

Exploring Predictors of Postsecondary Outcomes for Students with Autism Spectrum Disorder

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Abstract: Participating in postsecondary activities such as education and employment can increase an individual's independence, contribution to society, and quality of life. However, researchers suggest that students with autism spectrum disorder (ASD) engage in these postsecondary activities less than their peers do. The extent to which academic and social skills predict postsecondary outcomes for students with ASD is not yet understood. Logistic regression analyses using the National Longitudinal Transition Study – 2 (NLTS2; SRI, 2000) dataset were conducted to examine the extent to which academic skills and social skills predict postsecondary outcomes for students with ASD. Results suggested that academic achievement was significantly related to postsecondary education and overall success and that social skills significantly predicted all three postsecondary outcomes for students with ASD.

The transition from adolescence to adulthood can be challenging for many students. Students with disabilities in particular experience lower rates of success when transitioning from high school to postsecondary roles in comparison to their typically developing peers (Blackorby & Wagner, 1996). Specifically, students with autism spectrum disorder (ASD) encounter a variety of challenges. ASD is a developmental disorder characterized by impaired social interaction and communication skills and a repetitive or restricted pattern of behavior (American Psychiatric Association, 2013). These challenges can make the transition to postsecondary experiences especially difficult for students with ASD. In a comprehensive review of existing literature on the transition from high school to postsecondary environments among students with ASD, Wehman et al. (2014) point to the tremendous potential for individuals with ASD to make important contributions to society if various barriers to their postsecondary success can be overcome. Currently, students with ASD participate in postsecondary educational programs, employment opportunities, and independent living

at very low rates (Billstedt, Gillberg, & Gillberg, 2005; Hendricks & Wehman, 2009). Anderson, Shattuck, Cooper, Roux, and Wagner (2014) found that individuals with ASD were much less likely than students of other disability groups to live independently following high school, even when controlling for functional ability. Given these findings, it is important to more carefully explore factors that can potentially affect these students' transition and integration into the community.

There is evidence to suggest that academic achievement in high school is an important factor that corresponds to later outcomes for the student population in general (Hein, Smerdon, & Sambolt, 2013). However, the relationship of academic achievement and postsecondary outcomes for students with ASD is not yet well understood. Additionally, this emphasis on academic achievement may lead to a reduced focus on social skill instruction, which may be especially important for students with ASD given that “persistent deficits in social communication and social interaction across multiple contexts” are a defining feature of ASD according to the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5; American Psychiatric Association, 2013). Although variability exists in the severity and manner in which social impairments manifest across the autism spectrum, students

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with ASD by definition universally experience social difficulties, and social skills instruction has been shown to improve social functioning for students with ASD (White, Koenig, & Scahill, 2010). Given the social impairments experienced by students with ASD, social skills may be a particularly important and predictive factor that affects the postsecondary outcomes of students with ASD. Thus, the purpose of the current study is to explore both academic achievement and social skills as predictors of postsecondary success for students with ASD.

Postsecondary Outcome Rates

Transitioning to and completing a postsecondary education program or obtaining gainful employment can increase an individual's independence, contribution to society, and quality of life (Hendricks, 2010; Stodden & Mzurek, 2010). However, little research has been conducted regarding these postsecondary outcomes for students with ASD. Some researchers have examined the postsecondary participation rates of individuals with ASD. In a study of 140 young adult and adult males with ASD, only about 14% were a) employed or enrolled in higher education or vocational training and b) living independently, and 27% reported participating in one or the other (Cederlund, Hagberg, Billstedt, Gillberg, & Gillberg, 2008). In another study of 48 young adult males and females with ASD, less than one-third of the participants participated in a postsecondary educational or training program, with only one attending a four-year university, and none having yet graduated with a certificate or degree (Eaves & Ho, 2008). Additionally, only about half of the participants had ever participated in employment opportunities, most of which were in volunteer or part-time settings, such as delivering papers or sorting recyclables (Eaves & Ho, 2008). Finally, more than half of the participants lived at home with their parents, with only four participants living independently.

Taylor and Seltzer (2010) examined the postsecondary experiences of 66 students with ASD and examined more closely differences for those with and without comorbid intellectual disabilities (47 with comorbid intellectual disabilities [ID] and 17 without ID). Of the students with ASD and ID, 82% were involved

in some sort of regular day activity (i.e., college, employment, adult day services), whereas only 76% of those with ASD and no ID were involved in these regular day activities. Although more students with ASD and no ID were attending a college or university compared to those with ID (i.e., 47% vs. 2%), the lack of structured postsecondary activity among many of the students with ASD and without ID suggests a potential need to look more carefully at those who are higher functioning. Researchers have also compared postsecondary experiences of individuals with ASD to those of the general population and students with other disabilities (Hendricks & Wehman, 2009). These researchers found that less than one-third of 23- to 26-year-olds with ASD were currently employed and worked for pay compared to an average of 59% for all respondents (Hendricks & Wehman, 2009). Compared to other disability groups, those with ASD had the second lowest rate of postsecondary employment participation (Hendricks & Wehman, 2009).

Rates of postsecondary participation have also been examined in a nationally representative sample of students with ASD. In one study, postsecondary participation rates of students with ASD were compared to those of students of three other disability categories: speech/language impairment, learning disability, and intellectual disability (Shattuck et al., 2012). Postsecondary participation rates in this larger nationally representative sample were consistent with findings in the existing literature, with only about 35% of students with ASD attending a postsecondary educational institution and about 55% participating in paid employment within six years of graduating from high school. However, more than 50% of the ASD group had no participation in postsecondary educational or employment activities within two years of high school graduation. In comparison to the other disability groups, those with ASD had the lowest rate of participation in employment and the highest rate of no participation in postsecondary educational or employment activities (Shattuck et al., 2012). In other studies examining a nationally representative sample of students with ASD, findings indicated that 43% of students with ASD attended a postsecondary educational institution (Chiang, Cheung,

Hickson, Xiang, & Tsai, 2012) and 56% participated in paid employment (Chiang, Cheung, Li, & Tsai, 2013). Together, results from the existing literature consistently indicate that individuals with ASD have poorer postsecondary outcomes and are participating in important postsecondary activities, such as education, employment, and independent living, at lower rates compared to their peers. Based on data from the National Longitudinal Transition Study - 2 (NLTS2), enrollment in postsecondary training among students with autism was estimated to be approximately 44% and was less than enrollment rates of six other disability groups, including those with learning disabilities, speech/language impairments, hearing impairments, visual impairments, orthopedic impairments, and those with other health impairments (Newman et al., 2011). The postsecondary completion rate for students with ASD was estimated to be 39% (Newman et al., 2011). In a survey of postsecondary institutions, only 56% reported enrolling students with an ASD; a higher proportion of institutions reported enrolling students of several other disability types, including those with hearing impairments, visual impairments, mobility concerns, learning disabilities, ADD/ADHD, health impairments, and mental illness (Raue & Lewis, 2011).

Academic Achievement and Postsecondary Outcomes

Pursuing postsecondary activities such as higher education and employment can be a selective process in which only those who meet certain qualifications are given the opportunity to participate (Hart, Grigal, & Weir, 2010). Academic achievement is one qualification that has been found to be a strong predictor of postsecondary success for the student population in general (Garland et al., 2011). For instance, an American Institutes for Research review of the literature found several academic factors associated with postsecondary educational success, such as higher GPAs and standardized test scores on national and state academic assessments (Hein et al., 2013). Academic factors have been linked to enrollment and persistence in postsecondary education across a variety of programs, including both two- and four-year institutions (Gar-

land et al., 2011). Students with higher academic performance may have the necessary skills to pursue, persist, and succeed in demands of higher education.

Social Skills and Postsecondary Outcomes

Social skills have also been shown to be an important predictor of postsecondary success. Some researchers suggest that students who have better social skills demonstrate greater persistence and ability to navigate the demands of postsecondary education compared to students with lesser social skills (Dymnicki, Sambolt, & Kidron, 2013). Students with greater social skills may also be more desirable to employers (Hein et al., 2013). Many employers seek potential employees who demonstrate specific social skills in addition to work-related qualifications. Some researchers have found that individuals who demonstrate better social skills are more sought after by employers and may be more likely to secure entry-level positions (Casner-Lotto & Barrington, 2006).

Social skills have also been identified as important for postsecondary success among students with disabilities. Test, Mazzotti, Mustian, Fowler, Kortering, & Kohler (2009) conducted a systematic literature review to examine the existing research on predictors of postsecondary outcomes for students with disabilities. Of the 22 empirical articles included in the review, the authors identified three studies as including social skills as a predictor of postsecondary success for students with disabilities, with the three studies identifying a medium to large effect size for social skills on postsecondary success (i.e., Benz, Yovanoff, & Doren, 1997; Halpern, Yovanoff, Doren, & Benz, 1995; Roessler, Brodin, & Johnson, 1990). Whereas the Benz et al. (1997) and Roessler et al. (1990) studies focused on actual measurement of social skills as predictors, the Halpern et al. (1995) included instruction in social skills as the predictor, and found that receipt of such instruction was a predictor of postsecondary education participation. Based on a more recent analysis and report put out by the National Secondary Transition Technical Assistance Center (NSTTAC), social skills have been found to be predictive of several postsecondary outcomes including education, employment, and independent living for students with

disabilities (NSTTAC, 2013). Although some students with ASD may have been included in the related studies examined, separate analyses were not conducted to specifically examine predictors for students with ASD. In fact, NSTTAC (2013) points to a need for related information disaggregated by disability type.

Predictors of Postsecondary Outcomes for Students with ASD

Three recent studies have examined predictive factors of postsecondary outcomes for students with ASD using data from the NLTS2. Chiang et al. (2012) found that academic achievement, among a variety of other factors, significantly predicted participation in postsecondary education for students with ASD. Second, Chiang et al. (2013) found that social skills were significantly related to participation in postsecondary employment. Third, Wei, Wagner, Hudson, Yu, and Shattuck (2015) identified three primary pathways of postsecondary outcomes for students with ASD, including (1) primarily postsecondary education focused, (2) primarily employment focused, and (3) disengaged from both postsecondary education and employment; they further found that a brief measure of functional skills and conversational skills predicted which students were categorized as primarily postsecondary education focused, but these same skills did not differentiate between those in the other two groups. The current study aims to extend on these studies and the previous literature in several ways. First, while Chiang et al. (2012) and Chiang et al. (2013) identified academic achievement and social skills separately as predictive of postsecondary education and employment outcomes respectively, this study examines both academic achievement and social skills as potential predictors of postsecondary success. Given that academic achievement and social skills may both be important factors linked to postsecondary outcomes, it is important to consider both factors together. Additionally, the predictor variables used in this study (i.e., academic achievement and social skills) are based on data from instruments that have been developed to measure a broad range of academic and social skill proficiency levels and that have established technical adequacy. As opposed to use of categorical aca-

ademic and social skills variables in Chiang et al. (2012), Chiang et al. (2013), and Wei et al. (2015), this allows for more specific examination of the levels of academic achievement and social skills that are more likely to result in successful postsecondary outcomes for the population of students in our study. Second, multiple postsecondary outcomes (i.e., education, employment, independent living, and overall success) will be examined in this study together, as it is important to explore the variety of postsecondary opportunities available to students with ASD. Fourth, the most recent data on student outcomes will be used for analysis in this study, as opposed to outcomes examined from an earlier time point in Chiang et al. (2012) and Chiang et al. (2013). Finally, this study examines postsecondary outcomes for a specific subset of students with ASD. As a spectrum of disorders, ASD comprises a large variety of symptom manifestation and severity. Higher-functioning students with ASD have different challenges and needs than those with more severe ASD. Increased attention should be given to examine factors that may be related to postsecondary outcomes for higher-functioning students with ASD, as more of these students are entering the school system and aspiring to pursue postsecondary roles (Camarena & Sarigiani, 2009). Some research has indicated that a higher proportion of these higher-functioning students may not be accessing appropriate daytime activities when compared to lower functioning students with ASD (Taylor & Seltzer, 2010). Thus, the purpose of the current study is to answer the following research questions (1) To what extent do academic achievement and social skills in high school predict postsecondary education enrollment and/or graduation among higher-functioning students with ASD? (2) To what extent do academic achievement and social skills predict postsecondary employment among higher-functioning students with ASD? (3) To what extent do academic achievement and social skills predict overall success (i.e., enrollment or graduation from postsecondary educational institution or employment) among higher-functioning students with ASD? and (4) To what extent do academic achievement and social skills predict independent living

status among higher-functioning students with ASD?

Method

National Longitudinal Transition Study – 2

Data collected as part of a larger project, the National Longitudinal Transition Study – 2 (NLTS2; SRI, 2000), were analyzed in this study. The NLTS2 was a longitudinal study funded by the United States Department of Education that collected information about students with disabilities and their experiences transitioning from secondary school to postsecondary roles. Data were collected at five time points from 2001 to 2009. Data were gathered through multiple means: parent and/or youth telephone interviews, direct assessments of students, teacher surveys, school program surveys, school information surveys, and student transcripts (SRI International, 2000). The NLTS2 sample was developed with the intent to include a nationally representative sample of students across each of the 12 federal special education disability categories. Participants from the NLTS2 were identified using a two-stage process (SRI International, 2000; Wagner, Newman, Cameto, & Levine, 2005). First, a stratified sample of Local Educational Agencies (LEA) and state-supported schools were randomly selected to account for geographic region, student enrollment, and wealth of the LEA/community. Second, students within the selected LEAs and special schools who were receiving special education services, between the ages of 13 and 16, and in at least seventh grade on December 1, 2000 were randomly selected to participate. Participants were 13 to 16 years of age at the start of the study and 21 to 26 years old at the time of final data collection.

Participants

In this study, participants were a subset of the sample from the NLTS2. Students who were identified as having a primary disability of “autism” in Wave 1 of the Parent Interview were selected. Then, only those with data in the Wave 2 Direct Assessment and Wave 5 Parent/Youth Survey were included ($N = 170$). As part of NLTS2, about 67% of participants

completed either the direct or alternate assessment based on their level of functioning (Wagner, Newman, Cameto, & Levine, 2006). Students with sensory, physical, behavioral, or cognitive disabilities who were unable to follow instructions or answer questions reliably participated in the alternate assessment (Wagner et al., 2006). Given that the sample in this study consisted only of students who participated in the direct assessment, the sample likely represented students with ASD who were higher-functioning in general (e.g., had appropriate skills to complete language arts, math, social science, and science assessments). Through a brief analysis of the proportion of students with ASD taking the direct vs. alternate assessment, we identified a substantially greater proportion of those taking the alternate assessment to have comorbid moderate to severe intellectual disabilities (41%) compared to the proportion of those taking the direct assessment (10%). This supports the notion that our sample tended to be higher-functioning students with ASD. Use of the direct assessment data allowed for analysis of information about our predictor variables with higher technical adequacy, given that only students who participated in the direct assessment completed these measures. Ultimately, the total unweighted sample was 170 (NOTE: This is rounded to the nearest 10 per the requirements set by the Institute of Education Sciences (IES) for reporting purposes). Demographic information is similarly rounded to the nearest 5%. Participants represented approximately 20% of the students who were originally identified as having a primary disability of autism.

The final sample consisted of approximately 80% male and 20% female participants. Approximately 90% were White, approximately 5% were African American and approximately 5% were Asian/Pacific Islander. At the start of data collection, approximately 50% were 13 to 14 years old, approximately 10% were 15 years old, approximately 30% were 16 years old, and approximately 10% were 17 years old. At the time the direct assessment was administered, approximately 50% were 16 years old, approximately 40% were 17 years old, and approximately 10% were 18 years old. Household income was over \$50,000 for approximately 60% of students,

between \$25,001 and \$50,000 for approximately 20% of students, and under \$25,000 for approximately 10% of students; income data was missing for approximately 5%.

Data Collection

Data were pulled from the NLTS2 Wave 1 Parent Interview, Wave 2 Direct Assessment, and Wave 5 Parent/Youth Survey. The Wave 1 Parent Interview was a 60-minute phone interview completed with a parent or guardian. Mail questionnaires were administered to parents who were unavailable by phone. Parents answered questions about student and family characteristics, satisfaction with school programs, student activities outside of school, and student activities after high school. The Wave 5 Parent/Youth Survey was conducted in the same manner, except students who were able to answer the questions themselves were asked to provide information about their experiences and outcomes. If both youth and parent data were available, information provided by the youth was used. The Wave 5 Parent/Youth Survey contained the most recent data available for each participant as of 2009, which may have been collected at a previous time point. The Direct Assessment was conducted by trained on-site school professionals during the wave in which the student was between 16 and 18 years old.

Measures

Academic achievement. Academic achievement was measured using students' standard scores from four subtests (Passage Comprehension, Applied Problems, Social Science, and Science) on the research edition of the Woodcock-Johnson Tests of Achievement III (WJ-III ACH; Woodcock, McGrew, & Mather, 2001). Students' standard scores on the Passage Comprehension, Applied Problems, Social Sciences, and Science subtests from the Wave 2 Direct Assessment were averaged to create an overall academic achievement score.

Social skills. Social skills were measured using parent-ratings of the students' social skills in the Wave 1 Parent Interview. There were 11 total items, most of which were drawn from the Social Skills Rating System – Parent Form (Gresham & Elliot, 1990), reflecting three social skill areas:

assertion, self-control, and cooperation. Parents were asked to rate whether the student engaged in specific social interaction skills on a scale of “never,” “sometimes,” or “always.” A composite social skills score based on parents' responses to the 11 items was calculated by the dataset developers, ranging from 0 to 22. This composite score was used as a measure of students' overall social skills in this study. A reliability analysis of this scale was conducted for the purpose of this study and indicated a reliability coefficient of 0.65, which is considered to be an acceptable level of internal consistency (DeVellis, 1991; Kline, 2000).

Postsecondary educational success. Postsecondary educational success was defined as being enrolled in or having graduated from a postsecondary institution (i.e., vocational, two-year, or four-year college). Participants who were reported by the student or parent in Wave 5 to be currently attending, have graduated/completed and currently attending, or have graduated/completed their education at a postsecondary institution were coded as 1. Participants who were reported to have left, did not complete their education, or have not yet attended a postsecondary institution were coded as 0. Those who reported returning to secondary school were also coded as 0. Participants with a not applicable answer, those who skipped the question, and those who indicated attending but whose statuses in a postsecondary institution were unknown were coded as “missing.”

Employment success. Employment success was defined as holding a current paid job since leaving high school and within the past two years of the interview. Participants were coded as 1 if they were reported by the student or parent in Wave 5 to have a paid job currently and works/ worked full- or part-time at all jobs combined. Those who reported not having a paid job currently were coded as 0. Additionally, those who reported returning to secondary school were coded as 0. Those who provided an answer of not applicable or skipped the question were coded as “missing.” For the related analysis, participants who were currently enrolled in a postsecondary educational institution were not included and considered “missing.”

Overall success. “Overall success” was defined as experiencing postsecondary educational and/or employment success. Partici-

pants who were reported by the student or parent in the Wave 5 interview to (a) be enrolled in a postsecondary institution, (b) have graduated from a postsecondary institution, or (c) hold a current paid job were coded as 1. Those who did not experience postsecondary success and did not experience employment success were coded as 0.

Independent living. Independent living was defined as living autonomously from parental/guardian and assisted care. Those who were reported by the student or parent in Wave 5 to be in the following living conditions were coded as 1: on his/her own, with a spouse or roommate, in a residential or boarding school, in college housing or dormitory, in military housing, in job corps, job training program, or on location at the job. Those who were reported to be living with his/her parents, in foster care, with another relative, in a group home or assisted living center, in a hospital or medical facility, in a mental health facility, in a correctional facility/youth detention center, to be transient, homeless, or living in a car, with a non-family legal guardian, or in some other situation/location were coded as 0. Participants who reported living in several locations across categories ($n = 2$) were coded as missing.

Results

Descriptive statistics for the predictor variables are presented in Table 1. Participants performed generally in the low average range compared to same-age peers. Average scores on the WJ-III fall between standard scores of 90 to 110. Standard scores between 80 and 89 are considered to be in the low average range of academic functioning. Passage Comprehension and Applied Problems scores ($M = 87.5$ and $M = 87.3$) were in the low average range compared to same-age peers, while Social Science and Science scores ($M = 91.8$ and $M = 93.6$) were within the average range. The mean score of the social skills composite ($M = 11.6$) indicates that parents on average rated their youth to sometimes engage in appropriate social skills. Possible scores on this composite measure ranged from 0 (youth never engages in appropriate social skills) to 22 (youth always engages in appropriate social skills). A score of 11.6

TABLE 1

Descriptive Statistics of Standard Scores

	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>
Academic Achievement	8	129	90.05
Passage Comprehension	17	147	87.54
Applied Problems	4	116	87.31
Social Science	1	140	91.77
Science	9	136	93.60
Social Skills Composite	4	22	11.57

indicates that parents, on average, perceived their youth to sometimes engage in appropriate social skills.

Approximately 60% of the sample experienced postsecondary educational success. Of those individuals the areas of study represented included arts/drama/dance/music/graphic design/graphic arts/fashion, computer science/programming/information technologies/computer support, health care, communications/journalism/TV/radio/entertainment, science, liberal arts, 5% social sciences, business/marketing/advertising/management/finance, engineering, clerical work, English/literature/library science, and animal care. Approximately 40% of the individuals who were represented in this study were considered to have experienced employment success. Of those employed, areas of work included material recording/scheduling/dispatching/distributing, food preparation/service, material moving work, and building cleaning/pest control. Approximately 15% of the represented individuals in this study were considered to be living independently. Given that only a small percentage of the sample met the criteria for independent living, the logistic regression analyses were not carried out for this outcome variable.

Predicting Postsecondary Success

Logistic regression analyses were conducted using academic achievement and social skills to predict success for individuals with ASD for three postsecondary outcomes.

Post-Secondary Educational Success

First, the two predictor variables (i.e., academic achievement and social skills) were re-

TABLE 2

Logistic Regression Model for Postsecondary Educational Success

<i>Independent Variable</i>	<i>B</i>	<i>S.E.</i>	<i>Wald (df)</i>	<i>Sig.</i>	<i>Exp(B)</i>
Academic Achievement	.05	.01	27.22 (1)	< .001*	1.05
Social Skills	.12	.06	4.32 (1)	.04*	1.13
Constant	-5.51	1.19	21.32	<.001	.00
Model χ^2	=	39.8 (2), $p < .001^*$			
Nagelkerke R^2	=	.30			
Correct Predictions	=	74%			
<i>n</i>	=	160			

Note: the dependent variable in this analysis is postsecondary educational success coded so that 1 = successful and 0 = not yet successful.

* Indicates significance at the .05 level.

gressed on postsecondary educational success (see Table 2). According to the likelihood ratio statistic, this model was statistically significant ($\chi^2 = 39.8$ $p < .001$, $df = 2$), indicating that the overall model was statistically reliable in distinguishing between individuals with ASD who were successful and those who were not yet successful. The regression model explained 30.3% of the variance in postsecondary educational success (Nagelkerke's R^2), suggesting a moderately weak relationship between prediction and grouping, and the model correctly classified 74% of cases (59% for unsuccessful and 84% for successful). The Wald criterion suggested that both academic achievement ($p < .001$) and social skills ($p = .034$) were statistically significant predictors of postsecondary educational success. The exponent of the coefficient (odds ratio) for academic achievement (1.05) suggested that for every one unit increase in academic achievement, individuals with ASD were 1.05 times as likely (5% more likely) to be successful, holding social skills constant. The odds ratio for social skills (1.13) suggested that for every one unit increase in social skills, individuals with ASD were 1.13 times as likely (13% more likely) to be successful, holding academic achievement constant. Analysis of predicted probabilities indicated participants predicted to experience postsecondary educational success had an average academic achievement standard score of 99.61 and an average social skills score of 12.32. Participants predicted to be not yet successful had an average academic achievement standard score of 63.33 and an

average social skills score of 10.73. When the interaction was added to the model, no significant improvement in prediction was evident.

Employment Success

Next, academic achievement and social skills were regressed on employment success (see Table 3). Again, the likelihood ratio statistic suggested this model was statistically significant, indicating the model reliably distinguished between successful individuals and those who were not yet successful ($\chi^2 = 7.16$, $p = .03$, $df = 2$). The regression model explained 7.4% of variance in employment success (Nagelkerke's R^2), suggesting a weak relationship between prediction and grouping, and the model correctly predicted 59.5% of cases (74.6% for unsuccessful and 40.0% for successful). The Wald criterion suggested that social skills were a significant predictor of employment success ($p = .02$), while academic achievement was not a significant predictor ($p = .34$). The odds ratio for social skills (1.15) suggested that for every one unit increase in social skills, individuals with ASD were 1.15 times as likely (15% more likely) to experience employment success, holding academic achievement constant. Analysis of predicted probabilities indicated that participants predicted to experience postsecondary employment success had an average social skills score of 15.07. Participants predicted to be not yet successful had an average social skills score of 9.82. When the interaction was added

TABLE 3

Logistic Regression Model for Employment Success

<i>Independent Variable</i>	<i>B</i>	<i>S.E.</i>	<i>Wald (df)</i>	<i>Sig.</i>	<i>Exp(B)</i>
Academic Achievement	.01	.01	.91	.34	1.01
Social Skills	.14	.06	5.81	.02*	1.15
Constant	-2.56	1.00	6.54	.01	.08
Model χ^2	=	7.16 (2), $p = .03^*$			
Nagelkerke R^2	=	.07			
Correct Predictions	=	59.5%			
<i>n</i>	=	130			

Note: the dependent variable in this analysis is employment success coded so that 1 = successful and 0 = not yet successful.

* Indicates significance at the .05 level.

to the model, no significant improvement in prediction was evident.

Overall Success

Finally, academic achievement and social skills were regressed on overall success (i.e., experiencing postsecondary educational and/or employment success; see Table 4). A test of this regression model was statistically significant ($\chi^2 = 29.37, p < .001, df = 2$). The regression model accounted for 24.9% of the variance in overall success (Nagelkerke’s R^2) suggesting a weak relationship between prediction and grouping, and the model correctly predicted 77% of cases (25.6% for unsuccessful and 93.4% for successful). The Wald criterion suggested that both academic

achievement ($p < .001$) and social skills ($p = .001$) were significant predictors of overall success for individuals with ASD. The odds ratio for academic achievement (1.04) suggested that for every one unit increase in academic achievement, individuals were 1.04 times as likely (4% more likely) to experience overall success, holding social skills constant. The odds ratio for social skills (1.25) suggested for every one unit increase in social skills, individuals were 1.25 times as likely (25% more likely) to experience overall success, holding academic achievement constant. Analysis of predicted probabilities indicated participants predicted to experience overall success had an average academic achievement standard score of 90.03 and an average social skills score of 12.24. Participants predicted to be not yet suc-

TABLE 4

Logistic Regression Model for Overall Success

<i>Independent Variable</i>	<i>B</i>	<i>S.E.</i>	<i>Wald (df)</i>	<i>Sig.</i>	<i>Exp(B)</i>
Academic Achievement	.04	.01	14.76 (1)	$p < .001$	1.04
Social Skills	.22	.07	10.78 (1)	$p = .001$	1.25
Interaction of Predictors	-4.43	1.16	14.47 (1)		
Constant					.01
Model χ^2	=	29.374 (2), $p < .001$			
Nagelkerke R^2	=	.25			
Correct Predictions	=	77%			
<i>n</i>	=	160			

Note: the dependent variable in this analysis is overall success coded so that 1 = successful and 0 = not yet successful.

* Indicates significance at the .05 level.

cessful had an average academic achievement standard score of 56.85 and an average social skills score of 7.95. When the interaction was added, no significant improvement in prediction was evident.

Discussion

In this study, a secondary analysis of the NLTS2 data focusing on predictors of postsecondary outcomes for individuals with ASD was conducted. The results of this study suggest that (a) academic achievement was a significant predictor of postsecondary educational success and overall success and (b) social skills were a significant predictor of all three postsecondary outcomes. Similar to findings in the existing literature, which indicate that academic achievement corresponds to participation in postsecondary education for typically developing students and students with disabilities (Garland et al., 2011; Stodden & Mzurek, 2010), the results of this study suggest that academic achievement was predictive of enrollment in and/or completion of a postsecondary educational program for individuals with ASD. This finding is also consistent with the results from Chiang et al. (2012); individuals with ASD who achieved higher academic achievement scores were more likely to enroll in or graduate from a postsecondary institution. Specifically, those with a greater likelihood of enrolling in or graduating from a postsecondary educational institution on average achieved academic scores in the average range compared to typical peers. These findings highlight the importance of continuing to support the academic needs among individuals with ASD in high school in order to facilitate successful transitioning to a postsecondary educational program.

It is important to note that the results of this study indicated a higher rate of participation in postsecondary education for individuals with ASD than previously reported in the existing literature. While the results from many studies together have suggested low rates of postsecondary educational participation for individuals with ASD, finding that less than half of participate in postsecondary education (Chiang et al., 2012; Shattuck et al., 2012), 62% of the sample in this study were either enrolled in or had graduated from a postsecondary institution.

The higher percentage of postsecondary educational participation found in this study was likely due to the nature of our sample. Specifically, the sample of individuals with ASD in this study included only those who had appropriate skills to participate in academic achievement assessments and thus, likely represents students with ASD who were higher-functioning in general. In fact, descriptive statistics showed that our sample, on average, performed within the low average to average range academically in comparison to typically developing peers. Thus, these higher-functioning students with ASD were perhaps less likely to have cognitive deficits that are typically found in more severe cases of ASD and more likely to possess the appropriate intellectual abilities to pursue postsecondary education. This is consistent with what has been reported in the existing literature, which suggests that higher-functioning individuals with ASD are beginning to attend college or seek other postsecondary educational opportunities (Camarena & Sarigiani, 2009). Additionally, our definition of postsecondary educational success included participation in vocational education and/or training programs in addition to traditional two- and four-year institutions. When examining postsecondary outcomes for individuals with ASD, it is important to consider this broader definition of postsecondary educational success, as participating in vocational training programs becomes a viable option for students with and without disabilities alike. Ultimately, the higher rate of postsecondary educational success for higher-functioning individuals with ASD is reassuring, as it shows that these capable students are aspiring and beginning to participate in postsecondary education (Camarena & Sarigiani, 2009).

In addition to the encouraging rates of postsecondary educational participation, the individuals of ASD in this sample were engaged in studies across a variety of disciplines, including the arts, technology, healthcare, communications/entertainment, science, liberal arts, business, social sciences, engineering, clerical work, literature, and animal care. This finding is important because it suggests that individuals with ASD can pursue higher education in numerous different areas. This is contrary to the misconception that individuals with ASD are limited to certain subjects due to their

social deficits. For example, some researchers recently noted that students with ASD chose to study science, technology, engineering, and math at higher rates than the general population of students (Wei, Yu, Shattuck, McCracken, & Blackorby, 2013); however, the results from this study suggest that individuals with ASD may actually be exploring a greater variety of educational opportunities.

Social skills were found to be a significant predictor of all three postsecondary outcomes for individuals with ASD in this study. These findings further contribute evidence to the existing literature suggesting that social skills predict postsecondary education and employment success for students with and without disabilities (Casner-Lotto & Barrington, 2006; Chiang et al., 2013; Dymnicki et al., 2013). In this study, students with better social skills were more likely to have been enrolled in or graduated from a postsecondary educational institution. On average, those with a greater probability of experiencing postsecondary educational success were rated as engaging in appropriate social skills more than just “sometimes.” These individuals perhaps possessed the appropriate social skills necessary for navigating the social environment of a postsecondary institution. For individuals with ASD who were not currently enrolled in a postsecondary institution, social skills also significantly predicted whether or not they obtained paid employment. Those with a greater likelihood of experiencing employment success were rated as engaging in appropriate social skills significantly more than “sometimes,” but not quite “always.” While academics is undoubtedly an important goal for schools and educators, these findings highlight the importance of continued social skills instruction for individuals with ASD, who may particularly need support in this area. It may be especially important to provide appropriate social skills support to students with ASD to ensure that they are learning to engage in social skills and interactions appropriately at a higher rate than just some of the time, as this may help increase their likelihood of participation in various postsecondary activities.

The low rate of postsecondary employment participation in this study is consistent with findings of low participation rates in previous studies (Shattuck et al., 2012). Additionally, individuals

with ASD who were not currently enrolled in a postsecondary institution worked in a lesser variety of areas, such as material recording/scheduling/dispatching/distributing, food preparation/service industry, material moving, and building cleaning/pest control. There were extremely few to no individuals with ASD who worked in any other lines of work. These findings are inconsistent with those of Chiang et al. (2013), who found that more than half of individuals with ASD in general participated in variety of jobs after high school graduation. The differences in our findings is again likely due to the nature of our sample and related analyses, which only included higher-functioning individuals who were not currently enrolled in a postsecondary institution. Thus, the findings of this study suggest that, for individuals who obtained paid employment without first enrolling in or completing a postsecondary education, the opportunities for paid work may be limited. These findings highlight the potential importance of pursuing postsecondary education prior to employment, especially for higher-functioning individuals with ASD who may be capable of doing so. Postsecondary educational experiences can increase individuals’ future employment opportunities in general (Stodden & Mruzek, 2010), and this may also be true for individuals with ASD. Participating in postsecondary education first may open more opportunities for higher-functioning individuals with ASD to pursue individual areas of interests and strengths and obtain future employment in a larger variety of areas.

Implications

The results of this study hold several implications for practice. The results highlight the imperativeness of improving the academic skills of students with ASD, especially higher-functioning students who are capable of participating in academics. It is important for educators to use effective instructional practices, in addition to continuing to educate students with ASD in the general education curriculum, in order to promote the academic growth of students with ASD. Explicit and direct instruction in academic skills has been shown to be effective for students with ASD (Bethune & Wood, 2013; Ganz & Flores, 2009;

Knight, Smith, Spooner, & Browder, 2011), and may be particularly important for putting students with ASD on track for successful postsecondary educational experiences. Academic achievement appears to predict later participation in postsecondary education, and students who performed in the average range academically experienced a greater likelihood of postsecondary success. The importance of providing appropriate social skills instruction to students with ASD, who may particularly benefit from support in this area, is also emphasized in the findings. Effective social skills instruction should be provided in order to ensure students with ASD learn the appropriate social skills necessary for navigating the social environment of a postsecondary educational institution or the workplace. Students who had a greater likelihood of experiencing postsecondary success were rated as engaging in appropriate social skills more than sometimes, and thus, it is crucial that students with ASD are provided with effective instruction to learn how to improve their social interaction skills. As both academic achievement and social skills appear to be important for postsecondary success, students with ASD may benefit from interventions and instructional strategies that target both of these skills. For instance, cooperative peer groups and peer-mediated learning are two instructional methods have been shown to increase both social interactions and academic performance in students with ASD (Dugan et al., 1995; Kamps, Barbetta, Leonard, & Delquadri, 1994). Finally, the results suggest the potential importance of postsecondary education for high-functioning students with ASD. It may be important for parents and educators to plan for students' transitioning from high school to a postsecondary institution early and set related goals to encourage participation in postsecondary educational experiences, which can open greater opportunities for students to pursue their areas of strengths and interests.

Limitations and Future Directions

Although this study contributes valuable information regarding predictors of postsecondary outcomes for students with ASD, several limitations should be noted. First, although we developed our sample from a nationally-rep-

resentative dataset, and our sample represents students with a variety of demographic characteristics, the specific sample of students with high-functioning autism included in our analysis were not necessarily representative of the nation as a whole. Additionally, the percentage of students meeting the criteria for independent living was too small to carry out the related analyses. Finally, using the data available, we were only able to examine the success of young adults with ASD within a few years of high school graduation. We considered those who were still enrolled in a postsecondary institution as successful, and so it remains unknown whether those students ultimately went on to secure successful employment opportunities in their chosen areas of study.

Future research should consider examining more specific predictors of postsecondary outcomes for students with ASD. For example, what specific social and academic skills may be particularly important for promoting postsecondary success for students with ASD? Additionally, future research should examine postsecondary outcomes for students with ASD across the spectrum. Students across the spectrum have a variety of skills and needs, so different skills may be important for postsecondary outcomes depending on the severity of ASD. The limited extent to which students with ASD appear to be living independently, which has been similarly identified in prior work (Anderson et al., 2014), is also an important area for additional investigation. Finally, although exploratory studies such as the one described here can provide an initial foundation of areas ripe for further exploration, controlled investigations are warranted to identify practices that support the transition experiences of students with ASD. Specific recommendations for controlled investigations have been highlighted in prior work (e.g., Wehman et al., 2014); the current study echoes the need for such investigations, particularly those focused on promoting social interaction and academic success.

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