

Vocational rehabilitation services and competitive employment for transition-age youth with autism spectrum disorders

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Abstract.

OBJECTIVE: This study investigated the extent to which demographic characteristics, Social Security disability benefits, and vocational rehabilitation (VR) services influence competitive employment outcomes for transition-age youth with autism spectrum disorders (ASD).

METHODS: The Rehabilitation Services Administration's Case Service Reports (RSA-911) database for Fiscal Year 2011 was examined using a purposeful selection multivariate logistic regression analysis.

RESULTS: Results indicated that participants who received on-the-job support, job placement services, rehabilitation technology, occupational/vocational training, other services, job search assistance, vocational counseling and guidance, and job readiness training from the state-federal VR program were significantly more likely to achieve competitive employment than were participants who did not receive those services. In addition, higher levels of educational attainment, receiving a greater number of VR services, and not receiving Social Security disability benefits were positively associated with competitive employment outcomes. In contrast to findings reported in other studies of VR participants with ASD, gender was not associated with competitive employment outcomes.

CONCLUSION: Overall, the number and type of VR services had more influence on competitive employment than did demographic variables or Social Security disability benefits.

Keywords: Autism spectrum disorder (ASD), vocational rehabilitation (VR), transition-age youth

1. Introduction

The number of children and youth with autism spectrum disorders (ASD) enrolled in American

public schools has dramatically increased in recent years (Migliore, Butterworth, & Zalewska, 2014; Migliore, Timmons, Butterworth, & Lugas, 2012; Wilczynski, Trammell, & Clarke, 2013). Blumberg et al. (2013) reported that the prevalence of parent-reported ASD diagnoses for children between the ages of 6 and 17 increased by a factor of 67 percent between 2007 and 2012. In school year 2011-2012,

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7.1 percent of all children ages 3–21 enrolled in public schools in the United States had ASD, a marked increase over the school year 2006-2007 proportion of 3.9 percent (Burgess & Cimera, 2014; National Center for Education Statistics, 2014a).

The number of American students with ASD exiting public high schools increases by approximately 15 percent per year (National Center for Education Statistics, 2014b), a phenomenon that finds secondary special education teachers, transition specialists, developmental disability service providers, and vocational rehabilitation (VR) counselors struggling to meet the postsecondary support needs of this growing population of young adults with significant disabilities (Wehman, 2013). Despite a 40-year commitment to improve post high-school educational and employment outcomes for children and youth with disabilities through the Individuals with Disabilities in Education Act (IDEA) and its legislative predecessors, postsecondary outcomes for former special education students, especially those with ASD, lag far behind the adult outcomes reported by non-disabled public school graduates (Carter, Austin & Trainor, 2011; Migliore et al., 2014; Wehman, Schall, et al., 2014).

Burgess and Cimera (2014) examined employment outcomes for youth with ASD over a 10-year period. Results of their multi-state study revealed that employment rates, number of hours worked per week, and wages earned did not improve during the decade-long observation period. Most recent studies of labor force participation of youth with ASD report employment rates in the 20–33 percent range (Wilczynski et al., 2013). Shattuck et al. (2012) noted that employment rates and rates of enrollment in postsecondary education for youth with ASD are poorer than those rates observed among youth with speech and language impairments, learning disabilities, and intellectual disabilities. Taylor and Seltzer (2011) found only 6% of youth with ASD working in competitive employment settings in the community after exiting high school.

There is no doubt that young adults with ASD face considerable challenges in finding and retaining employment. Specifically, low service providers poor employment outcomes could be partially attributable to social functioning problems such as difficulty initiating interactions with others; engaging in communicative reciprocity; and understanding non-verbal cues or the use of metaphorical language in social communication (American Psychiatric Association, 2013). Individuals with ASD also frequently

experience behavioral and emotional problems that negatively impact the likelihood of securing and maintaining employment. For example, Matson and Rivet (2008) found that individuals with severe ID and ASD exhibited higher rates of problem behaviors, including aggression, stereotypy, self-injury, and disruption, than those with severe ID alone or Pervasive Developmental Disorder.

Despite the cognitive and behavioral challenges, there is evidence that individuals with ASD can be successful in the job market. Longitudinal studies demonstrate that youth with ASD often succeed in the workplace if transition and vocational rehabilitation services are tailored to meet their unique and individual needs (McDonough & Revell, 2010). In a randomized control trial, Wehman and his colleagues (2014) reported an 87.5% employment rate for youth with autism who had completed an intensive internship program called Project Search coupled with intensive supports such as on-site, intensive systematic instruction and consultation with employers. The employment rate for the control group was only 6.25%.

In recent years, special educators, vocational rehabilitation counselors, and health care providers have increasingly recognized the importance of employment as a health promotion intervention for transition-age youth with chronic illnesses and disabilities. There is ample evidence demonstrating significant correlations between unemployment and health problems including cardiovascular disease, hypertension, and musculoskeletal disorders (Pharr, Moonie, & Bungum, 2012; Quarells, Liu, & Davis, 2012). Unemployment affects health through poverty related-stressors, negative effects on psychosocial factors, and increased involvement in risky health behaviors (Braveman, Egerter, & Williams, 2011). Individuals who are unemployed also experience higher rates of chronic stress, anxiety, depression, substance abuse, and mental health hospitalizations than those who are employed (Henkel, 2011; Roelfs, Shor, Davidson, & Schwartz, 2011). To remedy these poor postschool outcomes, young adults with ASD and their families need open and seamless access to adult-service programs that focus on employment and independent community living (McDonough & Revell, 2010). The state-federal VR program is the nation's largest provider of employment supports to Americans with disabilities (Dutta, Gervey, Chan, Chou, & Ditchman, 2008). Available to people with ASD and other disabling conditions in all 50 states and United States territories (Lawer,

Brusilovskiy, Salzer & Mandel, 2009), this program provides a wide range of services designed to lead to successful employment, including assessment, job placement, on-the-job support, vocational and rehabilitation counseling, job search assistance, and assistive technology (Ditchman et al., 2013). Any individual with a disability who can benefit from these services and who requires assistance to prepare for, enter, engage in, or retain gainful employment is eligible to participate in the VR program (Ditchman et al., 2013). Recipients of Social Security Disability Benefits are presumed to be eligible for VR services if they are deemed feasible for future employment following receipt of services (Rehabilitation Services Administration, 2013).

Research is limited and inconclusive regarding the effectiveness of VR services in promoting successful employment for young people with ASD. Migliore et al. (2014) found that successful employment rates for transition-age VR consumers with ASD have generally declined in recent years, and they vary significantly from state to state. This disappointing trend is occurring at a time when more youth with ASD than ever before are enrolling in VR services (Wehman et al., 2014), so the relationship between youth with ASD and the nation's largest employment program for Americans with disabilities is marked by a growing yet increasingly unmet need for assistance.

In an effort to better understand the factors that influence employment outcomes for transition-age VR clients with ASD, the present study utilized the most recently available data from the US Department of Education's Rehabilitation Case Service Report (RSA-911) database. The specific purpose of this study was to investigate the effects of demographic variables, receipt of Social Security disability benefits, and VR service-related variables on employment outcomes for youth with autism. Many of these factors have been examined in previous ASD research, but the present study represents the most contemporary perspective on the VR program's role in preparing this growing clientele for the world of work.

2. Method

2.1. Participants

The data for this study were extracted from the Rehabilitation Services Administration (RSA) Case Service Report (Form-911) data base. The RSA-911

database contains information on personal history, types of services received, and employment outcomes for each client who receives state VR services in the United States. VR agencies across the country annually populate the national database to RSA, and RSA periodically releases the database for public utilization. The most current data available for this study were from Fiscal Year 2011.

Participants in this study included 4,322 VR clients who (a) had a primary diagnosis of autism, (b) were 16 to 25 years old at application, (c) were unemployed at the time of application for VR services, and (d) had their cases closed by the state VR program in Fiscal Year 2011. Participants who were employed at the time they applied for VR services were not included in this study.

Table 1 presents demographic characteristics of the sample. The majority of participants were between the ages of 16 and 18, 36% were aged 19 to 22, and 9% were aged 23 to 25. Seventy-nine percent of the participants were white, 10.1% were African-American, 6.0% were Hispanic or Latino, 3.6% were Asian or Pacific Islander, and 1.1% were American Indian or Alaska Native. Forty-eight percent of the participants had less than a high school education, 23.7% had completed high school, 18.7% had participated in a secondary special education program, 7.9% had associate's degrees, and 1.1% had bachelor's degrees or higher.

2.2. Outcome and predictor variables

The outcome variable in this study was competitive employment. Competitive employment is defined by RSA as working either full or part time in an integrated setting, in a state managed Business Enterprise Program (BEP), or in self-employed status for which the individual is paid at or above minimum wage. Minimum wage is defined as the state or Federal minimum wage, whichever is higher. A successful outcome to the VR program is realized if the client is competitively employed following completion of VR services. An unsuccessful outcome to the VR program is observed if the client is not competitively employed following completion of VR services.

Two sets of predictor variables were used in this study. The first of these consisted of client demographic variables including age at application (16–18, 19–22, 23–25; 16–18 years old as the reference category), gender (male, female; male as the reference category), race (White, black or African-American, Hispanic or Latino, Asian or Pacific Islander, Amer-

Table 1

Participants' demographic characteristics and services provided		
Characteristic/service	n	%
Age		
16–18	2379	55
19–22	1555	36
23–25	388	9
Gender		
Male	3662	84.7
Female	660	15.3
Race		
White	3424	79.2
Black or African American	437	10.1
Hispanic or Latino	260	6.0
Asian or Pacific Islander	155	3.6
American-Indian or Alaska Native	46	1.1
Education		
Special education	808	18.7
Less than high school	2105	48.7
High school	1023	23.7
Associate degree	340	7.9
Bachelor degree or higher	46	1.1
SSI/SSDI recipient		
Yes	1425	33
No	2897	67
Significant Disability		
Yes	4303	99.6
No	19	0.4
Services provided (<i>N</i> = 4322)		
Assessment	2941	68.0
Diagnostics and treatment	964	22.3
Counseling and guidance	2659	61.5
College or university training	494	11.4
Occupational or vocational training	362	8.4
On-the-job training	278	6.4
Remedial training	97	2.2
Job readiness training	1044	24.2
Augmentative skills training	82	1.9
Miscellaneous training	748	17.3
Job search assistance	1317	30.5
Job placement assistance	2015	46.6
On-the-job support	1595	36.9
Transportation services	983	22.7
Maintenance	387	9.0
Rehabilitation technology	115	2.7
Information and referral	878	20.3
Other services	1111	25.7

ican Indian or Alaska Native; white as the reference category), education (less than high school, special education, high school graduate, associate's degree, bachelor's degree or higher; special education as the reference category), and receiving Social Security disability benefits at the time of application (SSI, SSDI; not receiving benefits as the reference category). A client was placed in the special education category of educational attainment if he or she (1) was enrolled in a secondary special education program at the time of application, (2) received special education services and earned a certificate of

completion or high school diploma, or (3) received special education services but did not receive a certificate or diploma (RSA, 2011).

The second set of predictor variables consisted of VR services that can be provided to youth with ASD. Those services include assessment, diagnostics and treatment of impairments, vocational rehabilitation counseling and guidance, college or university training, vocational training, on-the-job training, basic academic remedial literacy or literacy training, job readiness training, disability related augmentative skills training, miscellaneous training, job search assistance, job placement assistance, on-the-job support, transportation, maintenance services, rehabilitation technology, readers, interpreters, personal attendant services, technical assistance, information and referral, and other services. Detailed descriptions of these services are provided in Table 2.

2.3. Data analysis

Data for this investigation were analyzed using the SPSS (2007) software package. Frequencies, percentages, means and standard deviations were used to describe the distributions of predictor and outcome variables. Then, a purposeful selection multivariate logistic regression analysis was conducted to investigate the influence of demographic variables, Social Security disability benefits, and VR services on the employment outcomes of transition-age youth with ASD.

The purposeful selection approach proposed by Hosmer, Lemeshow, and Sturdivant (2013) was used to build the most parsimonious and best-fit model in order to ensure that results are numerically stable and generalizable. Purposeful selection can be described in six steps: 1) investigating significance of one-on-one relationships between predictor variables and outcome variable at a $p < 0.20$ or 0.25 level in order to account for any important variables, 2) entering all the significant variables that were identified at Step 1 in a logistic regression model, 3) retaining variables that were significant at $p < 0.05$ level and removing variables that were not significant when removal did not change the beta coefficient of the significant variables by more than 20%, 4) entering variables that were not significant in Step 1 into the regression model one at a time and retaining variables as they become significant, 5) closely examining changes in predictor variables throughout the model, and 6) checking the model's adequacy and fit (Hosmer et al., 2013).

Table 2
Description of services provided by state vocational rehabilitation agencies

Type of services	Description of services
<i>Assessment</i>	Services provided and activities performed to determine an individual's eligibility for VR services, to assign an individual to a priority category of a state VR agency that operates under an order of selection, and/or to determine the nature and scope of VR services to be included in the Individual Plan for Employment (IPE); included in this category are trial work experiences and extended evaluation.
<i>Diagnosis and treatment of impairments</i>	Surgery, prosthetics and orthotics, nursing services, dentistry, occupational therapy, physical therapy, speech therapy, and drugs and supplies; this category includes diagnosis and treatment of mental and emotional disorders.
<i>VR counseling and guidance</i>	Discrete therapeutic counseling and guidance services necessary for an individual to achieve an employment outcome, including personal adjustment counseling; counseling that addresses medical, family, or social issues; vocational counseling; and any other form of counseling and guidance necessary for an individual with a disability to achieve an employment outcome; this service is distinct from the general counseling and guidance relationship that exists between the counselor and the individual during the entire rehabilitation process.
<i>College or university training</i>	Full-time or part-time academic training above the high school level that leads to a degree (associate, baccalaureate, graduate, or professional), a certificate, or other recognized educational credential; such training may be provided by a four-year college or university, community college, junior college, or technical college.
<i>Occupational/ vocational training</i>	Occupational, vocational, or job skill training provided by a community college and/or a business, vocational/trade, or technical school to prepare students for gainful employment in a recognized occupation; this training does not lead to an academic degree or certification.
<i>On-the-job training</i>	Training in specific job skills by a prospective employer; generally the individual is paid during this training and will remain in the same or a similar job upon successful completion; this category also includes apprenticeship training programs conducted or sponsored by an employer, a group of employers, or a joint apprenticeship committee representing employers and a union.
<i>Basic academic remedial or literacy training</i>	Literacy training or training provided to remediate basic academic skills needed to function on the job in the competitive labor market.
<i>Job readiness training</i>	Training to prepare an individual for the world of work (e.g. appropriate work behaviors, methods for getting to work on time, appropriate dress and grooming, methods for increasing productivity).
<i>Disability-related, augmentative skills training</i>	Service includes, but is not limited to, orientation and mobility, rehabilitation teaching, training in the use of low vision aids, Braille, speech reading, sign language, and cognitive training/retraining.
<i>Miscellaneous training</i>	Any training not recorded in one of the other categories listed, including GED or high school training leading to a diploma.
<i>Job search assistance</i>	Job search activities that support and assist a consumer in searching for an appropriate job; may include help in preparing resumes, identifying appropriate job opportunities, and developing interview skills, and may include making contacts with companies on behalf of the consumer.
<i>Job placement assistance</i>	A referral to a specific job resulting in an interview, whether or not the individual obtained the job.
<i>On-the-job supports</i>	Support services provided to an individual who has been placed in employment in order to stabilize the placement and enhance job retention; such services include job coaching, follow-up and follow-along, and job retention services.
<i>Transportation services</i>	Travel and related expenses necessary to enable an applicant or eligible individual to participate in a VR service; includes adequate training in the use of public transportation vehicles and systems.
<i>Maintenance services</i>	Maintenance means monetary support provided for those expenses such as food, shelter, and clothing that are in excess of the normal expenses of the individual, and that are necessitated by the individual's participation in an assessment for determining eligibility and VR needs or while receiving services under an individualized plan for employment (IPE).
<i>Rehabilitation technology</i>	The systematic application of technologies, engineering methodologies, or scientific principles to meet the needs of, and address the barriers confronted by, individuals with disabilities in areas that include education, rehabilitation, employment, transportation, independent living, and recreation; includes rehabilitation engineering services, assistive technology devices, and assistive technology services.
<i>Reader services</i>	Services for individuals who cannot read print because of blindness or other disability; includes reading aloud and transcribing printed information into Braille or sound recordings if requested by the individual; generally are offered to individuals who are blind or deaf-blind but may also be offered to individuals unable to read because of serious neurological disorders, specific learning disabilities, or other physical or mental impairments.
<i>Interpreter services</i>	Sign language or oral interpretation services performed by specially trained persons for individuals who are deaf or hard of hearing, and tactile interpretation services for individuals who are deaf-blind; includes real-time captioning services; does not include language interpretation.
<i>Personal attendant services</i>	Those personal services that an attendant performs for an individual with a disability such as bathing, feeding, dressing, providing mobility and transportation, and so on.

(Continued)

Table 2
(Continued)

Type of services	Description of services
<i>Technical assistance services</i>	Technical assistance and other consultation services provided to conduct market analyses, to develop business plans, and to provide resources to individuals in the pursuit of self-employment, telecommuting, and small business operation outcomes.
<i>Information and referral services</i>	Services provided to individuals who need assistance from other agencies (through cooperative agreements) not available through the VR program.
<i>Other services</i>	All other VR services that cannot be recorded elsewhere; included here are occupational licenses, tools and equipment, initial stocks and supplies, and medical care for acute conditions arising during rehabilitation and constituting a barrier to the achievement of an employment outcome.

3. Results

Participating VR clients reported a mean age of 18.90 at application with a standard deviation of 2.2. Fifty percent of VR clients ($N=2,168$) obtained competitive employment after receiving VR services. On average, employed participants worked 22.73 ($SD=10.16$) hours per week, with only 25 percent working more than 30 hours weekly. Employed participants earned an average weekly wage of \$199.80 ($SD=\135.67), with 25 percent earning more than \$250 per week.

For the entire sample, an average of 28.94 ($SD=20.83$) months passed between eligibility determination and case closure in the VR program. The mean number of VR services provided to all participants was 4.18 ($SD=2.37$). The median total case expenditure for the entire sample was \$2,924 (range=\$0- \$107,782). The successfully employed group ($M=4.97$, $SD=2.25$) had received significantly more VR services than the unemployed group ($M=3.39$, $SD=2.21$; $t_{(4320)}=23.32$, $p<0.001$; $d=0.70$). In addition, the successfully employed group ($M=27.40$ months, $SD=20.53$) had spent significantly less time in services than the unemployed group ($M=30.49$ months, $SD=21.03$; $t_{(4320)}=-4.884$, $p<0.001$; $d=-0.14$). Case expenditures for successfully employed clients ($M=\$6,111$, $SD=\$6,198$) were significantly higher than those for unemployed clients ($M=\$3,063$, $SD=\$5,715$; $t_{(4320)}=16.804$, $p<0.001$; $d=0.51$).

Male and female VR clients did not differ in their employment outcomes ($\chi^2(1, N=4322)=2.335$, $p=0.126$, ns.). Age at application was significantly related to employment outcomes ($\chi^2(2, N=4322)=25.562$, $p<0.001$; Cramer's $V=0.07$). Clients who were 19–22 and 23–25 years old had higher employment rates than clients who were 16–18 years old. There was a significant association between race/ethnicity and employment outcomes ($\chi^2(4, N=4322)=11.718$, $p<0.05$; Cramer's $V=0.05$),

with African-American, Hispanic or Latino, Asian or Pacific Islander, American Indian or Alaska Native having lower employment rates than white clients. As clients' educational levels increased, so did their employment rates. Clients who had at least a bachelor's degree had higher employment rates than clients with an associate's degree, a high school diploma, less than a high school education, and special education ($\chi^2(4, N=4322)=65.917$, $p<0.001$; Cramer's $V=0.12$). Clients who received Social Security disability benefits were less likely to be employed than clients who did not receive benefits ($\chi^2(1, N=4322)=14.483$, $p<0.001$; Cramer's $V=0.05$).

The most frequently provided VR services to all participants were assessment (provided to 68% of participants, $N=2,941$), vocational rehabilitation counseling (61.5%, $N=2,659$) and job placement services (46.6%, $N=2,015$). Less than 10% of participants received occupational/vocational training, on-the-job training, basic academic remedial or literacy training, disability related augmentative skills training, maintenance, rehabilitation technology, reader, interpreter, personal attendant, and technical assistance services. There were significant relationships between VR services provided and employment outcomes. The successfully employed group was more likely to have received assessment, vocational rehabilitation counseling, occupational/vocational training, on-the-job training, job readiness, miscellaneous training, job search, job placement, on-the-job support, transportation, maintenance, rehabilitation technology, information/referral, and other services than their unemployed counterparts.

3.1. Logistic regression analysis

A purposeful selection multivariate logistic regression was computed to investigate the relationship between (a) demographic variables, receipt of Social Security disability benefits, and VR services and (b) competitive employment at case closure. Univariate

analysis of the variables indicated that diagnosis and treatment, basic academic remedial and literacy training, interpreter, personal attendance and technical assistance services were not significantly associated with competitive employment at the $p=0.20$ level or lower. These variables were held aside. The remaining predictors were included in the logistic regression model using the ‘enter’ method. Results indicated that some of the demographic variables (i.e. age, gender) and VR services (i.e. assessment, college or university training, on-the-job training, basic academic remedial and literacy training, miscellaneous training, transportation, maintenance, reader and information referral services) did not significantly predict employment outcomes. As suggested by Hosmer et al., (2013), those variables were removed from the model one at a time. Although age at application was not a significant predictor, removing age at application caused the coefficient of educational attainment to decrease by more than 20% ($B=0.45$ to 0.21); therefore, age at application was put back in the model. Removal of no other variables caused changes in any coefficient of the significant predictors by more than 20%. The variables that were held aside were put back in the model; however, none of them were significant. Interaction effects of special education, disability benefits, and African American heritage with VR services were tested within the main effect model. The interaction effects between disability benefits and treatment, disability benefits and transportation, and African-American heritage and maintenance services were significant.

The omnibus test for the final prediction model, which included race; education; receiving Social Security disability benefits; and on-the-job support, job placement, rehabilitation technology, occupational/vocational training, other services, job search assistance services, vocational rehabilitation counseling and guidance, job readiness training VR services as significant determinants of employment outcomes, was significant, ($\chi^2(22, N=4322)=1186.79$ $p<0.001$). The Nagelkerke R^2 was computed to be 0.32, meaning that the predictors explained 32 percent of the variability in competitive employment outcomes. Seventy-two percent of the time, the predictors in the final model correctly classified the client’s employment outcome.

Specifically, the results indicated that African-American, Hispanic or Latino, Asian or Pacific Islander, American Indian or Alaska Native clients were less likely to obtain competitive employment than white clients ($OR=0.64, 0.87, 0.58, 0.76; 95\%$

CI 0.50–0.82, 0.65–1.17, 0.40–0.86 and 0.37–1.58, respectively). Clients with less than high school education, high school diplomas, associate’s degrees and bachelor’s degrees or higher were more likely ($OR=1.06, 1.30, 1.68, 4.68; 95\%$ CI 0.87–1.29, 1.04–1.62, 1.17–2.19 and 2.06–10.60, respectively) to obtain competitive employment than clients with special education. Clients who received SSI/SSDI had a 27% reduction in the odds of obtaining competitive employment ($OR=0.73; 95\%$ CI 0.60–0.88) compared to clients who did not receive SSI or SSDI benefits. Odds ratios for the VR service predictors were as follows:

- Participants receiving on-the-job support services were 4.30 times [$OR=4.30; 95\%$ CI: 3.69–5.01] more likely to obtain employment than were participants who did not receive those services.
- Participants receiving job placement services were 3.15 times [$OR=3.15; 95\%$ CI: 2.71–3.66] more likely to obtain employment.
- Participants receiving rehabilitation technology services were 1.69 times [$OR=1.69; 95\%$ CI: 1.10–2.60] more likely to obtain employment.
- Participants receiving occupational/vocational training services were 1.67 times [$OR=1.67; 95\%$ CI: 1.29–2.16] more likely to obtain employment.
- Participants receiving other services were 1.43 times [$OR=1.43; 95\%$ CI: 1.21–1.68] more likely to obtain employment.
- Participants receiving job search assistance services were 1.34 times [$OR=1.34; 95\%$ CI: 1.12–1.59] more likely to obtain employment.
- Participants receiving vocational rehabilitation counseling and guidance services were 1.32 times [$OR=1.32; 95\%$ CI: 1.14–1.54] more likely to obtain employment.
- Participants receiving job readiness training services were 1.21 times [$OR=1.21; 95\%$ CI: 1.02–1.44] more likely to obtain employment.

4. Discussion

There are a number of limitations that should be kept in mind when interpreting the present findings. First, this study used archival data with an ex-post-facto design; therefore, it is not possible to draw cause-and-effect inferences regarding the relationships among study variables. Also, the primary

disability of participants in this study, autism, was not necessarily diagnosed in accordance with clinical diagnostic criteria. In some cases, the autism classification may have come from the subjective judgments of rehabilitation counselors or from participants' self-reports. It is therefore possible that some of the participants in this study did not actually have autism. Moreover, the RSA-911 database does not provide information on various types and severity levels of autism.

The RSA-911 database is compiled for administrative purposes rather than research purposes. In that regard, rehabilitation counselors, during data collection, may have recorded services based on their recall rather than consulting with case files. In addition, although the RSA 911 database includes 18 cross-checks to minimize input errors, there may remain some inaccuracies due to counselor misrecording of client and case service information.

Finally, the present study only examined data from one year, 2011. Consequently, it is unclear whether findings in this investigation change over time for VR clients with autism. Multi-year investigations would enable researchers to place Vocational Rehabilitation services and outcomes for youth with autism within important (and often dynamic) historical, political, and economic contexts.

Even with these limitations, findings from this study indicate that client demographic variables, receipt of Social Security disability benefits, and VR services significantly predicted employment outcomes for transition-age youth with ASD. Particularly, after controlling for the effects of age, race, educational attainment, and Social Security benefits – on-the-job support, job placement, rehabilitation technology, occupational/vocational training, other services, job search assistance, vocational rehabilitation counseling and guidance, and job readiness training services were significantly related to employment outcomes.

Most notably, on-the-job support and job placement services were the strongest predictors of the employment outcome criterion. The odds of obtaining competitive employment were four times higher for participants who received on-the-job support and three times higher for participants who received job placement services. In other words, youth with autism who received on-site support services like job coaching, follow-up, follow along and job retention significantly enhanced their employment prospects – as did those who received assistance from rehabilitation professionals in obtaining employment. These

findings underscore the importance of supported employment services (Wehman et al., 2012) and targeted job placement services delivered by qualified rehabilitation providers during the critically important exploration and establishment phases of career development that characterize the 16–25 year-old age range of participants in this study (Hartung, 2013; Wehman, 2013). Coupling these effective VR services with hands-on work experience is indicated as a powerful way to improve employment outcomes for youth with ASD. Youth with ASD and comorbid intellectual disabilities were found more likely to be competitively employed if they had participated in a nine-month internship while receiving supported employment services as compared to their counterparts who had received supported employment services without the internship (Schall, Wehman, et al., 2015).

Also more likely to obtain competitive employment were participants in this study who received more VR services at higher expenditure levels over a shorter period of time. This finding underscores the importance of intensity in the services designed to facilitate transition from adolescence to adulthood (Cimera, 2011). Improved linkages between public high school special education personnel and adult service providers such as VR counselors and developmental disability case managers would help ensure that youth with ASD receive the intensive services that yield the most positive outcomes.

Participants in this study who received Social Security disability benefits were less likely to be successfully employed than their counterparts who did not receive disability benefits. Although this difference in employment outcome represents a relatively small effect size, it does underscore the powerful systemic disincentive to seek, secure, and maintain gainful employment that exists within Social Security programs (Strauser, 2013). Indeed, the benefits paid by the Social Security Administration's two disability programs (i.e., Social Security Disability Insurance [SSDI] and Supplemental Security Income [SSI]) are predicated on the beneficiary being too disabled to work (Marini, 2003). When this determination is made during the critically important career developmental stages of exploration and establishment (Super, 1990), young people with ASD and other disabilities often integrate the external confirmation of their disabled status into their self-concepts – self-concepts that do not necessarily include the role of worker (Migliore et al., 2012). Unemployment and receipt of disability benefits then conjoin in a

long-term self-fulfilling prophecy that is very difficult to change. Strauser et al. (2010) reported that only one percent of VR clients who received SSDI benefits at the time of application for services were successfully rehabilitated in competitive employment. In order to successfully change this pattern, young people with ASD need assistance in understanding disability benefits, especially the implications of paid employment to those benefits.

Results also indicated a number of interaction effects. Specifically, African-American participants who received employment maintenance services were three times more likely to obtain competitive employment than were other participants. VR professionals working with African-American youth with ASD would be well-served to keep in mind the importance of culturally relevant services that enable these consumers to maintain employment (Lewis & Burris, 2012). Interaction effects between Social Security disability benefits and (a) medical treatment services and (b) transition services were statistically significant, but the low effect sizes that characterize those interactions make it difficult to interpret those findings. Even so, additional research is needed to more fully understand the impact that incentives and disincentives within Social Security disability programs have on VR services and outcomes for youth with ASD and other VR consumers.

Although previous studies indicated that being male was positively associated with competitive employment outcomes among youth with ASD (Migliore et al., 2012), this study found that male and female participants had similar employment outcomes. There is some encouraging evidence to suggest that this gender non-difference is attributable to the improving employment outcomes reported by women with ASD (Cimera, 2011).

The present findings also underscore the importance of education as a conduit to competitive employment for youth with ASD. Perhaps not surprisingly, participants who held a bachelor's degree or higher were four times more likely to emerge from the VR program in competitive employment than were participants whose formal education consisted of special education services. For the entire sample, as clients' educational levels increased, so did their employment rates. Based on this finding and the strong recommendation of other researchers (Cimera, 2011; Wehman, 2013), VR professionals and other service providers must encourage transition-age youth with ASD to pursue additional formal training and education after high school

as a means of developing high-level, marketable, and generalizable skills that will improve their future prospects for employment and economic self-sufficiency. Of course, college tuition assistance must be accompanied by academic supports such as tutoring, training in cognitive support technology, and consultation regarding classroom accommodations if students with ASD are to succeed in postsecondary education (Wehman, 2013).

Finally, one has to ask whether the 50% VR success rate observed in this study of transition-age youth with ASD is an acceptable figure. The answer is: probably not. According to a report by Graham and West (2014), there were a number of studies that showed better competitive employment outcomes for youth with disabilities, some of which involved people with moderate and severe impairments (the present study included people with all levels of severity).

In the effort to improve VR success rates for transition-age youth with ASD, it is imperative that these youth who are enrolled in high school or college programs gain hands-on work experience in integrated community settings. A number of recent studies bear witness to the high positive correlation between paid employment during high school or college and competitive employment outcomes after graduation among young people with various disabling conditions (Carter, Austin, & Trainor, 2011, 2012; Siperstein, Heyman, & Stokes, 2014; Wehman, Sima, et al., 2014).

Understanding determinants of successful employment outcomes is essential for rehabilitation and health professionals serving individuals with ASD. Young adults with ASD are too often unemployed or placed in sheltered workshops and day activity centers (Taylor & Seltzer, 2011) despite the observed health benefits, such as lower rates of diagnostic symptoms and problem behaviors, associated with ongoing employment (Taylor, Smith, & Mailick, 2014). Findings from this study have clear implications for vocational service providers, suggesting that supported employment and advanced training should be emphasized in order to promote successful employment outcomes. Although youth with ASD often present unique behavioral and cognitive challenges, the provision of training services and programs that tailor training to meet specific needs, such as supported employment (Wehman et al., 2012) or supported employment coupled with a field-based internship experience (Schall et al., 2015) can effectively reduce barriers to employment.

5. Conclusion

Findings from this investigation are generally consistent with previous studies indicating that client demographic variables, Social Security disability benefits, and VR services are significant predictors of the employment outcomes of transition-age youth with autism spectrum disorders (ASD). Particularly, this study revealed that on-the-job support and job placement services strongly correlated with competitive employment. Results also indicated that having higher levels of educational attainment, receiving more VR services at a higher level of expenditure over a shorter period of time, and not receiving Social Security disability benefits made participants more likely to obtain competitive employment. In contrast to other studies, gender was not a significant predictor of employment outcomes. Stakeholders in the transition of youth with ASD to adult roles will be well served to consider the factors that predict successful rehabilitation as they identify and implement services to meet the needs of this growing VR clientele.

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Conflict of interest

The authors have no conflict of interest to declare.

References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5*. Washington, D.C: American Psychiatric Association.
- Blumberg, S. J., Bramlett, M. D., Kogan, M. D., Schieve, L. A., Jones, J. R., & Lu, M. C. (2013). Changes in prevalence of parent-reported autism spectrum disorder in school-aged US children: 2007 to 2011–2012. *National Health Statistics Reports*, 65, 1-11.
- Braveman, P., Egerter, S., & Williams, D. R. (2011). The social determinants of health: Coming of age. *Annual Review of Public Health*, 32, 381-398.
- Burgess, S., & Cimera, R. E. (2014). Employment outcomes of transition-aged adults with Autism Spectrum Disorders: A State of the states report. *American Journal on Intellectual and Developmental Disabilities*, 119(1), 64-83. doi:10.1352/1944-7558-119.1.64
- Carter, E. W., Austin, D., & Trainor, A. A. (2011). Factors associated with the early work experiences of adolescents with severe disabilities. *Intellectual and Developmental Disabilities*, 49(4), 233-247. doi:10.1352/1934-9556-49.4.233
- Carter, E. W., Austin, D., & Trainor, A. A. (2012). Predictors of postschool employment outcomes for young adults with severe disabilities. *Journal of Disability Policy Studies*, 23(1), 50-63.
- Centers for Disease Control and Prevention (CDC). (2010). Prevalence of autism spectrum disorder among children aged 8 years — autism and developmental disabilities monitoring network, 11 sites, United States, 2010. Retrieved from <http://www.cdc.gov/ncbddd/autism/data.html>. Accessed April, 8, 2015.
- Cimera, R. E. (2011). Does being in sheltered workshops improve the employment outcomes of supported employees with intellectual disabilities? *Journal of Vocational Rehabilitation*, 35, 21-27. DOI: 10.3233/JVR-2011-0550
- Ditchman, N., Wu, M., Chan, F., Fitzgerald, S., Lin, C. P., & Tu, W. (2013). Vocational rehabilitation. In D. Strauser (Ed.), *Career development, employment, and disability in rehabilitation: From theory to practice* (pp. 343-360). New York: Springer Publishing Company.
- Dutta, A., Gervery, R., Chan, F., Chou, C.-C., & Ditchman, N. (2008). Vocational rehabilitation services and employment outcomes for people with disabilities: A United States study. *Journal of Occupational Rehabilitation*, 18(4), 326-334. doi:10.1007/s10926-008-9154-z
- Graham, C. W., & West, M. D. (2014). Employment interventions for return to work in working-aged adults following traumatic brain injury (TBI): A systematic review. *Campbell Systematic Reviews*, 2014.
- Hartung, P. (2013). The life-span, life-space theory of careers. In S. Brown and R. Lent (Eds), *Career development and counseling* (2nd ed., pp. 83-114). Hoboken, NJ: John Wiley.
- Hosmer, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied logistic regression*. Hoboken, N.J.: Wiley. Retrieved from <http://site.ebrary.com/id/10677827>
- Lawer, L., Brusilovskiy, E., Salzer, M. S., & Mandell, D. S. (2009). Use of vocational rehabilitative services among adults with autism. *Journal of Autism and Developmental Disorders*, 39(3), 487-494. doi:10.1007/s10803-008-0649-4
- Lewis, A. N., & Burris, J. L. (2012). The multicultural rehabilitation counseling imperative in the 21st century. In Toriello, P.J., Bishop, M.L., & Rumrill P.D. (Eds.), *New directions in rehabilitation counseling: Creative responses to professional, clinical, and educational challenges* (pp. 164-208). Linn Creek, MO: Aspen Professional Services.
- Marini, I. (2003). What rehabilitation counselors should know to assist Social Security beneficiaries in becoming employed. *Work: A Journal of Prevention, Assessment, and Rehabilitation*, 21(1), 37-44.

- Matson, J. L., & Rivet, T. T. (2008). Characteristics of challenging behaviours in adults with autistic disorder, PDD-NOS, and intellectual disability. *Journal of Intellectual and Developmental Disability, 33*(4), 323-329.
- McDonough, J. T., & Revell, G. (2010). Accessing employment supports in the adult system for transitioning youth with autism spectrum disorders. *Journal of Vocational Rehabilitation, 32*(2), 89-100.
- Migliore, A., Butterworth, J., & Zalewska, A. (2014). Trends in vocational rehabilitation services and outcomes of youth with autism: 2006-2010. *Rehabilitation Counseling Bulletin, 57*(2), 80-89. doi:10.1177/0034355213493930
- Migliore, A., Timmons, J., Butterworth, J., & Lugas, J. (2012). Predictors of employment and postsecondary education of youth with autism. *Rehabilitation Counseling Bulletin, 55*(3), 176-184. doi:10.1177/0034355212438943
- Müller, E., Schuler, A., Burton, B. A., & Yates, G. B. (2003). Meeting the vocational support needs of individuals with Asperger syndrome and other autism spectrum disabilities. *Journal of Vocational Rehabilitation, 18*(3), 163-175.
- National Center for Education Statistic (2014a). *Children 3 to 21 years old served under Individuals with Disabilities Education Act (IDEA), Part B, by type of disability: Selected years, 1976-77 through 2011-2011*. Retrieved from https://nces.ed.gov/programs/digest/d13/tables/dt13_204.30.asp
- National Center for Education Statistic (2014b). *Number and percentage distribution of 14-through-21 years old students served under Individuals with Disabilities Education Act (IDEA), Part B, who exited school, by exit reason, age, type of disability:2009-2010 and 2010-2011*. Retrieved from https://nces.ed.gov/programs/digest/d13/tables/dt13_219.90.asp
- Pharr, J. R., Moonie, S., & Bungum, T. J. (2012). The impact of unemployment on mental and physical health, access to health care and health risk behaviors. *International Scholarly Research Notices, 2012*, 1-7.
- Quarells, R. C., Liu, J., & Davis, S. K. (2012). Social determinants of cardiovascular disease risk factor presence among rural and urban Black and White men. *Journal of Men's Health, 9*, 120-126.
- Rehabilitation Service Administration (2013). *Who is eligible for vocational rehabilitation program?* Retrieved from <https://rsa.ed.gov/faqs.cfm#vrp>
- Schall, C. M., Wehman, P., Brooke, V., Graham, C., McDonough, J., Brooke, A., ... Allen, J. (2015). Employment interventions for individuals with ASD: The relative efficacy of supported employment with or without prior project SEARCH training. *Journal of Autism and Developmental Disorders*, Advance online publication. doi: 10.1007/s10803-015-2426-5
- Schall, C. M., Wehman, P., & McDonough, J. (2012). Transition from school to work for students with autism spectrum disorders: Understanding the process and achieving better outcomes. *Pediatric Clinics of North America, 59*, 189-202.
- Shattuck, P. T., Narendorf, S. C., Cooper, B., Sterzing, P. R., Wagner, M., & Taylor, J. L. (2012). Postsecondary education and employment among youth with an Autism Spectrum Disorder. *Pediatrics, 129*(6), 1042-1049. doi:10.1542/peds.2011-2864
- Siperstein, G. N., Heyman, M., Stokes, J. E. (2014). Pathways to employment: A national survey of adults with intellectual disabilities. *Journal of Vocational Rehabilitation, 41*, 165-178.
- Simonoff, E., Pickles, A., Charman, T., Chandler, S., Loucas, T., & Baird, G. (2008). Psychiatric disorders in children with autism spectrum disorders: Prevalence, comorbidity, and associated factors in a population-derived sample. *Journal of the American Academy of Child & Adolescent Psychiatry, 47*(8), 921-929.
- Strauser, D. (2013). *Career development, employment, and disability in rehabilitation*. New York: Springer Publishing Company.
- Strauser, D., Feuerstein, M., Chan, F., Arango, J., Silva Cardoso, E., & Chiu, C. Y. (2010). Vocational services associated with competitive employment in 18-25 year old cancer survivors. *Journal of Cancer Survivorship, 4*(2), 179-186. doi:10.1007/s11764-010-0119-9
- Social Security Administration (2014). *Benefits for people with disabilities*. Retrieved from <http://www.ssa.gov/disability/>
- Super, D. E. (1990). A life-span, life-space approach to career development. In D. Brown, L. Brooks & Associates (Eds.), *Career choice and development: Applying contemporary theories to practice* (2nd ed., pp. 197-261). San Francisco, CA: Jossey-Bass.
- Taylor, J. L., & Seltzer, M. M. (2011). Employment and post-secondary educational activities for young adults with autism spectrum disorders during the transition to adulthood. *Journal of Autism and Developmental Disorders, 41*(5), 566-574. doi:10.1007/s10803-010-1070-3
- Taylor, J. L., Smith, L. E., & Mailick, M. R. (2014). Engagement in vocational activities promotes behavioral development for adults with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 44*(6), 1447-1460.
- Wehman, P. (2013). *Life beyond the classroom*. Baltimore, MD: Paul Brookes.
- Wehman, P., Lau, S., Molinelli, A., Brooke, V., Thompson, K., Moore, C., & West, M. (2012). Supported employment for young adults with autism spectrum disorder: Preliminary data. *Research and Practice for Persons with Severe Disabilities, 37*(2), 160-169.
- Wehman, P. H., Schall, C. M., McDonough, J., Kregel, J., Brooke, V., Molinelli, A., Ham, W., Graham, C. W., Riehle, J. E., Collins, H. T., & Thiss, W. (2014). Competitive employment for youth with Autism Spectrum Disorders: Early results from a randomized clinical trial. *Journal of Autism and Developmental Disorders, 44*(3), 487-500. doi:10.1007/s10803-013-1892-x
- Wehman, P., Sima, A. P., Ketchum, J., West, M. D., Chan, F., & Luecking, R. (2014). Predictors of successful transition from school to employment for youth with disabilities. *Journal of Occupational Rehabilitation*. Advance online publication. doi: 10.1007/s10926-014-9541-9546
- Wilczynski, S. M., Trammell, B., & Clarke, L. S. (2013). Improving employment outcomes among adolescents and adults on the Autism Spectrum: Employment outcomes and ASD. *Psychology in the Schools, 50*(9), 876-887. doi:10.1002/pits.21718