STUDENT, SCHOOL AND COMMUNITY PREDICTORS OF WORK-BASED LEARNING EXPERIENCE FOR HIGH SCHOOL STUDENTS WITH AUTISM SPECTRUM DISORDER

Alice H. Verstrat

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Approved by:
Rune Simeonsson
Kara Hume
Jessica Dykstra Steinbrenner
Sandra Evarrs
Thurston Domina
ABSTRACT

Alice H. Verstrat: Student, School and Community Predictors of Work-Based Learning Experience for High School Students With ASD
(Under the direction of: Rune Simeonsson)

The Centers for Disease Control and Prevention (2014) estimate that the prevalence of autism spectrum disorder (ASD) is currently 1 in 68 children. Post-secondary outcomes in education and employment for individuals with ASD are currently among the poorest of any disability group. This investigation sought to fill gaps in research on high school experiences that improve post-secondary outcomes for students with ASD. Data for this investigation were taken from the Center on Secondary Education for Students with Autism Spectrum Disorder (CSESA). Work-based learning experiences (WBLE) in high school have been shown to predict positive post-secondary outcomes in education and employment for students with disabilities (NSTTAC, 2013; Luecking, 2009). This study first examined three student-level predictors identified by NSTTAC (social skills, self-determination, diploma status) for their significance in predicting WBLE for high school students with ASD, controlling for several demographic variables and accounting for school clustering effects. Adapted diploma status was found to predict increased participation in WBLE. Applying the framework of Bronfenbrenner’s Ecological Theory, two ecological variables of community type (urban, suburban, rural) and school percentage of students eligible for free or reduced lunch were examined as predictors of WBLE. Neither was found to be significant. Descriptive data were examined for a subgroup of 28 students who participated most frequently in WBLE. Implications for research and practice
are discussed.
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CHAPTER 1: INTRODUCTION

Autism Spectrum Disorder (ASD) is a pervasive developmental disorder characterized by deficits in social communication and interaction, a limited range of interests and activities, and often by the presence of repetitive, stereotyped behaviors (Wehman, Smith & Schall, 2009). Autism characteristics and behaviors for an individual can range from very mild to severe. The social behaviors of individuals with autism can make it difficult for others to relate to them and can create extreme challenges in vocational and educational domains. Social skill limitations are a major reason so many individuals with ASD have difficulty securing and holding a job (Wehman et al, 2009). Other characteristics of autism magnify the demands of higher education and the work place. A need for sameness, adherence to rigid routines, and tendencies for intense preoccupations can create obstacles for people with autism when faced with the unpredictable environments of higher education and work places that require flexibility and adaptability. Further, individuals with autism are more vulnerable to mental health diagnoses of anxiety disorders and depression, which can add to their challenges in being successful in education and work (Wehman et al, 2009).

In its most recent 2014 update, the Center for Disease Control (CDC) increased its estimate of the rate of prevalence of Autism Spectrum Disorder (ASD) among 8 years olds in the United States to 1 in 42 boys and 1 in 189 girls, for a population average of 1 in 68 individuals. This is a 30% increase from its 2012 estimate of 1 in 88 individuals (CDC, 2014). Another change in the 2014 report indicates that an estimated half of these individuals have an IQ of 85 or
higher, up from only one third having an average or higher IQ ten years ago. In addition, many studies report a lessening in the severity of autism symptoms in adolescence and adulthood, such as repetitive behaviors, stereotyped interests, self-injury and aggression, as well as improvements in impairments of social reciprocity and verbal communication (Taylor & Seltzer, 2010). Given that more individuals with ASD are manifesting higher IQs and increased placement in regular education classrooms due to early diagnosis and intervention, and that the symptomology of individuals with ASD modestly improves with age, a concurrent increase in positive post-secondary outcomes would be expected.

However, individuals with ASD are currently experiencing pronounced decrease in post-secondary engagement (Taylor & Mailick, 2014). Eligibility for many special supports in adulthood requires co-occurrence of intellectual disability. The majority of today’s youth with ASD do not have an intellectual disability, although their communication and social impairments may significantly interfere with their ability to get a job, go to school, and socialize (Roux, Shattuck, Rast, Rava, & Anderson, 2015). Families of these individuals often refer to high school exit as “falling off a cliff” — referring to the dramatic decline in activity and access to services during the transition to adulthood (Roux et al, 2015).

About a half million youth with autism will enter adulthood over the next decade (Roux et al, 2015). The Economist (2016) discusses an estimate of the lost output when individuals with ASD are jobless or underemployed after high school. Failure to confront this loss is too costly, both in financial and human terms. Many individuals with autism aspire to fulfilling adult lives of independence, personal intimacy, and competitive employment (Giarelli, Ruttenberg & Segal, 2013). Many also possess tremendous strengths. Steven Silberman’s book NeuroTribes: The Legacy of Autism and the Future of Neurodiversity (2016) examines the contributions of many
individuals with characteristics of autism through history. Silberman’s biographies elucidate a compelling reality; that we will all benefit from improved educational and vocational outcomes for individuals with ASD. Findings suggest that the current service system may be inadequate to accommodate the needs of youths with ASD during the transition to adulthood (Wehman, Schall, McDonough, Molinelli, Riehle, Ham, & Thiss, 2012). The supports, interventions, and strategies that have led to better secondary educational outcomes for those with ASD do not yet translate into success after high school. Research into high school transition experiences that improve post-secondary outcomes for students with ASD is needed.

Comparing the post-secondary vocational activities of those with ASD to the general population is revealing. Typically developing young adults tend to improve their occupational positions as they grow older (Light, 2005). For those with ASD, engagement in vocational and educational activities declines and worsens (Taylor & Mailick, 2014). The Interagency Autism Coordinating Committee (IACC) coordinates all efforts within the Department of Health and Human Services (DHHS) concerning autism. The IACC estimates that at least 50% of all young adults with ASD experience a “total disconnect” from educational or vocational activities in the two years after high school (IACC, 2013). According to the National Longitudinal Transition Study-2 (NLTS-2), four in every ten young adults on the autism spectrum never worked for pay between high school and their early 20’s (Roux et al, 2015). A longitudinal study by Taylor and Mailick (2014) indicates that this disconnect immediately after high school is not a “momentary perturbation in development” (p. 705), but rather a persisting and even worsening condition. If any type of employment outside the home (including working with supports or in sheltered workshops) is included, the rate of employment for adults with ASD is estimated at 37% (Taylor & Seltzer, 2012). This is half of what would be expected of same-age, typically developing peers
(Bureau of Labor Statistics, 2012). It is also significantly lower than the employment rate for men and women who dropped out of high school before earning a diploma (Bureau of Labor Statistics, 2016). As it stands now, children and adolescents with ASD grow into adulthoods of extremely low educational and vocational success after exiting high school. Studies find that only 4 to 13% adults with ASD are competitively employed (Taylor & Seltzer, 2011).

Comparing post-secondary educational activities of those with ASD to the general population also reveals a significant gap. According the Bureau of Labor Statistics (2016), across the general population of 2015 U.S. high school graduates, the college enrollment rate was 72.6 percent for young women and 65.8 percent for young men. Among these, about 9 in 10 were full-time students. About 2 in 3 high school graduates enrolled in college attended 4-year colleges. In contrast, according to the National Longitudinal Transition Study-2 (NLTS-2), only one-third of those with ASD participated in any education after high school. Test, Smith & Carter (2014) found that up to six years after leaving high school, less than half the young adults with autism attended any type of postsecondary school (compared with 62% of young adults in the general population), and completion rates are as low as 35% (compared with 51% for young adults in the general population). The only disability group with a lower rate of postsecondary education was youth with intellectual disabilities (Roux et al, 2015). Seventy percent of those with ASD who received postsecondary education attended a 2-year college. Morgan (2016) used the results of the NLTS-2 to establish that individuals with ASD are among the lowest of any disability group in post-secondary employment and education. Over one-third of young adults with ASD were “disconnected” during their early 20s, meaning they never got a job or continued education after high school (Roux et al, 2015).

In the context of these concerns, The IACC recommends studies to investigate services,
supports, strategies and interventions for children and adolescents with ASD that impact adult quality of life outcomes (IACC, 2013). Given the prevalence of ASD and current post-secondary outcomes, these investigations are highly significant. Much correlational research now exists that has provided strong evidence of student characteristics and experiences that predict post-secondary success in education and employment for individuals with disabilities (NSTTAC, 2013). The National Secondary Transition Technical Assistance Center (NSTTAC) identified 17 predictors of post-school employment, education, and independent living success for students with disabilities from correlational studies (Test, Mazzotti, Mustian, Fowler, Kortering, & Kohler, 2009). Rowe, Alverson, Unruh, Fowler, Kellems & Test (2014) later researched and developed operationalized definitions for each predictor. Six of the seventeen predictors (career awareness, occupational courses, paid employment/work experience, vocational education, work study, and community experience) fall under the category of Work-Based Learning Experiences, or WBLE (Luecking, 2009; Mazzotti, Rowe, Sinclair, Poppen, Woods & Shearer, 2016; Roux et al, 2015; Test, Mazzotti et al, 2009). Work-Based Learning Experiences, as discussed extensively by Luecking (2009), have become a clear focus of intervention for students with disabilities to facilitate better transition outcomes in both education and employment. WBLE in high school have been established as key predictors of positive post-secondary educational and vocational outcomes for students with disabilities (NSTTAC, 2013).

Gaps persist in our understandings of successful post-secondary transition for students with ASD. Adolescents with autism may require specialized supports and planning throughout their transition from school to adult life (Wehman et al, 2009). Most of the NSTTAC predictors of post-school outcomes were based on research that did not consider differences among disability subgroups (Test, Mazzotti et al., 2009). The Division of Career Development and
Transition (DCDT) identified the need for researchers to examine how secondary transition predictors work for students with differing disabilities, socioeconomic status, ethnicity, and gender (Mazzotti, Rowe, Cameto, Test, & Morningstar, 2013; Mazzotti et al, 2016). Simonson & Neubert (2013) found that gender and ethnicity modified the effect of predictors for students with various disabilities in different ways. Much of the research used to identify transition predictors also did not control for the effects of gender, minority status, and community type, which can have a profound impact on post-school outcomes (Thompson, Diamond, McWilliam, Snyder & Snyder, 2005). As Daviso, Baer, Flexer & Meindl (2016) found, there is a need for research to determine which transition practices are effective, in what school and community contexts, and for what sort of students.

More research is also needed to understand the role of ecological variables as mediators and moderators of predictors of post-secondary outcomes for students with ASD. Bronfenbrenner’s (1979) Ecological Theory of Development provides an ecological framework to examine the multiple systems that impact the transition to adulthood for students with autism. Bronfenbrenner’s model conceptualizes the concentric ecological systems impacting a child’s development, from the microsystem (people and environments directly in contact with the child) to the macrosystem (broader cultural and regional systems and practices). NSTTAC (2013) and the Division for Career Development and Transition (DCDT) have also urged researchers to incorporate ecological factors into the development of evidence-based practice for transition (Trainor, Lindstrom, Simon-Burroughs, Martin, & Sorrells, 2008).

This study sought to fill gaps in research on in-school predictors of post-secondary outcomes for students with ASD. Work-based learning experiences (WBLE) in high school have been established as key predictors of positive post-secondary educational and vocational
outcomes for students with disabilities. This investigation examined three NSTTAC (2013) predictors of post-secondary success (diploma status, self-determination, and social skills) and their significance in predicting participation in work-based learning experiences (WBLE) for high schoolers with ASD. The analysis incorporated variables to control for gender, minority status, household income, student characteristics (nonverbal IQ and adaptive functioning) and community type (rural, suburban, urban). Further, applying the lens of Bronfenbrenner’s theory of ecological development, the current investigation used hierarchical linear modeling (HLM) (Bryk & Raudenbush, 2002) to examine the impact of variables from the exosystem and macrosystem on predictors of WBLE. There is a need for research on this topic to contribute to the development of appropriately targeted interventions for adolescents with ASD. We will all benefit from improved engagement of individuals with ASD in post-secondary education and competitive employment. Implications for practice include improving transition practices for high school students with ASD to improve post-secondary outcomes.
CHAPTER 2: REVIEW OF THE LITERATURE

Ecological Theory

In his *Ecology of Human Development* (1979), Urie Bronfenbrenner posited an ecological framework impacting human development. Rather than an emphasis on the “properties of the person”, the Ecological Theory of Development emphasized the “environment in which he/she is found” (p.6). Bronfenbrenner’s concentric circles have become familiar. The innermost circle, the microsystem, includes activities, structures, and people who are in direct contact with the developing person. The mesosystem includes interconnections between the various microsystems (home-school interactions or teacher-rehabilitation counselor communications). The exosystem includes linkages among settings that do not ordinarily involve the developing person directly. These can include system-level factors and educational resources and policies. The macrosystem extends to overarching attitudes and ideologies of the person’s culture, regional subculture or other social structure (Bronfenbrenner, 1979).

Specific aspects and Hypotheses of Bronfenbrenner’s (1979) theory have direct applications to transition planning and postschool outcomes for students with disabilities. Bronfenbrenner defines significant events in human development as “ecological transitions”. These are shifts in roles or settings, such as graduation from high school. These ecological transitions are times that are facilitated or impeded heavily by environmental factors, support and resources (Bronfenbrenner, 1979). Youth at these transition times are especially vulnerable to the impact of ecological variables. Bronfenbrenner’s Hypothesis 49 reads, “The direction and
degree of psychological growth are governed by the extent to which opportunities to enter settings conducive to development in various domains are open or closed to the developing person” (p. 288). Bronfenbrenner’s Hypothesis 50 elaborates, “The developmental effect of a transition from one primary setting to another is a function of the match between the developmental trajectory generated in the old setting and the balance between challenge and support presented by both the new setting and its interconnections with the old” (p. 261). As he stated in the preface, with reference to the impact of exo- and macrosystem variables on transition, “Public policy has the ability to affect the well-being and development of human beings by determining the conditions of their lives”. He continued, “Concern with public policy on the part of researchers is essential for progress in the study of human development” (p. 6). Bronfenbrenner suggested that an indication of a difference between the ecological opportunities for development among macrosystems can be useful as a “sign on the door” for further study (p. 260).

Bronfenbrenner’s Ecological Theory is especially relevant for work-based learning experience, since participation in work-based learning experiences is in part dependent on the ecology of students with ASD. A student’s individual and family characteristics may be found to predict this activity, but the opportunities for WBLE must be facilitated by adults, and available in the community. Dente & Coles (2012) proposed an ecological systems model of intervention for all post-secondary transition activities for individuals with ASD with an understanding of the micro-, meso- and macro- levels of intervention. They suggested that social workers, given their training, were ideally suited to facilitating such transitions.

Applications of ecological theory are already made to transition activities in general. In their position paper for the Division of Career Development and Transition (DCDT), Trainor,
Lindstrom, Simon-Burroughs & Sorrells (2008) discussed applications of Ecological Theory across all levels for more successful transition planning. They posited that an ecological framework is essential for improved transition planning and policy, especially for students of low socioeconomic status and from culturally diverse groups. They argued that existing systems are not yet working for many students with disabilities, and ecological research is needed to “uncover the complexity of real-life interactions and avoid deficit-notions of students with disabilities” (p. 63). Haber, Mazzotti, Mustian, Rowe, Bartholomew, Test, & Fowler (2016) proposed applying Ecological Theory as a lens to focus more attention on means of enhancing connections between stakeholders in different contexts or mesosystems by practitioners and researchers. Gil-Kashiwabara, Hogansen, Geenen, Powers & Powers (2007) claimed ecological systems theory as a relevant framework for discussing transition planning for students with disabilities because it is sensitive to contextual factors including social and cultural factors. They find these ecological factors can be helpful in explaining transition experiences and barriers to successful transition for students with disabilities, especially for those from traditionally marginalized groups.

**Evidence-based predictors of post-secondary education and employment**

To determine what factors in high school promote better post-school outcomes for students with disabilities, The National Secondary Transition Technical Assistance Center (NSTTAC) researchers synthesized the high-quality research in secondary transition published since 1985 to make recommendations for improving transition programming (Test, Mazzotti, et al., 2009). As a result, 17 predictors of post-school success were identified (Test, Bartholomew & Bethune, 2015). These 17 predictors included: career awareness, community experiences, high school diploma status, inclusion in general education, independent living, interagency
collaboration, occupational courses, paid employment/work experience, parent expectations, parental involvement, program of study, self-determination, social skills, student support, transition program, vocational education, and work study. Since the predictors were identified, research has been conducted that confirms the validity of these predictors (Haber, Mazzotti, Mustian, Rowe, Bartholomew, Test & Fowler, 2016). As many studies have noted, however, the predictive pathways seem to differ by disability subgroup, and may be impacted by gender, race and ethnicity, socioeconomic status, other student characteristics, and community-level factors (Daviso et al, 2016). Table 1 presents a more detailed exploration of the predictors that are relevant to this study.

Table 1

Selected Evidence-based Predictors of Post-Secondary Education and Employment

<table>
<thead>
<tr>
<th>Predictor (Test, Mazzotti et al, 2009)</th>
<th>Operational definition (Rowe et al, 2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Career awareness*</td>
<td>Learning about opportunities, education, and skills needed in various occupational pathways to choose a career that matches one’s strengths and interests</td>
</tr>
<tr>
<td>Community experiences*</td>
<td>Activities occurring outside the school setting, supported with in-class instruction, where students apply academic, social, and/or general work behaviors and skills</td>
</tr>
<tr>
<td>Vocational education*</td>
<td>Courses that prepare students for a specific job or career at various levels from trade or craft positions to technical, business, or professional careers</td>
</tr>
<tr>
<td>Work study*</td>
<td>Work skills instruction and experiences designed to develop students’ work attitudes and general work behaviors by providing students with mutually supportive and integrated academic and vocational instruction</td>
</tr>
<tr>
<td>Occupational courses*</td>
<td>Courses that support career awareness, allow or enable students to explore various career pathways, develop occupational specific skills through instruction and experiences focused on their desired employment goals</td>
</tr>
<tr>
<td>Paid employment/work experience*</td>
<td>Any activity that places the student in an authentic workplace. Could include work sampling, job shadowing, internships, apprenticeships, and paid employment. Activities always feature competitive pay (e.g., minimum wage) paid directly to the student by the employer</td>
</tr>
</tbody>
</table>
| Self-determination                     | The ability to make choices, solve problems, set goals, evaluate options, take initiative to reach one’s goals, and accept consequences of one’s
Social skills

Behaviors and attitudes that facilitate cooperation and communication (e.g., social conventions, social problem-solving when engaged in a social interaction, body language, speaking, listening, responding, verbal and written communication)

Diploma status

Exit exams are standardized state tests, assessing single content area or multiple skill areas, with specified levels of proficiency that students must pass to obtain a high school diploma. Diploma status is achieved by completing the requirements of the state awarding the diploma including the completion of necessary core curriculum credits.

*Work-Based Learning Experiences (WBLE)

Work-based learning experiences (WBLE). Six of the seventeen predictors (career awareness, occupational courses, paid employment/work experience, vocational education, work study, and community experience) fall under the category of Work-Based Learning Experiences, or WBLE (Luecking, 2009; Mazzotti, Rowe, Sinclair, Poppen, Woods & Shearer, 2016; Roux et al, 2015; Test, Mazzotti et al, 2009). Work-Based Learning Experiences (WBLE) include Career Exploration, Job Shadowing, Work Sampling, Internships, Service Learning, Mentoring, Apprenticeships, and Paid Employment (Luecking, 2009). Work-Based Learning Experiences, as discussed extensively by Luecking (2009), have become a clear focus of intervention for students with disabilities to facilitate better transition outcomes in both education and employment. WBLE in high school have been established as key predictors of positive post-secondary educational and vocational outcomes for students with disabilities (NSTTAC, 2013). Bronfenbrenner (1979) provides theoretical support for the value of WBLE in his Hypothesis 29: “development is enhanced as a direct function of the number of structurally different settings in which the developing person participates with others in a variety of activities, particularly when these others are more mature and experienced” (p. 212). As Wehman, Smith & Schall (2009) explain, Work-Based Learning Experiences provide skill-building in relationships, the way tasks
are completed, and the way people interact. The Project SEARCH High School program (Wehman et al, 2012) puts theory into practice and utilizes WBLE to dramatically increase post-school engagement for students with disabilities.

WBLE may be of particular importance for high schoolers with autism spectrum disorder. Evidence from research indicates that for students with ASD, Work-Based Learning Experience is an exceptionally powerful predictor of post-secondary success. For example, Roux et al (2015) found that approximately 90% of youth with autism who had a job during high school also had a job during their early 20’s, compared to only 40% of those who did not work during high school. Wehman, Schall, McDonough et al (2012) reported an 88% employment rate for the youth with ASD on completion of their Project SEARCH work-based learning program versus 0% for an equal randomized control group who attended their high school during the same period. Wei et al (2014) found that encouraging high schoolers with ASD to take Career and Technical Education (CTE) classes and engage in job-shadowing and work-related behavior and skills training could be instrumental in helping youth with ASD to reach their post-secondary goals.

Individuals with ASD have difficulties predominantly in the social, communication, and functional domains. These domains impact all aspects of post-secondary engagement. It is interesting to note that post-secondary outcomes for individuals with higher-functioning autism are not as good as might be expected (Cameto, Levine & Wagner, 2004; Howlin, Goode, Hutton & Rutter, 2004). Even those with post-secondary educational experiences commonly face employment difficulties, and self-reports indicate that vocational success relies not on the completion of job duties but the person’s ability to handle the social aspects of employment (Wehman, et al, 2009). As Wehman, et al (2014) explain, work-based learning experiences
allow these students to practice and build skills in the very domains they need. Further, due to the trouble individuals with ASD can have with generalizing skills from one environment to another, it is especially important for them to learn and practice these skills in the same environments that require them (Wehman et al, 2009).

Do high school students with ASD currently participate in the learning opportunities that WBLE provides? During secondary school, only half (50.2%) of youth with autism were reported to have had any type of school-sponsored on- or off-campus work experience (Lee & Carter, 2012), and only 14.5% had held a paid after-school or summer job at any time during the previous year. Access to job shadowing, job skills training, job placement support, job coaching, and internship or apprenticeship experiences during high school are also consistently low (Lee & Carter, 2012). Test et al (2014) stress that, given poor outcomes for young adults with ASD, it is critical that students learn relevant career-related skills and knowledge while still in high school, and have school-based activities that promote career awareness. They reiterate that vocational courses, connecting to early work experiences, and involvement in work study have been identified as predictors of successful outcomes in studies that include students with autism (Test, Mazzotti, et al, 2009).

Overall, WBLE provides opportunities to learn and practice functional skills that may be especially important for students with ASD, and participation in WBLE has demonstrated significance as a predictor of improved post-secondary outcomes for students with ASD. This study investigated student, school, and community predictors of participation in WBLE for students with ASD. It examined what student, school and community characteristics increase the likelihood that students with ASD have these crucial opportunities to learn. Because the correlational research has identified the significance of WBLE (6 out of 17, or 35% of the
 predictors are WBLE) to post-school engagement in education and employment, and due to their special significance for individuals with ASD, work-based learning experiences served as the outcome variable for this proposed study.

**High school diploma status.** Another of the seventeen NSTTAC (2013) predictors of post-secondary success is high school diploma status. Students with disabilities who earn a “regular” high school diploma are more likely to participate in post-secondary education and employment (Mazotti, Rowe, Sinclair, Poppen, Woods, & Shearer, 2015). Rowe at al (2014) defined the two criteria for a regular or standard high school diploma: first, it involves standardized state tests, assessing single content areas with specified levels of proficiency that students must pass to obtain a high school diploma; second, diploma status is achieved by completing necessary core curriculum credits. Its alternative would be a course of study that culminated in a certificate granted to students who follow a modified curriculum that does not fulfill the state requirements for the standard or regular diploma.

Examining the literature reveals that much is left unknown about the impact of diploma status on post-secondary outcomes. Two studies are repeatedly cited as evidence for this predictor. The first is Heal & Rusch (1994), who used the NTLS study data to examine predictors of independent living for special education high school students. They found that a variable for high school diploma status improved (raised the R-squared value) the predictive model by 2.3% percent. This study examined employment only and did not include a disability category of students with ASD. Test et al (2009) cited the Heal & Rusch (1994) study as their evidence for including this predictor in their very influential list and explained that the exit exam requirements/high school diploma status predictor had a potential level of evidence for employment based with a small effect size of .06 (Test et al, 2009).
The second study cited as evidence is Wagner, Newman, & Javitz (2014), who used the NTLS-2 data to examine the influence of family socioeconomic status on post high school outcomes in education and employment. They found that students earning a regular high school diploma significantly predicted the employment outcome and college attendance. This study included students with autism and effects were found after controlling for demographic variables including gender, ethnicity and household income. They concluded that earning a high school diploma was the only mediator that significantly affected both postsecondary education and employment outcomes (Wagner, Newman, & Javitz, 2014).

It is clear that more research is needed into the role of high school diploma status on post school outcomes specifically for students with ASD. More research is also needed into the impact of diploma status on participation in work-based learning for high schoolers with ASD. The Wagner et al (2014) study indicated that regular diploma candidates were more likely to be enrolled in career and technical education (CTE) courses, which are included in the category of work-based learning experiences. Improvements in K-12 academic success due to early intervention are giving students with ASD increasing access to standard diploma courses of study. However, for students with ASD, the relationship between standard diploma status and meaningful improvements in opportunities to learn real world, work-based skills (WBLE) that lead to better post school outcomes (WBLE) needed to be examined.

**Self-determination.** NSTTAC (2013) identified self-determination as another of the 17 in-school predictors of post-secondary success for students with disabilities (Test, Mazzotti et al., 2009). Since the early 1990s, attention has been focused on the importance of self-determination in the education of students with disabilities (Wehmeyer et al, 2003; Shogren, Wehmeyer, Palmer, Soukup et al, 2008). As Wehmeyer et al (2003) explained, the term “self-determination”
has its roots in determinism. Self-determined behavior refers to human behavior that is caused by the person as opposed to being caused by someone or something else. People who are self-determined are people who make or cause things to happen in their own lives (Wehmeyer, Shogren, Zager, Smith, & Simpson, 2010). Self-determination emphasizes the ability of individuals to exert control over their lives through informed choices and decision making. Wehmeyer (2003) has identified four components, or essential characteristics, of self-determination: (a) autonomy, (b) self-regulation, (c) psychological empowerment, and (d) self-realization (Shogren et al., 2008; Wehmeyer & Palmer, 2003). Self-determination also implies the ability to identify when supports are needed and who could provide them (Field & Hoffman 2007).

Components of self-determination touch on every aspect of transition and can be a core competence. Dissemination of research indicating the importance of this construct has impacted federal policy. For youth with disabilities receiving special education and related services, regulations for the Individuals with Disabilities Education Improvement Act (IDEIA) of 2004 included emphasis on self-determination by defining transition services to be based on the child’s needs, strengths, preferences and interests (Berry et al, 2012).

Research findings are impressive and convincing as to the impact of self-determination on post-school outcomes for students with disabilities (Martin, Van Dycke, D’Ottavio, & Nickerson, 2007; Thoma, Williams, & Davis, 2005). Examples include Berry, Ward & Caplan (2012) whose study surveyed high school leavers with intellectual disability or learning disabilities 1- and 3-years after they left school to determine what they were doing in major life areas (employment, independent living or community integration). Students were divided into two groups based on self-determination scores collected during their final year in high school.
Comparisons between these groups indicate that students who were more self-determined fared better across multiple life categories, including employment and access to healthcare and other benefits, financial independence, and independent living. Specifically, results indicated that higher levels of empowerment and autonomy were associated with a higher likelihood of participation in 2-year and 4-year colleges.

The research holds more evidence as well. In another study, Wehmeyer & Palmer (2003) found that youth with disabilities who acquired self-determination skills were more often productively engaged after high school, received higher hourly wages, were more likely to live independently, to have a job with a range of benefits, and exhibited more financial independence than those youth who did not demonstrate self-determination. McDonnall (2010) found similar relationships between self-determination and employment for youth with visual impairments. Morningstar, Frey, Noonan, Ng, Deane et al (2010) examined the significance of self-determination for students with disabilities enrolled in 4-year universities and found that the sampled postsecondary students with disabilities exhibited high levels of psychological empowerment, internal locus of control, and hope. Taken together, these studies make a strong case for the significance of self-determination as a predictor of post-secondary success for students with disabilities.

Characteristics of some individuals with ASD may make the skills involved in being self-determined an especial challenge. Yet self-determination also involves a set of skills that are critical and particularly relevant for students with autism (Wehman et al, 2009, Test et al, 2014). Studies involving transition-age youth with ASD suggest that these students often have limited skills and opportunities to engage in these self-determined behaviors that may be critical to post-secondary success (Test et al, 2014). Overall, youth with ASD reported lower rates of self-
determination than other youth with disabilities (Wehman et al, 2014, Test et al, 2015). These skills include the ability to make choices, select goals, and develop a plan to achieve those goals. Without being able to choose a plan and act for the benefit of their own future, students with autism may lack the required investment necessary to follow their own transition plans (Field & Hoffman, 2007). Participation in IEP transition planning as a part of the larger variable of self-determination has been associated with improved outcomes in postsecondary education and work participation after high school (Chiang, Cheung, Hickson, Xiang, & Tsai, 2012). Unfortunately, data indicate that youth with ASD participate in their own transition planning meetings at a lower rate than youth in any other disability category included in the NLTS-2 (Cameto et al, 2004; Shogren & Plotner, 2012, Test et al, 2014).

Self-determination requires social communication and self-awareness, and characteristics of persons with ASD may impact the development of this skill set. However, research clearly shows that students with ASD can, with educational supports and accommodations, acquire such skills (Wehmeyer et al, 2010). This acquisition may require practice early and often. This study examined whether the more self-determined students with ASD participated more often in work-based learning experiences. Does higher self-determination grant increased access to these crucial opportunities to learn? This study investigated the significance of self-determination as a predictor of WBLE.

Social skills. Social skills have also been found to predict post-school success for students with disabilities (Test, Mazzotti et al, 2009; Mazzotti, Rowe, Sinclair, Poppen, Woods & Shearer, 2016). NSTTAC (2013) found that social skills were correlated with improved education, employment, and independent living outcomes for students with disabilities, and they assessed social skills at a Promising level of evidence as a predictor of post-school success.
Many studies confirm the importance of social skills to students’ success after high school. Benz, Yovanoff & Doren (1997) reported findings that students with high social skills were two to three times more likely to be competitively employed one year out of high school. Macdonall’s (2010) results indicate that social skills are a chief predictor of employment after high school for students with visual impairments. Carter, Austin & Trainor (2012) found that youth who had strong communication skills had three to four times the odds of being employed after high school than youth who had a lot of trouble communicating, and that students whose teachers rated them highly on classroom social skills were two to three times more likely to be employed. Further, Roessler, Brolin, & Johnson (1990) reported that employment success and overall quality of life of students with disabilities was positively related to their personal and social skills. Halpern, Yovanoff, Doren & Benz (1995) found that a high rating in the skill “getting along with people” was a significant predictor of participation in post-secondary education. Gothberg, Peterson, Peak & Sedaghat (2015) identified social engagement as a predictor of post-secondary academic and career readiness for students with disabilities. Finally, Allen, Robbins & Sawyer (2010) found that social skills increased college success for students with and without disabilities.

For students with ASD, social skills are a critically important predictor of post-secondary success. Given the typical social communication deficits associated with autism spectrum disorder, this is perhaps understandable. Many studies support the importance of social skills for success for students with ASD. First, Roux et al (2015) found that nearly 50% of young adults with autism with the highest level of conversation skills reported ever attending postsecondary education, whereas only 12% of those with the lowest level of conversation skills did so. In addition, Anderson, Liang, & Lord (2014) compared groups of students with autism, separating
those with the best post-secondary success into the Very Positive Outcome (VPO) group. These VPO students shared IQ (verbal and nonverbal) and academic achievement scores in the average to above average range with the students in the “cognitively able” group who achieved lower rates of post-secondary success. The VPO students were distinguished by fewer social deficits; the effect sizes for social deficits were very large, accounting for between 40% and 51% of the variance. In another study, Wei et al (2014) found that fewer limitations in conversation skills predicted post-secondary education for those with ASD. Chiang, Cheung, Li & Tsai (2013) also found that the odds of participation in employment were 5.40 times larger if a high school leaver with autism had high social skills compared with low social skills, holding other variables constant. Chiang, Cheung, Hickson, Xiang & Tsai (2012) found that the differences between the students who participated in postsecondary education and those who did not depended in part on verbal communication skills. Griffin, Taylor, Urbano & Hodapp (2013) found that the specific sub-population of students with ASD with lower communication skills were at much higher risk of not participating in any transition planning. Further, acquisition of social skills requires opportunities for practice for everyone, especially for those with ASD. Shattuck, Ormond, Wagner & Cooper (2011) found that among students with disabilities, adolescents with ASD were significantly more likely never to see friends outside of school, never to get called by friends, and never to be invited to social activities. Their results indicated impairments in conversational ability and social communication were correlates of limited social participation.

How do social skills impact participation in work-based learning experiences in high school for students with ASD? It is clear that students with ASD struggle due to the connection between social skills and workplace success. In a telling study, Wehman et al (2009) discovered that even those adults with ASD with post-secondary education commonly faced employment
difficulties, and self-reports indicated that vocational success relied not on the completion of job duties but on the person’s ability to handle the social aspects of employment. This study investigated whether a student’s existing social skills impacted their opportunities to learn and practice the social aspects of work in work-based learning experiences.

**Student characteristics impacting post-secondary transition**

**Demographic variables.** In a recent paper on transition research, Haber, Mazzotti, Mustian, Rowe, Bartholomew, Test & Fowler (2016) emphasized the need to examine the role of demographic variables on predictors of post-school outcomes, as differences in outcomes may vary as a function of population subgroup. They stressed that demographic variables are crucial to examine, as prediction may vary by gender, ethnicity, socioeconomic status, or disability. Lacking knowledge of whether such influence exists, researchers or practitioners might apply interventions that are associated with outcomes in general, but not for the specific population of interest. The following sections address the demographic variables relevant to this study.

**Gender.** Studies show significant differences between the postschool engagement rates of young men and women with disabilities (Benz, Doren, & Yovanoff, 1998; Doren & Benz, 2001; Lindstrom, Benz, & Doren, 2004). Young women with disabilities often achieve poor post-school employment outcomes and experience limited career opportunities (Lindstrom et al, 2004; Doren & Benz, 2001). Research suggests that young women with disabilities are less likely than young men to be engaged productively in postschool employment and education activities (Benz et al 1998). Haber et al (2016) found in their meta-analysis that gender consistently emerged in transition research as affecting both postschool outcomes and the types of secondary programs and transition services that students with disabilities received. Baer,
Daviso, McMahan Queen, and Flexer (2011) also found that secondary programs and transition services tended to vary according to gender. Newman et al (2011) discovered that male students with disabilities were more likely than females to work full time or to work in skilled labor positions. Daviso et al (2016) found that gender negatively moderated the impact of the employment predictors for the students in their study. Wagner, Newman, & Javitz (2014) found that gender and socioeconomic status had statistically significant effects on post school outcomes for students with disabilities. Lindstrom, Benz, & Doren (2004) found that for young women with disabilities, WBLE may be especially important in facilitating post-secondary success. Female participants in their study who had a solid foundation of employment experiences coupled with opportunities to explore and refine career goals were more likely to enter post-school employment that matched their most ambitious goals.

**Gender and ASD**. Discussion of gender includes particular complexities in relation to autism spectrum disorder. Halladay, Bishop, Constantino, Daniels, Koenig, Palmer, & Szatmari (2015) found that despite variability in ascertainment that could be as great as 4:1, a sex difference in ASD prevalence remains with a magnitude of at least 2:1 or 3:1. In some studies of individuals with ASD, such as one conducted by Anderson et al (2014), the participants are predominantly male (92%). In addition, themes emerge in the literature describing possible differences between males and females with ASD (Halladay et al 2015). Females with a clinical diagnosis of ASD tend to have lower IQs (Frazier, Georgiades, Bishop & Hardan, 2014). However, females with an ASD diagnosis and average IQs show increased functional social behavior compared to males with ASD. Head, McGillivray & Stokes (2014) found that the females with ASD in their study had more developed social skills than males with ASD. Females may be underdiagnosed because of differing symptom presentation (Halladay et al, 2015),
whereas males with ASD may show more of the behaviors that lead to a clinical evaluation, such as hyperactivity and aggression (Frazier et al, 2014).

Post school outcomes may also differ for males and females with ASD. Taylor and Mailick (2014) conducted a longitudinal study that indicated a decline in the level of independence and engagement in educational and vocational activities after high school, particularly for women. The decline over time in educational/vocational engagement was fifteen times greater for women than for men in their study. This study suggests that females with ASD are able to obtain, but not maintain, employment or post-secondary education. Reasons may include gender expectations by employers, other staff, and the male bias in the type of skills offered in job training (Halladay et al, 2015). Migliore, Timmons, Butterworth & Lugas (2012) found that being male increased the odds of employment and increased the predicted hourly wage. In contrast, Chiang, Cheung, Li & Tsai (2013) found that the odds of participation in employment were .34 times smaller for male high school leavers with autism than female high school leavers with autism, holding all other variables constant; but in their study, female high school leavers with autism were more likely to participate in employment than male high school leavers with autism. Further complicating the findings, Chiang et al (2012) found that being female did not significantly impact the odds of participation in post-secondary education for students with ASD. Given that there are only a limited number of studies on gender differences in employment and educational outcomes for individuals with autism, there is a need for more studies to investigate this issue (Chiang et al, 2013). For individuals with ASD, more research is clearly necessary to help target interventions and supports for improving post-school outcomes that may differ in need and effectiveness according to gender. This study investigated whether gender impacts participation in the crucial opportunities to learn that WBLE provides for
individuals with ASD.

**Minority status.** For students with and without disabilities, disparities in employment and education exist for students belonging to racial and ethnic minority groups. According to the Bureau of Labor Statistics (2016), African American youth not enrolled in school had an unemployment rate of 21.6 percent in October 2015, higher than the rates for their White (9.5 percent), Asian (6.5 percent), and Hispanic (12.8 percent) counterparts. More white young adults ever attended postsecondary education during their early 20’s (41%) compared to African American (23%) and Hispanic young adults (29%) (Roux et al, 2015). In a meta-analysis of studies on students with disabilities, Haber et al (2016) found that minority status consistently emerged in transition research as affecting both postschool outcomes and the types of secondary programs and transition services that students received. Baer, Daviso, McMahan-Queen & Flexer (2011) also found that secondary programs and transition services tended to vary according to minority status. Losen & Orfield (2002) found that minority students labeled as learning disabled, intellectually disabled, and/or emotionally disturbed were more likely to be served in non-mainstream classrooms than were their white peers with disabilities. NLTS-2 research showed that African American status was correlated with less integration in general education classes and with worse employment outcomes after exiting high school (Losen & Orfield, 2002). Other studies have yielded similar findings (Baer et al, 2011; Daviso et al, 2016). Trainor et al (2008) noted the importance of conducting research that includes students with disabilities from cultural and linguistically diverse backgrounds. To date, NSTTAC has included disability and ethnicity in reporting its findings when available; however, it is necessary for research to disaggregate and investigate what works for students from various disability groups and diverse backgrounds (Mazzotti et al, 2013).
For students with ASD, minority status has also been found to be significant factor in outcomes across studies. Correlates of employment for students with ASD have included non-Hispanic/non-African American race/ethnicity status (Shattuck et al, 2012; Taylor & Seltzer, 2011). For high school leavers with autism, the adjusted odds of not receiving any services were 3.31 times higher for African American youths compared with white youths (Shattuck et al, 2011). Migliore et al (2012) found that for persons with ASD, being white increased the odds of participation in post-secondary education and predicted higher hourly wages for those who were employed. Griffin, Taylor, Urbano & Hodapp (2013) investigated involvement in transition planning meetings among high school students with autism spectrum disorder, and reported that African American students were much less likely to participate in their own transition meetings. Halterman and Montes (2011) found that among parents of children aged 0-17 with ASD, being African American was associated with lower reporting of family-centered care for their child. These findings indicate that minority status must be included in investigations of post-school predictors and transition practices for highschoolers with ASD.

**Household income.** For students with and without disabilities, disparities exist in post-secondary outcomes for students from families with lower household income. Roux et al (2015) found that among students with disabilities, nearly 60% of those from upper income households (>75,000) attended postsecondary education compared to 19% of those from the lowest income households (>25,000). Wagner et al (2014) found that socioeconomic status had a statistically significant effect on post school outcomes in both education and employment for students with disabilities. Benz et al (1998) found that young women with disabilities who came from a family with a low annual household income were less likely to be engaged in productive work and education activities after high school.
There is much evidence to suggest that household income impacts post school outcomes for individuals with ASD. Wei, Wagner, Hudson, & Shattuck (2014) found disproportionalities along transition pathways for persons with ASD determined by family household income. They stressed that especially with the increase in income inequality and poverty rates in the United States since the 1970’s, future research and policies should address new ways to promote participation in post-secondary education and employment by youth from lower income households. Several studies have found that higher odds of employment and post-secondary education for youth with ASD are associated with higher family income (Shattuck et al, 2012; Taylor & Seltzer, 2011; Roux, Shattuck, Cooper, Anderson, Wagner & Narendorf, 2013) and those from higher income households are significantly more likely to enroll in post-secondary education (Wei et al, 2014). Taylor & Mailick (2014) found that students with ASD whose families had low incomes were more likely to have no educational or vocational activities in the years after high school exit. Taylor & Seltzer (2010) also found that individuals with ASD whose families had lower incomes were more negatively impacted by transition out of high school relative to those with higher family incomes. Shattuck, Orsmond, Wagner, & Cooper (2011) found that participation in social activities among adolescents with an autism spectrum disorder was significantly more limited if they came from low income families. Chiang, Cheung, Hickson, Xiang & Tsai (2012) examined predictive factors of participation in postsecondary education for high school leavers with autism and found that annual household income was a significant predictor. Chiang, Cheung, Li, & Tsai (2013) examined predictors of post-secondary employment for those with ASD and found that annual household income had the greatest impact on the odds of participation in employment. Shattuck, Wagner, Narendorf, Sterzing & Hensley (2011) examined post– high school service use among young adults with an autism
spectrum disorder and found that the adjusted odds of not receiving any services were 5.96 times higher for those with incomes of $25,000 or less, compared with those with incomes greater than $75,000. In addition, the odds of having no case management was 5.88 times higher for African American youth with ASD from low socio-economic backgrounds.

**Other student characteristics impacting transition**

**Functional/adaptive skills.** Extensive research supports the significance of non-academic, non-cognitive skills in post-secondary success for students with and without disabilities. To fully prepare for postsecondary success, all students need skills that are nonacademic in nature (West et al., 2014). In fact, nonacademic skills appear to be more highly correlated with successful post-secondary academic and employment outcomes than cognitive skills (Heckman, Stixrud, & Urzua, 2006). For students with autism, the skills required to achieve academic success in secondary settings do not necessarily lead to post-secondary success in education and employment. Currently, individuals with ASD have the highest grade-point average and lowest percentage of students who failed one or more graded courses of any disability category (Newman, Wagner, Juang, et al., 2011). As a group, individuals with ASD had a reported grade point average of 3.0, whereas students with all other disabilities had grade point averages ranging from 2.0 to 2.9. Furthermore, only 27.0% of students with ASD reported failing one or more graded courses, whereas the percentage of reported failure for all other disabilities ranged from 40.8% to 77.1% (Newman et al, 2011). These academic successes in high school did not predict post-secondary success for students with ASD.

For students with ASD, predictors of post-secondary employment have included greater functional independence and fewer aspects of functioning limited by disability (Shattuck et al, 2012; Taylor & Seltzer, 2011). Roux et al (2013) found that predictors of post-secondary
employment included higher functional skills and minimal conversational impairments. Predictors of post-secondary education for youth with ASD also include fewer limitations in functional areas (Wei et al, 2014, Chiang, Cheung, Hickson, Xiang, & Tsai, 2012; Shattuck et al, 2012; Taylor & Seltzer, 2011). Similar findings by Shattuck, Narendorf et al (2012) indicate that for students with ASD, higher functional ability was associated with higher adjusted odds of participation in postsecondary employment and education. Anderson, Liang, & Lord (2014) evaluated groups of students with autism, separating those with the best post-secondary success into the Very Positive Outcome (VPO) group. These VPO students shared IQ (verbal and nonverbal) and academic achievement scores in the average to above average range with the students in the “cognitively able” group who achieved lower rates of post-secondary success. The VPO students were distinguished by greater adaptive behavior skills; the effect sizes for adaptive skills were very large. Howlin, Goode, Hutton, & Rutter (2004) discovered that within the normal IQ range, increased verbal or performance IQ proved not to be consistent prognostic indicators of post-secondary success. Overall, findings indicate that IQ above the intellectual disability level is necessary, but not sufficient, for very positive post-secondary outcomes for youth with ASD (Anderson et al, 2014; Howlin et al., 2004). Studies demonstrate that, for students with ASD, many of the skills that determine success after high school are in the adaptive and functional domains. This study investigated whether adaptive skills impact predictors of participation in WBLE for students with ASD.

Intelligence. Intelligence as measured by standardized assessments has mixed reviews as a correlate of post-secondary success for students with disabilities, and particularly for those with ASD. For students with ASD, IQ creates differences in post-secondary outcomes, though results of studies are complex. Anderson, Liang, and Lord (2014) conclude that studies of
individuals with ASD often use IQ as a measure of later outcome, rather than as a predictor. Anderson, et al (2014) and Howlin, et al (2004) found that, across studies, having an IQ below 70 in adults with autism is strongly associated with limited independence. These researchers also maintain, however, that a higher IQ in adulthood is not sufficient for independence or the remediation of marked social deficits in ASD. Holwerda, Klink, Groothoff & Brouwer (2012) concluded that IQ can be an important predictor for employment outcomes, in that among individuals with ASD with an IQ of less than 50, few are capable of employment, while outcomes for those with IQs between 50 and 70 are more variable, and for those with an IQ of 70 or more, outcomes are more promising but also difficult to predict. Eaves & Ho (2008) found that higher IQ at age 11 predicted good to fair outcomes in young adulthood, but only in combination with autism symptoms. Billstedt, Gillberg & Gillberg (2011) reported an association between having a higher IQ and having a daily occupation among individuals with ASD. In another study, Howlin et al (2004) found that individuals with a non-verbal IQ of at least 70 had significantly better post-secondary outcomes than those with an IQ below that. However, they also found that within the normal IQ range, post-secondary outcomes were highly variable, and neither verbal nor nonverbal IQ were consistent prognostic indicators. As Wehman, Schall, Carr, Targett, West & Cifu (2014) point out, even college educated students with ASD, whom we assume to have at least average IQs, struggle to gain and maintain employment commensurate with their abilities and training.

Adding complexity to the relationship between IQ and post-secondary outcomes, in persons with ASD, having an IQ in the intellectual disability range can account for differences in post-secondary outcomes and services. Chiang et al (2012) and Chiang et al (2013) found that the absence of intellectual disability was a predictor of post-secondary employment and
education for those with ASD. Similarly, Shattuck et al. (2012) and Taylor & Seltzer (2011) reported the absence of intellectual disability to be a predictor of employment for individuals with ASD. Demonstrating the complexity of findings, Taylor & Seltzer (2011) also found that young adults with ASD without an intellectual disability were three times more likely to have no daytime activities compared to adults with ASD and ID. This study investigated whether IQ predicts participation in WBLE for students with ASD.

**Ecological variables**

**Community type: urban, suburban, rural.** There is substantial research indicating that living in urban, suburban and rural communities significantly impacts post-secondary outcomes in employment and education for students without disabilities. Research is more scarce on the impact of community type on students with disabilities (Pennington, Horn, & Berrong, 2009). Pennington et al. (2009) found that socioeconomic status, school funding, population of schools, teacher salaries, and school resources differ between rural and urban school districts, and these factors impact postsecondary outcomes for students with disabilities.

The majority of studies seem to find that rural location is a disadvantage in post-secondary transitions. Ulrich (2011) found that pockets of rural areas may be characterized by multi-generational patterns of extremely low educational attainment and low family income that persist and predict similarly low outcomes for students currently enrolled in those communities. Fardig, Algozzine, Schwartz, Hensel, & Westling (1985) found that rural high school graduates with even “mild” disabilities were at risk of receiving no training after high school and lower employment rates than would be expected from suburban and urban peers. Karpinski, Neubert, & Graham (1992) found that rural high school leavers with disabilities were all employed in minimum wage jobs, some with benefits. They found that these former students had participated
in a limited range of educational and vocational experiences during high school, both in terms of diploma tracks and vocational education programs. None of the students were pursuing post-secondary education, and experienced lack of opportunity and transportation barriers. Cornwell (2014) found that the geographic classification as rural was strongly related to the postsecondary outcomes for students with disabilities in Kentucky. Those from urban classification areas were more likely to enroll in postsecondary training than students from rural and suburban classification areas. Pierson & Hanson (2015) found that, regardless of their high school levels of achievement in math and reading, rural Oregon students were less likely than nonrural students to enroll in postsecondary education after high school graduation, and to persist to the second year of college. In contrast, Stanley, Comello, Edwards, & Marquart (2007) found that rurality was not significantly related to educational achievement, but rather the characteristics of individuals (family income and parental education) living within those communities were. Further, Pennington, Horn & Berrong (2009) found that differences in service provision for students with disabilities existed between urban and rural districts in Kentucky, but that several rural districts were able to overcome barriers to educational and service provision and produce post school outcomes comparable to urban and suburban districts.

Some studies indicate a disadvantage for students in urban settings as well. Roscigno, Tomaskovic-Devey, & Crowley (2006) used data from the National Educational Longitudinal Survey and the Common Core of Data and discovered inner city and rural disadvantages in both family and school resources. They found that these resource inequalities translated into important deficits in educational attainment and achievement for students. Rutkowski, Daston, Van Kuiken, & Riehle (2006) found that students who came from urban areas were at risk due to few employment opportunities, and suggested there was the need for schools to partner with city
employers such as hospitals and universities to provide meaningful work experiences and job leads to facilitate successful post-school transition. The U.S. Department of Education (2007) found that students in urban settings were more likely to be taught by the most inexperienced teachers and attend schools with the lowest per-pupil expenditures. In contrast, Fabian (2007) found that for some students in their school-to-work program sites, urban site locations in different U.S. East Coast cities predicted a significant part of the variation in post-secondary employment. Students in their urban sites were much more likely to have prior paid work experience and were 35% more likely to get a good paying job out of high school. Baer et al (2003) investigated variables that best predicted full-time postsecondary education for students with disabilities (including two individuals with autism). They found participation in regular academics and attendance at a suburban school were the best predictors.

Studies focusing on the impact of community type on post-school outcomes for students with ASD are rare. One study by Howlin et al (2004) suggests that for high-functioning individuals with autism, employment levels may be more dependent on the area in which the individuals live and available support services than on any other factors. Given these mixed results, Flexer, Daviso, Baer, McMahan-Queen, & Meindl (2011) suggest research is needed to further understand the variability of transition programs in urban, rural, and suburban schools that might influence outcomes for students with differing gender, ethnicity, and disability. This investigation examined whether these ecological community types impact participation in the learning opportunities of WBLE for students with ASD.

**School percentage of students eligible for free or reduced lunch.** Another school-level ecological variable included as a control in this study is the percent of students in schools who qualify for free and/or reduced lunch. This measure is commonly used as a socioeconomic
indicator of a school’s population. Schools with higher percentages of students who qualify for free or subsidized lunch are often more burdened with the educational and behavioral issues of students who experience poverty. One research question to be tested is whether this school socioeconomic indicator impacts a student’s WBLE. Many studies that include this variable relate to students in the general population. Borman & Dowling (2010) used hierarchical linear modeling to test effects of school characteristics on student academic outcomes. Their results suggest that going to a high-poverty school has a profound limiting effect on a student’s achievement outcomes, above and beyond the effect of individual poverty or minority status. According to their study, the social class composition of a student’s school is 1 3/4 times more important than a student’s individual race/ethnicity or social class for understanding educational outcomes. McLaughlin & Drori (2000) used information from 2,000 schools in the U.S. Department of Education, National Center for Education Statistics (NCES) data, and found that student achievement was correlated with school poverty percentage at between .43 and .78 across all grade levels. Howley & Howley (2004) found in their study, focused primarily on school size, that percentage of free and reduced lunch in high school schools was correlated with achievement in courses in Algebra, English and Biology. Clasemann’s (2012) study examined postsecondary enrollment patterns in rural high schoolers, and found that average high school SES was the only school-level variable found to be significantly related with college attendance.

In contrast, Dong, Fabian & Luecking (2015) used hierarchical linear modeling to examine school factors including free/reduced lunch percentage that may contribute to employment outcomes for transitioning youth with disabilities beyond individual student factors. The study found that employment outcomes were primarily attributed to individual student factors, particularly prior paid work experience, rather than school factors. The study did not
distinguish among disability categories. Given the results especially of some national studies indicating that the free and reduced percentage is an ecological variable of importance to post-high school outcomes, it was included as a predictor variable in the investigation to assess its impact on participation in WBLE.

**Research rationale: the present study**

The present study was designed to address limitations of previous research and fill gaps within the current literature on predictors of post-secondary success for students with ASD. For students with ASD, work-based learning experiences (WBLE) are opportunities to learn and practice essential skills that impact all aspects of transition. The educational programs of adolescents with ASD often emphasize academic achievement and general education participation to the exclusion of other transition domains, such as career development and early work experiences (Lee & Carter, 2012). When students with ASD participate in WBLE in high school, they are much more likely to thrive after graduation. This study examined characteristics of the students who get these opportunities. It examined what student characteristics make WBLE more likely. It also utilized the framework of ecological theory to see WBLE in context, and examine what school characteristics and community types contribute to or detract from a student’s participation in WBLE. Figure 1 displays an ecological representation of the variables in this study.
Taken together, current research indicates that regular diploma status, self-determination and social skills are predictors of post-school success for students with disabilities in general (Test et al, 2009). However, the current literature lacks information about how these predictors perform for disability subgroups of students such as those with ASD. In addition, it is clear that some student demographics and characteristics, as well as some ecological variables, need to be included as control variables to assess the relationship of the three predictors with the outcome variable, above and beyond these controls. In keeping with Bronfenbrenner’s framework, this study also investigated the clustering effects of school and of state location to explore ecological impact of the micro-, meso- and macrosystems that may differ among schools and the three states (California, North Carolina, and Wisconsin) where schools and students were located in the study.
The study addressed specific research questions:

Question 1: Do self-determination, social skills, and diploma status of students with ASD significantly predict work-based learning experiences (WBLE), controlling for gender, race/ethnicity, household income, nonverbal IQ and adaptive skills?

Question 2: Do the ecological variables of community type (urban, suburban, rural) and school percentage of students eligible for free and reduced lunch significantly predict WBLE?

Question 3: What are the characteristics of high school students with ASD in this study who participate most frequently in WBLE?
CHAPTER 3: METHOD

Participants

This study was based on data collected by the Center for Secondary Education for Students with Autism Spectrum Disorders (CSESA). CSESA was a 5-year study funded by a grant from the U.S. Department of Education and coordinated by Primary Investigators at the Frank Porter Graham Institute for Educational Research in Chapel Hill, North Carolina. CSESA focused on developing, adapting, and studying a comprehensive school-based and community-based education program for high school students on the autism spectrum. The variables used are from cohorts 1 and 2, collected at Time 1 (pre-assessments) for each cohort, which was Fall 2014 (cohort 1) and Fall 2015 (cohort 2). CSESA participants were examined at Time 1 as a pre-intervention population of interest for the current study. Some school- and community-level data was taken from the NCES database created from US census data.

Participants in the study at the time of data collection were enrolled full-time in a public high school in one of three states (North Carolina, Wisconsin, and California). To recruit participants, the Principal Investigators at three universities (University of North Carolina at Chapel Hill, University of Wisconsin at Madison, and San Diego State University) met with school officials in their states to recruit 20 high school sites per state. Online recruitment for school participation also occurred through a link on the CSESA website. Thus 20 schools per university were recruited and then randomized, 10 designated control schools and 10 as intervention schools, for a total of 60 schools in Cohorts 1 and 2. Staff at the schools provided
the researchers with the number of students in their school with an AU designation as either the primary or secondary area of eligibility on an IEP. No students with 504 plans and no students without an IEP were included in recruitment. To be included, students also had to have two years remaining in high school. Staff distributed recruitment packets to families of eligible students. If interested in participating, families sent a consent form back to researchers in a provided envelope, and then researchers contacted them and enrolled the students and families in the study. Twelve students could be included per school, and if more than twelve were eligible, selection of participants was randomized. No sites were dropped for lack of participation, and the 60 schools in Cohorts 1 and 2 had between five and twelve students each. A total of 547 students were enrolled in the study. Students ranged in age from 13 years, 6 months to 20 years, 8 months at time of enrollment, and were 86% male and 14% female.

Measures

Measures used in this study are summarized in Table 2.

Table 2

Measures for Study Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Data sources/measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBLE (outcome variable)</td>
<td>• average of parent and/or teacher item-level responses on proximal measure (0-4) (continuous variable)</td>
</tr>
<tr>
<td></td>
<td>• dichotomous variable indicating “some” versus “any” WBLE</td>
</tr>
<tr>
<td>Nonverbal IQ</td>
<td>Leiter-3 nonverbal IQ, standard score</td>
</tr>
<tr>
<td>household income</td>
<td>CSESA child and family demographic form, school data</td>
</tr>
<tr>
<td>race/ethnicity, gender</td>
<td></td>
</tr>
<tr>
<td>Adaptive skills</td>
<td>Vineland-II ABC composite, standard score</td>
</tr>
<tr>
<td>Self-determination</td>
<td>AIR-SDS item-level average</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diploma status</th>
<th>&quot;regular vs adapted&quot; diploma status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social skills</td>
<td>SRS-2 T-score for total</td>
</tr>
<tr>
<td>Ecological variables</td>
<td>most recent available school/NCES data:</td>
</tr>
<tr>
<td></td>
<td>• % students eligible for F&amp;R lunch in the school</td>
</tr>
<tr>
<td></td>
<td>• urban-centric locale</td>
</tr>
<tr>
<td></td>
<td>• state where school is located</td>
</tr>
</tbody>
</table>

**Work-based learning experience (WBLE)**. The outcome variable of work-based learning experience (WBLE) was analyzed as a continuous and as a dichotomous variable. Both variables were created from responses on CSESA’s Proximal Measure-Teacher and Proximal Measure-Parent. For each student, the measures captured a teacher and a parent report of the student’s participation in WBLE in a 4-week period. The responses ranged 1 to 5, from “Never” (=1) to “Several times a week” (=5). For this investigation, the variable was recoded from 1-5 to 0-4 to more accurately reflect the response of “Never”. The four types of WBLE referenced on the measure included job exploration (work sampling, shadowing, and interviewing others about careers), jobs around the school, unpaid internships and volunteering in the community, and paid employment in the community. Analyses first examined predictors of this outcome variable in continuous form. The continuous variable was an item –level average of the responses on the teacher and parent measure. Many student cases were missing either the parent or teacher Proximal measure. To maximize sample size, the outcome variable incorporated responses from the parent, teacher or both if present. The average was investigated for correlation with the highest response on a student’s parent or teacher measure. These two values returned a correlation of $r = .84$. Next, 34% of the students were discovered to have an average WBLE frequency response of zero. Thus, the predictors were also investigated when the outcome variable was in dichotomous form to shed light on predictors of “none” versus “any”
student participation in WBLE.

**High school diploma status.** The CSESA data set included information as to whether a student was enrolled in a course of study that resulted in a “standard” or “modified” high school diploma. Of CSESA’s 547 participants, 56% were designated as standard diploma status, while 44% were designated as modified. Standard high school diploma status was measured in terms of a dichotomous standard/non-standard diploma status.

**Self-determination.** Self-determination was assessed by the *American Institutes for Research Self-Determination Scale*, or AIR-SDS (Wolman, Campeau, DuBois, Mithaug, & Stolarski, 1994). The American Institutes for Research (AIR), in collaboration with Teacher’s College of Columbia University in New York City, developed the AIR Self-Determination Assessments, which can be used for ages 8 to adult. Students in the CSESA study completed the student version. The AIR-SDS is a self-report measure that captures a student’s subjective assessment of his or her own level of self-determination in the contexts of both home and school. This measure is a self-report that balances other measures used in this study that are parent and teacher assessments or observations of a student’s skills.

The *AIR Self Determination Scale* assesses two broad self-determination components: capacity and opportunity. Capacity refers to the student’s knowledge, abilities, and perceptions that enable him or her to be self-determined. Opportunity refers to the students’ chances to use those abilities and knowledge in their lives. The scale measures three components of self-determination: thinking, doing, and adjusting. Each item consisted of a statement, such as “I know what I need, what I like, and what I’m good at” with Likert-scale response options ranging from 1= “Never” to 5= “Always”. A higher response indicated a higher level of self-determination. This study utilized the students’ mean item response score.
Social Skills. Social skills were measured by the Social Responsiveness Scale, Second Edition SRS-2 (Constantino & Gruber, 2012). Teachers in the CSESA study completed the School-Age (age 4 to 18) version of this 65-item, nationally standardized measure for each student. More than 40 research studies and independent sources support the validity of SRS-2 and the instrument’s application in a wide variety of clinical and educational contexts (Constantino & Gruber, 2012). Each item is scored on a 4-point Likert scale: 1 (“not true”); 2 (“sometimes true); 3 (often true); and 4 (“almost always true”). Scores are obtained for five Treatment Subscales: Social Awareness; Social Cognition; Social Communication; Social Motivation; and Restricted Interests and Repetitive Behavior. Interpretation is based on a single score (Total Score) reflecting the sum of responses to all 65 SRS-2 questions, which serves as an index of severity of social skill deficits. The SRS-2 total and subscale raw scores are converted to T-scores for gender and respondent. T-scores of 50 and below are considered normal, and elevated T-scores indicate deficits of increasing severity. For the purpose of this study, the T-score for the total SRS-2 score was used. A higher score on this measure indicated more social skills impairment.

Functional/Adaptive skills. The measure used to assess adaptive skills was the Vineland Adaptive Behavior Scales, Second Edition (Vineland-II) (Sparrow, Cicchetti, & Balla, 2005). Teachers in the study completed the Vineland-II teacher form, which is for students aged 3 to 21 years, 11 months. The teacher report of adaptive skills is valuable to this study in that it captures a student’s coping skills and independence in the demanding and stressful environments of school. Teachers are less likely than parents to overestimate a student’s adaptive skills, and teachers see the student’s functioning in the environment that is less likely to be shaped around a student’s needs.
The Vineland-II is a standardized measure which yields domain scores in the areas of communication, daily living skills, and social skills, as well as an adaptive behavior composite standard score. The domain scores and the composite score yield standard scores which have a mean of 100 and a standard deviation of 15. This study utilized the adaptive behavior composite (ABC) standard score from the teacher version.

The Vineland-II is also appropriate to this study because it was developed for use with individuals like the students in the CSESA sample. It was standardized using a nationally representative American sample of 3,695 individuals from birth to 90 years. The norm sample was stratified according to demographic variables such as sex, race/ethnicity, socioeconomic status, and geographic region. The researchers also controlled for community size and special education program placement. Data for norming and standardization were collected on eleven clinical groups: attention deficit/hyperactivity disorder, autism-nonverbal, autism-verbal, emotional or behavioral disturbance, deafness/hard of hearing, learning disability, cognitively delayed-mild (child and adult samples), cognitively delayed-moderate (child and adult samples), cognitively delayed severe/profound (adult sample) and visual impairment.

**Non-verbal IQ.** The CSESA data set contained a nonverbal IQ score assessed using the Leiter International Performance Scale, Third Edition Leiter-3 (Roid, Miller, Pomplun & Koch, 2013). Commonly used, language-laden standard IQ tests often require the individual to respond quickly to verbal questions, to have developed motor skills, and to communicate verbally what they know to a stranger. These assessments may not accurately measure the intellectual potential of an individual with autism. Thus, the nonverbal Leiter-3 IQ assessment may better tap into the true intellectual abilities of an individual with ASD.
CSESA staff administered the Leiter-3 individually at Time 1 with each participant. The Leiter-3 is a norm-referenced instrument developed to assess nonverbal intelligence, memory, and attention in individuals between the ages of 3 and 75 years. It is intended for use with individuals who would benefit from a nonverbal measure of cognitive ability, including those with autism, communication disorders, cognitive delay, English as a second language, hearing impairment, and traumatic brain injury. The Cognitive Battery includes four core subtests. The Leiter-3 is a completely nonverbal instrument, so the administration requires the use of pantomimed instructions that consist of combinations of hand and head movements, facial expressions, and demonstrations. Raw scores for the subtests are converted to scaled scores with a mean of 10 and standard deviation of 3. The sum of scaled scores from the four core subtests of the Cognitive Battery is converted to a Nonverbal IQ with a mean of 100 and standard deviation of 15. This study used the nonverbal IQ standard score.

**Race/ethnicity.** The variable for race and ethnicity was documented with four categories using the information on CSESA’s child and family demographics forms. These categories were: White (Non-Hispanic), African American (Non-Hispanic), Hispanic, and Other (Non-Hispanic).

**Ethical considerations**

The study was conducted with approval by the Institutional Review Board (IRB #17-0323) at the University of North Carolina, Chapel Hill, and met all the guidelines and criteria for conducting research with human subjects. All electronic files from CSESA were de-identified prior to receipt.
Analytic strategy

A quantitative approach was used to investigate diploma status, self-determination, and social skills as predictors of work-based learning experience (WBLE) for high school students with autism spectrum disorder (ASD). All analyses were completed using the statistics program Stata 14. Student characteristics of gender, race/ethnicity, household income, nonverbal IQ and adaptive skills were investigated as control variables with these predictors. The study also examined the impact of two ecological variables on participation in WBLE: school percentage of students eligible for free and reduced lunch, and community type (rural, suburban, urban). The analyses also accounted for school-level and state-level clustering effects as needed.

A data set of 285 participants was derived from the original data set of 547 after a preliminary examination indicated problems related to missing data. The data set was created by including participants with complete data for the variables of interest. Analysis began with an examination of the descriptive statistics for the data set. Bivariate correlations were then calculated to assess initial associations among variables.

Three research questions were posed. Two of the research questions examined the effects of the control and predictor variables on the outcome variable. Research Question 1 investigated how well the control variables of gender, household income, race, ethnicity, non-verbal IQ, and adaptive skills, and the three main predictors of diploma status, self-determination, and social skills predicted frequency of participation in work-based learning experience (WBLE). First, state- and school-level clustering effects were examined using likelihood ratio tests. Next, multilevel, multiple regressions were computed. Control variables were entered first (Model 1). Second, a model including the three main predictors (diploma status, self-determination and
social skills) and control variables was examined (Model 2). Variables were examined for problems with multicollinearity using the variance inflation factor (VIF). Intraclass correlations (ICC) and R-squared values were examined. These analyses were conducted using the outcome variable in continuous and dichotomous forms. Hypothesized results for Question 1 included: standard diploma status, increased self-determination, and increased social skills will predict increased participation in work-based learning experience for students with ASD. Including control variables is hypothesized to improve the predictive value of the model.

For Question 2, ecological variables of community type (rural, suburban, urban) and school percentage of students eligible for free and reduced lunch were added (Model 3). Hypothesized results for Question 2 included: rural location of the school will significantly predict decreased participation in work-based learning experience as compared to suburban and urban locations; and increased school percentage of free and reduced lunch will predict decreased participation in work-based learning experience.

For Question 3, a subgroup was created of students who had an average frequency of WBLE on the parent or teacher measure of 2 or higher, which equated to “A few times this month”. This resulted in a subgroup of 28 out of the 285 students in the study. Descriptive statistics for this subgroup were examined and compared to the 257 students who had an average frequency of WBLE on the parent or teacher measure of lower than 2. Hypothesized results for Question 3 are that characteristics for this subgroup will differ from the characteristics of the lower frequency WBLE group.
CHAPTER 4: RESULTS

From the original 547 participants at 60 schools, data for 285 were retained at 57 schools for the present analyses. The data set was created by including individual participants with values for the variables of interest: gender, household income, race, ethnicity, adaptive skills (Vineland Adaptive Composite), non-verbal IQ (Leiter-3), diploma type, self-determination (AIR-SDS), social skills (SRS-2 total T-score), and the teacher or parent report of work-based learning experiences (Proximal Measure). NCES data for community- and school-level variables were complete for all cases. The largest number of missing values (119) was for household income. Means, standard deviations, and pair-wise correlation coefficients were computed for all study variables and are presented in Tables 3 and 4, respectively. The descriptive statistics for the included participants were similar to both the whole group and to the participants who were dropped due to missing data. However, of the original 76 female participants, 45 were dropped due to missing data.

The age range of included participants was 13.8 to 20.8 years. The average age of participants was 16 years, with the males and females very close in mean age. The sample was composed of 254 boys and 31 girls. Participants in this study were 58% White, 13% African American, 15% Hispanic, and 13% identified as Other. The participants in this study had a mean non-verbal IQ of 87.6, with females slightly higher than males. The mean adaptive behavior standard score of 79.1 for participants was lower than the mean standard score for IQ. The female mean adaptive score of 86.87 was notably higher than that of the male score of 78.2, but
confidence intervals overlapped and male and female mean scores were within one standard deviation of each other.

Male and female participants in this study had similarly elevated T-scores on the SRS-2 measure, suggesting similar levels of impairment. The mean response to items on the AIR-SDS scale fell between 3 (“Sometimes”) and 4 (“Almost Always”) on items such as, “I believe that I can set goals to get what I want”. The original parent and teacher Proximal Measure, which indicated a student’s frequency of participation in WBLE, ranged from 1=Never to 5=Several days a week. Since the response of 1 indicated Never, for ease of interpretation the responses on the parent and teacher Proximal Measure were converted from 1-5 to 0-4. Teachers and/or parents indicated a mean participation in WBLE among participants that equates to between 0=Never and 1= 1-2 Times this month.

A summary of bivariate correlations is presented in Table 4. An examination of bivariate correlations with the outcome variable of WBLE indicated that it was correlated with other variables. WBLE was significantly \((r = .45, p \leq .01)\) correlated with adapted diploma status, and negatively correlated with non-verbal IQ \((r = -.31, p \leq .01)\) and adaptive skills \((r = -.18, p \leq .01)\). WBLE was also negatively correlated with household income \((r = -.13, p \leq .05)\). Adapted diploma type was also negatively correlated with nonverbal IQ \((r = -.57, p \leq .01)\) and adaptive skills \((r = -.51, p \leq .01)\). Household income was also negatively correlated with diploma type \((r = -.16, p \leq .01)\); that is, a student with higher household income was more likely to be enrolled in the standard, rather than the adapted, diploma track. Household income was negatively correlated with being African American and Hispanic. In addition, household income was negatively correlated with school percentage of students eligible for free and reduced lunch. Being African American was negatively correlated with non-verbal IQ, but positively correlated with adapted diploma status.
and school percentage of students eligible for free and reduced lunch. Although Hispanic ethnicity was not correlated with IQ, it was positively correlated with adapted diploma status and percentage of students eligible for free and reduced lunch.

**Research Question 1**

Do self-determination, social skills, and diploma status of high school students with ASD significantly predict work-based learning experiences (WBLE), controlling for gender, race/ethnicity, household income, nonverbal IQ and adaptive skills?

For Question 1, multilevel, multiple regression analyses were used to evaluate diploma status, self-determination, social skills and control variables (minority status, gender, household family income, nonverbal IQ and adaptive skills) as predictors of work-based learning experience (WBLE). First, likelihood ratio tests were used to examine the effects of state-level and school-level clustering. The likelihood ratio test is a statistical test used to examine the goodness of fit between two models, one of which (the null model) is a special case of the other (the alternative model). The likelihood ratio test that compared the model controlling for state clustering to an ordinary linear regression returned a chi-square value that was non-significant (*chi-square*=0.74, *p*=0.194). The non-significant chi-square value indicated that there was no significant difference between the linear regression model and one including clustering for state. Thus, going forward, multilevel regression models did not include state-level clustering.
Table 3

Descriptive Data for Included Students (Complete Data) vs All Participants vs Dropped Students (Missing Data)

\( n = 285, \, N=547, \, n=262 \)

<table>
<thead>
<tr>
<th>Range</th>
<th>Included Students Mean (SD or %)</th>
<th>All Participants Mean (SD or %)</th>
<th>Dropped Students Mean (SD or %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work-Based Learning Experiences (WBLE)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0=Never, 4=Several days a week)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-4</td>
<td>.62 (.76)</td>
<td>.63 (.04)</td>
<td>.66 (.06)</td>
</tr>
<tr>
<td>Age</td>
<td>16.00 (1.31) Males: N= 254 (89%)</td>
<td>16.16 (.06) Males: N=471 (86%)</td>
<td>16.32 (1.0) Males: N=215 (83%)</td>
</tr>
<tr>
<td>Gender</td>
<td>Male/Female Females: N=31 (11%)</td>
<td>Female N=76 (14%)</td>
<td>Females N=45 (17%)</td>
</tr>
<tr>
<td>1. &lt;20,000</td>
<td>1.24 (9%)</td>
<td>1.36 (7%)</td>
<td>1.13 (9%)</td>
</tr>
<tr>
<td>2. 20-39,000</td>
<td>2.41 (14%)</td>
<td>2.65 (12%)</td>
<td>2.24 (17%)</td>
</tr>
<tr>
<td>3. 40-59,000</td>
<td>3.41 (14%)</td>
<td>3.60 (11%)</td>
<td>3.17 (12%)</td>
</tr>
<tr>
<td>4. 60-79,000</td>
<td>4.42 (15%)</td>
<td>4.62 (12%)</td>
<td>4.20 (14%)</td>
</tr>
<tr>
<td>5. 80-99,000</td>
<td>5.31 (11%)</td>
<td>5.55 (10%)</td>
<td>5.25 (17%)</td>
</tr>
<tr>
<td>6. &gt;99,000</td>
<td>6.106 (37%)</td>
<td>6.150 (27%)</td>
<td>6.44 (31%)</td>
</tr>
<tr>
<td>Missing</td>
<td></td>
<td>119 (22%)</td>
<td></td>
</tr>
<tr>
<td>Household Income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race and ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>White=165 (58%)</td>
<td>White=300 (55%)</td>
<td>White=109 (50%)</td>
</tr>
<tr>
<td>African-American</td>
<td>AA=38 (14%)</td>
<td>AA=77 (14%)</td>
<td>AA=30 (14%)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>Hispanic=44 (15%)</td>
<td>Hispanic=104 (19%)</td>
<td>Hispanic=53 (24%)</td>
</tr>
<tr>
<td>Other</td>
<td>Other=38 (13%)</td>
<td>Other=66 (12%)</td>
<td>Other=28 (12%)</td>
</tr>
<tr>
<td>Nonverbal IQ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Standard Scores)</td>
<td>30-141</td>
<td>87.6 (25.2)</td>
<td>85.5 (1.22)</td>
</tr>
<tr>
<td>Adaptive Skills Composite (Standard Scores)</td>
<td>20-131</td>
<td>79.14</td>
<td>75.7</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>--------</td>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>Standard/Adapted</td>
<td>Standard =173</td>
<td>Standard=313</td>
<td>Standard=140</td>
</tr>
<tr>
<td>Standard =173</td>
<td>(61%)</td>
<td>1.25-5</td>
<td>3.69</td>
</tr>
<tr>
<td>Adapted=112</td>
<td>(39%)</td>
<td>(.69)</td>
<td>(.03)</td>
</tr>
<tr>
<td>AIR-Self Determination Scale</td>
<td>(item responses mean)</td>
<td>39-110</td>
<td>68.6</td>
</tr>
<tr>
<td>Social Responsiveness Scale-2 (T-Scores)</td>
<td>4.94-87.20</td>
<td>N=57</td>
<td>N=60</td>
</tr>
<tr>
<td>School % Free/Reduced Lunch</td>
<td>N=60</td>
<td>35.30 (18.48)</td>
<td>39.45 (2.69)</td>
</tr>
<tr>
<td>Urban</td>
<td>N=57</td>
<td>35.30 (18.48)</td>
<td>39.45 (2.69)</td>
</tr>
<tr>
<td>Suburban</td>
<td>Ur=111 (39%)</td>
<td>Ur=209(38%)</td>
<td>Ur=97(37%)</td>
</tr>
<tr>
<td>Rural</td>
<td>Su=130 (45%)</td>
<td>Su=269(49%)</td>
<td>Su=138(53%)</td>
</tr>
<tr>
<td>Community Type (% students)</td>
<td>Ru=44 (16%)</td>
<td>Ru=69(13%)</td>
<td>Ru=27(10%)</td>
</tr>
<tr>
<td>State</td>
<td>North Carolina</td>
<td>NC=125 (44%)</td>
<td>NC=195 (36%)</td>
</tr>
<tr>
<td></td>
<td>Wisconsin</td>
<td>WL=72 (25%)</td>
<td>WL=153(28%)</td>
</tr>
<tr>
<td></td>
<td>California</td>
<td>CA=88 (31%)</td>
<td>CA=199(36%)</td>
</tr>
</tbody>
</table>
Table 4

Correlation Matrix for All Variables

\(n=285\)

|       | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1. WBLE | 1   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 2. Male | .03 | 1   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 3. HH inc. | -.13* | -.03 | 1   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 4. AA | .14** | .1   | -.33** | 1   |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 5. Hispanic | .04 | .05 | -.21** | .17** | 1   |     |     |     |     |     |     |     |     |     |     |     |     |
| 6. Other | .01 | -.06 | .03 | -.15** | -.16** | 1   |     |     |     |     |     |     |     |     |     |     |     |
| 7. NV IQ | -.31** | -.02 | .03 | -.14** | 0   | -.02 | 1   |     |     |     |     |     |     |     |     |     |     |
| 8. Adaptive skills | -.18** | .17** | .04 | -.01 | -.02 | -.02 | .55** | 1   |     |     |     |     |     |     |     |     |     |
| 9. Adapted diploma | .45** | .05 | -.16** | .19** | .19** | -.01 | -.57** | -.51** | 1   |     |     |     |     |     |     |     |     |
| 10. AIR SDS | 0   | -.08 | .04 | -.01 | -.01 | -.08 | .09 | .19** | -.04 | 1   |     |     |     |     |     |     |     |
| 11. SRS-2 | .06 | -.02 | .09 | -.1 | -.01 | .08 | -.18** | -.53** | -.24** | .19** | 1   |     |     |     |     |     |     |
| 12. %F/R | .04 | -.01 | -.27** | .15** | .32** | -.13** | -.05 | .03 | .16** | .12** | -.14** | 1   |     |     |     |     |     |
| 13. Urban | .02 | -.02 | .04 | .11 | -.12* | -.06 | .07 | .12* | -.08 | -.02 | -.06 | .12* | 1   |     |     |     |     |
| 14. Suburban | -.02 | .00 | -.05 | -.11 | .14* | .08 | -.06 | -.12* | .07 | -.03 | .04 | -.02 | -.73** | 1   |     |     |     |
| 15. Rural | .00 | .02 | .01 | .00 | -.02 | -.03 | .00 | .01 | .01 | .06 | .02 | -.13 | -.34** | -.40** | 1   |     |     |
| 16. N.C. | .14* | .04 | .01 | .34** | -.18** | -.14* | -.16** | -.04 | .20** | .01 | .04 | -.14* | .09 | -.19** | .13* | 1   |     |
| 17. Wisconsin | -.06 | -.03 | .03 | -.23** | -.23** | -.01 | .25** | .16** | -.40** | .08 | .04 | -.06 | .15** | -.09 | -.07 | -.50** | 1   |
| 18. California | -.09 | -.01 | -.04 | -.15** | .40** | .16** | -.07 | -.11 | .16** | -.09 | -.08 | .20** | -.24** | .29** | -.08 | -.59** | -.39** | 1   |

**p ≤ .01, two-tailed  *p ≤ .05, two-tailed
The likelihood ratio test for school, however, returned a significant chi-square value \( \chi^2 = 4.43, p=0.017 \). This indicated a significant difference between the linear regression model and one including clustering for school. Thus, models going forward included school clustering effects, since the significant chi-square value suggested there were similarities among observations within schools that need to be accounted for.

A first set of regressions used the outcome variable for WBLE in continuous form. WBLE was recoded, shifting the value of one to zero to more accurately reflect the response of one that indicates “Never”. The seven control variables were examined as predictors of work-based learning experience, accounting for school clustering effects (Model 1). For ease of comparison, results for both Research Questions 1 and 2 are presented in Table 5. Only the variable for nonverbal IQ \( r = -.009, p=.00 \) resulted in a significant \( p \)-value. The remaining control variables for gender, household income, African American, Hispanic, Other (race) and adaptive skills all returned non-significant \( p \)-values at \( p \leq .05 \). Since significant bivariate correlations between some of these variables were discovered earlier, the variables were examined for problems with multicollinearity. The variance inflation factor (VIF) quantifies the severity of multicollinearity. When examined, the VIF values for these variables were very close to the lower-bound VIF value of 1, indicating that multicollinearity was not a factor.

The model including control variables and the three main predictors of diploma type, self-determination and social skills, accounting for school clustering effects, was examined next (Model 2). Results are presented in Table 5. The control variable of non-verbal IQ did not remain significant in Model 2, though its \( p \)-value of .06 approached significance. Of the three main predictors of interest, only diploma type was significant \( (p=.00) \). The three main predictors were examined individually as well to compare results with the model that included all of them.
Results of examining the predictors individually were very similar and did not alter their level of significance. In addition, multicollinearity was again examined, since significant correlations had been found between pairs of variables in Model 2. VIF values ranged from 1.02 to 2.14. A VIF below 5 is considered acceptable. Thus, analyses to investigate Research Question 1 indicate that, accounting for school clustering effects and controlling for gender, household income, racial and ethnic identity, non-verbal IQ, and adaptive functioning, diploma type is a significant predictor of WBLE for students in this study.

Table 5

*Regression Table: Predictors of WBLE (Research Questions 1&2)*

* n=285 students in 57 schools

<table>
<thead>
<tr>
<th>Control Variables</th>
<th>Model 1 control variables</th>
<th>Model 2 control variables</th>
<th>Model 3 control variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>main predictors</td>
<td>main predictors</td>
<td>ecological variables</td>
</tr>
<tr>
<td>Male</td>
<td>.031</td>
<td>.058</td>
<td>.058</td>
</tr>
<tr>
<td>Household Income</td>
<td>-.002</td>
<td>-.001</td>
<td>-.002</td>
</tr>
<tr>
<td>African-American</td>
<td>.174</td>
<td>.023</td>
<td>.022</td>
</tr>
<tr>
<td>Hispanic</td>
<td>.093</td>
<td>-.072</td>
<td>-.042</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td>.088</td>
<td>.088</td>
<td>.091</td>
</tr>
<tr>
<td>(Other)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-verbal IQ</td>
<td>-.009**</td>
<td>-.004</td>
<td>-.004</td>
</tr>
<tr>
<td>Adaptive Skills</td>
<td>-.000</td>
<td>.006</td>
<td>.006</td>
</tr>
<tr>
<td>Adapted Diploma</td>
<td>--</td>
<td>.716**</td>
<td>.721**</td>
</tr>
<tr>
<td>Social Skills</td>
<td>--</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Self-Determination</td>
<td>--</td>
<td>.023</td>
<td>.028</td>
</tr>
<tr>
<td>Suburban</td>
<td>--</td>
<td>--</td>
<td>-.031</td>
</tr>
<tr>
<td>Urban</td>
<td>--</td>
<td>--</td>
<td>.067</td>
</tr>
<tr>
<td>School % F/R lunch</td>
<td>--</td>
<td>--</td>
<td>-.002</td>
</tr>
<tr>
<td>Constant</td>
<td>1.45**</td>
<td>.032</td>
<td>.123</td>
</tr>
<tr>
<td>R²</td>
<td>(.Student/Level 1)</td>
<td>(.Student/Level 1)</td>
<td>(.Student/Level 1)</td>
</tr>
<tr>
<td></td>
<td>.120</td>
<td>.224</td>
<td>.229</td>
</tr>
<tr>
<td></td>
<td>(.School/Level 2)</td>
<td>(.School/Level 2)</td>
<td>(.School/Level 2)</td>
</tr>
<tr>
<td></td>
<td>.142</td>
<td>.173</td>
<td>.192</td>
</tr>
<tr>
<td>ICC</td>
<td>.077</td>
<td>.122</td>
<td>.114</td>
</tr>
</tbody>
</table>

**p < 0.01  *p < 0.05
Though Research Question 1 pertained to examining the significance of predictors, some information can be gained from other analyses. For Model 2, the R-squared value is .224 at Level 1, and .173 at Level 2; thus, this model explains 22.4% of the variance among students, and 17.3% of the variance among schools. The intraclass correlation (ICC) is .122, indicating that school-level clustering is responsible for 12.2% of the total variance.

The distribution of the outcome variable of WBLE as presented in Table 6 below suggested that a second set of regressions using the outcome variable in dichotomous form might yield different information. Of the 285 participants, 98 had an average of 0 (=Never) on the parent and teacher responses on the Proximal Measure that indicated frequency of participation in WBLE. The dichotomous variable for WBLE was created to distinguish between students who participated in “none” versus “any” work-based learning experiences.

Table 6

*Frequency table: participation in WBLE*

\[ n=285 \]

<table>
<thead>
<tr>
<th>Average of parent and teacher response*</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Cumulative</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>98</td>
<td>34.39</td>
<td>34.39</td>
</tr>
<tr>
<td>0-.875</td>
<td>106</td>
<td>37.19</td>
<td>71.58</td>
</tr>
<tr>
<td>1</td>
<td>22</td>
<td>7.72</td>
<td>79.30</td>
</tr>
<tr>
<td>1.125-1.875</td>
<td>31</td>
<td>10.88</td>
<td>90.18</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>3.86</td>
<td>94.04</td>
</tr>
<tr>
<td>2.125-2.75</td>
<td>12</td>
<td>4.21</td>
<td>98.25</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>1.40</td>
<td>99.65</td>
</tr>
<tr>
<td>3.25</td>
<td>1</td>
<td>.35</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>285</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

*Note: 0=Never, 1=1-2 times this month, 2= A few times this month, 3= About once a week, 4= Several days a week

Regressions continued to account for school clustering effects. Logistic regression with a dichotomous outcome variable provides results in odds ratios. Examining the control variables
(Model 1) for significance returned the same results as the examination using the continuous
form of the outcome variable. Only non-verbal IQ was significant (odds ratio=.977, p=.00). The
model including control variables and the three main predictors of diploma type, self-
determination and social skills, accounting for school clustering effects (Model 2), was examined
next with the dichotomous variable for WBLE. As with the regressions using the outcome
variable in continuous form, diploma type alone demonstrated significance (odds ratio=6.31,
p=.00). Odds ratios are multiplicative. Thus, using the results of the logistic regressions, a
student in the adapted diploma program was 6.31 times more likely than a student in a standard
diploma program to have any participation in WBLE. Regressions using the outcome variable in
dichotomous form supported the results for Research Question 1 gained from regressions using
the outcome variable in continuous form. Results from logistic regressions are presented in
Table 7.

Table 7
Odds Ratios Table: Predictors of WBLE (Research Questions 1 & 2)
n=285 students in 57 schools

<table>
<thead>
<tr>
<th>Control Variables</th>
<th>Model 1 control variables</th>
<th>Model 2 control variables main predictors</th>
<th>Model 3 control variables main predictors ecological variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Predictors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ecological Variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1.32</td>
<td>1.24</td>
<td>1.30</td>
</tr>
<tr>
<td>Household Income</td>
<td>.887</td>
<td>.909</td>
<td>.896</td>
</tr>
<tr>
<td>African-American</td>
<td>1.72</td>
<td>1.22</td>
<td>1.26</td>
</tr>
<tr>
<td>Hispanic</td>
<td>2.14</td>
<td>1.28</td>
<td>1.55</td>
</tr>
<tr>
<td>Race/ethnicity (Other)</td>
<td>1.19</td>
<td>1.21</td>
<td>1.20</td>
</tr>
<tr>
<td>Non-verbal IQ</td>
<td>.977**</td>
<td>.990</td>
<td>.990</td>
</tr>
<tr>
<td>Adaptive Skills</td>
<td>1.0</td>
<td>1.01</td>
<td>1.01</td>
</tr>
<tr>
<td>Adapted Diploma</td>
<td>--</td>
<td>6.31**</td>
<td>6.52**</td>
</tr>
<tr>
<td>Social Skills</td>
<td>--</td>
<td>.987</td>
<td>.983</td>
</tr>
</tbody>
</table>
### Research Question 2

Do the ecological variables of community type (urban, suburban, rural) and school percentage of students eligible for free and reduced lunch significantly predict WBLE?

To address Question 2, ecological variables were added to regressions to examine their significance as predictors and any changes in the significance of predictors of WBLE caused by their inclusion. A model including ecological dummy variables, control variables, and the three main predictors (Model 3) was examined. Results are presented above in Table 5. As in Model 2 that did not contain ecological variables, only diploma type demonstrated significance. In addition, regression coefficients for diploma type were similar in Models 2 and 3, and the level of significance did not change. The ecological variables themselves did not return significant p-values in any of the regressions. For Model 3, The R-squared value increased slightly from Model 2, increasing from .224 to .229 at Level 1 (student) and from .173 to .192 at Level 2 (school). The ICC also fell slightly from .122 in Model 2 to .114 in Model 3. Thus, though research questions pertained to the significance of predictors, Model 3 can be seen as a slightly better model, as it explains 22.9% of the variance among students, and 19.2% of the variance among schools. The intraclass correlation (ICC) of .114 indicates slightly lower effects of school-level clustering.

As for Question 1, logistic regressions re-examined predictors using the dichotomous form of the outcome variable. Results for Model 3 in odds ratios were similar to those from
regressions using the outcome variable in continuous form. Results for Model 3 in odds ratios are presented above in Table 7. Thus, analyses investigating Research Question 2 indicate that for participants in this study, the ecological variables of school percentage of students eligible for free and reduced lunch and community type (urban, suburban, rural) do not significantly predict WBLE.

**Research Question 3**

What are characteristics of high school students with ASD in this study who participate most frequently in WBLE?

To answer Question 3, the data was sorted to create a subgroup of the students whose parent or teacher reported that he or she participated in WBLE at least “A few times this month”. This equated to an average response of 2 or higher on the parent or teacher Proximal Measure and resulted in a subgroup of 28 out of the 285 students. Frequency data for participation in WBLE for this subgroup is presented in Table 8.

**Table 8**

*Frequency Table: Participation in WBLE for subgroup*  

<table>
<thead>
<tr>
<th>Average WBLE</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative</th>
</tr>
</thead>
<tbody>
<tr>
<td>2=A few times this month</td>
<td>11</td>
<td>39.29</td>
<td>39.29</td>
</tr>
<tr>
<td>2.125</td>
<td>1</td>
<td>3.57</td>
<td>42.86</td>
</tr>
<tr>
<td>2.25</td>
<td>3</td>
<td>10.71</td>
<td>53.57</td>
</tr>
<tr>
<td>2.375</td>
<td>1</td>
<td>3.57</td>
<td>57.14</td>
</tr>
<tr>
<td>2.5</td>
<td>6</td>
<td>21.43</td>
<td>78.57</td>
</tr>
<tr>
<td>2.75</td>
<td>1</td>
<td>3.57</td>
<td>82.14</td>
</tr>
<tr>
<td>3=About once a week</td>
<td>4</td>
<td>14.29</td>
<td>96.43</td>
</tr>
<tr>
<td>3.25*</td>
<td>1</td>
<td>3.57</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

*Note. A response of 4=Several days a week*
Descriptive statistics for this subgroup were examined. The group consisted of two females and 26 males in 19 schools. Two schools each contained three of the students in this subgroup, and five schools each contained two students. Otherwise, the remaining 12 schools each contained one student in this subgroup. Results are presented in Table 9 below. Statistics from the participants with an average of 2 or lower were included for comparison.

Table 9

*Descriptive Statistics for Subgroup with Highest Frequency of WBLE vs Lower Frequency*

<table>
<thead>
<tr>
<th></th>
<th>Subgroup (n=28) (SD or %)</th>
<th>Lower WBLE frequency group (n=257) (SD or %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work-Based Learning Experiences (WBLE) (0=Never, 4=Several days a week)</td>
<td>2.36 (.39)</td>
<td>.43 (.03)</td>
</tr>
<tr>
<td>Mean Age</td>
<td>17.43 (1.74)</td>
<td>15.87 (.07)</td>
</tr>
<tr>
<td>Gender</td>
<td>Males: N=26 (93%) Females: N=2 (7%)</td>
<td>Males: N=228 (89%) Females: N=29 (11%)</td>
</tr>
<tr>
<td>Household Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. &lt;20,000</td>
<td>1. 3 (11%)</td>
<td>1. 21 (8%)</td>
</tr>
<tr>
<td>2. 20-39,000</td>
<td>2. 4 (14%)</td>
<td>2. 37 (14%)</td>
</tr>
<tr>
<td>3. 40-59,000</td>
<td>3. 5 (18%)</td>
<td>3. 36 (14%)</td>
</tr>
<tr>
<td>4. 60-79,000</td>
<td>4. 4 (14%)</td>
<td>4. 38 (15%)</td>
</tr>
<tr>
<td>5. 80-99,000</td>
<td>5. 3 (11%)</td>
<td>5. 28 (11%)</td>
</tr>
<tr>
<td>6. &gt;99,000</td>
<td>6. 9 (32%)</td>
<td>6. 97 (38%)</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>13 (46%)</td>
<td>152 (59%)</td>
</tr>
<tr>
<td>AA</td>
<td>7 (25%)</td>
<td>31 (12%)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>3 (11%)</td>
<td>41 (16%)</td>
</tr>
<tr>
<td>Other</td>
<td>5 (18%)</td>
<td>33 (13%)</td>
</tr>
<tr>
<td>Mean Nonverbal IQ (Standard Scores)</td>
<td>71.25 (21.39)</td>
<td>89.4 (1.55)</td>
</tr>
<tr>
<td>Adaptive Skills Composite (Standard Scores)</td>
<td>74.32 (14.03)</td>
<td>79.67 (.95)</td>
</tr>
<tr>
<td>High School Diploma Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard</td>
<td>5 (18%)</td>
<td>Standard = 168 (65%)</td>
</tr>
<tr>
<td>Adapted</td>
<td>23 (82%)</td>
<td>Adapted = 89 (35%)</td>
</tr>
<tr>
<td>AIR-Self Determination Scale (item responses mean)</td>
<td>3.73 (.76)</td>
<td>3.69 (.04)</td>
</tr>
</tbody>
</table>
The students in this subgroup were on average 1.5 years older than the students in the larger group. The subgroup was more disproportionately male than the whole group, and over half were from North Carolina. The students in this subgroup were more likely to be from schools located in urban areas than students from the larger group, and 82% were enrolled in adapted diploma programs as opposed to 35% in the lower frequency WBLE group. Other differences were in the racial and ethnic diversity of the subgroup. The subgroup was 25% African American, and 18% identified as Other, which are higher percentages than for the lower frequency group. This subgroup contained a lower percentage of Hispanic students (11%) than the lower frequency WBLE group. The mean non-verbal IQ (71.25) was 18 points lower than that of the other group (89.4), while the mean adaptive composite (74.32) was 5 points lower than the larger group. Other descriptive statistics were similar to those of the larger group.
CHAPTER 5: DISCUSSION

This study posed three questions focusing on participation in work-based learning experiences among high schoolers with autism spectrum disorder. Research into predictors of successful transition practices into adulthood for students with disabilities, and in particular for students with ASD, has indicated that participation in the learning opportunities provided by WBLE is a significant predictor of post-secondary success in education and employment (Luecking, 2009; Mazzotti et al, 2016; Roux et al, 2015; Test, Mazzotti et al, 2009). Descriptive data analysis indicated that participants had, overall, very low rates of participation in Work-Based Learning Experiences (WBLE). With the original measure ranging from 1=Never to 5=Several days a week, teachers and/or parents indicated a mean participation in WBLE among participants at 1.62, which equates to less than 2= 1-2 Times this month (for analyses, the variable was recoded to values of 0-4). This low rate of participation is consistent with the findings of Lee & Carter (2012), whose research indicated that employment and access to job shadowing, job skills training, job placement support, job coaching, and internship or apprenticeship experiences during high school for individuals with ASD were consistently low.

Research Question One

The first research question asked, “Do self-determination, social skills, and diploma status of high school students with ASD significantly predict work-based learning experiences (WBLE), controlling for gender, race/ethnicity, household income, nonverbal IQ and adaptive skills?”
Control variables. Research into successful transition practices for students with disabilities has indicated the need to include the demographic control variables in this study (Haber et al, 2016; Mazzotti et al, 2013; Mazzotti et al, 2016; Simonson & Neubert, 2013). The impact of gender on post-secondary transition has been variable in previous studies, but research has suggested it may be of particular importance in investigations including students with ASD. The sample was composed of 254 boys and 31 girls. This gender distribution of approximately 8:1 male to female is more disproportionate than the gender distribution in the general population of individuals with ASD, which is estimated at 4:1 (Halladay et al, 2015). In this study, 89% of the sample were males. A disproportionate number of males are often found in studies of individuals with ASD; Anderson et al (2014) found that in some ASD studies, 92% of the participants were male. Results of previous studies have been mixed as to the impact of gender on transition practices and outcomes, but many have indicated that female gender can have a negative impact. In this investigation, results similar to those of Chiang et al (2013) were found in which gender was not a significant predictor of participation work-based learning experiences for the students in this study.

A meta-analysis on transition research by Haber et al (2016) also suggested the significant impact of minority status on transition practices for students with disabilities. According to Haber et al (2016) and a study by Baer et al (2011), minority status can lessen participation in transition practices and access to transition supports and services. The diversity of racial and ethnic identities of participants in this study was slightly greater than that of the general U.S. population. According to the 2010 Census, the general U.S. population is 63.7% White, 12.2% African American, 16.3% Hispanic, and approximately 7.8% identified as another race or ethnicity (Asian American, Native American, Pacific Islander). Participants in this study
were 58% White, 14% African American, 15% Hispanic, and 13% identified as Other. In contrast to the findings of Haber et al (2016) and Baer et al (2011), variables of racial and ethnic identity in this study were not found to impact participation in WBLE. Along with the results for gender, this could be seen as a positive finding in that it suggests that female and minority students in the public schools in this study had access to the learning opportunities of WBLE comparable to males and to those identifying as White.

Representation of African American and Hispanic students and of students with lower household incomes among students participating in WBLE may be related to their increased likelihood of placement in adapted diploma programs. Adapted diploma programs typically have a stronger focus on workplace skills and vocational preparedness than standard diploma programs. Losen & Orfield (2002) found that minority students labeled as learning disabled, intellectually disabled, and/or emotionally disturbed were more likely to be served in non-mainstream classrooms than were their white peers with disabilities. Other studies have yielded similar findings (Baer et al, 2011; Daviso et al, 2016). In line with those findings, identifying as African American and Hispanic in this study was significantly associated with adapted, rather than standard, diploma status ($r = .19$ for each). This relationship did not exist with identifying as Other. Household income in this study was also negatively correlated ($r = -.16, p \leq .01$) with adapted diploma status. Thus, results for variables of minority status and household income in this study could be indicative not of equal access to the opportunities provided by WBLE, but of unequal placement in adapted diploma programs.

The distribution of household income among participants indicated a somewhat affluent overall sample of families. In this investigation, household income was not found to impact participation in WBLE. This is surprising and in contrast with significant research findings
indicating that increased household income is a very strong predictor of successful transition practices and post-secondary engagement in education and employment for students with autism (Shattuck et al, 2011; Shattuck et al, 2012; Taylor & Seltzer, 2011; Roux et al, 2013; Wei et al, 2014; Taylor & Mailick, 2014; Chiang et al, 2013, Bouck & Joshi, 2015). One consideration is that this investigation examined participation in WBLE while students were still in high school. It may be that household income becomes a more significant predictor of access to successful transition practices, services and supports after high school. It can again be interpreted as a positive result that, for the students in this study, household income did not appear to deprive nor privilege them in terms of access to the opportunities provided by WBLE. However, household income was also significantly negatively correlated with adapted diploma status. Thus, students with lower household incomes were more likely to be placed in adapted diploma programs, which predicted significantly increased participation in WBLE for participants in this study.

Also interesting are the results for the control variables of adaptive skills and non-verbal IQ. For students in this study, increased adaptive skills did not predict increased participation in WBLE. Given findings from many studies (Wei et al, 2014; Chiang et al, 2012; Shattuck et al, 2012; Taylor & Seltzer, 2011; Shattuck, Narendorf et al, 2012, Bouck & Joshi, 2015) that demonstrate the significance of functional and adaptive skills for increased participation in post-secondary employment and education, this result is surprising. The result suggests that, for students in this study, lower adaptive skills did not lessen access to work-based learning while they were still in high school. These findings are not apparently due to an unusual adaptive skill level overall for these students. In accordance with research indicating that individuals with ASD struggle with functional and adaptive skills, the mean adaptive behavior standard score of 79.14 for participants was lower than the mean standard IQ score of 87.6.
Non-verbal IQ was the only control variable that was significant in any regression analysis (Model 1). It did not retain significance, however, when main predictors were added (Model 2). In line with the 2014 report indicating that an estimated half of individuals with ASD now have an IQ of 85 or higher (CDC, 2014), the participants in this study had a mean non-verbal IQ of 87.6. Previous research findings have demonstrated a complex and unclear relationship between IQ and engagement in post-secondary education and employment for students with disabilities and in particular with ASD (Wehman, et al, 2014; Chiang et al, 2012; 2013; Shattuck et al, 2012; Taylor & Seltzer, 2011). Results from this study are difficult to interpret. The significance of non-verbal IQ as a predictor of WBLE in Model 1, but not in Model 2, may be associated with its relevance to diploma status, as discussed below.

**Main predictors.** In contrast to hypothesized results, self-determination was not found to be a significant predictor of participation in WBLE for students in this study. This contrasts with research findings demonstrating the predictive role of self-determination on post-school outcomes for students with disabilities (NSTTAC, 2013; Martin et al, 2007; Thoma et al, 2005) and with ASD (Carter et al 2012; Test et al 2014). For the students in this study, all of whom were still in high school, levels of self-determination did not appear to limit or provide increased access to WBLE. One result to consider from descriptive analysis is the mean item response of participants on the AIR-Self-Determination Scale. Research indicates that youth with ASD report lower rates of self-determination than other youth with disabilities (Wehman et al, 2014, Test et al, 2015). However, the mean response to items on the AIR-SDS scale was 3.69 on a scale of 1 to 5. This mean response fell between 3 (“Sometimes”) and 4 (“Almost Always”) on items such as, “I believe that I can set goals to get what I want”. The mean response of participants indicated a somewhat higher sense of self-determination than would be expected
from the research. Self-determination is a complex construct to measure and compare across students and contexts. Further, the AIR-SDS is a self-report measure and does not measure observable behaviors of students. Reporting a feeling of self-determination is perhaps not the same as demonstrating self-determination. One potential concern with interpreting this finding is the accuracy of the measure of the construct. Other studies of transition planning for adolescents with autism (Hatfield, Falkmer, Falkmer & Ciccarelli, 2017) have noted difficulties with valid measurement of self-determination.

Also surprising was the non-significant result for social skills as a predictor of participation in WBLE for students in this study. NSTTAC (2013) research solidified social skills as a main predictor of transition success, as well as WBLE as a powerful predictor of positive post-secondary outcomes for students with disabilities. The participants in this study demonstrated a mean T-score of 68.6 on the SRS-2 that was elevated, suggesting that on average, participants were observed to have impairments in social domains. Though research has indicated that females with ASD often have more developed social skills, male and female participants in this study had very similarly elevated T-scores on the SRS-2 measure (males=68.5, females=69.3). For students in this study, however, SRS-2 T-score was neither correlated with, nor predictive of, the outcome variable of participation in WBLE. This finding was in contrast to that of a recent study by Nasamran, Witmer, & Los (2017) who used NLTS-2 data that was disaggregated to include only students with ASD. The study included actual post-secondary outcomes and found social skills to be a significant predictor of post-secondary success in education, employment and independent living. It is difficult to compare findings, however, since the social skills measure used was very different from the SRS-2 and relied only on parent report. The study also included only students who had capabilities that placed them in
a “high-functioning” category, i.e. those who had appropriate skills to participate in academic achievement assessments (Nasamran et al, 2017).

Of the three main NSTTAC (2013) predictors of interest, only diploma type was significant as a predictor of WBLE. Research findings support the significance of diploma type, but findings from this study are the opposite of hypothesized results. Previous research (Mazotti et al, 2015) found that students with disabilities who earn a standard high school diploma are more likely to take career-oriented classes and receive career-oriented exposure and mentoring while in high school. Standard diploma candidates are also more likely to engage in post-secondary education and employment. Thus, hypothesized results for this investigation were that standard diploma would predict increased participation in WBLE. Results, however, in odds-ratio terms indicated that a student in the adapted diploma program was 6.31 times more likely than a student in a standard diploma program to have any participation in WBLE. The bivariate correlation ($r = .45, p \leq .01$) discovered between adapted diploma status and participation in WBLE supports this result.

A look at the previous research may shed some light on why results for diploma status in this study differed from hypothesized results. First, curriculum for students with ASD may not predict outcomes as it does for students with disabilities in general. Bouck & Joshi (2015) found that curriculum path had no bearing on post-secondary engagement in employment for students with ASD. A major study (Heal & Rusch, 1994) that is cited supporting the positive impact of standard diploma status on post-secondary success did not include a disability category of students with ASD. Further, a study by Wagner, et al (2014) included students with ASD and found that students earning a regular high school diploma significantly predicted improved employment outcome and college attendance, which are both post-secondary outcomes. The
current investigation pertained to WBLE for students who were still in high school. It is possible that diploma status predicts transition practices while still in high school differently than it predicts actual post-school outcomes. In contrast to previous findings, the results of this investigation suggest that for the students in this study, those in an adapted diploma program had much more frequent access to the learning experiences provided by WBLE.

Adapted diploma type was also negatively correlated with nonverbal IQ ($r = -.57, p \leq .01$) and adaptive skills ($r = -.55, p \leq .01$), supporting a relationship between these measures and diploma type. These relationships are understandable, since qualifying for adapted diploma tracks often requires intellectual and functional challenges for students. These relationships offer information to help explain the correlation between WBLE and non-verbal IQ ($r = -.31, p \leq .01$) and between WBLE and adaptive skills ($r = -.18, p \leq .01$). These results suggest that students in this study in standard diploma programs with higher IQs and functional skills did not have the same frequency of opportunities to learn from WBLE.

**Research Question 2**

The second research question in this study asked, “Do the ecological variables of community type (urban, suburban, rural) and school percentage of students eligible for free and reduced lunch significantly predict WBLE?”

NSTTAC (2013), the Division for Career Development and Transition (DCDT), and Flexer et al (2011) recommended that ecological factors need to be incorporated in research to develop evidence-based practices for transition (Trainor et al, 2008). Bronfenbrenner’s Ecological Theory stresses the significance of the individual’s ecology, especially to facilitating successful developmental transitions. For this study, community type and school percentage of students eligible for free and reduced lunch were not found to impact levels of participation in
WBLE. The community variable of locale type has been shown to impact transition practices and outcomes for students without disabilities, but research is scarce on its impact on students with disabilities and in particular with ASD (Pennington et al, 2009). Further, results have been mixed. In general, research indicates that rural location is a disadvantage due to fewer school and community resources, employment opportunities, and barriers related to transportation (Fardig et al, 1985; Karpinski et al, 1992; Ulrich, 2011). Previous studies indicated that high school students with disabilities in rural locations participate in less career training and have more limited vocational experience than their urban counterparts (Karpinski et al, 1992). Other studies indicate that urban location can be a disadvantage in that schools in urban settings are more likely to contain schools and families with fewer resources to support successful transition, and may have lower rates of postsecondary employment and education. (Roscigno, et al, 2006). In contrast, for students with ASD in this study, results suggest that rural, suburban and urban location did not privilege or limit access to the career training and vocational experiences provided by WBLE in high school.

The ecological variable of percent of students in schools who qualify for free and/or reduced lunch was also found to be non-significant. This measure is commonly used as a socioeconomic indicator of a school’s population. Studies have indicated that higher poverty rates in a high school can result in lower rates of in-school achievement and reductions in positive post-secondary outcomes (Borman & Dowling, 2010; McLaughlin & Drori, 2000; Howley & Howley, 2004; Clasemann, 2012). In contrast, Dong et al (2015) found individual student factors to be more significant. For students in this study, this ecological school-level socioeconomic indicator did not predict a student’s level of participation in WBLE.
**Research Question 3**

What are characteristics of high school students with ASD in this study who participate most frequently in WBLE?

This research question was exploratory yielding descriptive results. Examination was made of a subgroup of 28 out of the 285 students whose parent or teacher reported that he or she participated in WBLE at least “A few times this month”. The subgroup differed from the lower frequency WBLE group in some ways. They were on average one and a half years older than the students in the lower frequency group, which is not surprising. Many states have age requirements for employment and for workplace trainings. Access to some WBLE may depend on attaining an age of eligibility. Older students may also become more able to transport themselves independently to WBLE outside of activities provided on school campuses. In addition, as students move towards high school completion, vocational and employment concerns may become a more central focus. The subgroup was also more disproportionately male than the lower frequency group. A closer look revealed that the two females in the subgroup both identified as Asian (Other), the only two students identified as Asian in the subgroup. Otherwise, these two females were not similar to each other in diploma type or any other indicator. Over half of the students in the high frequency subgroup were from North Carolina. This is difficult to interpret, given that state-level clustering effects for the whole group were previously found to be non-significant. In line with some research findings discussed earlier about community type, these subgroup students were more likely to be from schools located in urban areas than students from the larger group.

The significant association of adapted diploma with WBLE is confirmed in this subgroup, since 82% were enrolled in adapted diploma programs as opposed to 35% of the lower
WBLE frequency group. This may connect to the lower mean non-verbal IQ (71) of the subgroup, which represents a difference of one standard deviation. The mean adaptive composite (74) of the subgroup, however, was less than 5 points lower than the larger group. This subgroup appears to be comprised of many adapted diploma candidates with adaptive behavior skills rated as closer those of the students in standard diploma programs. The subgroup was slightly more racially and ethnically diverse than the larger group, supporting results of previous analyses that minority status does not appear to be a disadvantage to students in this study in terms of participation in WBLE. A less positive interpretation of the increased percentage of students identifying as African American and Hispanic in the high frequency WBLE group is the increased likelihood of students in these groups being placed in adapted diploma programs.

Limitations

This study has several limitations that need to be considered when interpreting results. First, the sample does not represent all high school students with an autism spectrum disorder, but a subset of students who met inclusion criteria for the CSESA study. Inclusion in the CSESA study required students to have an IEP with autism (AU) as the primary or secondary area of eligibility, not to have a 504 plan, to be enrolled in one of the participating public high schools in North Carolina, Wisconsin or California, and to have two years remaining in high school. Eligibility for an IEP requires the disability to have a demonstrated negative impact on the student’s educational performance. Thus, higher functioning students with ASD who did not require an IEP were excluded. Though the data does not give this indication, it is possible that those students, who would be enrolled in standard diploma programs, might participate in WBLE at rates higher than the standard diploma track students included in this study. A sample of all high schoolers across the autism spectrum, including students near graduation, higher-
functioning individuals, and those with diagnoses making them eligible for a 504 plan, would have been more representative of participation in WBLE in the broader population of ASD. Second, participation in work-based learning experiences was not directly observed but measured through parent and/or teacher report. Many students were missing one informant’s report. Relying on these informants may fail to represent the extent of actual participation. In addition, the Proximal Measure asked for report of participation in the last four weeks. Gathering data over a longer period of time and through more direct observation would provide a more accurate picture of participation in WBLE by these students. This study also included information from only one data collection point. It is not possible to determine the trajectory of participation in WBLE over time. Future studies drawing on data points from across participants’ high school years would be important for investigation of the levels of participation in WBLE in high school for students with ASD. Further, the AIR-SDS self-report measure may not have captured the full characteristic of self-determination for participants. Combining the self-report AIR-SDS with teacher, parent, or employer/mentor reports of behaviors may have been a more accurate measure of this complex construct.

This study was also limited in that it did not include real-world, post-secondary outcome data in education and employment for participants. Participation in WBLE is a predictor, but the long-term goal is improved outcomes in the real world. In addition, the gender distribution in this study was more disproportionately male than the gender distribution in the autism population at large. A large percentage of the larger sample’s female participants were excluded due to missing data. A sample with more female participants might have revealed differences by gender in predictors that were not detected in this study.
Implications for research and practice

The CDC (2014) has estimated the prevalence of ASD to be 1 in 68 children. Approximately 50,000 individuals with an ASD will turn 18 each year (Shattuck et al, 2012). In-school outcomes have improved with early intervention and increased understanding of ASD. The most recent CDC report indicates that 44% of individuals with an ASD have average to above average IQs, which is a substantial increase from previous reports (CDC, 2016). However, post-secondary outcomes are not what would be expected, given more in-school success. Current post-secondary outcomes in employment and education for individuals with ASD are among the lowest of any disability group. Research is needed into how school systems can effectively prepare students with ASD for life after high school. High school exit is a critical transition period that requires increased focus in autism research.

Test et al (2014), Luecking (2009) and many other researchers have stressed the value of work-based learning experiences in high school as opportunities to learn and practice skills that support successful post-secondary transition for students with disabilities. Limited adaptive and social skills appear to be particular barriers to successful post-secondary education and employment for those with ASD, regardless of cognitive abilities (Wehman et al, 2009). Impairments in social and functional domains can create tremendous obstacles for people with autism when faced with the unpredictable environments of higher education and work places that require flexibility and adaptability. Skills embedded in WBLE may be particularly helpful for those with ASD. Work-based learning can provide skill-building in adaptability, relationships, the way tasks are completed, and the way people interact.

This investigation confirmed concerns that overall, rates of participation in WBLE among students with autism are very low (Lee & Carter, 2012). Given poor post-secondary outcomes
for young adults with ASD, future research and practice should focus on programs that can increase participation in WBLE for students with ASD. Research should include high-functioning individuals with and without IEPs. Research should follow young adults with ASD into post-secondary settings to document positive effects on post-secondary outcomes. Hatfield et al (2017) found no studies of effective transition planning for adolescents with autism that met the inclusion criteria of quantitative research that focused on successful, sustained employment as an outcome. Longitudinal studies of in-school transition strategies for individuals with ASD that utilize actual adult outcomes are lacking, but entirely feasible (Westbrook, Fong, Nye et al, 2014).

Taylor et al (2012) and Westbrook et al (2014) both concluded that, due to the poor methodological quality of existing studies, there is no credible evidence for a specific approach to post-secondary transition for youth and young adults with ASD. Research has demonstrated that for students with ASD to develop skills that facilitate successful transition, earlier is better. Cimera, Burgess, & Wiley (2013) found that individuals with ASD who received transition services at age 14 were significantly more likely to be competitively employed than those who received transition services at age 16. Those who received transition services earlier also had higher wages and cost less in services. In addition, some models of practice exist for work-based learning programs that are effective for students with ASD. Wehman et al (2012) reported an 88% employment rate for the youth with ASD on completion of their Project SEARCH work-based learning program versus 0% for a randomized control group who attended high school during the same period. Howlin et al (2005) found that the few transition and employment programs developed to meet the specific needs of people with autism report high levels of success. Project SEARCH and similar enterprises can inform the creation and design of WBLE
programs. Research can investigate how to incorporate elements of these programs into high school WBLE programming.

Research also supports evidenced-based practices (EBPs) that include comprehensive treatment models (CTMs) and focused interventions that are effective for individuals with ASD that can inform practice (Wong, Odom, Hume et al, 2015). A recent pilot study (Dudley, 2017) of the UNC TEACCH School Transition to Employment and Post-Secondary Education (T-STEP) Program suggested success for this high school-based, employment and post-secondary intervention for young adults with ASD. T-STEP targets executive function skills that address the unique challenges faced by young adults with ASD who will be transitioning out of high school and into adulthood. T-STEP utilizes evidence-based strategies of structured teaching such as visual supports, schedules and work systems and that have been demonstrated to promote independent work skills (Hume & Odom, 2007) and engagement (Hume, Plavnick, & Odom, 2012). T-STEP includes weekly employment generalization practice within a “real-world” employment or internship setting (Dudley, 2017).

Results from the current investigation also suggest that research is needed into the role of high school diploma status on post school outcomes, specifically for students with ASD. The findings of this study related to diploma status as the only significant predictor of WBLE have implications for research and practice. Results were the opposite of the expected advantage anticipated for those enrolled in standard diploma programs. For students with ASD, as suggested by this study, a standard diploma could mean fewer school- and community-based WBLE activities such as supported employment practice, career exploration, vocational courses, and internships or apprenticeships. More individuals with ASD are manifesting higher IQs and increased placement in regular education classrooms. Adapted diploma programs typically have
an increased focus on functional and work-based skills. There may be a misconception that young adults with ASD and higher IQs do not need functional, work-based skill instruction as well as academics. Findings indicate that they often do not qualify for supports based on increasingly difficult qualification standards after high school (Shattuck et al, 2011).

Taylor & Mailick (2014) found that adults with ASD are currently experiencing a pronounced decrease in post-secondary supports. This decrease in supports may be due in part to the fact that eligibility for many services in adulthood requires co-occurrence of intellectual disability (ID). The emerging group of individuals with ASD without ID is a group that may warrant increased attention, as more of these students are entering the school system and aspiring to pursue postsecondary roles (Nasamran et al, 2017). Providing high school transitional supports to those who are least likely to qualify for services after exiting high school but are still experiencing difficulties, namely those with ASD but not intellectual disability, could have a meaningful impact on adult outcomes (Dudley, 2017). Research should focus on a potential gap in high school programming for individuals with ASD created by this shift in diploma status towards placement in standard rather than adapted programs. Research should investigate the impact and need for WBLE participation in high school for individuals with ASD, regardless of their level of in-school academic success.

In addition, researchers have called for disaggregating disability categories when studying in-school predictors of post-school outcomes (NSTTAC, 2013). The findings of this study support that approach. None of the predictors nor control variables that have been shown to have established effects for students with disabilities in general served as predictors of WBLE for high school students with ASD in this investigation. Burgess and Cimera (2014) reported that from 2002 to 2011, the number of adults with ASD seeking vocational rehabilitation (VR)
services increased by 792 %, but that the employment results of established VR programs are not showing hoped-for effectiveness for those with ASD. About a half million youth with autism will enter adulthood over the next decade (Roux et al, 2015). Given the prevalence of students with ASD and their unique needs for successful transition, investigations for evidence-based transition practices for students with ASD should continue to focus on students with ASD rather than on students with disabilities in general.

In his Ecological Theory of Development, Bronfenbrenner (1979) defined the microsystem that includes activities, structures, and people who are in direct contact with the developing person. The mesosystem he defined includes interconnections between the various microsystems (e.g., home-school interactions or teacher-rehabilitation counselor communications). The family-level variable of household income was found to be non-significant in this study, yet interventions that include the family microsystem of the individual such as Transitioning Together (Dawalt, Greenberg & Mailick, 2018) show promise. Though the school- and community- level ecological variables included in this study were insignificant in predicting student participation in WBLE, school-level clustering effects were significant in multilevel regression analyses. School-level clustering (ICC) accounted for between 11.4% and 12.2% of the total variance in Models 2 and 3. The CDC (2016) confirmed that schools play a vital role in the quality and effectiveness of evaluations and services provided for children with ASD.

The family-level variable of household income and the two ecological variables (percentage of students eligible for free or reduced lunch and community type) included in this study may not capture the aspects of the micro- or meso-systems that impact access to WBLE for the study participants. The ICC values and findings from other investigations, however, suggest
that the lens of Ecological Theory is appropriate when investigating opportunities for participation in WBLE by students with ASD. Further, the subgroup of 28 students identified with high rates of participation in WBLE came from nineteen schools. There were two clusters of three students who came from the same school, and five sets of two students who came from the same school. One student came from each of the remaining twelve schools. Further investigations could explore characteristics of these schools that appear to have students who have more frequent learning opportunities provided by WBLE.

The impact of ecology is also reflected in the success of Project SEARCH, a model that includes partnerships and collaborations among many levels of the individual’s ecosystem. The individual with ASD and family members identify their personalized employment goals and participate in vocational assessments and internships. The local education agency provides a teacher and an adequate number of instructional assistants to implement the senior year IEP of student interns in the program. The state VR agency provides funding and supervision for job coaching services that are provided throughout the final year of school in the internships. The community rehabilitation program provides a behavior/autism specialist as job coach to assess student interests, develop and supervise internships, and provide on-site job coaching during the school day. The employer provides internship sites for the individuals with ASD. The co-workers attend intensive staff training in ASD (Wehman et al. 2013) The authors of the model highlighted multidisciplinary collaboration as one of the key features of its overall success (Wehman et al. 2012, 2014).

Future research should also examine whether aspects of the macrosystem, including broader cultural, state or regional systems and practices, influence student participation in WBLE. Though state-level clustering effects were found to be non-significant, the subgroup of
students with the highest rates of participation in WBLE was disproportionately from North Carolina. In addition, diploma status may be decided by wider educational policies at the state macrosystem level. There is beginning evidence of variability among states in terms of the percentage of adults with ASD who achieve successful employment, the number of hours worked, and weekly wages earned (Burgess & Cimera, 2014). In addition, Farley et al (2009) suggested that the support of religious congregations through community inclusion contributed to their sample in Utah having more positive independence outcomes than in previous research. As Bronfenbrenner has suggested, an indication of a difference between the ecological opportunities for development among macrosystems may be useful as a “sign on the door” (p. 260) for further study. Henninger & Taylor (2013) conducted an historical review of adult outcomes for individuals with ASD and suggested that malleable targets for intervention in the community, in addition to targets within the individual, could yield more positive results. In spite of the non-significant results for ecological variables included in this study, other research confirms that Bronfenbrenner’s (1979) emphasis on the ecology of the developing individual is especially important for successful transition to adulthood for individuals with ASD.

Conclusion

Within his ecological systems model, Bronfenbrenner (1979) emphasized, “The developmental effect of a transition from one primary setting to another is a function of the match between the developmental trajectory generated in the old setting and the balance between challenge and support presented by the new setting” (p. 261). Autism spectrum disorder, a pervasive developmental disorder that can lead to impairments in social and functional behaviors, has a prevalence established by the CDC (2014) of 1 in 68 individuals. With increased rates of early detection and intervention and improved understanding of ASD, students
with ASD are currently experiencing increased academic success through high school. However, as it stands now, children and adolescents with ASD grow into adulthoods of extremely low educational and vocational success after exiting high school (Taylor & Seltzer, 2011). Gaps persist in our understandings of successful post-secondary transition for students with ASD. Results from this investigation suggest that research on in-school predictors of post-secondary outcomes should disaggregate students with ASD from students with other disabilities in analyses. Adolescents with autism may require specialized supports and planning throughout their transition from school to adult life (Wehman et al, 2009). In Bronfenbrenner’s terms, the “developmental trajectory” generated in high school does not yet match the “challenges and supports presented by the new”, post-secondary settings. Continued research into high school transition experiences that improve post-secondary outcomes for students with ASD is therefore needed.

Work-based learning experiences (WBLE) for high school students with ASD should provide learning and practice in the skills they need to better “match” the challenges they face in higher education and the work place. Findings from this investigation and previous research both suggest that students with ASD are, overall, characterized by very low rates of participation in WBLE. Research is needed on how to increase these rates. Currently questions remain as to student, school, and community characteristics that predict participation in the learning opportunities that WBLE provides. This investigation found that students in standard diploma programs participated in WBLE at a much lower rate than those in adapted diploma programs. In addition, findings suggested that what happens in an individual school can greatly impact rates of WBLE participation. Research is also needed on the impact of WBLE participation on actual post-secondary outcomes for students with ASD. Individuals with ASD deserve the quality of
life that is afforded by successful transition to adulthood. They have skills, talents and contributions we have all benefitted from tremendously. We cannot afford to lose the future contributions they can make with increased engagement in the environments of work and learning after high school.
### APPENDIX A: CSESA Proximal Measure

#### CSESA Proximal Measure - PARENT

<table>
<thead>
<tr>
<th>During the <strong>past 4 weeks</strong> about how often did your son or daughter:</th>
<th>Never</th>
<th>1-2 times this month</th>
<th>A few times this month</th>
<th>About once a week</th>
<th>Several days a week</th>
<th>If Yes, how long was each activity?</th>
<th>If YES, was this a school supported activity?</th>
</tr>
</thead>
<tbody>
<tr>
<td>20. Job exploration (work sampling, work shadowing, interviewing others about careers)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>☐ Less than 30 min.</td>
<td>☐ Yes</td>
</tr>
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<td></td>
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<td></td>
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<td></td>
<td>☐ 30-60 min</td>
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<td></td>
<td></td>
<td></td>
<td>☐ More than 60 min</td>
<td></td>
</tr>
<tr>
<td>21. Jobs around the school</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>☐ Less than 30 min.</td>
<td>☐ Yes</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>☐ 30-60 min</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>☐ More than 60 min</td>
<td></td>
</tr>
<tr>
<td>22. Unpaid internships/ volunteering in the community</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>☐ Less than 30 min.</td>
<td>☐ Yes</td>
</tr>
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<td></td>
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<td></td>
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<td>☐ 30-60 min</td>
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<td></td>
<td>☐ More than 60 min</td>
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<tr>
<td>23. Paid employment in the community</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>☐ Less than 30 min.</td>
<td>☐ Yes</td>
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<td>☐ More than 60 min</td>
<td></td>
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</tbody>
</table>

#### CSESA Proximal Measure - TEACHER

Please read each item carefully and mark the number that best describes how often the student has participated in each transition-related activity in the past 4 weeks, to the best of your knowledge.

<table>
<thead>
<tr>
<th>During the <strong>past 4 weeks</strong> about how often did the student:</th>
<th>Never</th>
<th>1-2 times this month</th>
<th>A few times this month</th>
<th>About once a week</th>
<th>Several days a week</th>
<th>If Yes, how long was each activity?</th>
</tr>
</thead>
<tbody>
<tr>
<td>24. Job exploration (work sampling, work shadowing, interviewing others about careers)</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>25. Jobs around the school</td>
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<td>26. Unpaid internships/ volunteering in the community</td>
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<td>27. Paid employment in the community</td>
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