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ORIGINAL PAPER

Competitive Employment for Transition-Aged Youth with Significant Impact from Autism: A Multi-site Randomized Clinical Trial

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Abstract
This study reports the results of a multi-site, parallel block randomized clinical trial to expand the previous findings regarding the implementation of Project SEARCH plus ASD Supports (PS + ASD) on employment outcomes upon graduation from high school. Participants were 156 individuals with significant impact from ASD between the ages of 18–21. There was a significant difference between treatment and control groups with 73.4% of the treatment group acquiring competitive employment at or above minimum wage by 1-year after graduation compared to 17% of the control group for whom data was provided. At 1-year, employed treatment group participants worked an average of 21.2 h per week (SD = 9) for a mean hourly wage of $9.61 per hour (SD = $1.55).
Clinical Trial Registration: clinicaltrials.gov Identifier: NCT03560453.

Keywords Autism · Employment · Transition to adulthood · ASD · Applied behavior analysis · Positive behavior support · Project SEARCH

Introduction

Securing competitive employment remains a challenge for many young adults with autism spectrum disorder (ASD). While federal legislation has mandated enhanced services for transition during recent years, via the Individuals with Disabilities Education Improvement Act reauthorization (IDEIA 2004) and the Workforce Innovation and Opportunity Act (WIOA 2014), many young adults with ASD still face unemployment and underemployment upon leaving secondary education settings. Findings from the 2017 National Autism Indicators Report, a 31-state sample of 3520 adults with ASD who received state Developmental Disability Services, indicated that only 14% achieved paid work in an integrated setting, while the majority (54%) worked without pay and usually in segregated settings (Roux et al. 2017). A review of employment outcomes for 47,312 individuals with ASD obtained from the Rehabilitation Services Administration (RSA-911) database indicated an overall employment rate of only 37.57% (Alverson and Yamamoto 2018). Further, according to the National Longitudinal Transition Study-2 (NLTS-2), four out of ten young adults with ASD in their early 20's never worked for pay during their young adulthood (Roux et al. 2015). Overwhelmingly, evidence highlights the tremendous need to improve transition outcomes for adults with ASD.

Demographically, young adults with ASD appear to be at an even higher risk for unemployment when compared both across disability categories and to older adults with ASD. For example, results from the NLTS-2 indicated that young adults with ASD were among the least likely (45.2%) of all 12 disability categories to be in paid

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employment outside of the home (Sanford et al. 2011). RSA 911 data indicated that, of all individuals sampled with ASD, transition-age youth comprised the largest portion of individuals using VR services yet had the worst outcomes of any age group (Chen et al. 2015). Individuals with ASD and comorbid intellectual disabilities (ID) are observed to attain even lower rates of employment (14.3%) than those with ASD alone (Chan et al. 2017). While most individuals with ASD are not employed, the few who are working tend to be underemployed and earn less than peers without disabilities (Sanford et al. 2011). In summary, the majority of youth with ASD continue to face severely limited opportunities to achieve meaningful paid work in adulthood.

Review of Empirical Research

While there is a paucity of research addressing comprehensive interventions for transition-aged youth with ASD seeking employment, there has been some intervention research addressing critical components of the employment process. For example, interventions have been researched to address work specific social skills (Baker-Ericzen et al. 2018); the use of assistive technology to teach work skills and to organize work (Gentry et al. 2015; Weaver 2015); pre-employment interview skills (Morgan et al. 2014); and video modeling to teach specific work skills (Allen et al. 2012; Bennett and Dukes 2013; Kellems and Morningstar 2012). Even so, these studies were mostly quasi-experimental and generally included individuals with ASD and average to above average cognitive abilities and life skill functioning (Scott et al. 2018). Additionally, very few studies have utilized randomized control trial (RCT) designs in order to confidently measure the effectiveness of interventions (Hedley et al. 2017; Scott et al. 2018). A lack of detailed intervention procedures is also a pervasive problem making it difficult to replicate or effectively apply study findings. Small samples sizes, a lack of representation of females with ASD, a vague description of participant characteristics, and in some cases, complete omission of this information altogether, and a failure to use standardized measures to both verify diagnoses and measure outcome variables in the literature make it difficult to generalize results (Hedley et al. 2017). These methodological issues hamper progress toward successful employment outcomes as a lack of a rigorous research with reliable, high quality procedures impedes the ability of educators and service providers to effectively utilize employment practices. Consequently, to date, no specific evidence based transition to employment practices with a significant number of participants with ASD who also have comorbid ID and other disabilities have been identified (Scott et al. 2018).

Supported and Customized Employment

Supported employment (SE) is well established as an evidenced-based employment intervention for a variety of disabilities (McLaren et al. 2017; Modini et al. 2016; Ottomanelli et al. 2012; Rumrill et al. 2016; Wehman et al. 2014a). SE is additionally recognized as a cost effective means for achieving competitive employment (Mavranezouli and Pilling 2014). Recent RCT studies indicate its effectiveness specifically for individuals with ASD (Schall et al. 2015; Wehman et al. 2014b, 2017). The four phase SE process involves creating a profile of the job seeker, job development, on-the-job training, and then long-term support as needed (Schall et al. 2015).

Customized employment (CE) is an extension of SE. CE was added to the definition of SE in the WIOA (2014) and matches the unique strengths of the job candidate with the identified needs of the employer (Brooke et al. 2018; Wehman et al. 2016; WIOA 2014). This approach is particularly suited to job seekers with ASD because it focuses on strengths while allowing for the development of jobs that avoid some of the complexities individuals may face (Wehman et al. 2016). Such jobs result in an excellent job match for the person with ASD and meet a business need.

Project SEARCH

Students who participate in community-based employment internships during high school have a greater likelihood of obtaining paid work after high school (Schall et al. 2015). Project SEARCH is a transition-to-work internship program that uses an SE approach to assist youth and young adults with developmental disabilities acquire vocational skills (Kaehne 2016; Muller and; VanGilder 2014; Persch et al. 2015). The Project SEARCH model utilizes a series of internship rotations in various work settings to help the student obtain job experience and determine job preferences. (Muller and VanGilder 2014; Schall et al. 2015; Wehman et al. 2014, 2017). Importantly, the Project SEARCH model assumes a close partnership with the business by ensuring that internship work is meaningful and productive, benefiting both the student and the business (Muller and VanGilder 2014). Project SEARCH reports the program is implemented in over 400 sites internationally. On the Project SEARCH website, they define a successful employment outcome as year-round competitive integrated employment (CIE) working for the prevailing wage at least 16 h weekly. They report between a 92 to 93.6% completion rate and a 70.2 to 75.5% employment rate (Project SEARCH 2017). To date, published research reports variable employment outcomes from

approximately 50% (Kaehne 2016) to 83% (Christensen et al. 2015). The program has been reported to serve individuals with a wide variety of disabilities including autism spectrum, blind/visually impaired, deaf/hearing impaired, emotional disturbance, mild, moderate, severe and profound intellectual disabilities, learning disabilities, multiple disabilities, orthopedic impairment, other health impairment, speech or language impairment, and traumatic brain injury (Christensen et al. 2015; Kaehne 2016; Project SEARCH 2018).

Project SEARCH Plus ASD Supports

Individuals with ASD often have specific disability related barriers to employment (Chan et al. 2017; Hayward et al. 2018; Hendricks 2010; Lorenz et al. 2016). Project SEARCH plus ASD Supports (PS + ASD) provides specific techniques to meet the needs of youth with ASD, including social communication training, provision of visual cues, and behavior support and self-regulation strategies. Participants in PS + ASD have been found through a randomized controlled trial (RTC) to have both higher job retention rates and a higher average wage that those who received SE alone (Schall et al. 2015). Results of that study indicated that 87% of interns maintained part-time competitive employment 12 months post-graduation versus 12% for control participants (Wehman et al. 2017). These findings are promising and establish the foundation for the current study described herein with the need for future research in this area.

Study Purpose

The purpose of this prospective study was to expand the number of participants and replicate findings from a previous randomized clinical trial of PS + ASD (Wehman et al. 2017). It was designed to examine a single research question:

> To what extent does an intensive, employer-based employment training and placement program improve CIE outcomes of young adults with ASD 18–21 served in public special education programs?

CIE was defined as (a) the acquisition of paid employment in a community business, (b) wages were at least minimum wage or higher, (c) wages were comparable to non-disabled workers performing the same or similar tasks, and (d) the employee with ASD interacts with other employees and, as appropriate to the work performed, other persons who are not individuals with disabilities to the same degree as non-disabled workers performing the same or similar tasks. This resulted in the following supporting research questions:

1. Do individuals who participate in a collaborative, employer-based employment training and placement program (treatment condition) gain CIE at a higher rate than those in an equal "business as usual" (control) condition?
2. What is the mean wage earned and mean hours worked weekly by those assigned to the treatment condition compared to those in the control condition?
3. What was the average amount of time in weeks for individuals in the treatment and control condition to acquire employment?
4. Are there any external factors, (gender, race, age, support intensity, or characteristics of ASD) associated with employment outcomes for those in the treatment condition?
5. What types of jobs were acquired by participants who gained employment?
6. What was the employment retention rate at 1-year by those who gained employment?
7. What were the identified reasons for not acquiring employment for those in the treatment condition who did not acquire employment by 1-year?

Method

Procedures

This study was a prospective multi-site, parallel block randomized clinical trial. It took place at four different hospitals across Virginia within about a 100 mile radius where local school divisions, local VR offices, the hospitals, and local employment services organizations collaborated to deliver PS + ASD. Potential participants were recruited from the participating public school division closest to the participating hospital in four cohorts from 2013 to 2016. Potential participants were contacted and provided with study information including a brochure describing the project, an invitation to an informational meeting, and an application. Inclusion criteria required all participants to: (a) attend local public school where the research was being conducted, (b) have a medical diagnosis of ASD or educational identification of autism, (c) be between the ages of 18–21 on the first day of the next school year, (d) display independent self-care, including using the bathroom, eating, and moving from place to place independently (e) be eligible for funding through the state VR agency, and (f) have continued eligibility for public school services. Participants were excluded if they were unwilling or unable to provide consent or, if assigned a guardian, assent.

Control Condition

Students in the control condition attended their assigned high school and received the services, accommodations,

and modifications stipulated in their IEP. In addition to these school based services, all but one control group participant reported receiving some community based employment training (CBET). The mean hours of weekly CBET provided by school division staff for the control group were 8.9 (sd: 4.5) hours with a range of 0–20 h weekly. All educational services (100%) were provided by school district staff including teachers, paraprofessionals, related services therapists, etc. exclusively. According to a review of 19 control condition participant individualized education plans (IEP), only five out of 19 IEP meetings (26.3%) included any other adult services agency staff. Additionally, 48.3% of time in the school day was spent in traditional academic courses, followed by non-academic/non-vocational courses at 39.5% of the time. The amount of time in vocational course work comprised only 8.6% of the school day.

Treatment Condition

PS + ASD is the 9-month independent variable where students with ASD seeking employment after graduation spend their last year of high school in a combination classroom and un-paid internship program located in a large community business. Throughout the 9-month school year, students rotated through three 10–12 week internships selected to assist them in gaining marketable skills (Datson et al. 2012; Wehman et al. 2014, 2017). Participants in the PS + ASD treatment condition received their entire school week in CBET, therefore, all of the students who participated in PS + ASD received 35 h weekly of CBET.

Description of Internships

The culmination of the program was the development of socially acceptable professional behaviors and marketable vocational skills throughout the provision of the three 10–12 week unpaid internships. For participants who articulated a specific desired employment outcome, their three internships would represent successively more complex iterations of the eventual employment goal. For example, someone interested in data entry might start their first internship entering simple data into an existing spread sheet; the second internship might involve learning to scan, label, and save data in a large server; and their final internship might involve building a database to enter selected data. More often than not, however, participants did not have any work experience and were not able to articulate their desired future employment goals. In that case, the first internship acted as an assessment period where the intern and the job coach would identify work strengths, preferences, and interests. Then the second and third internships would result in the refinement and acquisition of work skills and social behaviors. For example, one participant required intensive behavioral supports and only articulated a goal to "do good work". Their first internship involved removing trash and sweeping the stairwells of the hospital parking garage. This internship taught the intern to move independently and safely between locations while following a schedule and completing tasks. It also allowed their job coach to observe them learning new tasks and analyze and develop consistent behavioral supports in the work setting. In their second internship, they learned to stock janitorial closets in the hospital. This internship provided the participant movement throughout their day while also allowing for safe interaction with others in the hospital. During their final internship, the participant cleaned the hospital lobby. At this point in the intern's development, they learned to manage their own behavior and were able to move independently between tasks and locations. This participant is currently employed in the hospital's central sterilizing unit where they scan and move large carts in and out of the sterilizing unit.

Provision of Instruction

One of the essential hallmarks of the PS + ASD model is the braided provision of services by educational and adult services agencies simultaneously. Participants in the treatment condition received direct instruction during their internship time from a team composed of a licensed special education teacher and a special education paraprofessional funded by their public school systems and from one or more job coaches funded by the state VR agency. The ratio in this program was one service provider to 2.5 student interns. Participants in PS + ASD received a mean of 206.19 h of direct instruction from project team members during their time in the three internships. Educational staff provided a mean of 113.54 h (55.07%) of the direct instructional time while job coaches provided a mean 92.65 h (44.93%) of the direct instructional time on the internship sites. In addition to direct instruction, job coaches spent a significant amount of indirect time developing internships, working with the on-site supervisors and internship mentors, and communicating with hospital management. The amount of time spent in direct instruction and supervision decreased across the three internships as participants gained independence at work. The instructional expertise of the special educator was matched by the business acumen and natural environments analysis and teaching skill of the job coach. Both the teacher and job coach also received additional training in the provision of applied behavior analytic instructional and behavior change techniques. The main methods of applied behavior analytic instruction provided included scored task analysis, behavioral rehearsal of social communication skills, shaping and modeling, planned structured generalization of skills between environments, functional assessment of behavioral

challenges, multicomponent behavior intervention planning, and prompting and prompt fading.

Team Collaboration and Management

In addition to the direct services team described above, each location was supported by a coordinator group composed of a school district administrator, the VR case manager, a business liaison from the hospital, and the university coordinator. Members of these teams were from four different school divisions, four different local VR services offices, two different job coaching agencies, the four participating hospitals, and the university. All members from the direct services team and the coordinating group received approximately 30 h of training in the PS + ASD model from the model developers. In addition, all direct services teams met weekly to discuss project implementation and student needs. All coordinator group team members met monthly to support implementation of the model. Finally, fidelity of implementation was monitored and verified by an independent team from the original developers of the Project SEARCH model from Cincinnati Children's Hospital and by the research staff who visited each site on a monthly basis.

Planning for Employment and Graduation from PS + ASD

Graduation from PS + ASD is qualitatively different than graduation from high school. In addition to the direct training that all PS + ASD interns receive during the program, they also engage in a number of activities throughout the year to prepare for employment. At the end of each of the three internships, each student prepares a presentation using video, pictures, and descriptions of their internships. They identify tasks they liked, ideas they have for potential future employment, and additional training they need to acquire employment. They also develop and update their resumes. These tasks are modified through the use of technology for students with ASD who are not able to fully participate verbally in the preparation of this presentation. Once this presentation is completed, each individual's support team, including the students' parents, VR case manager, their teacher, job coach, and internship mentors and supervisors meet to view the student's presentation and discuss next steps in their quest to support the participant with ASD's goal to seek employment.

In addition, family members of students also receive support across the PS + ASD year. This includes engaging in discussions about their vision for their child's future employment as well as practical planning regarding the impact employment will have on family life, transportation, the provision of supplemental security income, Medicaid, and other public benefits. Across the year, families are invited to discuss their desires and concerns as they plan for their child to transition to adulthood.

This year long transition to employment discussion culminates in an employment planning meeting that typically occurs in March of the PS + ASD year. During this meeting, the student, family, job coach, and VR case manager define the criteria of the desired job, including amount of time the individual would like to work, location near home, preferred tasks, jobs and industries, preferred shifts, etc. In addition the team develops specialized job seeking modifications. Because many of these individuals are unable to sit for interviews these modifications include collecting videos of the person working, recommendation letters from internship supervisors, and job leads from the family's contacts.

Thus, graduates of PS + ASD leave high school with strategic plans for acquiring employment and a team of case managers and direct service providers who are engaged and ready to implement that plan. Further, PS + ASD graduates continue services with the same VR case manager and job coaching agency that provided services during their PS + ASD year. This means that phase two, the job development phase of SE begins immediately upon graduation, instead of starting with phase one, job seeker profile.

If a PS + ASD graduate does not have employment upon graduation, they and their family members will continue to meet with their job coach at least monthly to further discuss, implement, and expand the transition-to-employment plan. Most of the activities during this phase are intermittent and involve mining the job coach and family contacts for potential networking and employment opportunities, having the individual complete "working interviews" where the applicant performs the duties of the job alongside the supervisor, and further expanding employment training opportunities for the graduate.

After graduation, while it might appear that the unemployed PS + ASD graduate has no educational or vocational activities occurring daily, they are, in fact, working with their job coach to find a job. Thus, the model allows for a true seamless transition. Meanwhile, students in the control condition complete high school with minimal interaction with adult services agency staff and are essentially unknown to their new adult direct service providers.

Supports After PS + ASD

After completion of PS + ASD 100% of participants that completed the entire intervention remained with the same job coaching agency and maintained the same VR case manager. Consequently, the applied behavior analytic techniques implemented during the PS + ASD year continued after graduation through the job development phase and into phase three, job site training, and phase four, long term supports.

Data Collection Schedule and Measures

Data were collected at three points during the study, at baseline (beginning of the school year between August and October), at graduation (end of the school year between June and August), and at 1-year follow-up (1 year after graduation, between June and August). Data were collected through an in-person interview with the participant, their parents or guardians, and/or their educators. Participants received nominal compensation for completing the interview protocol. Because of the in-person interview, blinding was not feasible in this study, however, independent data collectors were used to complete interviews. The baseline interview was composed of 14 questions and recorded the participant's age, gender, race, medical diagnosis, primary IEP eligibility, secondary IEP eligibility, previous paid employment history, previous unpaid internship or volunteer experience history, hours in CBET in the previous school year, and requested a copy of the student's services page from the IEP and their weekly school schedule. The graduation and 1 year follow-up interview was composed of 12 questions and recorded the participants' current employment status using the *Vocational Index for Adults with Autism Spectrum Disorders* (Taylor and Seltzer 2012). In addition, this interview recorded the name of business where employed, data of hire, job title, hourly wage, main tasks completed at work, hours worked weekly, benefits provided at work, school placement in previous year, hours in CBET in previous school year, and requested a copy of the student's IEP and their weekly school schedule. Finally, in order to measure the impact of ASD, we completed the Support Intensity Scale (SIS, Thompson et al. 2004) and the Social Responsiveness Scale, second edition (SRS-2, Constantino and Gruber 2012). The SIS provides an overall support needs index (SNI) as well as descriptive impact of behavioral and medical challenges. The SRS-2 provides a measure of the impact of the social communication symptoms of ASD.

Randomization

The PS + ASD intervention was offered at four different hospitals within Virginia. Each PS + ASD program recruited students from an identified school district within proximity to the program. PS + ASD Program "A" recruited participants from School District "A", PS + ASD Program "B" recruited students from School District "B", and so on. This resulted in four parallel blocks of participants to coincide with the four hospitals and participating school districts. Within each block, 1:1 randomization was completed blindly. The control arm of the study required participants to remain in the student's assigned high school for the school year (business as usual) while the treatment arm required students attend PS + ASD instead of high school for the school year. Figure 1 shows the flow of participants through the study.

Data Management and Analysis

Data reporting was consistent with recommended guidelines (Boutron et al. 2017). Participant information was summarized using means and standard deviations (SD) or frequencies and percentages separately for individuals who consented but dropped out of the study prior to graduation and those that remained in the study at graduation. The effect sizes phi (φ) and f^2 were used to assess whether differences existed between those who dropped out and those who remained in the study. Phi values less than 0.20, 0.20–0.40, and greater than 0.40 were considered small, medium, and large effect sizes whereas small, medium, and large values of f^2 were 0.02, 0.15, and 0.35, respectively. Similar summaries and effect sizes were computed for participants in the control condition and treatment condition. Unadjusted estimates of the employment rate for each of the study arms were made separately at each time point and compared using a Pearson chi square test. The relative risk and 95% confidence interval (CI) were used to describe the differing employment rates between the treatment arms. Random effects adjusted for repeated measures on each individual and these individuals being clustered within each hospital. Relative risks and CIs were calculated using a method proposed by Zhang and Yu (1998), with the observed estimate of the employment rate being used at each time point. For individuals who had employment, the distribution of hourly wages and hours worked per week were summarized with means and SDs for the treatment condition and, due to very low sample sizes, were individually reported for the control condition. All inference was performed at the 0.05 level using SAS V9.4.

Participants

During recruitment efforts, 205 individuals applied to participate. Forty nine of those individuals were excluded due to a failure to meet one or more of the inclusion criteria. Thus, 156 individuals were randomly assigned by blocks into one of the two arms of the study. Control condition participants dropped from the study at a much higher rate than treatment condition participants. Thus, investigators completed an analysis of those who dropped compared to those who remained in the study. The participants remaining in the study at graduation showed small or negligible differences as compared to those who dropped out prior to conclusion of study procedures (Table 1). The distribution of baseline information for participants included in the final analysis are

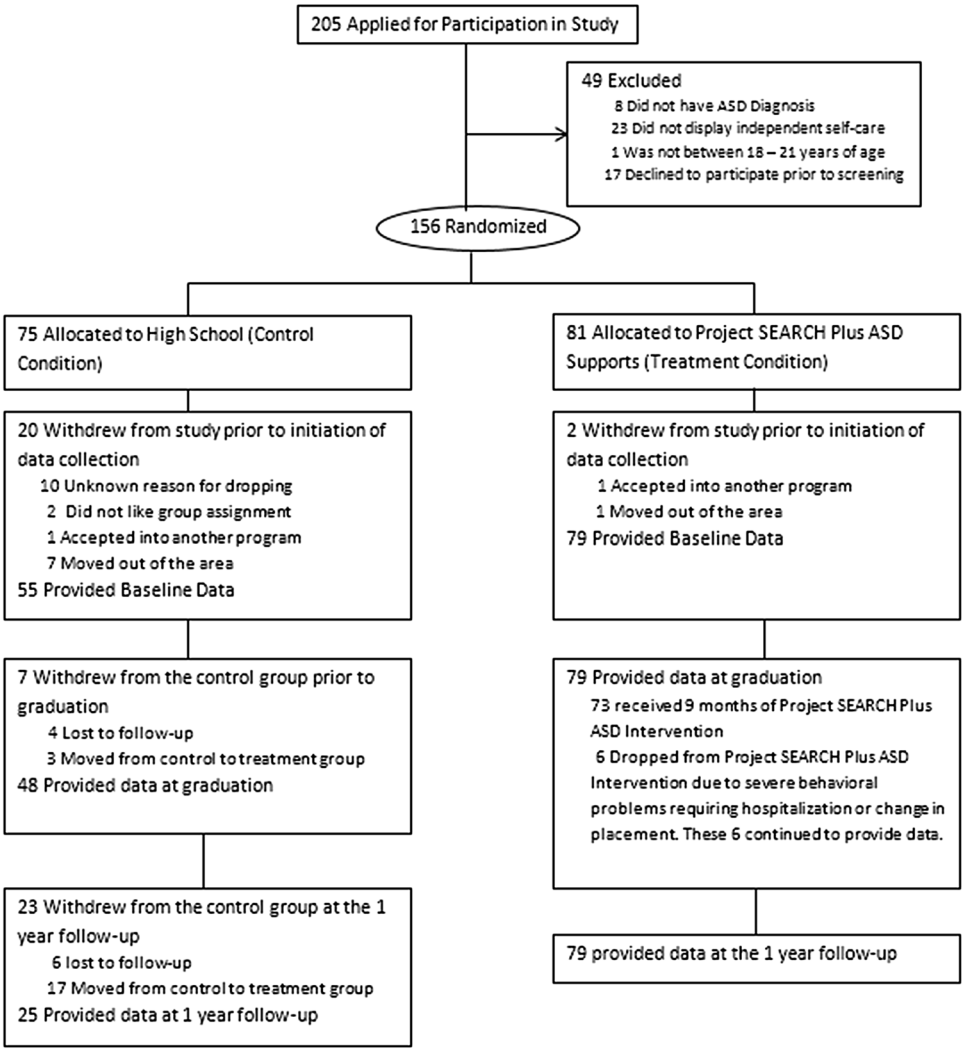

Fig. 1 Flow of participants through the study

Table 1 Characteristics of participants who dropped out prior to graduation and those enrolled at graduation. Effect sizes correspond to φ and f^2 for categorical and continuous measures. Due to missing data, samples sizes may not sum to appropriate values

Characteristic	Level	Treated (N = 125)	Dropout prior to graduation (N = 30)	Effect Size
Gender	Male	93 (74%)	24 (83%)	0.077
	Female	32 (26%)	5 (17%)	
Race	White	70 (57%)	10 (43%)	0.098
	Nonwhite	53 (43%)	13 (57%)	
Age	(years)	19.7 (1.1)	19.6 (0.9)	0.004
SIS (SNI)		76.8 (10.9)	74.1 (6.7)	0.016
SRS (Total)		64.4 (10.2)	67.5 (12.7)	0.022

displayed in Table 2. Nominally, participants in the control group who withdrew were more likely to have higher SIS and SRS values. However, these disparities were only small in nature (Table 2).

Baseline Demographic Description of Participants

The participants in this study were mainly male, fairly equally distributed between white and non-white individuals and were a mean of approximately 19.6 years of age (see Tables 1, 2 for demographic variables). The majority of participants in both groups had a diagnosis of autism (73.6% control and 73.1% treatment condition participants reported autism as opposed to pervasive developmental disorder-not otherwise specified or aspergers disorder under the Diagnostic and Statistical Manual of Mental Disorders 4th Edition, Text Revision, American Psychological Association 2000). In addition, a number of participants reported comorbid secondary diagnoses (44.8% treatment condition and 62.2% control condition). The most common comorbid diagnosis was intellectual disability (ID) followed by speech language impairment, other health impairment, emotional disability, and severe learning disability. While we did not collect individual participants' socio-economic status, the school districts represented four counties and four cities with

Table 2 Characteristics of participants who had primary outcome data. Effect sizes correspond to φ and f^2 for categorical and continuous measures. Due to missing data, samples sizes may not sum to appropriate values

Characteristic	Level	Treatment	Control (completed)	Control (dropout)	Effect size
Gender	Male	57 (72%)	19 (83%)	17 (74%)	0.090
	Female	22 (28%)	4 (17%)	6 (26%)	
Race	White	45 (57%)	15 (65%)	10 (48%)	0.106
	Nonwhite	34 (43%)	8 (35%)	11 (52%)	
Age	(years)	19.8 (1.1)	19.5 (1.2)	19.8 (0.9)	0.008
SIS (SNI)		76.0 (10.2)	77.0 (12.5)	80.4 (11.5)	0.020
SRS (Total)		63.9 (10.4)	63.6 (11.8)	67.3 (7.3)	0.017

reported poverty rates ranging from a low of 5.4% to a high of 20.9% with an average poverty rate of 11.24% according to the Small Area Income and Poverty Estimates published by the United States Census Bureau (Acquired from https://www.census.gov/data-tools/demo/saipe/saipe.html). Participants in the study represented individuals from across the income and family composition spectrum.

Severity of ASD Symptoms

In terms of the severity of the symptoms of ASD as measured by the SRS-2, the range of total scores indicated deficiencies in reciprocal social behavior was from mild (clinically significant deficiencies may lead to mild to moderate interference with everyday social interactions) to severe (clinically significant delays may lead to severe and enduring interference with every day social interactions). There were no differences between participants in the treatment or control conditions with mean scores measured at 63.9 and 63.6 respectively.

Support Needs

In this study, there were no differences between the support needs of participants in the treatment and control condition. The mean SNI was76.0 and 77.0 for treatment and control participants respectively. This score indicates that participants support needs ranged from limited supports required consistently over time but not intermittent in nature to extensive supports required daily. Additionally, 22.6% of the control group and 12.8% of the treatment group reported having some medical condition that required support including allergies, special dietary needs, seizure disorders, and other similar medical needs. In terms of behavioral support needs, 49% of the control group and 44.7% of the treatment group reported having significant support needs to address behavioral challenges. Behavioral Challenges were reported to include aggression toward others, property destruction, stealing, self-injury, tantrums, wandering, non-aggressive but inappropriate behavior, and self-stimulation. In addition, 62% of the treatment group required planned behavioral supports or formal behavior intervention plans.

Prevalence of Comorbid ID

During this study, there was a state policy in effect that may have suppressed the reported incidence of ID in this group (Virginia Department of Behavioral Health and Developmental Services 2016). This is due to the fact that home and community based waiver support services were only available to individuals with developmental disabilities if they did not have a reported comorbid intellectual disability. As a result of this state policy, many parents did not approve of IQ testing for their children with ASD in order to maintain these in-home services (Personal Communication). In fact, the majority of participants in both the treatment and control conditions required significant prompts to learn a task and remain on task, demonstrated variable math and reading skills ranging from no to only basic literacy skills (basic counting, basic time telling, having limited sight word vocabularies, etc.), and were unable to consistently communicate wants and needs verbally. Further, very few individuals in either group were able to solve every day problems independently, ask for help when needed, demonstrate personal safety skills, use public transportation, or understand work appropriate social behaviors. Finally, all participants in the study were enrolled in self-contained special education programs for the majority of their school day and working to receive a special education certificate of completion instead of a standard diploma. It is for these reasons that we refer to this group of participants as having significant impact from ASD.

Results

Supporting Research Question 1: Employment Outcomes

Without covariate adjustment, the treatment group displayed higher employment at both graduation and follow-up time points ($P < 0.001$). At graduation, 32% of the participants in

the treatment condition were employed (25/79) whereas only 5% (2/42) of the control group reported attaining employment. At follow-up, 73% (58/79) and 17% (4/24) of the participants of the treatment and control groups, respectively, were employed in CIE. Using the unadjusted relative risk procedure comparing the employment rate between the treatment and control condition, participants in the treatment group were 6.65 times more likely at graduation (95% CI 1.65, 26.7) and 4.41 times more likely at 1 year follow-up (95% CI 1.78, 10.9) to be employed than participants in the control condition.

After adjusting for baseline SIS SNI and taking the repeated measures into account, the treatment group still demonstrated higher employment compared to the control group at both graduation and follow-up ($P = 0.014$, $P < 0.001$, respectively). Participants in the treatment group were 5.84 (95% CI 1.50, 13.3) times more likely to achieve employment at graduation and 4.50 (95% CI 2.60, 5.53) times more likely to be employed at 1-year follow-up. In order to demonstrate the trajectory of employment outcomes for participants in both conditions (Fig. 2) presents the percent employed at baseline, graduation, 6 months post-graduation (derived from reported start date at the 1 year interview), and 1-year follow-up.

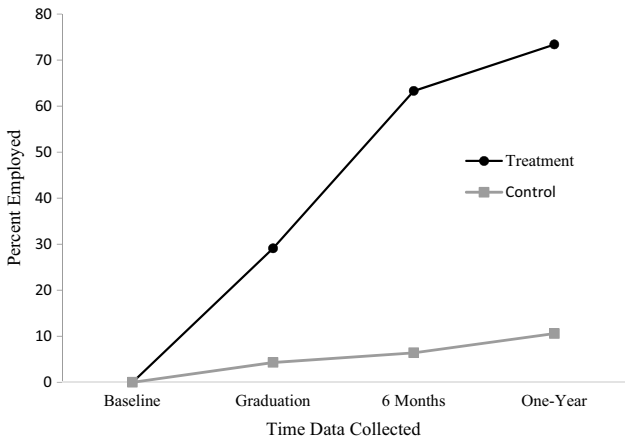

Fig. 2 Employment rates at baseline, graduation, 6 month, and 1-year follow-up

Supporting Research Questions 2–3: Wages, Hours Worked and Weeks to Employment

Table 3 presents the wages and hours worked for employed participants in each group at graduation and 1 year follow-up. At graduation, employed participants in the treatment condition worked on average 19.36 h per week (SD = 6.7) for an hourly wage of $9.61 per hour (SD = 1.48). Similar values were observed at 1-year follow-up, with employed participants working an average of 21.2 h per week (SD = 9.7) for an hourly wage of $9.67 per hour (SD = 1.55). The two control condition participants employed at graduation worked 2.25 and 21.5 h per week for hourly wages of $8 and $8.75 per hour. At the 1-year follow-up, the four individuals who were employed worked 8, 12, 20, and 27.5 h per week and earned $7.50, $8, $8.99, and $10.23 per hour, respectively. Further, we calculated the mean number of weeks between graduation and employment for the treatment and control group. Because we used a 1 year follow-up point, anyone who remained unemployed at that point was assigned 52 weeks, even if their unemployment extended beyond that point. The participants in the control condition reported a mean of 43.4 weeks between graduation and employment with a range of 0–52 weeks while participants in the treatment condition reported 18.8 weeks from graduation to employment with a range of 0–52 weeks as well. Employment outcomes according to the Vocational Index for Adults with ASD are presented in Table 4.

In addition to these employment outcomes, there was a large decrease in the number of individuals in the treatment group identified as having no vocational or educational activities. At graduation from PS + ASD, 65.8% of treatment group participants were identified as having no vocational or educational activities, while only 21.8% of individuals were identified in that category at 1-year follow-up. This change is explained by the PS + ASD model which results in graduation from high school with an immediate hand off to VR for seamless enrollment into SE with job development (SE phase 2; Schall et al. 2015). Because the individual student is well known by the VR case manager and job coaching agency, there is no need to complete additional assessments upon graduation. This resulted in all students who completed PS + ASD remaining in VR case management and receiving

Table 3 Wages, and hours worked, at graduation and 1 year follow-up for treatment and control condition with weeks to hire

Wages and hours worked	Control values	Treatment mean (range)
Wage per hour at graduation	$8.00, $8.75	$9.61 ($7.25–$11.83)
Hours worked weekly at graduation	2.25, 21.5	19.36 (6–20)
Wage per hour at 1 year follow-up	$7.50, $8.00, $8.99, $10.23	$9.60 ($7.25–$12.07)
Hours worked weekly at 1 year follow-up	8, 12, 20, 27.5	21.2 (4–40)
Weeks from graduation to Hire Date	43.4 (0–> 52)	18.8 (0–> 52)

Table 4 Employment outcomes

Employment outcomes on the vocational index for adults with ASD	Control graduation frequency (percent)[a]	Control 1-year follow-up frequency (Percent)[a]	Treatment graduation frequency (percent)	Treatment 1-year follow-up frequency (percent)
Employed in community without supports	0	1 (4.2)	2 (2.5)	4 (5.1)
Postsecondary degree seeking program	1 (2.1)	1 (4.2)	0 (0.0)	0
Employed in the community with supports	1 (2.1)	3 (12.5)	21 (26.6)	49 (58.9)
Employed in the community with supports 10 h week or fewer	1 (2.1)	1 (4.2)	2 (2.5)	5 (6.4)
Sheltered vocational setting and volunteering	0	1 (4.2)	0	0
Sheltered vocational setting	2 (4.3)	0	0	0
Volunteering or Postsecondary non-degree seeking education only	6 (12.8)	4 (16.6)	1 (1.3)	6 (5.1)
No vocational/educational activities	12 (25.5)	1 (4.2)	52 (65.8)	14 (21.8)
Still in high school	19 (40.4)	12 (50.0)	1 (1.3)	1 (1.3)
Missing	5 (10.6)	0	0	0
Total	47 (100)	24 (100)	79 (100)	79 (100)

[a]Figures for the control group may not represent actual outcomes due to higher control group attrition

supported employment services while the majority of the control group remained in high school with limited VR involvement in their transition planning.

Supporting Research Question 4: External Predictors of Employment

The predictors of employment in the treatment group are displayed in Table 5 separately for the graduation and 1-year follow-up time points. At graduation, only SIS SNI was predictive of employment, with a five unit decrease in the SIS SNI score being related to a 1.47 (95% CI 1.05, 2.06; P = 0.026) increase in the odds of gaining employment, indicating that individuals with less intensive support needs appeared to gain employment earlier. No participant characteristics were related with employment at the 1-year follow-up. Because race, gender, age, support intensity, or severity of characteristics of ASD were not associated with employment outcomes, it is likely that the PS + ASD intervention is responsible for the employment outcomes.

Supporting Research Questions 5–7: Type of Jobs Acquired, Employment Retention Rate, and Reasons for Not Acquiring Employment

Most jobs acquired were part-time entry level positions. Table 6 presents the frequency of positions by industry and position title. Job tasks within these positions varied greatly based upon the position. The four control group participants who were employed also worked entry level positions in foodservice (2) and landscaping (2). Of the 79 participants in the treatment group, 64 gained employment at some point during the study for an overall employment acquisition rate of 81%. Further, 58 participants gained and maintained employment across the 1-year post-graduation period for an employment retention rate of 90.6% (58/64). Nine of those 58 participants changed jobs within the 1-year follow-up period. Six of those nine were promoted to a job that met one or more of the following criteria; (a) paid more per hour; (b) worked more hours per week; (c) attained a job with more responsibility or a higher rank. Two job changers made lateral moves where they worked the same job for another employer, made about the same amount of money

Table 5 Assessment of predictors of employment for individuals in the treatment group

Characteristic	Comparison	Graduation		1-year follow-up	
		OR (95% CI)	P	OR (95% CI)	P
Gender	Male–female	1.53 (0.48, 4.86)	0.471	1.95 (0.62, 6.09)	0.252
Race	White–nonwhite	1.51 (0.52, 4.40)	0.454	1.24 (0.41, 3.76)	0.700
Age	(1 year increase)	1.49 (0.90, 2.48)	0.123	1.07 (0.64, 1.79)	0.796
Baseline SIS (SNI)	(5 unit decrease)	1.47 (1.05, 2.06)	0.026	1.21 (0.95, 1.53)	0.381
Baseline SRS (Total)	(5 unit increase)	1.23 (0.90, 1.67)	0.198	0.94 (0.69, 1.28)	0.711

Table 6 Positions acquired in treatment group by industry and position title

Industry	Position
Treatment Group Participant Jobs	
Healthcare (26)	Clinical Associate (9) Environmental Services Aide (5) Central Sterile Processing Associate (3) Information Technology Clinical Associate (2) Utilities Aide (2) Surgical Care Technician (1) Unit Secretary (1) TBI Data Entry Clerk (1) Patient Care Technician (1) Purchasing Associate (1)
Foodservice (15)	School Nutrition Services Associate (7) Dishwasher (3) Food Service Worker (2) Dining Room Assistant (2) Bread Bagger (1)
Retail (9)	Front End Associate (2) Cart Attendant (2) Customer Service Associate (1) Sales Associate (1) Re-shop (1) Loader (1) Merchandise Stock Flow Associate (1)
Hospitality (7)	Laundry Attendant (3) Spa Assistant (1) Domestic Assistant (1) House Attendant (1) Banquet Houseman (1)
Distributor (5)	Warehouse Associate (2) Picker (1) Distribution Center Associate (1) Distribution Center Health Enthusiast (1)
Manufacturer/supplier (3)	Production Worker (1) Package Handler (1) Mail Sorter (1)
Entertainment (2)	Concessionist (1) Ticket Taker/Usher (1)
Sports/Recreation (2)	Custodian (1) Housekeeper (1)
Education (1)	Office Assistant (1)
Transportation (1)	Stock Associate (1)
Facilities Management (1)	Groundskeeper (1)
Control Group Participant Jobs	
Foodservice (2)	Cafeteria Worker (1) Janitorial Crew (1)
Landscaping (2)	Lawn and Garden Associate (1) Self-employed Yard Work (1)

for about the same amount of time. Finally, one person was demoted because they worked fewer hours albeit for a higher hourly salary. Of those 15 (19%) subjects who never gained employment during the study, six (7.6%) did not complete the PS + ASD program due to severe behavioral challenges requiring a change in placement. Another six (7.6%) participants gained employment after the 1 year follow-up point. Finally, three (3.8%) participants chose not to pursue employment after participation in PS + ASD. Table 7 presents the employment and retention outcomes.

Table 7 Employment acquisition and retention among treatment participants

Employment Outcome	Frequency	Percentage
Participated in treatment condition	79	100
Completed 9 month intervention	73	92.4
Acquired employment at some point during the study	64	81
Employment retention at 1-year follow-up	58/64	90.6
Employed at the 1-year follow-up	58	73.4
Changed Jobs prior to 1-year follow-up	9	11.4
Promotion	6	7.6
Lateral change	2	2.5
Demotion	1	1.3
Did not gain employment by 1-year follow-up	15	19
Did not complete the Intervention	6	7.6
Gained employment after 1-year follow-up	6	7.6
Decided to not pursue employment	3	3.8

Discussion

The unemployment of youth with significant impact from ASD is a major societal problem. As Roux et al. (2017) and Chan et al. (2017) have noted youth with ASD are the most likely disability group to leave school without competitive employment with a significant number exiting school unemployed. This outcome occurs after hundreds of millions of dollars have been spent in both public and private school education for these students from approximately 2 to 3 years old up through 18 to 21 years of age. It is not unreasonable to ask what we are doing, or perhaps not doing in the specialized education of students with ASD that leads to an absence of competitive employment. It also raises the question; what happens to these students as they become adults? It is precisely because of these disappointing results that we embarked upon a systematic series of studies to develop, research, and document an evidence based practice that could lead to CIE; (Brooke et al. 2018; Schall et al. 2015; Wehman et al. 2012, 2014, 2016, 2017).

The purpose of the present study was to substantially expand an earlier randomized clinical trial that involved only one work setting and 49 students with ASD (Wehman et al. 2017). In this present study, we increased the work settings from one hospital to four hospitals and more than tripled the population of students enrolled to 156. Our findings were definitive. Even with an apparent low employment rate at graduation, it is still impressive that 32% of participants with significant support needs receiving the PS + ASD intervention graduated from high school with competitive employment. Further, the PS + ASD model that resulted in a seamless transition from school-based to adult community-based services appears to have continued to serve these youth as they were able to enter SE at phase two rather than phase one. This may have resulted the significant decrease in the number of individuals who reported being unengaged between graduation and the 1 year follow-up point.

As a result of these findings, we now know that young people with the significant impact from ASD can successfully complete an intensive business-based internship program where outcomes include over a 70% rate of competitive employment 1 year after the intervention, at a higher than base minimum wage and for an average of 20 h per week. Additionally, we know that over 90% of these young people are still employed at least 1-year and beyond. While the PS + ASD model stops at graduation, the seamless hand off of services from school-based to adult-based agencies seems to further impact these students by reducing the time between graduation and acquisition of CIE. Hence it clearly appears that an internship that is intense, business-based, and delivered with applied behavior analytic techniques by trained teachers and employment specialists is one evidence-based path to real jobs for youth with ASD.

The jobs that were acquired were almost always the first real employment for the students in the treatment group and they spanned industries in health care, manufacturing, entertainment, hospitality, retail, transportation, and food service. Students were not stereotyped into the same job or industry and all worked in close proximity to their coworkers without disabilities with ample opportunities for interaction with coworkers, customers, and their supervisors. All employed persons received pay checks directly from their employer. Some had partial benefits while a few participants were able to work 40 h weekly and gain full benefits.

Aspects of PS + ASD That May Have Led to Employment

There are six key elements to PS + ASD that we believe resulted in the significant differences in employment outcomes between the treatment and control condition. Each component and its contribution to the outcome is detailed below:

- Internships: Participants gained work experience through internships that either built upon their long term career goals and/or were designed to cumulatively build their employment skills and social communication behavior with the eventual goal of each participant demonstrating career readiness by the end of internship 3. The internship experiences were invaluable for the participant to gain employment experience and for staff to identify their strengths, support needs, and interests.
- Instruction: Instructional practices provided within internship experiences were embedded in ABA techniques. Instructional strategies also capitalized on repeated performance of skills in natural environments. Given the learning histories and needs of individuals with ASD, we believe these practices are an essential component of transition to employment programs for youth with ASD.
- Personalized vocational assessment and training: Partnering with the hospitals allowed the program staff to match individuals to internships coordinated to their career goals and work support needs and allowed for individualized supervision within the hospital. Rather than completing works tasks as a group in a community business near their high school, PS + ASD participants were able to work in individually selected internships that acted as both assessment and training opportunities.
- Seamless transition to adult services: Treatment participants received services in their senior year from both educational staff and job coaches daily. In addition, they had regular contact with their VR counselors. Upon graduation, they did not enter waiting lists for services with staff who did not know them. Instead, the very next day after graduation, they immediately began their job search with job coaches and VR counselors who knew them, their family members, their strengths, interests, preferences, and support needs.
- Leaving high school with a resume and examples of successful work: Treatment participants were not able to complete traditional employment interviews due to their social communication challenges. Thus they relied, instead, upon alternate interview techniques, such as "working interviews," "video resumes," specific letters of recommendation from internship mentors and supervisors, and word of mouth recommendations among colleagues in similar fields.
- Focus on meeting business needs: Businesses who participated had high expectations of the interns. Additionally, business were not expected to hire interns unless they had an open position or a set of tasks that comprised a new position that could be customized for an intern. Consequently, while interns were offered the opportunity to grow through the experience, they were expected to perform the job as required. These high expectations increased the quality of job skills learned.

These six aspects of the PS + ASD model represent a significant departure from the way CBET is provided in the participating public school programs and likely resulted in the significantly better employment outcomes for participants in the treatment condition.

Barriers to Implementation

While there is convincing evidence that PS + ASD results in much better employment outcomes for youth with ASD, there are barriers to implementation that require consideration for replication sites. These include time, cost, staffing, inter-agency collaboration, and business participation. Each is described below.

- Time: PS + ASD requires intensive time in both the operation and implementation by all staff and students. It is important that replication sites allow ample time for the project to develop.
- Cost: In order to implement a PS + ASD site, replication sites must coordinate with and purchase training and technical assistance for Project SEARCH from Cincinnati Children's Hospital Project SEARCH developers. In addition, replication sites will need resources to fund staff and outfit the classroom with materials and supplies. These costs represent more upon start-up, but also continue across the life of the project.
- Staffing: Because of the unique skills sets required, there is an additional training requirement for PS + ASD staff, especially in the area of applied behavior analysis instructional and behavioral practices. Replication sites will need to account for this training.
- Inter-agency collaboration: Because of braided funding and program design, PS + ASD requires participation from multiple agencies. It also requires agencies to come to agreement regarding admission and service provision. This can be a barrier in some locations.
- Business participation: The PS + ASD model requires a business to participate as a host site for the project. It is helpful if that site is large enough to accommodate multiple internships while allowing staff to act as mentors to interns. Small communities that do not have access to such businesses may struggle to find business participants.

Limitations and Future Research

There were several limitations of note related to this study. First, the individuals in this study may not be

representative of the population of individuals with ASD. In order to address this concern, we have provided an in-depth description of the demographic and behavioral characteristics of the participants in this study. Second, the uneven dropout rate between the treatment and control group poses a threat to the findings presented. However, the results presented are a second replication using a randomized controlled design. This adds to the strength of the findings. Additionally, analysis of the control group suggested only minor differences between completers and dropouts. Third, while we present six essential elements of the PS + ASD model that we believe increased the employment outcomes for the treatment group, we did not systematically vary those elements to test their impact on outcomes. Fourth, we did not complete a cost analysis of the treatment. It is likely that PS + ASD is more expensive to implement than the "business as usual" high school practice currently provided to youth with ASD between the ages of 18–21. Whether or not this cost is recuperated through the contribution individuals with ASD make as employees is a subject for future research. We believe this to be the case. Fifth, PS + ASD is a highly intensive program comprising 9-months of intervention. We also don't know if that amount of intensity is required or if a less intensive program might result in the same outcomes. Finally, we did not systematically measure differences between responders and non-responders. All of these areas represent questions for future research.

Conclusion

The purpose of this study was to evaluate the efficacy of a 9 month internship on the competitive employment outcomes for youth with ASD. The results demonstrate, convincingly, that an internship designed with specialized supports can lead to competitive employment in varied types of industries at a competitive wage for a level of hours of work that provides an excellent foundation for a long career and work history.

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Compliance with Ethical Standards

Conflict of interest The authors of this paper declare no conflicts of interest in the completion of the study or the preparation of this manuscript.

Financial Disclosure All authors have indicated that they have no financial relationships relevant to disclose.

Ethical Approval All procedures performed in this study involved human participants and were in accordance with the ethical standards of the institutional review boards of the University and the State Department of Vocational Rehabilitation with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. In addition, the procedures implemented were reviewed by the research committees of all participating school districts. All participants provided informed consent and, when appropriate, assent was obtained from all individual participants included in the study.

References

Allen, K. D., Burke, R. V., Howard, M. R., Wallace, D. P., & Bowen, S. L. (2012). Use of audio cuing to expand employment opportunities for adolescents with autism spectrum disorders and intellectual disabilities. *Journal of Autism and Developmental Disorders, 42*, 2410–2419.

Alverson, C. Y. & Yamamoto, S. H. (2018). VR employment outcomes of individuals with autism spectrum disorders: A decade in the making. *Journal of Autism and Developmental Disorders, 48*, 151–162.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th edn., text revision). Washington, DC: Author.

Baker-Ericzen, M. J., Fkitch, M. A., Kinnear, M., Jenkins, M. M., Twamley, E. W., Smith, L., ... Leon, J. (2018). Development of supported employment, comprehensive cognitive enhancement, and social skills program for adults on the autism spectrum: Results of an initial study. *Autism, 22*, 6–19.

Bennett, K. D. & Dukes, C. (2013). Employment instruction for secondary student siwth autism spectrum disorder: A systemtatic review of the literature. *Education and Training in Autism and Developmental Disabilities, 48*, 67–75.

Boutron, I., Altman, D. G., Moher, D., Schulz, K. F., & Ravaud, P. (2017). CONSORT statement for randomized trials of nonpharmacologic treatments: A 2017 update and CONSORT extension for nonpharmacologic trial abstracts. *Annals of Internal Medicine, 167*, 40–47. https://doi.org/10.7326/M17-0046.

Brooke, V., Brooke, A. M., Schall, C., Wehman, P., McDonough, J., Thompson, K., & Smith, J. (2018). Employees with autsim spectrum disorder achieving long-term employment success: A retrospective review of employment retention and intervention. *Research and Practice for Persons with Severe Disabilities, 43*, 181–193.

Chan, W., Smith, L., Hong, J., Greenberg, J., Taylor, L., J., & Mailick, M. (2017). Factors associated with sustained community employment among adults with autism and co-occurring intellectual disability. *Autism: The International Journal of Research and Practice*. https://doi.org/10.1177/1362361317703760.

Chen, J., Sung, C., & Pi, S. (2015). Vocational rehabilitation service patterns and outcomes for individuals with autism of different ages. *Journal of Autism & Developmental Disorders, 45*(9), 3015–3029. https://doi.org/10.1007/s10803-015-2465-y.

Christensen, J. J., Hetherington, S., Daston, M., & Riehle, E. (2015). Longitudinal outcomes of Project SEARCH in upstate New York. *Journal of Vocational Rehabilitation, 42*, 247–255.

Constantino, J. N., & Gruber, C. (2012). *The Social Responsiveness Scale—Second edition (SRS-2)*. Torrance: Western Psychological Services.

Datson, M., Riehle, J. E., & Rutkowski, S. (2012). *High school transition that works: lessons learned from Project Search*. Baltimore: Paul H. Brookes Publishing.

Gentry, T., Kriner, R., Sima, A., McDonough, J., & Wehman, P. (2015). Reduing the need for personal supports among workers with autism using an iPod Touch as an assistive technoligy: Delayed randomized control trial. *Journal of Autism and Developmental Disorders, 45*, 669–684.

Hayward, S., Mcvilly, K., & Stokes, M. (2018). Challenges for females with high functioning autism in the workplace: A systematic review. *Disability and Rehabilitation, 40*(3), 249–258.

Hedley, D., Uljarević, M., Cameron, L., Halder, S., Richdale, A., & Dissanayake, C. (2017). Employment programmes and interventions targeting adults with autism spectrum disorder: A systematic review of the literature. *Autism, 21*(8), 929–941.

Hendricks, D. (2010). Employment and adults with autism spectrum disorders: Challenges and strategies for success. *Journal of Vocational Rehabilitation, 32*(2), 125–134.

Individuals with Disabilities Education Improvement Act, 20 U.S.C. § 1400 (2004).

Kaehne, A. (2016). Project SEARCH UK—Evaluating its employment outcomes. *Journal of Applied Research in Intellectual Disabilities, 29*(6), 519–530. https://doi.org/10.1111/jar.12207.

Kellems, R. O. & Morningstar, M. E. (2012). Using video modeling delivered through iPods to teach vocational tasks to young adults with autism spectrum disorders. *Career Development and Transition for Exceptional Individuals, 35*, 155–167.

Lorenz, T., Frischling, C., Cuadros, R., & Heinitz, K. (2016). Autism and overcoming job barriers: Comparing job-related barriers and possible solutions in and outside of autism-specific employment. *PloS ONE, 11*(1), e0147040.

Mavranezouli, I., Megnin-Viggars, O., Cheema, N., Howlin, P., Baron-Cohen, S., & Pilling, S. (2014). The cost-effectiveness of supported employment for adults with autism in the United Kingdom. *Autism: The International Journal of Research and Practice, 18*(8), 975–984.

McLaren, J., Lichtenstein, J., Lynch, D., Becker, D., & Drake, D. (2017). Individual placement and support for people with autism spectrum disorders: A pilot program. *Administration and Policy in Mental Health and Mental Health Services Research, 44*(3), 365–373.

Modini, M., Tan, L., Brinchmann, B., Wang, M. J., Killackey, E., Glozier, N., … Harvey, S. B. (2016). Supported employment for people with severe mental illness: Systematic review and meta-analysis of the international evidence. *The British Journal of Psychiatry, 209*, 14–22.

Morgan, R. L., Callow-Heusser, C. A., Horrocks, E. L., Hoffmann, A., N., & Kupfeman, S. (2014). Identifying transition teacher competencies through literature review and surveys of experts and practitioners. *Career Development and Transition for Exceptional Individuals, 37*, 149–160.

Müller, E., & VanGilder, R. (2014). The relationship between participation in Project SEARCH and job readiness and employment for young adults with disabilities. *Journal of Vocational Rehabilitation, 40*(1), 15–26.

Ottomanelli, L., Goetz, L. L., Suris, A., McGeough, C., Sinnott, P. L., Toscano, R., … Holmes, S. A. (2012). Effectiveness of supported employment for veterans with spinal cord injuries: results from a randomized multisite study. *Archives of physical medicine and rehabilitation, 93*(5), 740–747.

Persch, A. C., Cleary, D. S., Susie, R., Malone, H. I., Darragh, A. R., & Case-Smith, J. D. (2015). Current practices in job matching: A Project SEARCH perspective on transition. *Journal of Vocational Rehabilitation, 43*(3), 259–273. https://doi.org/10.3233/JVR-150774.

Project SEARCH. (2017). Outcome summary. Retrieved from https://www.projectsearch.us/outcome-summary/.

Project SEARCH (2018). Transition to work. Retrieved from https://www.projectsearch.us/transition-to-work/.

Roux, A. M., Rast, J. E., Anderson, K. A., & Shattuck, P. T. (2017). *National autism indicators report: developmental disability services and outcomes in adulthood*. Philadelphia: Life Course Outcomes Program, A.J. Drexel Autism Institute, Drexel University.

Roux, A. M., Shattuck, P. T., Rast, J. E., Rava, J. A., & Anderson, K. A. (2015). *National autism indicators report: transition into young adulthood*. Philadelphia: Life Course Outcomes Research Program, A.J. Drexel Autism Institute. Drexel University.

Rumrill, P., Wehman, P., Cimera, R., Kaya, C., Dillard, C., & Chan, F. (2016). Vocational rehabilitation services and outcomes for transition-age youth with traumatic brain injuries. *The Journal of head trauma rehabilitation, 31*(4), 288–295.

Sanford, C., Newman, L., Wagner, M., Cameto, R., Knokey, A.-M., & Shaver, D. (2011). *The Post high school outcomes of young adults with disabilities up to 6 years after high school. Key findings From the National Longitudinal Transition Study-2 (NLTS2) (NCSER 2011–3004)*. Menlo Park: SRI International.

Schall, C. M., Wehman, P., Brooke, V., Graham, C., McDonough, J., Brooke, A.,… Allen, J. (2015). Employment interventions for individuals with ASD: The relative efficacy of supported employment with or without prior Project SEARCH training. *Journal of Autism and Developmental Disorders., 45*(12), 3990–4001. https://doi.org/10.1007/s10803-015-2426-5.

Scott, M., Milbourn, B., Falkmer, M., Black, M., Bolte, S., Halladay, A., ... Girdler, S. (2018). Factors impacting employment for people with autism spectrum disorder: A scoping review. *Autism*. https://doi.org/10.1177/1362361318787789.

Taylor, J. L., & Seltzer, M. M. (2012). Developing a vocational index for adults with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 42*, 2669–2679. https://doi.org/10.1007/s10803-012-1524-x.

Thompson, J. R., Bryant, B., Campbell, E. M., Craig, E. M., Hughes, C. M., Rotholz, D. A., Schalock, R. L., Silverman, W. P., Tasse, M. J., & Wehmeyer, M. L. (2004). *Supports Intensity Scale*. Washington, DC: American Association on Intellectual and Developmental Disabilities.

Virginia Department of Behavioral Health and Developmental Services (2016). Waiver redesign informational series for providers. Retrieved from http://vnppinc.org/wp-content/uploads/2016/04/MLMC-Provider-slides-handout-4-1-16.pdf.

Weaver, L. L. (2015). Effectiveness of work, activities of daily living, education, and sleep interventions for people with autism spectrum disorder: A systematic review. *American Journal of Occupational Therapy, 69*, 1–11.

Wehman, P., Brooke, V., Brooke, A. M., Ham, W., Schall, C., McDonough, J., Lau, S., Seward, H., & Avellone, L. (2016). Employment for adults with autism spectrum disorders: A retrospective review of a customized employment approach. *Research in Developmental Disabilities, 53–54*, 61–72.

Wehman, P., Chan, F., Ditchman, N., & Kang, H. J. (2014a). Effect of supported employment on vocational rehabilitation outcomes of transition-age youth with intellectual and developmental disabilities: A case control study. *Intellectual and developmental disabilities, 52*(4), 296–310.

Wehman, P., Schall, C., Carr, S., Targett, P., West, M., & Cifu, G. (2014b). Transition from school to adulthood for youth with ASD: What we know and what we need to know. *Journal of Disability Policy Studies, 25*, 30–40.

Wehman, P., Schall, C., McDonough, J., Graham, C., Brooke, V., Riehle, J. E., Brooke, A., Ham, W., Lau, S., Allen, J., & Avellone, L. (2017). Effects of an employer based intervention on employment

outcomes for youth with significant support needs due to autism. *Autism, 21*, 2760290. https://doi.org/10.1177/1362361316635826.

Wehman, P., Schall, C., McDonough, J., Molinelli, A., Riehle, E., Ham, W., & Thiss, W. (2012). Project SEARCH for youth with autism spectrum disorders: Increasing competitive employment on transition from high school. *Journal of Positive Behavior Intervention, 15*, 144–155.

Wehman, P. H., Schall, C. M., McDonough, J., Kregel, J., Brooke, V., Molinelli, A., Ham, W., Graham, C. W., Riehle, J. E., Collins, H. T., & Thiss, W. (2014). Competitive employment for youth with Autism Spectrum Disorders: Early results from a randomized clinical trial. *Journal of Autism and Developmental Disorders, 44*, 487–500. https://doi.org/10.1007/s10803-013-1892-x.

Workforce Innovation and Opportunity Act. Public Law No. 105–220; 29 U.S.C. Section 2801. (2014).

Zhang, J., & Kai, F. Y. (1998). What's the relative risk?: A method of correcting the odds ratio in cohort studies of common outcomes. *Journal of the American Medical Association, 280*(19), 1690–1691.