSS were also shown to predict postsecondary employment, while WRSS was not.

These findings underscore the particular importance of IPSS for postsecondary employment among students with ASD. Although IPSS did not significantly predict academic achievement or enrollment in postsecondary education in this study and only partially predicted postsecondary education persistence, both P-IPSS and T-IPSS were shown to predict postsecondary employment among students with ASD. These findings are consistent with the established literature base that suggests IPSS, such as cooperating, sharing, helping others, and understanding others' feelings, are strongly linked to employment among the student population in general for both entry-level positions and full-time jobs (Jones et al., 2015; Hein et al., 2013). These findings are plausible given that employers typically value skills like teamwork and collaboration and look for these IPSS when considering new hires (Casner-Lotto & Barrington, 2006). Thus, students who demonstrate better IPSS, especially during a job interview, may be more competitive and desirable to employers, increasing the likelihood of obtaining employment.

Interestingly, academic achievement demonstrated the strongest relationship to postsecondary employment among students with ASD, and WRSS were not shown to be related to postsecondary employment. There are a few reasons that may explain these unexpected results. First, students with better WRSS likely demonstrate greater academic motivation and engagement and may be more likely to pursue postsecondary education opportunities after high school before seeking work. Additionally, WRSS may not be immediately apparent or important for job obtainment, especially during the initial stages of the hiring process where employers are looking to hire candidates with well-developed IPSS. Instead, WRSS may be more predictive of

maintaining employment, which was not measured in the current study. Future research should continue to investigate the importance of specific social skills using additional conceptualizations of employment success.

Regarding academic achievement, findings from the current study suggest that higher levels of academic achievement predict participation in employment after high school in general. However, information about the specific time at which postsecondary employment was obtained (i.e., during postsecondary education or after graduation from a postsecondary education program) was not examined in the current study. Previous research has suggested that students with higher academic achievement tend to be more likely to obtain part-time work in college and may also be more likely to obtain full-time employment after college (Pike, Kuh, Massa-McKinley, 2008). Some researchers have also suggested that about 70% of students work for pay while in college (Pike et al., 2008). Furthermore, students with higher academic achievement may be more likely to obtain job interviews after college. Thus, findings from the current study align with previous research to suggest a link between academic achievement and obtaining paid work after high school overall. However, future research is needed to more closely examine postsecondary employment outcomes, specifically the type of employment and whether employment was obtained after high school or college graduation, among students with ASD. These distinctions may provide greater insight about the nature of postsecondary employment success among students with ASD.

Limitations and Implications for Future Research

Despite the strengths and contributions of this study's findings to the existing literature, including use of a national sample of students with ASD and rigorous analytic procedures, there are several limitations and areas on which future research could expand in addition to those

previously discussed. First, a concrete measure of intellectual functioning was not available in the NLTS2 dataset. Given the study's focus on high-functioning students with ASD, the sample in this study was presumed to be high-functioning based on elimination of participants who were identified as having an intellectual disability and only including students who were deemed capable of participating in academic assessments. However, future research that establishes a concrete measure of intellectual functioning could more accurately focus on the high-functioning subset of students with ASD who are cognitively capable of independently participating in postsecondary education and employment activities. Furthermore, examination of predictors of postsecondary success among individuals across the autism spectrum is needed, given that students with ASD have a variety of skills and needs, and different skills may be important for different postsecondary outcomes depending on the severity of ASD.

Additionally, the use of secondary data posed notable restrictions on the measurement of certain constructs of interest in the current study. The NLTS2 was beneficial because it provided a large national sample of students with ASD, which can be difficult to obtain in traditional practical or clinical settings. However, some measures selected to operationalize certain variables in this study were not ideal. Specifically, development of the social skills constructs was limited to the available items that were administered to parents and teachers in the NLTS2. NLTS2 did not administer questionnaire items from complete and previously validated social skills scales. Although solid statistical analyses were used to develop and ensure sound reliability of the social skills constructs in the current study, these limitations prevented the use of previously validated WRSS and IPSS measures and the consideration of a wider range of items that may have been relevant in defining WRSS and IPSS among students with ASD. For example, P-IPSS and T-IPSS were defined using four and three items respectively. Given the

limited number of available social skills items, it was not possible to further refine or empirically explore additional conceptualizations or distinctions of the IPSS constructs. Additionally, the same questionnaire items were not administered to both parents and teachers. These limitations prevented possible comparisons and further examination of whether differences between IPSS constructs were due to rater or definitional differences. Future research would benefit from using previously validated measures or standardized rating scales of social skills with established WRSS and IPSS constructs or a wider range of items used to define the specific social skills domains of interest.

Furthermore, future research is needed to better understand and define WRSS among students with ASD. Although rigorous statistical techniques were used to develop a reliable WRSS construct in the current study that aligned with previously validated WRSS scales, the examination of additional conceptualizations of WRSS, as well as other possible distinctions from related skills is needed. For example, although WRSS in the existing literature and the current study were conceptualized as social skills that are important for classroom success, several of the skills that were used to define WRSS do not appear to require social interaction with others (e.g., staying focused, working to best ability). Future research should consider whether these skills are appropriately conceptualized as social skills or if they may better align with executive functions, which also require the organization and self-management abilities that are necessary for classroom success. Thus, there appears to be possible further distinctions among the skills that comprise what is currently considered WRSS, in particular between skills that require social interaction with others (e.g., asking for help, following directions) and those that do not. Future research should investigate additional possible distinctions that may exist

among WRSS. In addition, future research aimed at better understanding WRSS should empirically investigate the distinction between WRSS and executive functioning skills.

Overall, future research is needed to continue examining and to more accurately define specific social skills among students with ASD. Given that social skills are a broad construct, the literature base would benefit from additional exploration, refinement, and understanding of specific social skills important in the school setting among students with ASD. Specifically, more consistent definitions of both WRSS and IPSS are needed. In addition, potential further distinctions of WRSS and IPSS should be investigated, as well as possible additional ways to categorize and define specific social skills important in the school setting. These continued efforts to better understand and more accurately and consistently define specific social skills important in the school setting are needed in order to better inform intervention efforts aimed at increasing the likelihood of postsecondary success among students with ASD.

Furthermore, although this study provided the first known empirical examination of different social skills and academic achievement as predictors for several important postsecondary outcomes, future research aimed at understanding the successful transition of students with ASD to postsecondary life would benefit from exploring additional predictors and outcomes. For example, only two specific types of social skills were examined, and additional social skills were not accounted for in the current study. In addition to examining different ways to further categorize social skills among students with ASD, future research would benefit from including a greater variety of specific social skills in the analyses. Additionally, other potentially important skills and factors that may also contribute to the learning experiences and outcomes of students with ASD should be considered. Examining a greater variety of malleable factors and predictors in future research will be important, especially in regard to postsecondary employment

outcomes, for which WRSS, IPSS, and academic achievement only accounted a small to moderate amount of variance in the current study. Future research may wish to examine skills such as adaptive behavior, language level, physical and emotional health, and school accommodations, which are targetable in intervention efforts, in relation to the school-related functioning and postsecondary outcomes among students with ASD.

Additionally, the current study focused on three important outcomes of postsecondary success related to education and employment. Aside from the previously discussed need for future research to examine different measures of postsecondary education persistence, further consideration of postsecondary education enrollment, including a possible distinction between enrollment in different types of higher education institutions (i.e., two-year versus four-year programs) is needed. Additional conceptualizations of employment success, such as job maintenance and gainful earnings, would also extend on the current study. For example, there is evidence to suggest that young adults with ASD, including those who graduate from a postsecondary education program, struggle to maintain employment over time (Taylor, Henninger, & Mailick, 2015). Future research should extend on the findings from the current study and examine potential factors that may be related to maintenance of gainful employment. Furthermore, success after high school can be defined in a number of ways beyond pursuing higher education and employment, and these milestones and functional outcomes should also be considered in future research. For example, independent living is often considered to be a marker of success in young adulthood; however, examination of this outcome was not possible due to the limited sample size in the NLTS2 that achieved this milestone. It may also be particularly important to examine outcomes such as involvement in and the quality of social relationships for students with ASD. Future research should continue to investigate a variety of additional

outcomes among students with ASD to better understand their postsecondary successes and participation in meaningful experiences as young adults.

Future research may benefit from using more stringent and current measures of an ASD diagnosis to ensure a more precise representation of the target population. The sample of students with ASD in the current study was identified using parent report in the NLTS2. NTLS2 did not administer autism-specific measures to confirm ASD diagnoses among the participants. Although it is unlikely the parents falsely reported participants as having ASD, the evaluation and diagnostic details and procedures regarding how each participant received a diagnosis was not available. Thus, it is unclear how or if participants were officially medically diagnosed with ASD. Additionally, given the timeline of the NLTS2, participants were likely diagnosed with ASD according to a previous version of the Diagnostic and Statistical Manual of Mental Disorders. Future research using established standardized measures, such as the Autism Diagnostic Interview, Revised and/or the Autism Diagnostic Observation Schedule, Second Edition, to identify participants with ASD according to the current clinical diagnostic criteria is needed.

Finally, the nature of secondary analysis not only constrains the measures that are developed and used, but also removes the researcher from experiencing the process and potential challenges of data collection. For example, collecting original data would allow for the careful selection and use of alternative forms of measurement for the constructs of interest in this study. It would have also allowed for selection of a more targeted sample of students with ASD. However, this may have greatly reduced the sample size, as there are several foreseeable challenges with recruitment of individuals with ASD for research purposes. For example, the current study was exploratory in nature and did not offer families the benefit of intervention or

treatment of social skills, academic achievement, or postsecondary outcomes. Future research with additional resources and time may seek to investigate more causal forms of research related to postsecondary success for students with ASD.

Overall, the current study provided a starting point to understanding the social skills, academic achievement, and postsecondary outcomes among high-functioning students with ASD. Future research that expands on this study by examining additional social skills and other potentially important factors for school and post-school success, as well as a greater variety of postsecondary outcomes among a current sample of medically diagnosed students with ASD would meaningfully contribute to the literature.

Implications for Practice

The current study has several strengths and practical implications for understanding and facilitating the successful transition of the "great wave" (Smith & Lugas, 2010) of young adults with ASD who are expected to transition from high school to postsecondary life over the next decade. One fundamental implication of the current study is the identification of specific malleable factors related to an increased likelihood of participation in important postsecondary education and work activities among students with ASD. Previous research has tended to focus on factors that are difficult to change, such as SES, gender, and cognitive ability, whereas the results from this study can be used to guide intervention efforts aimed to improve the likelihood of achieving certain postsecondary outcomes. Given that high-functioning students with ASD are at great risk for not participating in meaningful activities after high school, the current study's findings provide a basis for understanding possible areas to target in order to prepare students with ASD to become successful and self-sufficient in their postsecondary endeavors.

First, the results from this study highlight the importance of continuing to support the academic needs of students with ASD in high school, especially those who are higher-functioning and capable of participating in academics, in order to facilitate successful transitioning to postsecondary activities. Academic achievement was shown to be a significant predictor of success in all three outcomes, as students who performed better academically experienced a greater likelihood of enrolling and persisting in higher education, as well as obtaining work. Thus, it is important for educators to continue using effective instructional practices and educating students with ASD in the general education curriculum in order to facilitate the academic development and growth that appears to be important for future education and employment success.

In addition, the results from this study emphasize the importance of providing appropriate social skills instruction to students with ASD who may particularly require support in specific social skills areas. For example, WRSS was shown to be important for both academic success in high school and later success in postsecondary school. Teaching and facilitating WRSS among students with ASD who lack these types of skills earlier in primary and secondary settings may help increase their likelihood of performing better academically in school and subsequently enrolling in a postsecondary education program. Importantly, facilitating students' WRSS may improve their chances of persisting in and ultimately graduating from a postsecondary education institution. Thus, targeting WRSS among students with ASD who would benefit from receiving support with these skills in earlier grades before they reach the transition to higher education may help increase their success with entering and graduating from a postsecondary education program. In addition, given that IPSS were shown to be especially important for obtaining paid employment after high school, it will be important for educators to continue providing direct

instruction to students with ASD who struggle with IPSS at the secondary and postsecondary level. While IPSS are commonly targeted in early intervention efforts for students with ASD, continuing to support the IPSS needs of adolescents and young adults with ASD who would benefit from intervention in this area may help increase their chances of obtaining gainful employment after high school.

Given that many educators work within the constraints of limited time and resources, the results from this study pinpoint specific areas for stakeholders to prioritize and target in the intervention efforts for students with ASD. Students with ASD often vary in their unique strengths and skill deficits, which can make treatment goal setting and intervention efforts challenging. These findings may potentially help with the feasibility of intervention efforts. For example, the findings from this study may help guide the individual education programming needs and treatment goal setting of students with ASD by identifying specific skill areas to target among those who demonstrate deficiencies in these areas. Interventions targeting academic achievement, WRSS, and IPSS should be prioritized among those who require support in these areas in order to improve the likelihood of success among students with ASD in high school and in postsecondary educational environments and the workplace.

Ultimately, this study provides an initial identification of specific skill areas to prioritize and target in intervention efforts for students with ASD. Although the field has expanded immensely in the area of effective interventions, including social skills interventions, the primary focus has been on effective methods and protocols for teaching social skills. This has resulted in social skills interventions that target a wide range of skills, which often lack consistency, creating difficulty in measuring treatment goals and efficacy (Volkmar et al., 2014). The results from this study should be used to guide more consistent intervention and progress monitoring

efforts by establishing specific treatment goals in school and clinical settings related to the academic, work-related, and interpersonal functioning of students with ASD that can produce multiple benefits in their school and postsecondary lives.

Conclusion

The relationships between specific social skills, academic achievement, and postsecondary education and employment outcomes among high-functioning students with ASD were examined in this study. In particular, this study provided an initial investigation of the categorization of different types of social skills (i.e., WRSS and IPSS) among secondary students with ASD and examined the relationships to academic achievement and postsecondary education and employment outcomes. The results from this study support the notion that academic achievement in high school is especially important for facilitating the successful transition of students with ASD to meaningful postsecondary activities, including not only enrollment, but also persistence in postsecondary education, as well as postsecondary employment. In addition to academic achievement, different social skills may be important for certain postsecondary outcomes among students with ASD. In particular, facilitating WRSS among students with ASD may help improve their likelihood of participating in and successfully graduating from a postsecondary education program. Furthermore, helping students with ASD learn to effectively use IPSS may improve their chances of obtaining meaningful work after high school. It will be important for future research to continue to understand the academic and social functioning of students with ASD, including specific aspects of social skills, and how these factors may predict greater independence, quality of life, and their overall success in both school-related and postsecondary outcomes.

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