

Gender Differences in Vocational Rehabilitation Service Predictors of Successful Competitive Employment for Transition-Aged Individuals with Autism

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Abstract As males and females with autism spectrum disorder (ASD) experience different symptomology, their needs for vocational rehabilitation (VR) are unique as they transition into adulthood. This study examined the effects of gender differences in VR service predictors on employment outcomes for transition-aged individuals with ASD. A total of 1696 individuals (857 males and 839 females) were analyzed from a sample of RSA-911 data of FY 2011. Hierarchical logistic regression analyses were conducted. Results revealed both gender-independent VR service predictors (with job placement and on-the-job supports more beneficial for both genders) and gender-specific predictors of employment (with counseling and guidance, job search assistance, and other services more beneficial for the male group). This study provides support for individualized gender-specific VR services for people with ASD.

Keywords Autism spectrum disorder · Transition · Vocational rehabilitation · Employment · Gender differences

Introduction

Autism spectrum disorder (ASD), according to the latest Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), is characterized as having persistent deficits in social communications, social interactions, and restricted, repetitive patterns of behaviors, interests or activities (American Psychiatric Association 2013). The Centers for Disease Control and Prevention (CDC) estimated that 1 in 68 children met criteria for ASD in the United States in 2010 (CDC 2014) which was a dramatic increase in the prevalence rates since 2000 where only one

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out of 150 children were identified. In addition, ASD affects boys almost five times more often than girls; one out of 42 boys compared to one out of 189 girls are diagnosed with ASD in the US alone (CDC 2014).

In addition to the difference in prevalence rates between males and females, the presentation of ASD symptoms also differ between the gender groups. Males with ASD exhibit more repetitive behaviors (Frazier et al. 2014; Hartley and Sikora 2009; May et al. 2012), more “restrictive” or overly focused interests (Frazier et al. 2014; Hartley and Sikora 2009), greater difficulty with communication (May et al. 2012; McLennan et al. 1993), decreased vocabulary and word knowledge (Frazier et al. 2014; Mandy et al. 2012), inattention (May et al. 2012), and have greater externalizing and social problems (Mandy et al. 2012). In contrast, females on the spectrum display fewer repetitive behaviors, have fewer stereotyped activities, their restricted interests tend to be more socially acceptable (McLennan et al. 1993; Wolff and McGuire 1995), and they tend to have better communication skills in terms of their greater vocabulary and word capacity (Frazier et al. 2014; Lai et al. 2011). However, females do exhibit more sleep problems as well as anxiety and/or depressed affect (Hartley and Sikora 2009; Lai et al. 2011). Interestingly, females tend to have lower cognitive functioning than males as evidenced by their IQ scores (Volkmar et al. 1999) and weaker adaptive skills (Frazier et al. 2014) as well as performances on planning tasks (Nyden et al. 2000). This finding was somewhat controversial. A more recent study examined higher-functioning adults with ASD and found that males were more cognitively impaired than their female counterparts (Lai et al. 2012). Other researchers also found that regardless of IQ, females with ASD had greater social communication impairment and show more irritability and externalizing behaviors than males who have the disorder (Frazier et al. 2014). Although gender differences are evident, few studies have attempted to partial out gender when conducting studies on individuals with ASD, perhaps due to the very low numbers of females with the disorder that participate in research.

Despite gender differences in symptom presentations, a diagnosis of ASD tends to have detrimental effects on employment for both genders (Hendricks 2010; Taylor and Seltzer 2010, 2011). Employment is a major part of an adult’s identity and greatly impacts his/her quality of life. While recent research efforts have been focused on evidence-based vocational services and supports in the community (García-Villamisar and Hughes 2007), the majority of individuals with ASD remain unemployed and/or underemployed. In a study conducted by Ballaban-Gil et al. (1996) with a sample of 45 adults with ASD in the US, only 27 % were employed. Of the individuals who were employed, the majority tended to be underemployed and

underpaid, with only half of them being employed competitively. A similar study was conducted by Taylor and Seltzer (2011) with a sample of 66 transition-aged individuals with ASD who exited secondary school; they found that only 18 % were employed, and of those individuals only 33 % were competitively employed, and none were employed full-time (Taylor and Seltzer 2011). Similarly, Hendricks (2010) reported that between 25 and 50 % of adults with ASD were employed and the majority of those employed were either underemployed or found it difficult to remain employed.

Evidently, employment issues among individuals on the spectrum continue to be a major concern. The most crucial time period for this population is while transitioning from school to work, when they are between the ages of 16 and 25. It was estimated that each year 48,500 U.S. teenagers with ASD reach 18 years of age; however, only a very small percentage (8 %) of those who received special education services remained in high school until age 21 (Shattuck et al. 2012). Chappel and Somers (2010) suggested that transition planning for individuals with ASD should begin 3–4 years prior to exiting the school system. Cimera et al. (2013) even argued that transition should be addressed as early as age 14 (i.e., 2 years earlier than age of 16 currently required by the 2004 reauthorization of IDEA). However, according to Migliore et al. (2012), the majority (85 %) of people with ASD who sought VR services were between 16 and 26 years old with 21 years old being the average age when they applied for VR services (Chen et al. 2015). Shattuck et al. (2012) conducted a study using national data and found that individuals with ASD were at a significantly high risk of not continuing on to postsecondary education or securing employment. The study also emphasized that the first 2 years after high school, when more than 50 % of the individuals with ASD were not engaged in meaningful activity, were the most crucial, highlighting the necessity of adequate planning (Shattuck et al. 2012). Taylor and Seltzer (2010) echoed the same finding with the notion that these individuals are at a greater risk of exhibiting behavioral problems. Over a decade has passed since Volkmar et al. (1999) advocated for more attention to be placed on providing adolescents with ASD the necessary vocational and prevocational skills to obtain and retain employment. For this reason it is imperative that school and vocational rehabilitation (VR) systems collaborate to provide comprehensive transition plans for individuals with ASD (Chappel and Somers 2010).

More recently, a growing interest in transition-aged individuals with ASD and their VR has emerged and researchers as well as practitioners have tried to find best practices to improve the employment outcomes for this population as they exit the school system. Hayward and Schmidt-Davis (2003a) examined the relationship between

case services utilized and successful closure rates in competitive employment; they found that receiving on-the-job training and job placement were positively related to competitive employment. Hayward and Schmidt-Davis (2003b) also found that individuals in competitive employment, on average, worked more hours and earned a higher weekly salary than those individuals in supported employment. In addition, Lai et al. (2011) suggested that appropriate social behaviors could be learned by youth with ASD under the right circumstances, such as with the guidance of a counselor, and then applied in multiple situations that require social interaction, including employment. As suggested by McClannahan et al. (2002), a way to potentially alleviate vocational barriers would be to provide “a multifaceted service model that offers not only skill-development opportunities but also fall-back support that enables [individuals with ASD] to try again” (p. 25).

State-Federal Vocational Rehabilitation (VR) System

In the United States, the state-federal VR program authorized by the Rehabilitation Act of 1973, as amended, was developed to provide employment-related services through the state VR agencies to maximize employment outcomes of individuals with disabilities. Services provided include: assessment and diagnosis, rehabilitation counseling, college or university training, job placement, and on-the-job supports for clients with severe disabilities, in order to assist them in securing and maintaining employment in the integrated work setting that is consistent with their interests, preferences, and skills (Hanley-Maxwell et al. 2003; Hendricks 2010; Muller et al. 2003). See Table 1 for detailed descriptions. Although state VR agencies play a pivotal role in helping individuals with disabilities acquire and retain employment, these services continue to be underutilized by people with ASD; according to previous studies, they only made up a very small proportion (0.6–3.0 %) of the total service users (Dew and Alan 2007; Lugas et al. 2010). Given the fact that individuals with ASD are capable of achieving successful competitive employment and that employment is one of the most valued life roles among adults in our society, researchers have continuously advocated the need for improved services for adults with ASD (Murphy et al. 2010). Recently, Burgess and Cimera (2014) reported that from 2002 to 2011 the number of individuals with ASD seeking VR services increased by 792 %.

Furthermore, arguments have been made for gender-specific interventions, such as educational strategies and behavior modification plans due to the fact that females with ASD “process language and social information

differently than boys do” and because hormonal changes brought on by the menstrual cycle can exacerbate behavior problems in females with developmental disabilities, such as ASD (Thompson et al. 2003, p. 356). Given these issues, the different symptom presentations found in males and females may also cause gender-specific vocational barriers and require gender-specific services. However, there is a paucity of empirical studies addressing the gender differences within ASD and its potential to influence the effectiveness of VR services on employment outcomes. There are researchers who hypothesize that females may be better at “camouflaging” their social deficits (Kopp and Gillberg 1992; Lai et al. 2011). Thus, individuals with ASD would likely benefit from gender-independent and gender-specific interventions (Lai et al. 2012), depending on the limitations looking to be ameliorated.

The purpose of this study was to determine whether there are gender-specific VR service predictors of employment status in transition-aged individuals with ASD after controlling for the covariates of demographics and work disincentives.

Method

Participants

Data used in this study were extracted from the Rehabilitation Services Administration Case Service Report (RSA-911) database of fiscal year 2011 (FY 2011). The RSA-911 database contains information of clients who receive state VR services in the US after their case is closed. Information such as service users’ individual characteristics, cost, duration, number, and type of services received, as well as employment outcomes are uploaded on the database system annually by state VR agencies across the country. The dataset of FY 2011, which was the most recent national data file available at the time of the study, was used for analyses. A total number of 5344 individuals with autism (male = 4505; female = 839) who met the following criteria were selected as participants for this study: (a) were between the ages of 16 and 25 at application for VR services with a diagnosis of ASD as either the cause of a primary or a secondary disability; (b) received VR services; and (c) exited the VR system either successfully rehabilitated with competitive outcome (i.e., competitively employed) or unsuccessfully rehabilitated (i.e., not able to be employed).

Subsequently, the sample was divided into two subgroups according to individuals’ gender. To better serve the purpose of this study, only a portion of the male sample (approximately 20 %) was randomly selected by SPSS for

Table 1 Description of services provided by state VR agencies

Types of services	Descriptions of services
Assessment	Services provided 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)
Diagnosis and treatment of impairments	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
Counseling and guidance	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
College or university training	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, or technical college
Occupational/vocational training	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
On-the-job training	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
Basic academic remedial or literacy training	Literacy training or training provided to remediate basic academic skills needed to function on the job in the competitive labor market
Job readiness training	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)
Disability-related, augmentative skills training	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
Miscellaneous training	Any training not recorded in one of the other categories listed, including GED or high school training leading to a diploma
Job search assistance	Job search activities that support and assist a consumer in searching for an appropriate job; may include help in identifying job opportunities, preparing resumes, developing interview skills, and making contacts with companies
Job placement assistance	A referral to a specific job resulting in an interview, whether or not the individual obtained the job
On-the-job supports	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
Transportation services	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
Maintenance services	Monetary support provided for those expenses such as food, shelter and clothing that are in excess of the normal expenses of an individual, and that are necessitated by the individual's participation in an assessment or while receiving VR services under an individualized plan for employment (IPE)
Rehabilitation technology	Systematic application of technologies or engineering methodologies to meet the needs of an individual in areas that include education, rehabilitation, employment, transportation, independent living, and recreation; includes rehabilitation engineering services, assistive technology devices/services
Reader services	Services for an individual who cannot read print because of blindness or other disabilities such as serious neurological disorders, specific learning disabilities, or other physical or mental impairments; includes reading aloud and transcribing printed information into Braille or sound recordings
Interpreter services	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
Personal attendant services	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
Technical assistance services	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
Information and referral services	Services provided to individuals who need assistance from other agencies (through cooperative agreements) not available through the VR program

Table 1 continued

Types of services	Descriptions of services
Other services	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

Table 2 Demographic characteristics for clients with ASD of each gender group (N = 1696)

	Male (n = 857)		Female (n = 839)	
Age				
16–18	474	(55.3 %)	439	(52.3 %)
19–25	383	(44.7 %)	400	(47.7 %)
Race				
European American	679	(79.2 %)	671	(80.0 %)
Black/African American	86	(10.0 %)	69	(8.2 %)
Others	92	(10.7 %)	99	(11.8 %)
Co-occurring intellectual disability				
Yes	93	(10.9 %)	101	(12.0 %)
No	764	(89.1 %)	738	(88.0 %)
Co-occurring anxiety/depression				
Yes	77	(9.0 %)	120	(14.3 %)
No	780	(91.0 %)	719	(85.7 %)
Pre-service education level				
Less than HS	414	(48.3 %)	392	(46.7 %)
Special education	158	(18.4 %)	158	(18.8 %)
HS diploma or equivalency	214	(25.0 %)	200	(23.8 %)
Postsecondary education	71	(8.3 %)	89	(10.6 %)
Pre-service employment status				
Employed	82	(9.6 %)	62	(7.4 %)
Unemployed	775	(90.4 %)	777	(92.6 %)
SSI/SSDI beneficiary				
Yes	289	(33.7 %)	277	(33.0 %)
No	568	(66.3 %)	562	(67.0 %)
Medicare/medicaid beneficiary				
Yes	286	(33.4 %)	276	(32.9 %)
No	571	(66.6 %)	563	(67.1 %)
Post-service employment status ^a				
Competitively employed	447	(52.2 %)	418	(49.8 %)
Unemployed	410	(47.8 %)	421	(50.2 %)

^a Chi square analysis was conducted to examine the difference in employment outcomes between male and female groups, however, no significant difference was revealed [$\chi^2(1, N = 1696) = 0.336, p = .356$]

the analysis in order to match the number of their female counterparts due to the imbalanced ratio of male to female clients in the pool population. As a result, a total of 1696 sample individuals with 857 males and 839 females were included in the study. Other demographic and work disincentive variables, such as age, race/ethnicity, pre-service education level, pre-service employment status, post-

service employment status, SSI/SSDI beneficiary, Medicaid/Medicare beneficiary, co-occurring intellectual disability, co-occurring anxiety/depression, cost of VR services, duration of VR services, and number and types of VR services received were also included in the study. The demographic and work disincentive detail of each gender group is presented in Table 2.

Variables

Outcome Variable

The outcome variable used in the study was employment status at closure, which included: successful competitive employment and unsuccessful employment outcome. Competitive employment is defined in the RSA-911 manual as employment in an integrated setting or self-employment that is performed on a full-time or part-time basis for which an individual is compensated at or above the minimum wage (i.e., those who worked for wages or salary in a non-integrated setting such as sheltered workshop were excluded). Unsuccessful employment outcome refers to clients who were not working after exiting their planned VR program.

Predictor Variables

Two sets of predictor variables were used: (a) demographic characteristics and work disincentives and (b) VR services. The first set of predictor variables (i.e., demographic characteristics) included age, race/ethnicity, pre-service education level, pre-service employment, co-occurring intellectual disability, and co-occurring anxiety/depression, as well as two work disincentive variables—SSI/SSDI beneficiary and Medicaid/Medicare beneficiary. The second set of predictor variables (i.e., VR services) included cost of services, duration of services (i.e., number of days from service planning to case closure), and each of the types of services received (see Table 1 for detailed descriptions). There were 22 service types provided by the state VR system. There were seven services received by <5 % of the sampled participants and therefore excluded in the subsequent regression analyses, which included: basic remedial or literacy, augmentative skills training, rehabilitation technology, reader services, interpreter services, personal attendant services, and technical assistance services.

Data Analysis

Statistical package for social science (SPSS) version 22.0 for Mac was used to analyze the data. Chi square tests were performed to examine the difference in employment outcome (i.e., post-service employment status), demographic variables, and types of VR services received among the gender groups, whereas one-way ANOVAs were performed to examine cost of services and duration of services between the two gender groups. A separate hierarchical logistic regression analysis was conducted for each gender group to examine the effect of demographic covariates and VR service variables on successful

competitive employment of transition-aged males and females with ASD. Individual demographic and work incentive variables were entered in step 1 to examine their unique effects on employment outcome. In step 2, 15 different types of services were entered into the model to examine their unique effects on employment outcome after controlling for the effects of demographic covariates. A Bonferroni correction was used for multiple analyses to control type I error.

Results

Descriptive Statistics

In FY 2011, a total of 861 individuals with ASD were competitively employed after receiving VR services (successful competitive employment rate = 51.0 %). Refer to Table 2 for demographic characteristics of the sample and case service information in each subgroup. There was no significant difference in employment rates between male and female groups, with 52.2 % of males ($n = 447$) and 49.8 % of females ($n = 418$) having obtained competitive employment [$\chi^2(1, N = 1696) = 0.336, p = .356$]. The post-service employment rate among the male population is very similar to the selected sample, with 52.9 % (vs. 52.2 % in selected sample) of males being competitively employed post-service ($n = 2381$), reflecting that the overall male population and the selected male sample in this study are highly comparable. Among those who obtained competitive employment at closure, the average hourly wages of males and females were similar, at \$8.88/h ($SD = 3.28$) and \$8.73/h ($SD = 4.91$), respectively. However, the average weekly work hours were significantly different between the two groups, with 23.3 h/week ($SD = 10.9$) and 21.0 h/week ($SD = 10.4$) for males and females, respectively.

In relation to the demographic characteristics and work disincentives, eight variables (age, race/ethnicity, pre-service education level, pre-service employment, SSI/SSDI beneficiary, and Medicaid/Medicare beneficiary, co-occurring intellectual disability, and co-occurring anxiety/depression) were compared between the two gender groups. While the majority of the demographic characteristics were similar ($p > .05$) between the two groups, only co-occurring intellectual disability [$\chi^2(1, N = 1696) = 4.207, p = .047$] and co-occurring anxiety/depression [$\chi^2(1, N = 1696) = 4.597, p = .034$] were found to have significant gender differences. Among the female group, 12.0 % of them had co-occurring intellectual disability and 14.3 % had co-occurring anxiety/depression. In contrast, 10.9 % of the males had co-occurring intellectual disability and 9.0 % had co-occurring anxiety/depression.

Table 3 Differences in use of VR services between two gender groups

Type of services	Male (n = 857)		Female (n = 839)		χ^2	<i>p</i>
Assessment_used	579	(67.6 %)	583	(69.5 %)	.729	.393
Diagnosis and treatment of impairments_used	202	(23.6 %)	182	(21.7 %)	.854	.355
Counseling and guidance_used	550	(64.2 %)	510	(60.8 %)	2.080	.149
College or university training_used	93	(10.9 %)	109	(13.0 %)	1.850	.174
Occupational/vocational training_used	75	(8.8 %)	68	(8.1 %)	.230	.632
On-the-job training_used	50	(5.8 %)	59	(7.0 %)	1.012	.315
Basic academic remedial or literacy training_used ^a	15	(1.8 %)	19	(2.3 %)	–	–
Job readiness training_used	190	(22.2 %)	200	(23.8 %)	.666	.415
Disability-related, augmentative skills training_used ^a	15	(1.8 %)	19	(2.3 %)	–	–
Miscellaneous training_used	134	(15.6 %)	147	(17.5 %)	1.090	.297
Job search assistance_used	272	(31.7 %)	248	(29.6 %)	.947	.330
Job placement assistance_used	397	(46.3 %)	361	(43.0 %)	1.864	.172
On-the-job supports_used	306	(35.7 %)	314	(37.4 %)	.541	.462
Transportation services_used	193	(22.5 %)	192	(22.9 %)	.032	.858
Maintenance Services_used	63	(7.4 %)	72	(8.6 %)	.876	.349
Rehabilitation technology_used ^a	35	(4.1 %)	20	(2.4 %)	–	–
Reader services_used ^a	0	–	1	(0.1 %)	–	–
Interpreter services_used ^a	1	(0.1 %)	1	(0.1 %)	–	–
Personal attendant services_used ^a	1	(0.1 %)	1	(0.1 %)	–	–
Technical assistance services_used ^a	7	(0.8 %)	7	(0.8 %)	–	–
Information and referral services_used	170	(19.8 %)	176	(21.0 %)	.340	.560
Other services_used	224	(26.1 %)	204	(24.3 %)	.747	.387

	Male (n = 857)		Female (n = 839)		<i>F</i>	<i>p</i>
Cost of services (\$)	4489	(6412)	4971	(6979)	2.189	.139
Duration of services (day)	708	(576)	759	(646)	2.884	.090
Number of services	4.17	(2.26)	4.16	(2.48)	.002	.967

^a Basic Academic Remedial or Literacy Training, Disability-Related, Augmentative Skills Training, Rehabilitation Technology, Reader Services, Interpreter Services, Personal Attendant Services and Technical Assistance Services were excluded in the further regression analyses, since the sample participants receiving these services was minuscule (<5 %)

Additionally, there was no significant difference in either cost of services ($F = 2.189, p = .139$), duration of services ($F = 2.884, p = .090$), or number of services received ($F = 0.002, p = .967$) between the two gender groups of individuals. Among the types of services received by over 5 % of the clients, no significant gender difference was found across the two groups. The cost, duration, number, and different types of VR services received by each gender and results of Chi square tests between the two gender groups are presented in Table 3.

Logistic Regression Analysis

To answer the research question “whether there is any gender-specific VR service predictor of employment status in transition-aged individuals with ASD,” two hierarchical logistic regression analyses were computed

separately for each of the two gender groups. The results of the logistic regression analyses are presented in Table 4.

Overall, the omnibus tests for the logistic regression models of both genders were found to be statistically significant, which indicated that there was a significant effect for the combined predictor variables on employment status. Specifically, the final model of the male group yielded a $\chi^2 (32, N = 857) = 305.97, p < .001$. The Nagelkerke $R^2 = .40$, indicating that 40 % of the total variance in employment outcome can be explained by the predictor variables. The Hosmer and Lemeshow test yielded a $\chi^2 (8, N = 857) = 7.45, p = .489$, indicating that the final model fits the data reasonably well. Similarly, the final model of the female group yielded a $\chi^2 (32, N = 839) = 319.90, p < .001$. The Nagelkerke $R^2 = .42$, indicating that 42 % of the total variance in employment outcome can be

Table 4 Binary logistic regression coefficients and odds ratios for the final models

	Male				Female			
	B	OR	95 % CI		B	OR	95 % CI	
			Lower	Upper			Lower	Upper
<i>Step 1^a</i>								
Age								
19–25	.007	1.007	.689	1.471	.276	1.317	.877	1.979
Race								
Black/African American	-.229	.795	.480	1.318	-.171	.843	.467	1.519
Other	-.204	.816	.502	1.326	-.361	.697	.421	1.154
Co-occurring intellectual disability	-.385	.680	.394	1.175	.232	1.261	.761	2.089
Co-occurring anxiety/depression	-.567	.567*	.345	.933	-.144	.866	.542	1.384
Pre-service education level								
Special education	.081	1.084	.715	1.644	-.068	.934	.598	1.461
HS diploma or equivalency	.465	1.592*	1.056	2.399	.222	1.249	.797	1.958
Postsecondary education	.817	2.264*	1.160	4.419	.853	2.346**	1.245	4.420
Pre-service employment status	1.004	2.730***	1.575	4.732	1.264	3.541***	1.749	7.168
SSI/SSDI beneficiary	-.201	.818	.551	1.213	-.335	.715	.462	1.107
Medicare/medicaid beneficiary	-.120	.887	.606	1.298	-.151	.860	.570	1.298
Days from service planned to case closure								
300–549 days	-.711	.491***	.321	.750	-.689	.502**	.317	.796
550–899 days	-.990	.372***	.239	.579	-1.256	.285***	.177	.458
More than 900 days	-1.239	.290***	.186	.452	-1.381	.251***	.158	.401
Cost of services								
\$750.00–\$2999.99	.387	1.472	.978	2.216	.341	1.407	.887	2.230
\$3000.00–\$6499.99	1.209	3.352***	2.194	5.120	1.773	5.889***	3.723	9.313
More than \$6500.00	2.213	9.142***	5.633	14.840	2.559	12.920***	7.899	21.132
<i>Step 2^a</i>								
Age								
19–25	.114	1.121	.738	1.703	.197	1.217	.779	1.902
Race								
Black/African American	-.255	.775	.442	1.358	-.089	.915	.478	1.753
Other	-.130	.878	.516	1.492	-.354	.702	.409	1.205
Co-occurring intellectual disability	-.526	.591	.321	1.090	.223	1.250	.722	2.166
Co-occurring anxiety/depression	-.758	.468**	.269	.817	-.006	.994	.602	1.640
Pre-service education level								
Special education	.088	1.092	.685	1.742	-.048	.953	.588	1.545
HS diploma or equivalency	.396	1.486	.942	2.346	.193	1.213	.745	1.975
Postsecondary education	.734	2.083*	1.015	4.272	.850	2.340*	1.174	4.664
Pre-service employment status	.709	2.031*	1.131	3.647	1.398	4.048***	1.895	8.650
SSI/SSDI beneficiary	-.323	.724	.469	1.119	-.333	.717	.446	1.152
Medicare/medicaid beneficiary	-.226	.798	.522	1.220	-.253	.776	.496	1.215
Days from service planned to case closure ^b								
300–549 days	-.829	.436***	.271	.703	-.523	.593*	.361	.972
550–899 days	-.838	.433***	.266	.704	-1.131	.323***	.194	.538
More than 900 days	-1.224	.294***	.176	.492	-1.187	.305***	.182	.512

Table 4 continued

	Male ^d				Female			
	B	OR	95 % CI		B	OR	95 % CI	
			Lower	Upper			Lower	Upper
Cost of services ^b								
\$750.00–\$2999.99	.215	1.240	.778	1.976	.129	1.138	.690	1.877
\$3000.00–\$6499.99	.694	2.002**	1.212	3.308	1.260	3.526***	2.101	5.918
More than \$6500.00	1.412	4.102***	2.262	7.440	1.693	5.438***	3.040	9.729
VR services ^c								
Assessment	-.049	.952	.663	1.366	-.078	.925	.628	1.362
Diagnosis	.107	1.113	.743	1.667	-.250	.779	.507	1.197
Counseling and guidance	.858	2.359***	1.608	3.461	.394	1.484	.998	2.206
College or university training	.255	1.290	.741	2.247	.382	1.466	.841	2.555
Occupational/vocational training	.226	1.254	.690	2.278	.592	1.808	.923	3.543
On-the-job Training	.407	1.502	.702	3.214	.585	1.795	.834	3.867
Job readiness training	.231	1.260	.814	1.949	-.175	.840	.535	1.318
Miscellaneous training	.032	1.033	.634	1.683	.293	1.340	.843	2.129
Job Search Assistance	.454	1.574*	1.047	2.366	-.024	.976	.611	1.559
Job Placement Assistance	.932	2.541***	1.766	3.655	.846	2.330***	1.583	3.430
On-the-job supports	1.085	2.960***	1.993	4.395	1.345	3.838***	2.621	5.621
Transportation	.116	1.123	.737	1.712	-.059	.943	.609	1.461
Maintenance	-.233	.792	.423	1.485	-.096	.908	.488	1.689
Info and referral	-.399	.671	.427	1.056	-.358	.699	.430	1.139
Other services	.583	1.791**	1.202	2.669	-.167	.846	.566	1.265

OR odds ratio. 95 % CI 95 % confidence intervals

^a Demographic covariates: age (with 16–18 year as the reference category), gender (with men as the reference category), race/ethnicity (with European American as the reference category), co-occurring anxiety/depression (with no anxiety/depression as the reference category), co-occurring intellectual disability (with no intellectual disability as the reference category), education level at application (with less than high school as the reference category), SSI/SSDI beneficiary (with not receiving SSI/SSDI as the reference category), Medicare/Medicaid beneficiary (with not receiving Medicare/Medicaid as the reference category), pre-service employment status (with not having pre-service employment experience as the reference category), cost of services (categorized by quartile; and with less than \$749.99 as the reference group) and days from service planned to case closure (categorized by quartile; and with <299 days as the reference group)

^b All the grouping is redefined and categorized based on quartile of the sample

^c All the VR services are using not receiving services as the reference group

^d To avoid possible methodological biases, a replicated regression analysis was conducted with another group of male sample ($n = 848$) selected from the pool. Findings similar to the current study were revealed. Detailed analysis results are available upon request

* $p < .05$; ** $p < .01$; *** $p < .001$

explained by the predictor variables. The Hosmer and Lemeshow test yielded a $\chi^2(8, N = 839) = 8.18$, $p = .416$, also indicating a good fit for the final model.

The current study involved two steps. In the first step, demographic covariates were entered as predictors of the employment status at closure: including age, gender, race/ethnicity, pre-service education level, pre-service employment status, SSI/SSDI beneficiary, Medicare/Medicaid beneficiary, co-occurring intellectual disability, co-occurring anxiety/depression, cost of services, and duration of services received. In the second step, the model was expanded with the addition of 15 VR service variables as predictors of employment status at closure.

In step one, pre-service education level, pre-service employment status, duration of VR services, and cost of VR services were found to be significant predictors for employment outcomes in both male and female groups. All of these variables appeared to share a similar pattern in predicting competitive employment outcomes for each of the gender groups. Specifically, when compared to those who had received less than high school education, individuals with a postsecondary education at application had significantly increased odds of obtaining competitive employment (male: OR 2.26; 95 % CI 1.16–4.42; female: OR 2.35; 95 % CI 1.25–4.42). Individuals who had previous work experience were 2.73 and 3.54 times more likely

to find competitive employment than those who did not (male: *OR* 2.73; 95 % CI 1.58–4.73; female: *OR* 3.54; 95 % CI 1.75–7.17, respectively). In addition, individuals who received higher case expenditure, generally, were more likely to obtain employment in comparison to those who had received less than \$750 in case expenditure (male: *OR* 3.35–9.14; female: *OR* 5.89–12.92). However, individuals who stayed in the VR system for services for a longer period of time were less likely to find employment compared to those who received services for <300 days before they exited the VR system (male: *OR* 0.29–0.49; female: *OR* 0.25–0.50). Interestingly, co-occurring anxiety/depression showed a different predictive effect on employment outcomes for each gender group. In the male group, individuals having co-occurring anxiety/depression showed a 43 % reduction in odds of finding employment compared to those who did not have any (*OR* 0.57; 95 % CI 0.35–0.93). No such effect was found in the female group. Interestingly, the receipt of SSI/SSDI and Medicaid/Medicare was not found to be a significant predictor in either gender group.

In step two, a number of demographic and case information variables continued to show similar predicting effects, such as having previous work experience and receiving postsecondary education. After controlling for the effects of demographic covariates, two VR service variables were found to significantly and consistently increase the chance of successful employment outcomes across the gender groups: job placement assistance and on-the-job supports. On-the-job supports was the strongest predictor of employment at closure across both gender groups, followed by job placement assistance. Results revealed that individuals who received on-the-job support services were 2.96 times more likely to be employed in the male group (*OR* 2.96; 95 % CI 1.99–4.40) and 3.84 times more likely to be employed in the female group (*OR* 3.84; 95 % CI 2.62–5.62). As for job placement assistance, male clients who received the services were 2.54 times more likely to be employed (*OR* = 2.54; 95 % CI: 1.77–3.66) and female clients were 2.33 times more likely to be employed (*OR* 2.33; 95 % CI 1.58–3.43) than those who did not receive the service in their respective gender groups.

For the male group, three additional VR service variables were found to be significantly predictive of employment outcomes, including: vocational rehabilitation counseling and guidance, job search assistance, and other services. All of the predictors positively contributed to employment outcomes. Male clients who received counseling and guidance, other services, and job search assistance services were, respectively, 2.36 times (*OR* 2.36; 95 % CI 1.61–3.41), 1.79 times (*OR* 1.79; 95 % CI 1.20–2.67), and 1.57 times (*OR* 1.57; 95 % CI 1.05–2.37)

more likely to secure competitive employment than those who did not.

Discussion

With the recent movement towards evidence-based practice in vocational rehabilitation (Chan et al. 2010) and the current passage of the Workforce Innovation and Opportunity Act (WIOA), an increased emphasis on the effectiveness of transition-related vocational services and employment outcomes of individuals with disabilities has emerged. Research has revealed gender differences in the symptomatology of people with ASD; however, gender-specific determinants on employment outcomes and the effectiveness of VR services for different genders remains largely unknown. In this study, key factors were found to predict employment in transition-aged individuals with ASD, including previous work experience, postsecondary education, and greater case expenditure in cost of services. Conversely, remaining in the VR system for longer periods of time was associated with lesser likelihood of successful competitive employment outcomes. Gender-independent VR service predictors of employment included job placement and on-the-job support services.

Nonetheless, males and females with ASD are quite different. They present with different symptomology and deficits, and meet different diagnostic criteria, as a result. Having different deficits would suggest that they might also have different needs. The purpose of this study was to determine and identify the effects of gender differences in VR service predictors on employment outcomes for transition-aged individuals with ASD. The results of the study revealed that males and females with ASD encountered different facilitators as well as barriers to successful employment outcomes. Gender-specific predictors of employment for males consisted of VR counseling and guidance, job search assistance, and other services. Co-occurring anxiety/depression in transition-aged males with ASD was a deterrent to employment.

Gender-Independent Factors and Service Needs

Some gender-independent demographic factors were found, which were not surprising. For example, having previous work experience and receiving postsecondary education were both associated with higher likelihood of successful employment outcomes. This is similar to findings within the general (Ayres 2013) and disability (Dutta et al. 2008) literature regarding prior work experience and postsecondary education as predictors of employment. Specifically, individuals with ASD who worked in the community during high school (Carter et al. 2012) or those

who had two or more jobs (Chiang et al. 2013) had greater chances for successful employment outcomes. However, experience working in a sheltered workshop resulted in poorer employment outcomes for individuals with ASD (Cimera et al. 2012). In addition, individuals with higher education also earn more, on average, than those without, underscoring the importance of education on earning potential. Another advantage of receiving formal education and work experience is the added social opportunities, an area of deficiency for individuals with ASD.

With regard to VR services provided, those who received greater case expenditure, job placement assistance, and on-the-job supports, and those who were in the VR system for shorter timeframes (i.e., <300 days) exhibited greater success with securing competitive employment. This would suggest that more funding allocated to assist transition-aged individuals with ASD in securing placement results in better employment outcomes. In fact, the newly enacted WIOA program is one of the examples that would be beneficial for transition-aged individuals with ASD to achieve better employment outcomes. Under WIOA, 15 % of each state's public VR funds must now be used for transition services, and specifically pre-employment transition services as defined within WIOA. These services include job exploration counseling, work-based learning experiences, counseling on post-secondary opportunities, workplace readiness training, and training on self-advocacy. In addition, half of the funding that states receive under the supported employment state grants will now have to be used to support youth with the most significant disabilities (up to age 24), and these youth may receive extended services (i.e., ongoing supports to maintain an individual in supported employment) for up to 4 years (U.S. Department of Labor 2015). With each state's public VR system now allocating more funding in transition from school to adult life and having a much larger role in serving youth who need the most assistance, it would not only be beneficial to the transition population with various levels of disability but also to society in general as proven by previous research evidence. Specifically, Cimera and Burgess (2011) reported that individuals with ASD who worked in the community "generated more monetary benefits than monetary costs (i.e., average benefit-cost ratio of 5.28 and monthly net benefit of \$643.20)" (p. 173). Likewise, helping individuals to obtain employment sooner, rather than later, would also benefit society, as well as individuals with ASD. This would align with the literature that advocates for the "place and train" model. Research has shown positive effects for individuals with ASD (Lugas et al. 2010), where individuals are first placed in a job, and then provided with the training required to complete the job functions satisfactorily.

Job placement assistance was beneficial in assisting transition-aged individuals with ASD with employment

acquisition. This aligns well with previous studies (Migliore et al. 2012; Schaller and Yang 2005). Researchers have advocated for jobs that highlight the strengths, address the needs, and maintain the interest of individuals with ASD (Smith 1990) in order to support job retention (Hendricks 2010). Similarly, on-the-job supports was important in assisting transition-aged individuals with ASD retain employment. Numerous studies have evaluated the efficacy of various on-the-job supports, including video modeling, audio cuing, and using coworkers as mentors. Studies regarding the efficacy of video modeling have been contradictory; some research reports its success in teaching vocational skills (Allen et al. 2010a, b), while others found that it was not effective (Allen et al. 2012). Audio cuing has repeatedly demonstrated efficacy in promoting vocational skill mastery for individuals with ASD (Allen et al. 2012; Bennett et al. 2013a, b). In addition, another study found that video modeling coupled with audio prompting was effective (Burke et al. 2013). Not all research regarding on-the-job support services has been favorable regarding individuals with ASD. For example, Migliore et al. (2012) found that receiving on-the-job supports was negatively associated with higher earnings. Similarly, having a job coach has been associated with reduced interaction between employees with disabilities and their non-disabled coworkers (Chadsey et al. 1997). In addition, the magnitude of effects on-the-job support services has on employment outcomes seems quite different between the two gender groups—found to be more beneficial for females with ASD than their male counterparts (with odd ratios equal to 3.84 versus 2.96). Clearly, more research needs to be done in this area.

Gender-Specific Factors and Service Needs

When looking at gender differences related to employment for males and females with ASD, some were clearly significant. It is important to note that although males presented less frequently with co-occurring anxiety/depression than their female counterparts, those who did have co-occurring anxiety/depression exhibited an alarming, almost 50 %, reduction in the odds of finding employment. This may be due to males and females exhibiting different types and severity of anxiety and/or depression. Therefore, it may be that the female associated disorders are more acceptable (or less evident) in employment settings. Mental health services for transition-aged males with ASD targeted at managing symptoms could prove beneficial. Employment, in itself, has been found to be closely related to reduced mental health issues; therefore, providing males with ASD supports necessary to be successfully employed, may actually assist them from developing co-occurring anxiety and/or depression, and subsequently promote job retention.

Employment supports that were unique in predicting employment outcomes for males were VR counseling and guidance, job search assistance, and other services. VR counseling and guidance efforts should focus on job-related task skills, but more importantly, interpersonal skills (Fast 2004), and behavioral skills training (Burke et al. 2010) to optimize successful employment outcomes and retention.

Transition-aged male VR clients with ASD directly benefited from receiving assistance in preparing resumes, identifying appropriate job opportunities, and developing interview skills. Sometimes, VR counselors provide additional assistance by making contacts with potential employers on behalf of the consumer. Males with ASD often present with more challenging behavioral and communicative issues (Frazier et al. 2014; Hartley and Sikora 2009; Mandy et al. 2012; May et al. 2012; McLennan et al. 1993). Therefore, focusing on job search assistance appears essential.

Other services, VR services that cannot be recorded elsewhere, include 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. When working with males with ASD, it would be beneficial to provide these services in order to optimize their chances of obtaining competitive employment. Future research might also look into whether the gender difference in other services is due to the different types of preferred occupations between males and females with ASD.

Implications of Clinical Practices

Several implications for vocational rehabilitation practice can be derived from these findings. Given the importance of previous work experience for this population, interventions targeted at providing work experience are warranted. Work experience can be provided in numerous ways including paid internships and supported employment. Postsecondary education is also a significant predictor of eventual employment. Therefore, efforts to provide postsecondary education opportunities would be beneficial (Burgess and Cimera 2014; Migliore et al. 2012); however, caution should be taken to not under-employ individuals (Baldwin et al. 2014).

VR counselors should be mindful when determining appropriate budgets for transition-aged individuals with ASD, keeping in mind that greater case expenditures results in increased employment outcomes for individuals with ASD and decreased cost to society (Cimera and Burgess 2011). In addition, when placing transition-aged individuals in jobs, efforts should be made to select jobs that focus on the strengths, needs, and interests of individuals with ASD (Hendricks 2010; Smith 1990).

For individuals with ASD, on-the-job supports that may be most beneficial appear to be video modeling, audio cuing, and coworkers as mentors. However, technological supports appear to have the most benefits. Hill et al. (2013) indicated that using personal digital assistants (PDAs; e.g., iPad) could serve to “increase [their] independence by removing reliance on an adult to prompt them to complete tasks” (p. 29). Furthermore, VR counselors should be mindful of the potential “effects of bullying and depression on employee success” when attempting to utilize “coworkers as mentors and trainers of employees with ASD” (Wilczynski et al. 2013, p. 881).

When working with males with ASD, special attention should be paid to the unique gender differences and their effects on employment. Specifically, providing VR counseling and guidance to teach interpersonal and behavioral skills are especially important (Burke et al. 2010; Fast 2004). Assistance with job search would also benefit transition-aged males with ASD. Providing transition-aged individuals with ASD these necessary life skills could assist them in transitioning into employment opportunities (Wehman 2006). Life skills which are useful to individuals with ASD and can be taught include: organization, scheduling, task sequencing, social skills, appropriate behavior and anxiety management, as well as leisure applications for developing coping and waiting skills (Hill et al. 2013). Certain types of technology can be utilized to teach and/or reinforce these life skills, such as Assistive Technology (AT), Video Based Instruction (VBI), Covert Audio Coaching (CAC), and Alternative AT Supports (Wilczynski et al. 2013). Researchers have advocated for the use of PDAs in lieu of traditional AT devices to decrease the negative stigma associated with the traditional AT devices (Gentry et al. 2012; Hill et al. 2013). Interestingly, due to individuals with ASD’s preference to objects over people, they may prefer receiving instruction from PDAs over people (Hill et al. 2013). The increased use of PDAs coupled with their reduced cost could prove beneficial for clinicians working with transition-aged individuals with ASD to assist with teaching vocational life skills (Wilczynski et al. 2013).

Finally, WIOA (2014) requires VR agencies to collaborate with school systems to set up a transition plan for students with disabilities prior to their departure of the school system. Numerous researchers since have advocated for school systems to actively collaborate with their VR agencies with only limited success noted (Chappel and Somers 2010; Friedman et al. 2013; Hillier et al. 2007).

Limitations

This study incorporates some limitations; caution should be heeded when making generalizations. First, this study used the RSA-911 data, a pre-existing dataset. As a result, some

of the details from the data, including information about specific diagnosis, disability severity, cognitive and behavioral functioning, comorbidity, type of school attended/job held by participants are limited. In addition, causality cannot be inferred due to the cross-sectional research design of this study. Males were represented at a disproportionate rate compared to females. In order to achieve a balanced male–female sample, a random male sample was used (as opposed to all males), which could result in a sampling error. To avoid possible methodological biases, a replicated regression analysis was conducted with another male sample group selected from the population. Findings similar to the current study were revealed.

Conclusions

Services provided by state VR agencies are a viable resource to assist transition-aged individuals with ASD in seeking and maintaining employment. Different predictive patterns of employment outcomes were found between the two gender groups. In addition to the common service predictors, transition-aged males with ASD also benefited from counseling and guidance services, job search assistance, and other services. However, those three services were not found to be significant contributors among transition-aged females. Therefore, rehabilitation professionals who provide VR services should consider customizing them to meet the gender-specific vocational needs of transition-aged individuals with ASD. Future studies could further investigate the effectiveness of gender-specific tailored VR service modalities for transition-aged individuals with ASD.

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