

Title Page

THE EFFECT OF A BUSINESS INTERNSHIP MODEL AND COMPETITIVE EMPLOYMENT ON ENHANCING THE INDEPENDENCE OF YOUNG ADULTS WITH SIGNIFICANT IMPACT FROM AUTISM

Carol Schall, Ph.D.; Adam P. Sima, Ph.D.; Lauren Avellone, Ph.D.; Paul Wehman, Ph.D.; Jennifer McDonough, M.Ed., CRC; Alecia Brown, B.S.

Corresponding Author:

Carol Schall, Ph.D.

Email address: cmschall@vcu.edu

Virginia Commonwealth University

Autism Center for Excellence

Box 842011

Richmond, VA 23284-2011

Adam P. Sima, Ph.D., Virginia Commonwealth University Department of Biostatistics, Richmond, VA, 23298-0032, USA

Lauren Avellone, Ph.D., Virginia Commonwealth University Rehabilitation Research and Training Center, Richmond, VA, 23284-2011, USA

Paul Wehman, Ph.D., Virginia Commonwealth University Physical Medicine and Rehabilitation, Richmond, VA, 23298-0330, USA

Jennifer McDonough, M.Ed., CRC, Virginia Commonwealth University Rehabilitation Research and Training Center, Richmond, VA, 23284-2011, USA

Alecia Brown, B.S., Virginia Commonwealth University Rehabilitation Research and Training Center, Richmond, VA, 23284-2011, USA

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The Effect of Business Internships Model and Employment on Enhancing the Independence of Young Adults with Significant Impact from Autism

Introduction

Autism Spectrum Disorder (ASD) is a lifelong developmental disorder that affects each individual with the diagnosis differently in terms of behavioral strengths and support needs including several deficits in major life areas including social emotional responding, non-verbal communication, development and maintenance of interpersonal relationships, and inflexibility or rigidity regarding routines and patterns of thinking (American Psychiatric Association, 2013). Individuals who have a comorbid diagnosis of ASD and intellectual disability (ID) may also experience cognitive deficits (e.g., reading, language, math, writing, reasoning, or memory) and impairments in adaptive functioning (e.g., self-care, self-regulation, navigation, or money management) that can be lifelong (American Psychiatric Association, 2013). For adolescents with ASD, obtaining employment is a major milestone during the transition from youth to adulthood as competitive employment enables financial independence, opportunities for socialization, the ability to pursue personal interests, and a chance to contribute to the community (Wehman, [et al.](#), 2019).

To improve postsecondary employment outcomes, federal mandates have increasingly focused on the provision of transition-to-employment services for individuals with disabilities. The Individuals with Disabilities Education Improvement Act (IDEA) of 2004 required transition plans to begin before the age of 16, be individualized according to student's strengths, preferences, interests, and needs, and include opportunities for developing vocational skills. The Workforce Innovation and Opportunity Act (WIOA) of 2014 enabled greater transition-to-work services for youth with disabilities by requiring states to provide pre-employment transition

services (WIOA, 2014) such as work-based learning experiences or career exploration counseling. In fact, Under WIOA, state Vocational Rehabilitation (VR) offices are now responsible for improved collaboration with schools regarding transition planning processes, such as attending student transition meetings (WIOA, 2014). Nationwide, states are adopting an Employment First approach by focusing on competitive employment outcomes over segregated sheltered workshop settings (U.S. Department of Labor, 2018). Over the past few decades, what constitutes acceptable employment outcomes for individuals with disabilities has been redefined to emphasize integrated community work, for comparable wages, in employment positions aligned with individualized interests and skillsets (Wehman, et al., 2018).

Impact of Work on ASD

While federal mandates continue to support initiatives to improve postsecondary employment outcomes for youth with disabilities, the impact of participating in paid work on a multitude of life domains has yet to be studied (Scott, et al, 2018). Natural work environments are rich with diverse opportunities for skill development and refinement. Employment provides opportunities to learn beyond required job duties including how to interact with supervisors and coworkers, accept corrective feedback, navigate a work setting, exercise safety and caution within the work setting, maintain work appropriate hygiene, follow a schedule, and use technology on-the-job. Therefore, sustained participation in employment offers individuals with ASD perpetual opportunities for skill development over time. This is important because findings from several studies indicate that when the provision of stimulating activities is absent in adulthood, skill growth plateaus. Taylor and Seltzer (2010) reported that skill acquisition halted after existing high school for students with ASD despite significant improvement observed during high school. Similarly, Smith ~~and colleagues~~Maenner and Seltzer (2012) found that

progress developing self-help skills continued through adolescence while receiving educational services but then slowed during participants' 20s. The incongruence in skill acquisition may be explained by the disability cliff many youth with disability face once reaching adulthood. While children with ASD are entitled to educational services via federal mandates, adults with ASD face the prospect of limited access to services with long waiting lists rather than receiving mandated services. Continued participation in employment is not thought of as a typical intervention, however, its therapeutic value for individuals with ASD is worth investigating.

Taylor, Smith, and Mailick (2014) found that greater independence at work over a 5.5 year period was associated with declines in autism symptoms and maladaptive behaviors. This particular longitudinal sample included a heterogeneous population across the spectrum of abilities and challenges. However, at both time points, just over 50% of the sample were employed in sheltered vocational settings. Further, this sample employed a longitudinal developmental method that used a correlational cross lagged method. While relationships and directionality can be inferred, the findings of these correlations can only be confirmed by a prospective experimental design. Findings from this study suggested that vocational activity resulted in adaptive behavioral improvement and a decrease in the symptoms of ASD. The authors suggested the need for randomized clinical trials to confirm their findings.

Wehman, et al. documented the growth in independence at work for individuals with significant support needs due to autism (Wehman, et al., 2017). Specifically, they found in a randomized clinical trial that individuals who received 9 months of an intensive business-based internship program, Project SEARCH plus ASD Supports (PS+ASD) acquired competitive integrated employment (CIE) at a much higher rate than those in an equal control group. Additionally, they found the treatment group experienced significantly decreased support needs

on the Employment Activities Subscale of the Support Intensity Scale – Adult Version (SIS-A, Thompson, et al., 2004) at baseline, graduation, three month follow-up and six month follow-up. In addition, the treatment group demonstrated a significant decrease in support intensity by twelve months after employment when compared with the control group (Wehman, et al., 2017). These findings are of particular importance for three reasons. Primarily, it was the first study to use a randomized clinical trial with equal treatment and control groups to provide evidence of efficacy of the PS+ASD model. Secondly, the individuals in the treatment group engaged in vocational activity in CIE during a 9-month unpaid internship program and upon graduation at a very high rate. Thus, this study provided a comparison of outcomes where CIE was the focus of the intervention, not sheltered employment. Finally, it provided prospective confirmation regarding the direction of the relationship between vocational activity and behavioral improvement. Specifically that employment may impact behavioral development positively in individuals with ASD rather than the opposite assumption that behaviorally less challenged individuals are able to acquire employment more readily. Even so, those results only examined the impact of CIE on independence at CIE.

Study Purpose

This study was part of a larger study to determine the efficacy of Project SEARCH plus ASD Supports (PS+ASD, [Wehman et al., 2019](#)) on employment outcomes for 18-22 year old youth with ASD. This examination of enhanced independence was a secondary outcome of this study. The primary outcome was the effect of PS+ASD on the acquisition of CIE. The primary research question driving this study was:

What is the impact of business-based internships and CIE on the overall independence of youth and young adults with significant impact from autism between the ages of 18 – 24?

CIE was defined as the acquisition of paid employment in a community business where 1) wages were at least minimum wage or higher, 2) wages were scaled to the same wage as non-disabled workers performing the same or similar tasks, 3) the employee with ASD interacted with other employees, and where appropriate to the work performed, other persons who were not individuals with disabilities. Business-based internships were defined as participating in work in an unpaid internship in a community business learning marketable tasks through PS+ASD. PS+ASD is a transition-to-employment program where individuals with ASD between the ages of 18 to 22 in their last year of high school participated in an intensive internship program in a community business (Datson, Riehle, & Rutkowski; 2012 [Schall, Wehman, & McDonough, 2012](#)). To address the needs of individuals with ASD, employment specialists and educational staff implemented additional applied behavior analytic supports and instructional methods ([Wehman et al., 2019](#)).

This resulted in two supporting research questions. They were:

1. What were the within group differences reported on the six Part 1 SIS-A subscales and SNI for treatment condition participants and control condition participants respectively at baseline to graduation, and baseline to one year follow-up?
2. What were the differences reported on the six Part 1 SIS-A subscales and SNI between the treatment and control condition participants at baseline, graduation, and one year follow-up?

Method

Procedures

This study was part of a larger prospective multi-site, parallel block randomized clinical trial of PS+ASD ([Wehman et al., 2019](#)). It was conducted at four different hospitals within about

a 100 mile radius in Virginia. Each hospital partnered with a local school district and a local VR office to complete the research. Two different employment services organizations also participated to provide employment specialists to implement the PS+ASD internship supports and continued to provide supported employment upon graduation from PS+ASD. Potential participants were recruited in four cohorts between 2013 to 2016. Participants were eligible for the study if they; a) had a medical diagnosis or educational eligibility label of ASD; b) attended local public school where research was being conducted; c) were between the ages of 18 – 21 by the first day of school; d) displayed independent self-care including using the bathroom, eating, and moving from place to place; e) were eligible for funding through the state VR office; and f) had continued eligibility for public school services in the coming school year. Exclusion criteria were an inability or unwillingness to provide consent or assent.

Recruitment and Randomization. Participants were recruited to participate in one of four PS+ASD programs offered at four different hospitals in Virginia. Recruitment efforts included contacting eligible students from among local high schools of participating school districts, providing informational meetings, and providing interested individuals with an application to participate.

Randomization occurred in four blocks associated with the four hospital programs with each completing its own recruitment and randomization. Randomization occurred at a 1:1 ratio to assign each participant into one of two arms of the study. The first arm was the control condition where participants remained in their home high schools for the school year and received services as identified in their individualized education programs (IEP); hereafter referred to as “control”. The second arm was the treatment condition where participants attended PS+ASD for the school year; hereafter referred to as PS+ASD.

Participants. Recruitment efforts resulted in 205 individuals applying to participate. Forty-nine applicants were excluded with 32 not meeting the inclusion criteria and 17 declining participation prior to screening. Consequently, 156 individuals were randomly assigned in blocks at an approximate 1:1 ratio into the treatment condition (81 participants) and the control condition (75 participants). As noted in Figure 1, control participants dropped from the study at a higher rate than treatment participants. Previous analysis suggested negligible differences between those who dropped from the study and those who remained in the study until its conclusion ([Wehman et al., 2019](#)). Table 1 presents the mean race, gender, age, and Support Intensity Scale Support Needs Index (SIS-A SNI, Thompson, et al., 2004) for all individuals in the study.

Participants in this study were 57% white and 43% non-white with non-white races including African American, Hispanic, and Asian. Males represented 72% of treatment participants, 83% of the control participants, and 74% of control dropouts. The overall mean age was 19.6 years while the mean ages of treatment, control participant completers, and control participant dropouts was 19.8, 19.5, and 19.8 years respectively. Most participants in both groups reported a medical diagnosis of autism with 73.6% control and 73.1% treatment condition participants identifying autism as their primary disability. Many participants reported having comorbid disorders including intellectual disability (31% of control and 30% of PS+ASD participants), speech language impairment (26% of control and 12% of PS+ASD participants), other health impairment (16% of control and 3% of PS+ASD participants), emotional disability (2% of control and 5% of PS+ASD participants), and/or severe learning disability (3% of control and 4% of PS+ASD participants). The actual incidence of intellectual disability may be underestimated in this sample due to a state regulation regarding the provision of Home and

Community Based Medicaid Waiver services to individuals identified with a developmental disability that excluded those with a comorbid intellectual disability ([Wehman et al., 2019](#)).

Participants represented transition-aged high school youth from four county and four city school districts. These localities reported poverty rates ranging from a low of 5.4% to a high of 20.9% (Acquired from <https://www.census.gov/data-tools/demo/saipe/saipe.html>).

Participant Support Needs. Participants in both groups reported support needs ranging from limited support required consistently over time to extensive support required daily. Both groups also reported additional medical conditions requiring support including allergies, special dietary needs, seizure disorders, and other similar medical conditions. Participants in both conditions also reported relatively high behavioral support needs including aggression toward others, property destruction, stealing, self-injury, tantrums, wandering, inappropriate social interactions, and self-stimulation. Participants in both groups reported requiring significant prompts to learn tasks, remain on task, demonstrated low reading and math literacy, and were inconsistently able to communicate basic wants and needs verbally. Further, few individuals in either group were able to engage in every day problem solving, ask for help when needed, demonstrate personal safety skills, use public transportation, or demonstrate work appropriate social behaviors. Finally, all participants in both conditions were in self-contained special education programs for the majority of their school day prior to participating in the study. They were all also seeking a special education certificate of completion and not a standard diploma. In short, the individuals in both conditions were significantly impacted by their disabilities.

Control Condition. Control condition participants remained in their assigned high school and received the services identified by their individualized education plans. Participants in this condition received a mean of 8.9 hours weekly of community-based employment training

(CBET) and vocational preparation course work comprised only 8.6% of their school day. In a previously published report on this study, 4.2% of control group participants acquired CIE at graduation and 16.8% acquired CIE by 1 year follow-up ([Wehman et al., 2019](#)).

Treatment Condition. Treatment condition participants attended PS+ASD instead of high school ([Wehman et al., 2019](#)). During the 9 month school year, treatment group participants received 35 hours a week in CBET in a community business. Additionally they rotated through three 10 – 12 week unpaid internships in the business where they learned marketable job skills and important work behaviors. During this year, they spent approximately 900 hours of time in a community business with approximately 720 hours of time in internship activities ([Wehman et al., 2014](#)). Employment outcomes for this group were significantly higher than those for the control group with 31.6% acquiring CIE at graduation and 73.4% acquiring and maintaining CIE at one year follow up ([Wehman et al., 2019](#)).

Data Collection Measure and Schedule

Support needs were measured using the SIS-A (Thompson, et al., 2004) at three points during the study; baseline (beginning of the school year between August and October), graduation (end of the school year between June and August), and 1-year follow-up (one year after graduation, between June and August). Because this study was initiated prior to the release of the revised interview and profile form, we used the 2004 version of the Interview and Profile Form throughout the study. References to the order of the sections in the SIS-A are from the 2004 Interview and Profile Form. In addition, demographic and descriptive data were collected via researcher made interviews at the baseline data collection point. Participants received compensation for completing the SIS-A interview. Blinding was not possible because of the in-person interview protocol required by the SIS-A. To protect against researcher bias, participants

and their parents and/or educators participated in the SIS-A interview conducted by a trained data collector independent of the intervention team.

The Supports Intensity Scale – Adult Version (SIS-A)

The SIS-A is a good measure of impact because it is comprehensive, assessing multiple life domains. The SIS-A is a standardized instrument used to evaluate the intensity of support needed by an individual with a disability to be successful in various life activities, targeted for individuals with ID or a related developmental disability who are age 16 or older (Thompson et al., 2004). The psychometric properties of items on the SIS have been examined by a number of researchers and found to have adequate reliability and validity (Kuppens et al., 2010; Thompson et al., 2004; Thompson, [Tassé, & McLaughlin](#), 2008). Accordingly, the SIS-A has demonstrated favorable median discriminating power, content, criterion, and construct validity (Thompson et al., 2004), factorial validity (Kuppens et al., 2010), test-retest reliability, standard errors of measurement, internal consistency (Bossaert et al., 2009; Thompson et al., 2004) and interrater reliability (Thompson et al., 2008).

SIS-A Subscales. The SIS is comprised of three sections. The first section, titled the Support Needs Scale includes six subscales; Home Living, Community Living, Lifelong Learning, Employment, Health and Safety, and Social. The second section of the SIS contains 1 subscale; Supplemental Protection and Advocacy. The third section includes two subscales assessing Exceptional Medical and Behavioral Support Needs.

Administration and Scoring. Trained professionals administer the SIS in an interview style format with multiple individuals, including the individual with a disability. Appropriate respondents have a regular opportunity to observe the individual in a variety of situations and

settings, such as parents, guardians, teachers, or supervisors. Combined, Sections 1 and 2 address 57 life activities and Section 3 addresses 28 medical and behavioral areas.

SIS-A administrators conduct the interview, interpret and then code respondents' answers on a Likert scale. Sections 1 and 2 require a 0-4 score indicating least to most intensive support across three dimensions (i.e., type, frequency, daily support time). Section 3 deviates from Sections 1 and 2 in that it includes a one dimensional score of 0-2 concerning amount of support (i.e., no support needed, some support needed, extensive support needed).

Interpretation. A Support Needs Index (SNI) score is generated from the summed standard scores from each of the six subscales in Section 1. The SNI does not include Supplemental Protection and Advocacy Scale or the Exceptional Medical and Behavioral Support Needs sections. Nevertheless, the SNI provides a general indication of the overall intensity of the individual's support needs. The SNI can be interpreted to indicate limited (SNI 1-60), intermittent (SNI 61-84), extensive (SNI 85-116) or pervasive support needs (SNI 117 and above, Thompson, et al., 2004). On the SIS-A lower scores indicate lower support needs and higher rates of independence.

Data Management and Analysis

Each SIS-A Interview and Profile form was completed at the interview with a coded tracking number to protect the confidentiality of each participant. Scoring of answers was completed using the SIS-A Computer Scoring Program. All data was encrypted and stored on an encrypted password protected computer. Data reporting was consistent with the Consolidated Standards of Reporting Trials statement for non-pharmacologic treatments (Boutron, Altman, Moher, Schulz, & Ravaud, 2017).

Participant information was summarized at baseline with means and standard deviations (SD) or frequencies and percentages. Separate summaries of the total SIS-A, SIS-A SNI, SIS-A Exceptional Behavior and each of the SIS-A subscales were reported and compared using Cohen's *d* effect size. A repeated measures ANOVA was used to assess differences from baseline between study arms for each of the SIS scores. This model included time, group, and their interaction as fixed effects. A Toeplitz error structure was used to account for the longitudinal dependence within each participant and a separate random effect adjusted for any differences between the cohorts. A Kenward-Rogers adjustment to the denominator degrees of freedom was used to account for the estimation of the random effects (Kenward & Roger, 2009). In addition to the separate Graduation-Baseline and 1-year follow-up-Baseline differences, an omnibus *p*-value for the test of no overall differences in the change scores were different between the treatment groups. Cohen's *d* values measuring the change in improvements between the treatment and control groups were calculated separately for the Graduation to Baseline and 1-year follow-up differences. A sensitivity analysis was performed that excluded any participant that missed all post-baseline follow-up visits. This analysis compared the partial-eta squared in the overall test of no difference in the change scores between the groups (Richardson, 2011). Since this study assesses secondary outcomes of a larger clinical trial, no adjustment for multiple comparisons were made (Bender & Lange, 2001; Feise, 2002).

Results

At baseline, the total SIS-A, SIS-A SNI, and most of the SIS-A subscales indicated a fair amount of balance between the treatment and control groups (Table 3). The notable exception was the community living subscale, which was higher in the control group ($d=-0.57$).

Supporting Research Question 1: Within Group Differences

Participants in the treatment group exhibited improvement on all scales of the SIS (Table 3). Total and SNI scores were 4.5 and 5.1 units lower at graduation compared to baseline and 5.3 and 6.1 units lower at 1-year follow-up. Similarly, graduation to baseline improvement of standardized subscale scores ranged between 0.6 and 1.1 units lower, with the Lifelong Learning (Difference=-1.0), Employment (Difference=-1.1), and Health Safety (Difference=-0.7) having the largest magnitude of change. Meaningful improvements between baseline and either graduation or 1-year follow-up in the control group were observed only in the Community Living subscale.

Supporting Research Question 2: Between Group Differences

Except for the community living subscale, participants in the treatment group demonstrated nominally better rates of improvement than participants in the control group at graduation compared to baseline for all SIS scales (Table 3). Notably, the Lifelong Learning, Employment, Health Safety, and Social subscales all had improvements in the treatment group that were at least 0.5 units lower than the control group when comparing Baseline and Graduation scores. To a lesser extent, participants in the treatment group had more improvement in the Home Living, Total and SNI scales. Conversely, participants in the control group had superior baseline to graduation changes in the Community Living subscale.

The differences at 1-year follow-up were more pronounced than those previously discussed, as the magnitude of the difference in improvements were larger at the later time point compared to graduation. Noticeably, the magnitude of change indicated that meaningful improvements for the treatment group over the control group were observed for the Home Living and SNI scales, while the improvements in the Community Living subscale was less favorable to

the control group. No differences were observed between the treatment and control groups for the Exceptional Behavior scale.

These results are further displayed in Figure 2 using Cohen's *d* effect sizes. For all SIS subscales, except Community Living and Exceptional Behavior, small to moderate differences in improvement were observed between the treatment and control groups for both the Graduation to Baseline and 1-year follow-up to Baseline comparisons. The largest differences consistently occurred in the Employment and Lifelong Learning subscales, whereas the other SIS scales showing differences were relatively similar in magnitude.

Lastly, the previous results were relatively robust against the inclusion of participants who dropped out after the baseline measure (Table 4). While some moderate percentage changes were observed, the overall effect sizes remained in the small to medium range.

Discussion

Acquiring employment is a significant developmental accomplishment for all adolescents and young adults (Saunders & Needlec, 2014; Schunberg, Bryant, & O'Malley, 2004).

Employment is also a well-known protective factor against numerous critical mental health and psychopathological threats (Schulenberg, Sameroff, & Chicchetti, 2004). Yet, questions remain regarding to the impact of employment on youth and young adults with ASD. Specifically, there is correlational evidence that even sheltered employment may result in benefits beyond the specific tasks learned in the course of work (Taylor, Smith, & Mallick, 2014, Wehman, et al., 2017). Even so, until this study, there have been no prospective, experimental studies of the impact of CIE on the overall independence of individuals with ASD.

The present study provides strong evidence that CIE results in increased independence in young adults with ASD. The data support this finding by virtue of the within group significant differences for every subscale in the SIS-A, the SNI and total SIS-A score for the PS+ASD group at each data collection point. Further, the findings comparing the groups suggest that increases in independence were nominally better for the PS+ASD group than the control group at graduation. Further those improvements continued at a greater pace for the PS+ASD group than the control group one year after the completion of the program. This is an impressive finding that suggests two important points. First, employment is likely a therapeutic pursuit for youth with significant impact from ASD. In other words, the youth who acquired employment continued to develop in most areas while their peers in the control condition displayed plateaued growth. Second, even after just nine months of intervention followed by approximately one year of employment, youth with ASD showed impressive improvement in their overall independence. That is a relatively short time period to demonstrate growth in all of the areas of adaptive behavior considered. For example, while it is expected that these individuals will gain independence at work, they also gained independence in other areas, such as lifelong learning, and social activities. Specifically, youth in the PS+ASD condition experienced improvements in reading, solving problems, using technology, making educational decisions, engaging in self-management, making and keeping friends, participating in recreation and leisure activities, and using appropriate social skills at both data collection points in the study. Their peers in the control condition did not reap these benefits despite continuing in high school where these skills were the focus of those programs.

The two findings that are contrary to this pattern of improvement for the PS+ASD and control groups were in the community living activities subscale and the exceptional behavioral

support needs scale. With respect to the community living activities subscale, the control group required more support than the PS+ASD group at baseline. As such, the observed changes could be due to a regression to the mean. It is also possible that this particular finding was influenced more than other subscales by the number of control group participants who dropped from the study. Finally, it is also possible that the control participants' needs in this particular domain were such that the high school programs met those needs with intensive community based instruction, although, given our analysis of the community-based training in the control condition, this explanation seems the most unlikely as control group participants received minimal CBET. The most likely explanation is that participants with significant community living support needs who were randomized to the control condition may have dropped at a higher rate than those who demonstrated less intensive needs. The pattern observed in the exceptional behavioral support needs scale was somewhat different in that the gains by both groups were small and mirrored each other. This resulted in no findings of significant within or between group differences, despite noted decreases in supports needed. In this one area, it is possible that the method of scoring provided by the SIS-A did not detect the types of changes that did occur. Where other subscales explore support needs across three different dimensions (type, frequency, and daily support time), the exceptional behavioral support needs scale defines support by one dimension (no support, some support or extensive support needed), thus there may not have been enough variability in scores to detect differences.

Limitations

While the findings from this study are impressive, external validity of these findings are limited by a few factors. Firstly, as a secondary aim of an employment outcomes study, this particular aim of the study was underpowered for detecting differences in all aspects of the SIS-

A. As such our study could be improved with a larger sample size to improve the precision in the estimated effects. Secondly, the time allowed to detect differences was only one year. It is possible that a stronger relationship between competitive employment and independence would be detected after a greater period of time. A controlled longitudinal design would address this limitation. Thirdly, the dropout rate among the control group may have had an impact on the findings presented for that group. However, baseline analysis suggested minor differences between completers and dropouts. Finally, it is possible that the individuals described in this study are not representative of the greater population of individuals with ASD. We have provided an in-depth description of the participants to allow readers to make their own determination regarding the applicability of these results to their own experiences. These limitations point to the need for further research regarding the impact of competitive employment on adults with ASD, especially the need for the development of additional interventions, and controlled longitudinal designs that seek to understand how the individual with ASD gains benefits from competitive employment.

Conclusion

While there is no doubt that employment results in a financial benefit to young adults with ASD, this study provides convincing evidence of the overall benefits that young adults with significant impact from their ASD may reap with competitive employment. These results indicate that individuals with ASD gain independence as a result of competitive employment, rather than increased independence being related to the acquisition of employment.

Consequently, these findings have important implications for policy makers and field-based practitioners. The findings in this study should provide support for the continued policy emphasis

on CIE as the first choice of employment for transition aged youth with ASD. Indeed, the fact that the youth who participated in PS+ASD improved their traditional academic skills at a greater rate than the control group participants provides evidence of the efficacy of CBET as an educational intervention. Field based practitioners could use these findings to support the development of CBET programing by demonstrating educational benefits of such experiences. In this way, these findings appear to support the move of CBET from research to practice.

To our knowledge, this is the first study to prospectively investigate the impact of CIE on subsequent increases in independence using an experimental design. Further, this study confirms the anecdotal experience of employers, parents, and job coaches who participated in this study and who reported significant “growth” in the youth with ASD. The results of this study suggest that transition aged youth and young adults with ASD would be well served by increasing their access to interventions that result in competitive employment.

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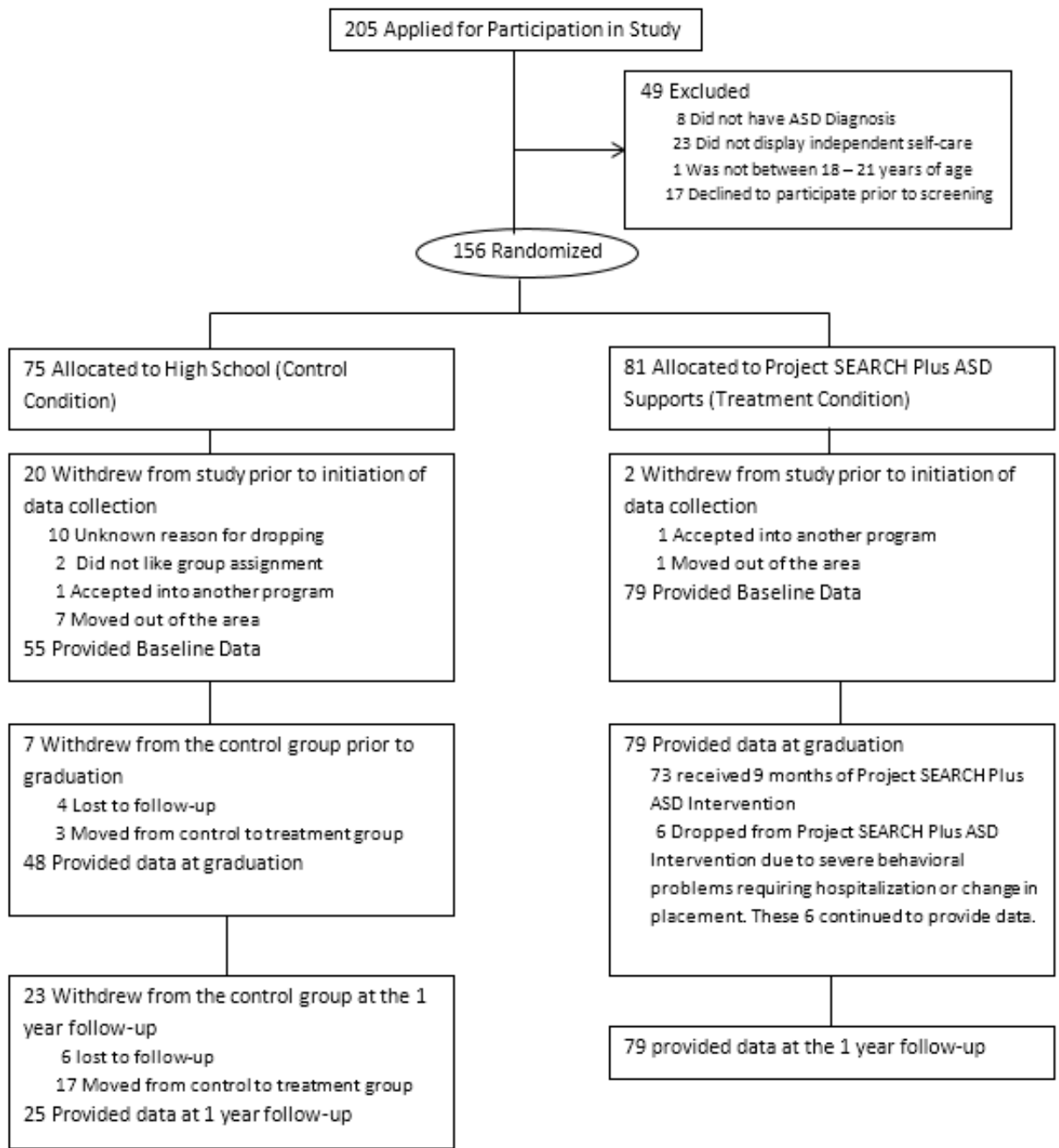


Figure 1: Flow of Participants through the Study

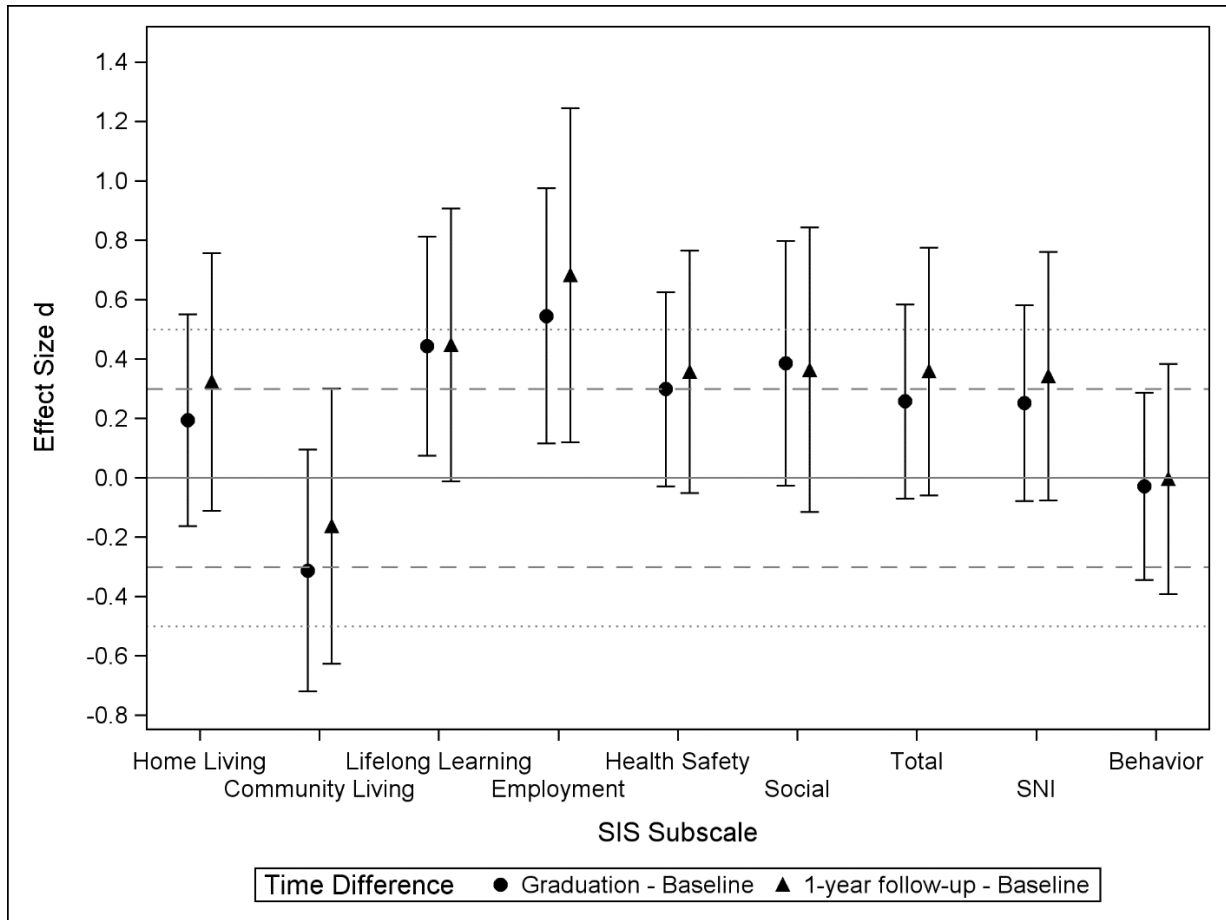


Figure 2 Cohen's *d* values measuring the difference in improvement between the treatment arms for the Baseline to Graduation (circles) and Baseline to 1-year Follow-up time points, separately for each SIS measure. Dotted and dashed lines correspond to $d=0.3$ and $d=0.5$, respectively

Table 1: 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
Race	White	45 (57%)	15 (65%)	10 (48%)	0.106
	Nonwhite	34 (43%)	8 (35%)	11 (52%)	
Gender	Male	57 (72%)	19 (83%)	17 (74%)	0.090
	Female	22 (28%)	4 (17%)	6 (26%)	
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

Table 2: SIS-A Subscale Standard Scores, Exceptional Behavioral Support Needs Score, Total Score and SNI for Treatment and Control Group Participants at Baseline, Graduation and 1-Year Follow-up. ^a Differences at baseline exceed $d=0.5$

SIS Measure	Condition	Baseline Mean (SD)	Graduation Mean (SD)	1-Year Follow-up Mean (SD)
Home Living	PS+ASD	5.9 (1.7)	5.3 (1.6)	5.1 (1.4)
	Control	6.1 (2.1)	6.0 (2.2)	6.0 (1.7)
Community Living ^a	PS+ASD	6.1 (1.8)	5.4 (1.6)	5.1 (1.6)
	Control	7.3 (2.4)	6.2 (1.7)	5.9 (1.6)
Lifelong Learning	PS+ASD	7.1 (1.7)	6.1 (1.5)	6.0 (1.6)
	Control	7.1 (2.0)	6.8 (1.9)	6.5 (1.6)
Employment	PS+ASD	7.1 (2.1)	5.9 (1.5)	5.6 (1.4)
	Control	6.7 (1.8)	6.6 (2.1)	6.4 (1.6)
Health and Safety	PS+ASD	6.1 (1.7)	6.1 (2.0)	5.9 (1.5)
	Control	6.1 (1.6)	5.3 (1.5)	5.3 (1.6)
Social	PS+ASD	7.0 (1.6)	6.4 (1.3)	6.4 (1.3)
	Control	7.1 (1.4)	7.1 (1.4)	6.9 (1.4)
Total	PS+ASD	39.2 (8.9)	34.4 (7.3)	33.5 (7.9)
	Control	40.7 (9.9)	38.6 (9.9)	37.6 (7.4)
SNI	PS+ASD	76.0 (10.2)	70.6 (8.5)	69.5 (9.1)
	Control	77.8 (11.4)	75.5 (11.5)	74.1 (8.6)
Exceptional Behavioral	PS+ASD	1.2 (2.2)	0.8 (1.6)	0.6 (1.3)
	Control	1.3 (2.0)	1.1 (1.4)	0.8 (1.2)

Table 3: Difference in change scores for each SIS score separately for each treatment group.

SSI Measure	<u>Graduation – Baseline</u> <u>(PS+ASD)</u>		<u>Graduation – Baseline</u> <u>(Control)</u>		<u>PS+ASD vs Control</u>	
	Diff (SE)	P	Diff (SE)	P	Diff (SE)	P
Home Living	-0.60 (0.19)	<0.001	-0.27 (0.25)	0.290	-0.33 (0.31)	0.286
Community Living	-0.65 (0.20)	<0.001	-1.19 (0.29)	<0.001	0.53 (0.35)	0.131
Lifelong Learning	-0.97 (0.17)	<0.001	-0.28 (0.24)	0.241	-0.69 (0.29)	0.019
Employment	-1.06 (0.21)	<0.001	-0.16 (0.59)	0.587	-0.90 (0.36)	0.013
Health Safety	-0.73 (0.16)	<0.001	-0.22 (0.23)	0.334	-0.51 (0.28)	0.073
Social	-0.61 (0.18)	<0.001	-0.05 (0.25)	0.850	-0.57 (0.31)	0.067
Total	-4.46 (0.77)	<0.001	-2.37 (1.10)	0.033	-2.07 (1.35)	0.122
SNI	-5.11 (0.90)	<0.001	-2.74 (1.28)	0.034	-2.37 (1.57)	0.132
Exceptional Behavior	-0.20 (0.21)	0.232	-0.25 (0.24)	0.290	-0.05 (0.29)	0.858

SSI Measure	<u>1-year follow-up – Baseline</u> <u>(PS+ASD)</u>		<u>1-year follow-up – Baseline</u> <u>(Control)</u>		<u>PS+ASD vs Control</u>	
	Diff (SE)	P	Diff (SE)	P	Diff (SE)	P
Home Living	-0.71 (0.19)	<0.001	-0.15 (0.33)	0.643	-0.55 (0.38)	0.143
Community Living	-0.97 (0.20)	<0.001	-1.25 (0.35)	<0.001	0.27 (0.40)	0.490
Lifelong Learning	-1.05 (0.18)	<0.001	-0.35 (0.31)	0.261	-0.70 (0.36)	0.057
Employment	-1.44 (0.25)	<0.001	-0.32 (0.40)	0.431	-1.13 (0.47)	0.018

Health Safety	-0.61 (0.18)	<0.001	-0.00 (0.30)	0.991	-0.61 (0.35)	0.086
Social	-0.62 (0.18)	<0.001	-0.08 (0.31)	0.789	-0.54 (0.36)	0.134
Total	-5.30 (0.87)	<0.001	-2.40 (1.48)	0.107	-2.91 (1.72)	0.093
SNI	-6.14 (1.00)	<0.001	-2.92 (1.71)	0.090	-3.21 (1.99)	0.108
Exceptional Behavior	-0.33 (0.18)	0.066	-0.34 (0.31)	0.270	0.01 (0.35)	0.983

Table 4 Partial eta-squared values for the overall differences between baseline and both graduation and follow-up. Large, medium, and small partial eta-squared values correspond to values of 0.0099, 0.0588, and 0.1379.

SSI Measure	All Participants	Participants with Follow-up	Change
Home Living	0.0221	0.0118	-46%
Community Living	0.0144	0.0173	20%
Lifelong Learning	0.0387	0.0421	8%
Employment	0.0434	0.0397	-8%
Health Safety	0.0367	0.0230	-37%
Social	0.0241	0.0227	6%
Total	0.0154	0.0195	27%
SNI	0.0206	0.0179	13%
Behavior	0.0001	0.0003	-300%