Comparing Employment Outcomes of Young Adults with Autism: Does Postsecondary Educational Experience Matter?

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Abstract

Previous research indicates that postsecondary educational experience (PSE) predicts successful employment outcomes for transition-aged youth with disabilities. Using data on supported employment services from the Rehabilitative Services Administration, this study compared employment rates and outcomes for young adults with Autism Spectrum Disorder (ASD) with different levels of education who received supported employment services. The study also analyzed the cost-effectiveness and cost-efficiency of vocational rehabilitation (VR) services provided to these youth. Findings indicate that young adults with PSE experienced increased rates of employment, earned greater weekly wages, and worked more weekly hours than individuals with ASD with less education. VR services provided to youth with ASD in the PSE group were more cost-effective and were ultimately cost-efficient, provided that individuals maintained employment for 16 months.

Keywords: autism, transition, postsecondary education, vocational rehabilitation

Transition planning was first included in the Individuals with Disabilities Education Act (IDEA) in 1997 to address abysmal school outcomes for youth with disabilities. The most recent iteration of IDEA (2004) continues the requirement that Individualized Education Program (IEP) teams work with youth with disabilities to prepare them for the transition from school to adult life through transition planning and services that consider students' strengths, needs, preferences, and interests. Adult service agencies who would likely be responsible for the provision of transition services, including state vocational rehabilitation (VR) agency representatives, are invited to participate in the transition process. Despite the decades-long focus on improving post-school outcomes through the transition planning process, progress has been both limited and uneven. Youth with IEPs are still less likely than students without IEPs to participate in postsecondary planning and work experiences while in high school (Lipscomb et al., 2017). Overall outcomes for youth with disabilities continue to trail those of their peers without disabilities, and outcomes for young adults with Autism Spectrum Disorder (ASD) remain poor compared to youth with other disability categories (Newman et al., 2011).

Employment Outcomes for Youth with ASD

For many youth with ASD, there is a divergence between the goals of IDEA-mandated transition planning and practices and actual employment experiences in the years following high school. Individuals with ASD experience high rates of unemployment or under-employment (Hendricks & Wehman, 2009; Roux, Shattuck, Rast, Rava, & Anderson, 2015; Taylor & Seltzer, 2011). Only 26% of young adults with significant disabilities, including ASD, are working two years post-high school; nearly half (43%) of those employed work in segregated settings, such as sheltered workshops (Carter, Austin, & Trainor, 2012). When compared with youth with other disabilities, including Learning Disabilities, Intellectual Disabilities (ID), and Speech Language Impairment, young adults with ASD are least likely to be employed or to have prior work experiences in the first six years following high school (Shattuck et al., 2012). Access to VR services does not necessarily lead to successful employment outcomes. Participation in VR services varies widely across states for young adults with ASD, and measures of successful employment outcomes for youth with ASD receiving VR services range from 36% to 58% (Burgess & Cimera, 2014;

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Migliore, Butterworth, & Zalewska, 2014). These findings highlight difficulties young adults with ASD encounter in finding and maintaining employment, even for individuals who participate in VR services during transition.

Factors that Influence Employment Outcomes

The field has begun to identify factors that may differentially influence employment outcomes for young adults with ASD. Work experience is associated with improved employment outcomes for young adults with ASD (Carter et al., 2012; Simonsen & Neubert, 2012; Sung, Sanchez, Kuo, Wang, & Leahy, 2015) and youth with disabilities in general (Test et al., 2009; Wehman et al., 2015). Young adults with ASD who receive VR job placement services, which focus on assisting individuals with disabilities to find specific job positions, are more likely to be successfully employed (Migliore, Timmons, Butterworth, & Lugas., 2012; Sung et al., 2015). Recent studies have also indicated that postsecondary educational experience (PSE) predicts successful employment for young adults with ASD (Migliore et al., 2012; Sung et al., 2015), individuals with ID (Grigal, Hart, & Migliore, 2011) and youth with disabilities (Wehman et al., 2015). When compared to peers without PSE, transition-aged youth with ID who participate in PSE are employed in greater numbers in competitive, integrated settings, work more hours, and earn more in weekly wages (Cimera, Thoma, Whittenburg, & Ruhl, 2018). Although these factors suggest potential pathways for improving employment outcomes for young adults with ASD, closer examinations of these approaches are needed. There has not been research that directly compares specific employment outcomes of young adults with ASD who have attained different educational levels, including PSE.

Postsecondary Educational Experiences

In our current knowledge-based economy, exploring the influence of PSE on work outcomes of young adults with ASD becomes increasingly important. Recent data indicate that higher levels of education continue to be associated with increased earnings, decreased unemployment, and healthier lifestyles (Ma, Pender, & Welch, 2016). At the federal level, arguments about the impact of PSE on employment outcomes for youth with and without disabilities have been used to justify increases in funding for PSE programs that specifically target youth with ID and other developmental disabilities (DD), including ASD. The Higher Education Opportunity Act of 2008 supports the inclusion of students with ID, DD, and ASD in higher education settings through the establishment of a national center for sharing best practices, grants for model programs, and expanded access to some student financial aid programs (Think College, 2017b). In particular, the Transition and Postsecondary Programs for Students with Intellectual Disabilities (TPSID) model programs offer eligible students opportunities for meaningful participation in college academic and social life, while also preparing them for employment (Think College, 2017a). Emerging research describing employment outcomes for PSE program participants is positive, with preliminary results indicating high employment rates across program types (Moore & Schelling, 2015) and time (Ross, Marcell, Williams, & Carson, 2013). Traditional avenues for young adults with ASD to participate in PSE also exist through community college, vocational and career training, and four-year universities. However, PSE financial support for this population is limited. In 2008, only 10% of youth with ASD using VR services received VR financial assistance through college services to offset costs of PSE participation (Migliore, et al., 2012).

VR Services and Individuals with ASD

State VR agencies assist individuals with disabilities in finding and maintaining employment and are responsible for taxpayer monies spent during that process. It is important to identify services that are associated with successful employment, better wages, and more work hours for young adults with ASD, but also to determine which approaches yield returns on societal investments in VR through increased tax base contributions and decreased reliance on government benefits (Burgess & Cimera, 2014). When compared to the larger population of young adults with disabilities receiving VR services, transition-aged youth with ASD are more likely to achieve employment than the larger group; however, costs of providing VR services to youth with ASD are significantly higher. Previous research has demonstrated that having sheltered workshop experience may hinder the earning power of adults with ASD, while costing VR agencies more to provide services (Cimera, Wehman, West, & Burgess, 2012). Across the board, individuals with ASD who receive VR services continue to experience low rates of successful employment, low wages, and limited number of hours worked per week (Burgess & Cimera, 2014, Cimera & Burgess, 2011; Cimera et al., 2012). Yet these studies also describe possibilities for improving employment outcomes for individuals with ASD and maintaining cost-effective services for taxpayers. Transition planning and services for youth with ASD can result in competitive employment and avoiding segregated employment training settings

can help more adults with ASD achieve higher wages while costing VR agencies less to provide services (Burgess & Cimera, 2014; Cimera et al., 2012).

Current Study

Access to PSE appears to benefit young adults with disabilities. It is still unknown, however, how PSE may affect specific employment outcomes for transition-aged youth with ASD and if the provision of VR services to this group is cost-effective and cost-efficient from a public policy perspective. This paper extends previous research within the field to transition-aged youth with ASD by comparing employment rates and outcomes across different educational attainment levels and analyzing the cost-effectiveness and cost-efficiency of VR services provided. This study focused on the following research questions: Are there differences in employment rates for transition-aged youth with ASD with different levels of educational attainment (no high school diploma, special education certificate, high school diploma, and PSE)? How do employment outcomes (wages earned, hours worked, hourly pay rate, type of position obtained) compare for young adults with ASD with different levels of education? Is PSE cost-effective for transition-aged youth with ASD when total cost of services, cost-per-hour worked, and cost-per-dollar earned are considered? From the taxpayers' perspective, is it cost-efficient for young adults with ASD to participate in PSE?

Method

In this study, the researchers used descriptive statistics to compare specific employment outcomes for transition-aged supported employees with ASD who have different educational levels. Descriptive statistics were calculated to make comparisons across educational level groups on participant demographic characteristics and multiple vocational outcomes, including the reason for VR case closure, occupation type, weekly wages earned, weekly hours worked, and hourly pay rate. The researchers also performed cost-effectiveness and cost-efficiency analyses of the VR services provided to this population. The method used in this paper replicated that used by Cimera et al. (2018). While the previous study focused on employment outcome comparisons for transition-aged youth with ID, this study considered how different educational attainment levels influence work outcomes for young adults with ASD.

Data Source

Data used in this study were obtained from the Rehabilitative Services Administration's Case Service Report (RSA-911) for 2015, a federally funded database designed to track VR services and outcomes across the United States annually. State agency VR counselors enter information into the database, including: participants' demographic data, provision of specific VR services, and outcomes of VR cases. Data entries into the database are certified before submission and checked for potential errors after submission (U.S. Department of Education, 2016).

Participants

Over 500,000 individuals with disabilities accessed VR services in the United States in 2015 (U.S. Department of Education, n.d.). Data on transition-aged youth with ASD who received VR services (n = 4,249) were analyzed in this study. To be included in analysis, participants must have: 1. ASD listed as primary disability, 2. No recorded secondary disabilities, 3. Individualized Plans for Employment (IPE) with supported employment as an employment goal, and 4. Been between the ages of 17-26 years old when their VR cases were closed. Individual records were excluded if secondary disabilities were present and/or participants were older than 26, since these two factors may also differentially affect employment outcomes (Cimera et al., 2018).

Participants were divided into four groups, based on highest level of education attained at time of VR case closure. The four groups were: no high school diploma (n = 426; 10.03% of total sample), high school special education certificate of completion (n = 926; 21.79% of total sample), high school diploma (n = 1,868; 43.96% of total sample), and some postsecondary educational experience (n = 1, 029; 24.22% of total sample). Demographic information, including gender, ethnicity, severity of disability, and personal living arrangement, was also collected for each of the groups. Please see Table 1 for descriptions.

Variables

Level of educational attainment. RSA-911 provides nine data coding options for describing educational levels of VR participants (U.S. Department of Education, 2016). The researchers collapsed these levels into four variable categories for analysis: no high school diploma, high school special education certificate, high school diploma, and some postsecondary educational experience. "No high school diploma" was defined as having elementary and/or secondary school experience that did not result in a standard high school diploma, "high school special

education certificate" as finishing high school with a special education certificate of completion or attendance based on IEP requirements, "high school diploma" as meeting requirements for a state-issued diploma or its alternative, and "some postsecondary educational experience" as participating in postsecondary educational training after high school - including degree, non-degree, and certificate programs.

Severity of disability. VR counselors rated severity of participants' disabilities and entered that information into the RSA-911database. There were three possible values – not significant, significant, and most significant. Disabilities were categorized as "significant" if they limited functioning in areas that may affect work outcomes (including communication, independent living, social, and work skills) and were likely to require multiple and ongoing VR services. The category of "most significant" disabilities added to the criteria for "significant" disabilities by describing participants who demonstrated functional limitations in more than one area. Finally, participants who did not meet criteria listed above were classified as having disabilities that were "not significant" (U.S. Department of Education, 2016).

Reason for VR case closure. Data were collected on reasons for VR case closure. Multiple reasons were provided for why participants' cases may not have been closed successfully, including: VR counselor was unable to locate or contact the participant, disability was deemed "too significant" to benefit from VR services, participant was no longer interested in VR services, participant transferred to another agency, transportation to and from work was not found, necessary extended VR services were unavailable, the participant was incarcerated, or the participant was placed in a sheltered or non-integrated extended employment program instead. Participants' cases were categorized as "employed" when they achieved competitive, integrated or supported employment (U.S. Department of Education, 2016).

Occupation type. For individuals whose cases were closed because of successful employment outcomes, VR counselors entered information into RSA-911 on the type of work they obtained. Occupation type was categorized using the Standard Occupational Classification (SOC) code that best matched the work description (U.S. Department of Education, 2016; U.S. Department of Labor, 2016). This study utilized SOC's 23 occupational family codes to make work type comparisons across participant groups (Cimera et al., 2018).

Weekly wages, hours worked, and hourly pay rate. Weekly wages were defined as the average money earned from employment, before deductions, per week. Hours worked referred to the average number of hours spent at work on a weekly basis. Hourly pay rate was reported as the amount of money earned per hour in employment.

Monthly government subsidies. VR counselors entered into RSA-911 the amount of money participants received in government subsidies per month at the point when their cases were closed. Social Security disability payments, Veterans' Disability benefits, Workers' Compensation payments, monies received through Temporary Aid for Needy Families (TANF), and any other cash assistance from local or state government were included in these calculations (U.S. Department of Education, 2016). The researchers added together subsidy monies received from various sources to obtain monthly totals for group comparison purposes (Cimera et al., 2018).

Cost of VR services. The total cost of VR services provided prior to case closure was reported in RSA-911. These figures reflected the amount of money spent to purchase VR services from outside vendors (such as assessment, job search assistance, supported employment), and did not include direct services provided by state VR counselors (U.S. Department of Education, 2016).

Cost-effectiveness. Cost-effectiveness is a comparison measure that analyzes costs of different approaches that achieve same outcomes (Boardman, Greenberg, Vining, & Weimer, 2006). The most cost-effective approach is the one that costs the least but still reaches the desired outcome. This analysis compared VR service costs for participants in each education level group to average costs for the total sample and for participants who became employed (Cimera et al., 2018). Cost-effectiveness was also calculated in terms of cost-per-hour worked and cost-per-dollar earned for individuals who exited VR with successful employment outcomes.

Cost-efficiency. Cost-efficiency is a method for comparing economic costs and benefits of a given situation (Boardman et al., 2016). The United States VR system is funded by federal and state governments. Local VR counselors and authorized providers often work together to provide individuals with disabilities a range of services needed to find and maintain employment (e.g., job development, job site training, transportation training). Because these services are publicly funded, taxpayers, through their tax contributions, ultimately pay for the provision of VR services. Therefore, the cost-efficiency analysis focused on costs and benefits to taxpayers to determine if PSE participation produced cost-efficient results. PSE participation could potentially require more expensive VR services, because of financial support for

PSE, cases staying open longer, or requirements for additional, varied VR supports. PSE participation could possibly result in benefits to taxpayers too, if young adults with ASD who have PSE experience earn more in wages, thus potentially paying more in taxes while receiving less in government subsidies (Cimera et al., 2018).

Results from this study yielded average annual wages that would likely fall beneath the threshold for state and federal tax payment requirements. Therefore, the researchers used differences across groups in government subsidies received to determine the cost-efficiency of VR services from the taxpayers' perspective. Cost-efficiency was calculated using the following formula: difference in average cost of VR services between each contiguous level of education group divided by the difference in average monthly government subsidies received. The resulting quotient indicates the number of months it would take to "pay off" higher costing VR services through decreased government subsidies. If there are no reductions in government subsidies between contiguous educational level groups (e.g. between individuals without a high school diploma and individuals with a special education certificate), then there is not cost-efficiency between those groups, since savings to the taxpayer do not exist (Cimera et al., 2018).

For example, compare the cost-efficiency of hypothetical VR services provided to individuals with PSE and individuals with high school diplomas. Suppose that VR services cost, on average, $1200 for the PSE group and $1000 for the high school diploma group. Also, the PSE group receives average monthly government subsidies of $400 at VR case closure, compared to $600 for the high school diploma group. In other words, individuals with PSE receive $200 less through reduced monthly subsidies. In this hypothetical example, it would take one month to "pay off" the additional cost of more expensive VR services for the PSE group using the cost-efficiency formula described above, since (1200 – 1000)/200 = 1 (Cimera et al., 2018).

Results

Question 1: Are there differences in employment rates for transition-aged youth with ASD with different levels of educational attainment?

Analysis of the 2015 RSA-911 data indicated that as levels of education increased, so did employment rates. 41.3% of young adults with ASD without a high school diploma obtained employment. The rate rose to 58.9% for students who left high school with a special education certificate of completion and to 61.7% for individuals with ASD who earned a high school diploma. The highest employment rate, at 68.9%, was achieved by young adults with ASD with PSE. Please see Table 2 for additional information.

Question 2: How do specific employment outcomes compare for young adults with ASD who have different education levels?

Weekly wages increased with each successive education level. Young adults with ASD without high school diplomas earned average weekly wages of $79.61. Individuals who left high school with special education certificates earned $108.35 per week, compared to $129.08 per week for individuals who exited high school with diplomas. Young adults with ASD who were in the PSE group earned the most, with average weekly wages of $207.80.

Mean weekly hours worked rose with education level, although none of the groups came close to full-time work. Individuals with ASD who did not finish high school worked the least, at 8.8 hours weekly. Average weekly work hours increased to 12.4 for young adults with ASD in the special education certificate of completion group. Individuals with high school diplomas worked more, averaging 14.3 hours per week. Young adults with ASD who had PSE worked more hours than any of the other groups, with 19.1 hours spent on the job weekly.

Hourly pay rate was similar for participants in three out of four education level groups. There were no differences in pay rate between young adults with ASD who did not complete high school and who earned diplomas, with both groups earning $8.88 per hour, on average. Participants who finished high school with special education certificates of completion fared slightly worse, as their mean hourly pay was $8.65. Young adults with ASD in the PSE group performed best on this employment outcome marker, earning an average of $10.40 per hour.

VR counselors reported information on types of positions obtained when cases were successfully closed. Individuals with PSE worked in 22 different types of occupations, compared to 20 for the high school diploma group and 21 for the special education certificate of completion group. VR participants with ASD who did not complete high school demonstrated substantively less variety in types of work obtained; they were represented in 14 occupation families. Almost a quarter of young adults with ASD across groups were employed doing office and administrative support work. 18-20% of participants with and without high school credentialing worked in food preparation and service; that number fell to 11.6% for young adults with PSE. Cleaning and maintenance

jobs were the third highest ranked occupation type for individuals who did not complete high school or who graduated with a special education certificate or diploma; sales were ranked third highest for young adults in the PSE group. Information on employment outcomes is presented in Table 2.

Question 3: Is PSE cost-effective for young adults with ASD, when total cost of services, cost-per-hour worked, and cost-per-dollar earned are considered?

Total cost of VR services was more expensive for individuals with PSE. Services for all transition-aged youth with ASD, regardless of whether or not they achieved employment at case closure, cost an average of $5,794 for participants who did not complete high school. That number rose to $5,815 for individuals with ASD who completed high school with a special education certificate of completion and dipped to $5,673 for high school graduates. VR services for participants in the PSE group cost the most, averaging $7,225. In general, services cost more for participants who gained competitive employment, with differences in expenditures across education levels. Cost of service was greater for employed participants who did not complete high school ($7,413) than for participants with special education certificates of completion ($7,073). VR services cost the least for employed high school graduates, averaging $6,582, and the most for employed participants from the PSE group, at $8,065.

Although services for young adults with ASD in the PSE group were most expensive, they were also most cost effective, when cost-per-hour worked and cost-per-dollar earned were considered. Individuals with PSE received VR services that cost $422.25 per hour worked, compared to $842.39 for participants without high school diplomas, $570.40 for young adults with special education certificates of completion, and $460.30 for participants with diplomas. A similar pattern of improved cost efficiency with more education was also apparent when cost-per-dollar earned was calculated. VR services cost $93.12 per dollar earned for individuals who did not complete high school. The rate dropped to $65.28 for individuals with special education certificates of completion, $50.99 for participants with high school diplomas, and $38.81 for young adults with PSE. Please see Table 3 for specifics on cost-effectiveness for each group.

Question 4: Is it cost-efficient for young adults with ASD to participate in PSE?

Results from cost-efficiency analyses indicated that it was cost-efficient for young adults with ASD to participate in PSE. Specifically, VR services became cost-efficient once participants in the PSE group had been employed for 16 months. This number was obtained by dividing the difference in VR service costs for the PSE and high school diploma groups by the difference in government subsidies received by the two groups. At 16 months, the higher cost of VR services incurred for individuals with PSE was "zeroed out" by decreased monthly government subsidies received by the PSE group. The researchers also found that VR services for youth with ASD who obtained high school diplomas were automatically more cost-efficient than services for participants who exited high school with special education certificates of completion, because the total average cost of services for the high school diploma group was less. Table 3 also provides information on cost-efficiency of services for participants with different levels of educational attainment.

Discussion

College has long been considered to be a pathway to improved employment opportunities for young adults without disabilities (O'Neill, 2001). For transition-aged youth with ASD accessing PSE, similar patterns emerge. Specifically, this study found that individuals with ASD who participated in PSE experienced better employment outcomes than young adults with ASD with less education. The most dramatic difference was between participants without high school diploma and participants with PSE, where there was a 27.6% point difference in successful employment outcomes (41.3% for the no high school diploma group compared to 68.9% for the PSE group). Employment outcomes for young adults with ASD who completed high school, with special education certificates or high school diplomas, fell toward the middle of this range, at 58.9 and 61.7%, respectively. These findings align with prior research by Chiang, Cheung, Li, and Tsai (2013), who found that students with ASD who leave high school with diplomas are significantly more likely to be employed post-high school than students with ASD who do not graduate with standard diplomas. However, the comparison of youth with ASD with different levels of educational attainment in this study indicates that participation in PSE may yield even greater employment outcomes.

It could be argued that observed differences in employment outcomes reflect differences in participant characteristics, e.g., that individuals with less significant disabilities were more likely to participate in PSE. Data from this study do not indicate that this is necessarily so. Young adults with ASD whose dis-

abilities were classified as "most significant" in RSA, defined as demonstrating functional limitations in more than one life area and requiring ongoing support to address, comprised 78.4% of the no high school diploma group, compared to 58% of the PSE group. The higher proportion of individuals with "most significant" disabilities who did not complete high school could suggest that disability severity negatively affected educational attainment and ultimately, employability. However, it is important to note that over half of the participants in the PSE group received this same designation, yet employment outcomes were markedly different. In addition, 71.2% of young adults with ASD who graduated with high school diplomas were described as having "most significant" disabilities, a proportion closely approaching that of the no high school diploma group. Yet the rate of successful employment outcomes for this group was much closer to that of the PSE group, at 61.7%, compared to 41.3% for participants without high school diplomas. These findings align with other research examining relationships between educational attainment and successful employment outcomes for VR participants with ASD, which have found PSE to be a significant predictor of VR case closures with competitive employment outcomes (Alverson & Yamamoto, 2018), correlated with higher earnings and more weekly work hours (Migliore et al., 2012), and an employment predictor for both males and females with ASD (Sung et al., 2015). Consistent with other studies which have described strong employment outcomes for young adults with Intellectual and Developmental Disabilities participating in PSE programs (Moore & Schelling, 2015; Ross et al., 2013), results from this study suggest that improved access to higher levels of educational opportunity for young adults with ASD with significant disabilities could potentially lead to higher rates of employment.

This study also found improvements in other specific employment outcomes for young adults with ASD in the PSE group. Weekly wages and weekly hours worked increased with educational attainment level, with averages for both indicators more than doubling for participants with PSE compared to participants who did not complete high school. Hourly pay was also highest for the PSE group, at $10.40 per hour. Hourly pay rates did not vary much for participants with less education (ranging from $8.65-$8.88 per hour), but other outcome differences were noted for individuals with dissimilar high school experiences. Young adults with ASD who exited high school with diplomas worked more hours weekly (14.3 compared to 12.4) and earned more in weekly wages ($129.08 compared to $108.35) than their peers who left high school with special education certificates of completion.

This last finding aligns with previous research indicating that exiting high school with alternative credentialing versus a high school diploma may have negative consequences for individuals with disabilities (Hartwig & Sitlington, 2008; O'Neill, 2001). Specifically, students with disabilities who graduate with special education certificates of completion may have limited access to pathways to higher-earning careers through college or the military (O'Neill, 2001). Perspective employers have also demonstrated greater reluctance to hire individuals with special education certificates of completion and are more likely to assign special education certificate of completion earners to low-level positions (Hartwig & Sitlington, 2008). These findings, documenting lower wages and less work hours for young adults with ASD who earned certificates of completion, indicate that exiting high school without a standard diploma may negatively affect youth with ASD too.

Young adults with ASD who had PSE were also represented in greater proportions than individuals with less educational attainment in higher-paying, professionally-oriented occupational fields, such as business and finance (2.3%) and computer and mathematics (4.7%). Moreover, youth with ASD in the PSE group were less likely to be employed in areas traditionally open to individuals with disabilities, such as cleaning and maintenance, personal care and service, production, and food preparation and services. It is important to note, however, that improved employment outcomes for young adults with ASD who had PSE were insufficient to lift them above the poverty line. The 2016 federal poverty level for single-person households in the United States and District of Columbia was $11,880 (Healthcare.gov, 2017). VR participants with ASD in the PSE group earned, on average, $10,805.60 annually; both hourly wages and weekly hours worked would need to increase in order for young adults with ASD to move above the poverty level.

This study also explored how PSE participation could potentially benefit taxpayers by analyzing the cost-effectiveness and cost-efficiency of VR services. Although VR services were more expensive for youth with ASD in the PSE group, they were also more cost-effective. Specifically, when total VR service costs were divided by hours worked and wages earned, cost-per-hour worked and cost-per-dollar earned ratios were less for employed individuals who had PSE than for individuals with less education. VR services were also cost-efficient for young adults with ASD in the PSE group, as VR service expendi-

tures would "pay for themselves" over time through decreased monthly government subsidies, provided participants maintained employment for 16 months. Given this finding, future longitudinal research is needed that both investigates and describes duration of employment for young adults with ASD who participate in PSE. At present, VR services for young adults with ASD who have PSE appear to be a worthwhile investment from the taxpayers' perspective, given the increased cost-effectiveness and ultimate cost-efficiency of this approach.

Implications for Practice

While results from this study describe the promise of PSE experience in improving employment outcomes for young adults with ASD, they also highlight areas for growth. Findings from this study indicated that young adults with ASD who participated in PSE were represented in larger numbers in professionally-oriented fields (e.g., business and finance, computer and mathematics), but overall representation was still very low. Developing opportunities for young adults with ASD, while participating in PSE, to explore these and other professionally-oriented career fields through work experiences (e.g., internships, summer employment, part-time work, service learning) and work-based learning (e.g., job shadowing, job rotations, career mentoring) may help students with ASD develop specific work skills and business connections needed to obtain positions in a wider range of fields (National Collaborative on Workforce and Disability for Youth, 2016). Due to deficits in social communication skills and sensory issues often experienced by individuals with ASD, careful planning to identify and assess potential work experience and work-based learning sites is key. Creating strong matches based on students' strengths and interests and business partner needs, while also considering and planning for environmental demands (e.g., sensory, social, communication, and organizational), will help create successful experiences for students and businesses (Kurtz & Jordan, 2008).

Additionally, this study found that earnings were higher for youth with ASD in the PSE group. However, these higher earnings still fell below the poverty threshold. Developing work experiences in professionally-oriented fields while participating in PSE may also support individuals with ASD in obtaining higher-paying positions postschool. For individuals receiving Social Security disability benefits, concerns about loss of funding and/or health insurance, combined with limited information about the effects of work on benefits, may result in decisions to work less hours or in lower-paying positions (O'Brien, Revell, & West, 2003). PSE professionals may consider collaborating with VR and Social Security colleagues to offer benefits planning workshops to students on Social Security work incentive programs. A clearer understanding of how employment affects benefits, and the programs available to encourage workforce participation, may support young adults with ASD in making informed choices around employment.

Finally, this study demonstrated both the cost-effectiveness and cost-efficiency of VR services for young adults with ASD in the PSE group. This finding offers a compelling rationale for VR financial support of youth with ASD attending college. However, recent research suggests that some local VR policies (e.g., maintaining a certain grade point average, taking a specific number of courses per semester) may not align with PSE programming for youth with significant disabilities (Grigal, Migliore, & Hart, 2014). Other research describes persistent concerns around program funding, with programs relying more heavily on tuition over time as grant funding dissipates (Plotner & Marshall, 2015). Cost-effectiveness and cost-efficiency data from this study may provide disability service providers with valuable information in advocating for expanded VR participation in funding college services for youth with ASD.

Limitations

Several limitations should be considered in light of the findings reported here. A wide range of PSE options are available to young adults with ASD, from vocational and career training to traditional four-year university experiences. Even across TPSID programs, myriad differences related to specific programming components and emphases exist (Thoma, 2013). This study did not investigate how participation in unique types of PSE may differentially affect employment outcomes for young adults with ASD. Comparing employment outcomes across different PSE models would be a rich area for future study. Also, as discussed earlier, it is somewhat unclear if potential differences in significance of disability between groups could have affected employment outcomes. To mitigate this possibility, the researchers excluded data from VR participants with reported secondary disability categories, such as ID, from the analysis. Also, more than half (58%) of the PSE group were rated as having "most significant" disabilities by their VR counselors, and 99% of participants across all groups had disabilities described as "significant" or "most significant" in the RSA database.

Conclusion

The results from this study echo findings from earlier research indicating that participation in PSE may lead to successful employment outcomes for young adults with disabilities (Migliore et al., 2012; Sung et al., 2015; Wehman et al., 2015). Like youth with ID, young adults with ASD who participated in PSE were more likely to be employed in competitive, integrated settings, and earn more than their peers with less education. In addition, VR services for young adults with ASD who participated in PSE were both cost-effective and cost-efficient, an important consideration for publicly-funded services. It should be noted, however, that PSE may not be an appropriate or desired pathway to employment for every young adult with ASD. Decisions about PSE, like all other transition choices, should result from thoughtful, collaborative planning between students, families, schools, and adult service providers, and most importantly, should center on students' individual strengths, preferences, and needs (Cimera et al., 2018).

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Table 1

Demographic Characteristics by Level of Education

		No High School Diploma	Special Education	High School Diploma	Postsecondary Education
Gender	N	426 (10%)	926 (21.8%)	1868 (44%)	1029 (24.2%)
	Male	83.8	85.3	85.8	83.6
	Female	16.2	14.7	14.2	16.4
Ethnicity	White	83.1	78.3	87.3	88.1
	African American	14.8	18.6	10.8	7.8
	Native American	0.7	1.6	1.4	1.3
	Asian	3.3	4.0	2.5	5.3
	Pacific Islander	0.0	0.5	0.3	0.4
	Hispanic/Latino/a	6.6	9.4	8.0	5.8
	Average Age in Years (*SD*)	18.6 (1.8)	19.2 (2.1)	19.5 (2.2)	20.4 (2.9)
Severity of Disability	Not Significant	0.9	0.4	0.9	1.0
	Significant	20.7	31.2	27.9	41.0
	Most Significant	78.4	68.4	71.2	58.0
Living Arrangement	Private Residence	97.4	96.7	97.5	98.3
	Group Home	0.9	2.1	1.3	0.4
	Rehabilitation Facility	0.2		0.1	
	Halfway House	0.2		0.1	
	Homeless/Shelter		0.1	0.1	0.1
	Other	1.2	1.2	1.0	1.2

Note. All data are presented in percentages, with the exception of population size and age. Sample size percentages are included in parentheses. *SD* indicates standard deviation. Participants were able to identify multiple ethnicities. Consequently, the sum total of all ethnicities equals more than 100%.

Table 2

Vocational Outcomes by Level of Education

		No High School Diploma	Special Education	High School Diploma	Postsecondary Education
Reason for Closure	Employed	41.3	58.9	61.7	68.9
	Unable To Locate	17.1	9.3	11.2	7.6
	Disability Too Significant	1.9	1.2	0.3	0.1
	No Longer Interested In Service	26.5	18.1	17.7	15.6
	Transferred To Another Agency	3.1	2.6	1.3	1.2
	Transportation Not Feasible	0.5	0.2	0.1	0.2
	Extended Services Not Available			0.1	0.1
	All Other Reasons	9.1	9.5	7.0	6.1
	Extended Employment			0.4	
	Incarcerated	0.5	0.2	0.2	0.1
Type of Occupation	Management	0.6	0.6	0.1	0.7
	Business and Financial Operations		0.2		2.3
	Computer and Mathematics	1.7	0.4	0.3	4.7
	Architecture and Engineering			0.1	1.0
	Life, Physical, and Social Sciences		0.6	0.1	1.3
	Community and Social Services	1.1	0.6	0.3	0.4
	Legal		0.4		0.4
	Education, Training, and Library	0.6	0.2	0.6	1.8
	Arts, Design, and Entertainment	0.6	0.2	0.3	2.7
	Healthcare Practitioners/Technical		0.6	0.4	1.6
	Healthcare Support		2.4	0.5	1.4
	Protective Services		0.6	0.4	1.6
	Food Preparation and Serving	21.0	18.1	18.4	11.6
	Cleaning and Maintenance	10.8	14.8	13.3	7.0
	Personal Care and Service	7.4	5.4	5.4	4.0
	Sales	9.7	7.2	9.8	11.5
	Office and Administrative Support	22.7	23.1	22.3	25.6
	Farming, Fishing, and Forestry		0.7	0.8	0.1
	Construction and Extraction	2.3	0.4	0.5	0.6
	Installation, Maintenance, Repair	4.0	8.1	6.3	4.1
	Production	8.5	8.3	10.1	7.5
	Transportation/Material Moving	9.1	7.6	10.1	8.1
	Weekly Wages (SD)	$79.61 ($120.92)	$108.35 ($119.82)	$129.08 ($138.80)	$207.80 ($221.72)
	Hours Worked (SD)	8.8 (12.3)	12.4 (12.7)	14.3 (13.7)	19.1 (15.4)
	Hourly Pay (SD)	$8.88 ($1.90)	$8.65 ($2.30)	$8.88 ($2.12)	$10.40 ($4.30)

Note. Data are presented in percentages except for where noted otherwise. SD indicates standard deviation.

Table 3

Average Costs of Services, Cost-Effectiveness, and Cost-Efficiency by Level of Education

	No High School Diploma	**Special Education**	**High School Diploma**	**Postsecondary Education**
Cost of Services (All Participants) *(SD)*	$5,794 ($7,154)	$5,815 ($6,246)	$5,673 ($6,441)	$7,225 ($8,853)
Cost of Services (Employed)	$7,413 ($7,383)	$7,073 ($6,556)	$6,582 ($6,218)	$8,065 ($9,494)
Cost-per-Hour Worked	$842.39	$570.40	$460.30	$422.25
Cost-per-Dollar Earned	$93.12	$65.28	$50.99	$38.81
Monthly Subsidies Received *(SD)*	$274.99 ($363.55)	$298.04 (361.61)	$245.54 ($341.48)	$152.59 ($304.50)
Number of Months Until Cost-Efficient	n/a	n/a	0.0 months	16.0 months

Note. Cost-efficiency analyses could not be conducted on the no high school diploma group because there were no levels of education below this cohort to which to make comparisons. Cost-efficiency was not conducted on the special education cohort, because there were not any savings in monthly subsidies (i.e., amount of monthly savings increased from the no high school diploma to the special education cohorts). Because the high school diploma cohort averaged a lower cost of services than participants in the special education cohort, individuals in the high school diploma cohort would automatically be more cost-efficient than those in special education.