

ARTICLE TITLE

Competitive Integrated Employment for Youth and Adults with Autism: Findings from a Scoping Review

AUTHOR NAMES AND DEGREES

Carol Schall, Ph.D.

Paul Wehman, Ph.D.

Lauren Avellone, Ph.D.

Joshua P. Taylor, M.Ed.

AUTHOR AFFILIATIONS

Carol Schall
Assistant Professor
Director of Technical Assistance at Autism Center for Excellence
Co-Investigator Project SEARCH plus ASD Supports
Rehabilitation Research and Training Center
Autism Center for Excellence
School of Education, Department of Counseling and Special Education
Virginia Commonwealth University
Richmond, VA, USA

Paul Wehman
Professor of Physical Medicine and Rehabilitation
Director of Rehabilitation Research and Training Center
School of Medicine, Department of Physical Medicine and Rehabilitation
Principal Investigator Project SEARCH plus ASD Supports
Rehabilitation Research and Training Center
Autism Center for Excellence
School of Education, Department of Counseling and Special Education
Virginia Commonwealth University
Richmond, VA, USA

Lauren Avellone
Research Associate
Rehabilitation Research and Training Center
Autism Center for Excellence
School of Education, Department of Counseling and Special Education

Virginia Commonwealth University
Richmond, VA, USA
Joshua P. Taylor
Research Associate
Rehabilitation Research and Training Center
Autism Center for Excellence
School of Education, Department of Counseling and Special Education
Virginia Commonwealth University
Richmond, VA, USA

AUTHOR CONTACT INFORMATION

Carol Schall
cmschall@vcu.edu
1314 West Main Street
Box 842011
Richmond, VA 23284-2011

Paul Wehman
pwehman@vcu.edu
1314 West Main Street
Box 842011
Richmond, VA 23284-2011

Lauren Avellone
leavellone@vcu.edu
1314 West Main Street
Box 842011
Richmond, VA 23284-2011

Joshua P. Taylor
jtaylor66@vcu.edu
1314 West Main Street
Box 842011
Richmond, VA 23284-2011

CORRESPONDING AUTHOR

Carol Schall
cmschall@vcu.edu

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KEY WORDS

Autism, ASD, Competitive Integrated Employment, Scoping Review, Vocational Rehabilitation, Project SEARCH+ASD Supports, Supported Employment, Customized Employment

KEY POINTS

- A scoping review was conducted to investigate effective vocational interventions for youth and young adults with ASD.
- The transition to work internship program called Project SEARCH + ASD Supports (PS+ASD) had the highest level of research evidence.
- Supported employment was backed by substantial research as an evidenced-based practice for individuals with ASD.
- Specific components of vocational rehabilitation and transition program services (e.g., community integrated service delivery, work experience prior to graduation, etc.) produced competitive employment outcomes for individuals with ASD.
- Technology supports in the workplace and customized employment emerged as promising practices with demonstrated efficacy across limited trials.
- Sheltered workshops were not identified as a means to competitive employment by this review and is thus not a recommended practice.

SYNOPSIS

A scoping review was conducted to map existing literature on effective interventions for competitive employment for individuals with autism spectrum disorder. Empirical database searches were conducted in CINAHL, EMBASE, Education Research Complete, PubMed, and Web of Science. A filter for level of methodological rigor was implemented, such that only experimental, quasi-experimental and secondary data analysis research designs were included. A total of 25 articles met inclusion criteria. Findings were categorized by level of evidence into strongly recommended, recommended, emerging, and non-recommended practices. Findings revealed strong empirical support for a transition-to-work program called Project SEARCH plus ASD Supports and traditional supported employment services at the highest levels of

methodological rigor. Receipt of specific vocational rehabilitation and transition services in high school were identified as effective interventions at a slightly less rigorous methodological level. Emerging practices included customized employment and technological interventions. Recommendations per level of evidence are provided in more detail.

Introduction

Individuals with autism spectrum disorder (ASD) face significantly greater challenges transitioning to adult life than peers without disabilities and peers with other types of disabilities.¹ Research indicates that many individuals with ASD experience poor outcomes after leaving high school across a broad range of life domains.² Additionally, adolescents and young adults with ASD have higher incidences of anxiety and depressive disorders compared to peers without disabilities or other disabilities.³ A heightened risk of anxiety and depression, combined with a greater likelihood of unsatisfactory postsecondary outcomes in major life areas highlights the vulnerability of individuals with ASD.⁴ However, the current knowledge base concerning effective interventions for youth and adults with ASD is extremely limited.

Employment is the defining activity of adulthood and acts as a protective factor in the acquisition of many key life domains.⁵ People with disabilities report that work is a source of identity, inclusion, financial support, and socialization.⁶ Even so, securing competitive integrated employment (CIE) remains a primary challenge for many young adults with ASD. While federal legislation has mandated enhanced services for transition, many young adults with ASD still face unemployment upon leaving secondary education settings.^{7,8} Findings from the 2017 National Autism Indicators Report showed that only 14% achieved paid work in an integrated setting, while the majority (54%) worked without pay usually in segregated settings.⁹ Further, 27% of

adults with ASD reported no participation in work or other integrated community activities.⁹ A review of employment outcomes for 47,312 individuals with ASD indicated an overall employment rate of only 37.57%.¹⁰ Overwhelmingly, evidence highlights the tremendous need to improve employment outcomes for youth with ASD. The purpose of this scoping review was to identify key research describing effective employment interventions and practices for individuals with ASD seeking CIE.

Method

The following databases were reviewed in order to capture a broad range of multi-disciplinary literature across educational, medical, and vocational rehabilitation related fields; PubMed, CINAHL, Education Research Complete, Web of Science, and EMBASE. The recommended framework for conducting a scoping review was followed, which includes formulating research questions, identifying relevant articles, and then charting and summarizing findings.^{11–13} A more elaborate description of each step in the protocol is presented below.

Research Questions

The following research questions were developed to determine the range, nature, and extent to which evidenced-based employment practices for youth and adults with ASD have been investigated within the existing body of literature during the past 20 years:

- Which employment practices emerge at the highest levels of methodological rigor as effective interventions for individuals with ASD?
- What are the components of the interventions that appear to increase the employment outcomes for individuals with ASD?

Identification of Articles

The above stated research questions led to the following inclusion criteria for published research studies:

1. Published between 2000 – 2019
2. Population samples where 100% of individuals had ASD with or without a comorbid diagnosis
3. Research examined interventions or practices resulting in CIE outcomes
4. Published in peer reviewed journals in the United States or abroad written in or translated to English

Articles were excluded if:

1. They did not meet criteria for methodological rigor as level I, experimental, level II, quasi-experimental, or level III, secondary data analysis research
2. The study did not examine CIE as an outcome of the intervention

Articles were reviewed by two researchers who met 95% inter-rater agreement in applying inclusion and exclusion criteria during the review process. Both researchers had prior training in research methodology and applicable disciplines related to the intersection of ASD and CIE. Key search terms used for study selection are presented in Table 1. A record of total number of articles included and excluded at each stage is presented in Figure 1.

Charting Findings

Articles collected during the review were categorized according to established guidelines ranking methodology and assigned an associated I – III ranking outlined in Table 2.¹⁴ This scoping review restricted analysis to the top three levels of rigor in order to identify the most empirically-based findings related to CIE interventions for individuals with ASD. All articles meeting inclusion criteria were subjected to three tiers of review: a) screening for duplicates, b)

abstracts screened for inclusion/exclusion criteria, and c) full text articles assessed for inclusion/exclusion criteria.

Results

A total of 25 articles met established inclusion criteria regarding employment interventions for individuals with ASD. Nearly all studies were conducted within the United States ($n = 23$; 92%) followed by the United Kingdom ($n = 1$; 4%) and Ireland ($n = 1$; 4%) A breakdown of articles by methodological rigor includes 6 at Level I, 4 at Level II, and 15 at Level III.

Review of Level I Research and Findings

Level I represents the highest level of methodological rigor utilizing randomized control designs.¹⁴ Of the studies identified at Level I, the following findings emerged; a) Project SEARCH plus ASD Supports (PS+ASD) is an effective transition-to-work program for youth and young adults with ASD and significant support needs, and b). Technology, such as virtual reality interviewing and a personal digital assistant (PDA), promotes job attainment and independence, respectively, in a vocational setting.^{4,15-19} Each is reviewed in more detail.

PS+ASD Supports Model

A total of 4 studies examined PS+ASD supports which is an extension of the traditional Project SEARCH model.^{4,15-17} For context, the traditional model was developed in the mid-1990s to help high school students with disabilities aged 18 to 22 build work skills by participating in a series of individualized unpaid internships in applied business settings using supported employment (SE) techniques (Table 3).²⁰ Several key elements define the Project SEARCH model, including complete immersion in a workplace, personalized curriculums, customized internships, highly trained staff, collaboration among service provider agencies,

braided funding streams, follow-along services, and a business-led approach.²⁰ Because Project SEARCH adheres to the principles of SE (Table 3), it also focuses on securing CIE outcomes for all students after leaving the internship program regardless of the severity of disability.¹⁵ In fact, Project SEARCH is designed for individuals with intellectual and developmental disabilities (IDD).

The PS+ASD supports model follows the traditional Project SEARCH format but further includes the installation of diagnosis specific supports that address the vocational, learning, social, and communication needs of individuals with ASD and IDD or other comorbid disorders. Results from our review indicated an extremely high rate of transition-to-employment using the PS+ASD model, with CIE outcomes ranging from 73.4% to 90% for participants with ASD and IDD, compared to a range of 6% to 17% employment for control groups.¹⁵ Wehman and colleagues attribute such noteworthy employment outcomes to several key components of the PS+ASD model including the high dosage and intensity of the internships, use of evidenced-base teaching strategies known to be specifically effective for individuals with ASD, increased opportunities to conduct vocational assessments, applied opportunities for interns to build resumes before transitioning to work, a focus on collaboration with adult agencies, and a perpetually high work standard for interns.⁴ A more in-depth description of the key PS+ASD components that contribute to its success are presented in Table 4.

Technology for Employment Skills

The remaining two studies identified at Level I rigor highlighted the potential for technology to bolster CIE outcomes. Both of these studies were completed with more cognitively able individuals who reported .^{18,19} First, Gentry and colleagues found that the use of an iPod touch as a PDA helped individuals with ASD and significant support needs organize

employment tasks. Participants were taught how to use various applications on the device to meet job support needs such as using tasks lists, picture prompts, task reminders, navigation tools, and task-sequencing prompts. Findings indicated that individuals taught to use the PDA required a significantly lower number of job support hours during the first 12 weeks of employment compared to control participants.¹⁹ Further, this trend continued during a subsequent 12 week period.

Secondly, Smith and colleagues used a Virtual Reality Job Interview Training (VR-JIT) program to help youth and young adults with ASD practice interviewing in a simulated environment. Data collected at a 6 month follow-up indicated that participants who received the VR-JIT training were more likely than control participants to have secured a competitive position within the community. However, it should be noted that results were collapsed in terms of types of position with competitive employment and volunteering reported as one outcome.¹⁸ Volunteering along with any other type of non-paid work is generally not considered an acceptable work outcome regardless of the level of community integration. While both of these studies support the utility of technology in teaching workplace independence, it is noted that only two studies were identified at Level I methodology and thus more research in this area is needed to better understand the breadth of application.

Review of Level II Research and Findings

All 4 studies identified at Level II rigor shared a common theme of an SE approach (see Table 3). SE is a packaged intervention that involves four phases; assessment phase (job seeker profile), supported job searching (job development), on-the-job training (job site training), and follow-along services (long term supports). Individuals with ASD have disability specific supports at each phase that appear to be unique to them.^{21,22} For example, individuals with ASD

have difficulty identifying their job preferences during the job seeker profile stage, usually due to a lack of employment experiences. Additionally, they may require alternate interviewing strategies and a higher intensity of instruction to achieve independence at work during the job development and job site training phases.²¹ Because of its personalization for each job seeker, SE provides an opportunity for those modifications without compromising fidelity of implementation.

Each article defined a set of intervention services that were individualized to the individual and adhered to an “employ then train” philosophy which is a hallmark of SE. The SE approach refutes the need for preparatory training prior to immersion in a work setting and instead focuses on assisting an individual with a disability in finding employment and then adding needed supports to build skills and promote independence. Findings from articles identified at Level II support the efficacy of the SE approach across both youth and adults with ASD.

For example, Wehman et al. reported an 82% employment rate for participants using personalized SE with all participants earning at or above minimum wage and securing equal benefits to those without disabilities performing similar work.²³ The majority of individuals in this study were described as having high social interaction support needs (76%) and partial to full travel support needs (84%), indicating that these individuals had significant support needs.²⁴ In a pilot study using the Individualized Placement and Support (IPS) model, which is an SE model that includes specialized supports for individuals with psychiatric disorders, McLaren et al. reported that all five participants (100%) with ASD and a comorbid psychiatric condition were able to secure CIE positions in the community.²⁵ These five individuals represented a mix of those with some college or college degrees (3) and those who acquired specialized certificates

upon graduation from high school (2). Similarly, Howlin et al. reported a 68% employment rate for adults with “high functioning” (without comorbid IDD) ASD in 13 different industries using services that characterize the SE model, including job searching and workplace support.²⁶ Lynas reported a 56% employment rate for adults with ASD across the range of cognitive abilities using Project ABLE in Ireland which defines itself as a “place, then train” SE model by providing customized services such as job assessment, development of a job profile, and on-the-job supports.²⁷ Lynas noted that in this case, all CIE outcomes were observed among the adult rather than the youth population involved with Project ABLE. Nevertheless, overall, the level II research findings provide strong support for the use of SE as an evidence-based intervention for individuals with ASD.

Review of Level III Research and Findings

There were 16 studies meeting criteria for Level III research rigor. They employed secondary data analysis to describe correlations between services delivered and CIE outcomes. A majority focused on the correlation between specific VR services and CIE outcomes ($n = 9$).^{10,28–35} Four studies examined the correlation between agency specific services (e.g., individuals with ASD who accessed SE services from a provider, individuals with ASD who accessed sheltered workshop services prior to CIE, etc.).^{22,23,36,37} Two studies examined the correlation between transition services during high school and CIE outcomes after high school.^{38,39} One study compared the correlation between two groups, one that received SE after PS+ASD during high school and one that received SE after graduation from high school (See Table 5).²¹ As these were secondary data analysis studies, most of these did not provide thorough reports of the cognitive abilities of those included in the research populations. These studies explored the correlation between five service delivery types and CIE outcomes. The services included; a) VR, b) SE, c)

customized employment (CE), d) high school transition programs, and e) sheltered workshop participation. Each of these is presented below.

Correlation between Vocational Rehabilitation (VR) Services and CIE Outcomes

Most of the level III research studies reviewed the correlation between specific VR services and CIE outcomes. Table 6 presents a list and description of services offered by most State VR agencies. Findings from this research indicated that individuals with ASD were more likely to achieve CIE after the following indicators:

- Using more VR services was significantly correlated with better CIE outcomes^{10,28,31,32}
- Clients who obtained CIE used two times as many services as those who did not²⁸
- The following services were positively correlated with better CIE outcomes
 - Postsecondary education, occupational/vocational training, on-the-job training, job readiness training, job search assistance, for transition-aged youth^{29,30}
 - Assessment, diagnostic and treatment services, counseling/job guidance, job search support, job placement assistance, on-the-job support, transportation services, across all age ranges³⁰⁻³⁴
- Assessment and vocational rehabilitation counseling and guidance without job related services were not correlated with CIE outcomes³⁵
- Despite better CIE outcomes from VR services, the range of individuals successfully employed was still underwhelming, ranging between 36 – 37%^{28,29}
- Despite better outcomes with VR services, the majority of individuals with ASD who acquired CIE still reported being underemployed³⁰

These findings indicate that individuals with ASD who access job related services are more likely to achieve CIE than those who do not.

Correlation between Supported Employment (SE) and CIE Outcomes

CIE outcomes after SE ranged from 98.4% to 100%.^{21,22,40} SE was also associated with strong employment retention with one study reporting 87.1% at 18 months after CIE acquisition.²² These particular studies urge caution in generalizing results to other agencies because of the specific training employment specialists serving individuals with ASD received in these studies. Given the quasi-experimental and secondary data analysis studies finding positive CIE outcomes from SE, it is fair to conclude that SE is an evidence-based practice for individuals with ASD.

Correlation between Customized Employment (CE) and CIE Outcomes

Two of the studies presented noted that a major source of successful CIE outcomes for individuals with ASD was CE. CE matches the unique strengths, interests, and support needs of the job candidate with the identified demands of the employer.^{22,40,41} To achieve CIE through CE, the employment service provider and job seeker undergo a four phase process involving a) Discovery, b) Customized Job Development, c) Individualized On-the-Job Supports, and d) Long-Term Supports.⁴⁰ Brooke et al. found 63% of 126 jobs worked by 104 individuals with ASD across 18 months were customized.²² While Wehman et al. found similar results with 52 of 72 jobs (72.2%) being customized for a group of 64 adults with ASD seeking employment.⁴⁰ Results from these studies suggest CE is a promising intervention requiring more prospective research.

Correlation between Transition to Adulthood Programs during High School and CIE Outcomes

Three of the studies explored the correlation between transition practices while in high school and CIE outcomes after high school. These findings indicate the following high school practices and interventions have been associated with CIE after high school:

- Having a paid job during high school³⁸
- Participating in intensive school-to-work programs, such as PS+ASD²¹
- Receiving career counseling³⁸
- Receiving transition planning services³⁸
- Starting transition at 14 years old instead of the federally mandated age of 16²⁹

Further, Schall et al. found that youth who participated in PS+ASD in high school required fewer intervention hours to secure CIE, retained jobs longer, and had higher wages than the SE only group.²¹ These findings emphasize the importance of high school curriculum and activities in preparing youth with ASD for CIE.

Correlation between Sheltered Workshop Programs and CIE Outcomes

One study reviewed the RSA 911 database to compare the CIE outcomes of individuals who moved from sheltered employment to CIE to those who moved directly into CIE without prior sheltered workshop experiences.⁴² They examined differences in employment rate, hours worked, wages, and service costs. Their findings suggested no differences between the two groups with respect to the rate of employment and hours worked. However individuals with ASD without prior sheltered workshop experiences earned 32.4% more and cost 59.8% less in VR services than their matched peers who had prior sheltered workshop experiences. This study finds that sheltered workshops cost more in services and pay less in CIE wages with no advantages in employment outcomes or hours worked.

Discussion

This scoping review analyzed the experimental, quasi-experimental and secondary data analysis research literature to identify employment interventions that result in CIE for individuals with ASD. In addition, the authors provided a description of the intervention components that appear to increase positive CIE outcomes. Table 7 presents these findings. The results indicate strong evidence for one packaged intervention, PS+ASD. Additionally, there is strong evidence of the efficacy of SE for individuals with ASD given the multiple quasi-experimental and secondary data analysis articles presented. Both VR and transition-to-employment high school programs are recommended, particularly specific components of those interventions such as career counseling and intensive job support services. While there have been two randomized controlled trials on technology supports for teaching interviewing skills, and increasing independence at work, more research is needed to identify how best to integrate technology into the overall array of supports provided to individuals with ASD seeking CIE. The same is true of CE. It appears that CE is a promising practice that might result in better outcomes for individuals with ASD, however more research and guidance regarding specific ASD supports are needed to confirm these findings. Both technology and CE are promising practices that could increase CIE outcomes for individuals with ASD. Finally, given the lack of any advantages and the noted disadvantages, we cannot recommend sheltered workshops as a viable intervention to increase CIE outcomes.

There are commonalities across the components of the various evidence-based interventions. Specifically, the most effective interventions include personalized assessment, evidence-based on-the-job training strategies, intensive interventions using multiple strategies to meet the job seekers needs, diagnoses specific supports that address the social communication

needs of individuals with ASD at work, and intervention in real environments. These components appear to be keys to ensuring CIE outcomes for individuals with ASD.

Limitations

There are several limitations to note associated with both scoping reviews in general and with this particular review. While scoping review protocol does not require a quality filter for article selection, authors opted to apply such a filter by screening for, and ranking, articles according to research methodology.¹² Though the quality filter strengthens the validity of findings by scrutinizing research designs, a meta-analysis of results more commonly performed with systematic reviews was not conducted. Rather, a descriptive analysis of findings was presented per scoping review designs which lacks the statistical backing that could be provided by a meta-analysis.¹² Additionally, scoping reviews involve broad research questions which inevitably yield broad findings. Therefore, the results of this review still offer more general information about the types of interventions and services that are effective for individuals with ASD rather than information about how to match specific interventions to the wide spectrum represented by individuals with ASD. This last point is particularly important with respect to the wide spectrum of abilities and impact noted in ASD and the lack of common terminology to describe individual support needs across the variety of domains where an individuals with ASD might require supports. Thus, we have described the level of support needs required by individuals studied in the various intervention recommendations in Table 7.

With respect to limitations specific to this review, it is possible that the inclusion of non-English articles may have informed other results. Similarly, all studies were conducted in western countries, mainly the United States, which could limit the generalizability of findings to non-western cultures. Lastly, it is possible that unpublished research exists on this topic that may have been conducted at Levels I, II or III. Sources were acquired from scientific databases to

allow for ranking due to methodology and to ensure peer review, and thus grey literature on ASD and CIE outcomes was not systematically investigated during the article collection process.

Implications and Future Directions

Findings from this scoping review revealed two salient gaps within the existing literature. First, there remains a lack of research on interventions conducive to CIE for individuals with ASD at the Level I rigor. The overwhelming majority of studies in this review were secondary data analysis which highlights the need for more randomized control and quasi-experimental designs to be conducted to inform better intervention and service provision. Secondly, the existing research at Levels I and II note a clear lacking in the amount of variation of interventions being examined at the highest levels of methodological rigor. While the results of this review clearly indicate SE is an evidenced-practice, there remains much room for other interventions such as CE to be tested experimentally or quasi-experimentally.

Future research suggestions include an emphasis on more varied employment outcomes beyond employed versus unemployed following intervention and services. In particular, deeper investigations into the quality of outcomes (e.g., job retention, wage, opportunities for upward mobility) associated with different types of interventions would be beneficial. Future research should also consider manipulating aspects of interventions to determine maximum efficacy such as the dosage of intervention or services, or the training levels needed by service providers in order to effectively boost CIE outcomes. It would be extremely helpful for researchers to develop a common language to describe the cognitive abilities and support needs of the individuals for whom CIE interventions are found to be efficacious. This would likely increase the precision with which field based practitioners could match intervention to individual. Lastly, future research should examine the effect of demographic variables within randomized designs. For example, while PS+ASD supports was highly effective in helping transition-age students

secure employment, a similar study with an older population or population from an extremely rural area has not been conducted at the RCT level of research to determine its effectiveness with these populations. This scoping review allowed for clear gaps in the literature to be identified and holds the potential to influence future research directions.

Conclusion

Individuals with ASD continue to experience extremely poor employment outcomes, often remaining chronically unemployed or only finding work in segregated settings.⁹ The challenges that individuals with ASD face in their quest to attain CIE can be mitigated by the implementation of evidence-based interventions. Therefore, the identification of highly effective vocational interventions is greatly needed to help an array of stakeholders, including individuals with ASD, service providers, educators, and vested community members allocate time and funds most efficiently. While there is still much research work to do to develop more interventions, it is encouraging to report growth in the development of research literature that has resulted in sound recommendations for practice.

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Table 1. Key Search Terms

Format	Population	Intervention
Concept terms related to the main topic, organization of terms using Boolean operations (AND/OR/NOT), and truncation symbols by population x intervention	autis*OR autism spectrum disorder OR asperger* OR ASD OR high functioning autis*	evidence-based employment practice OR vocational rehabilitation OR employment practices OR supported employment OR customized employment OR competitive integrated employment OR employment internships OR transition to employment OR open employment

Table 2. Research Methodology Rigor Coding System

Methodology	Rank	Description	Types
Experimental	I	<ul style="list-style-type: none">• Random assignment to groups• Manipulation of independent variable• Tests of causality• Control of confounding variables	Randomized control designs, classic experimental designs that include randomization
Quasi-Experimental	II	<ul style="list-style-type: none">• Assignment is <i>not</i> random but all other experimental qualifications are met	Classic experimental designs that do <i>not</i> include randomization, pre-posttest designs, post-test only designs,

			interrupted time series designs
Non-experimental (Secondary Data Analysis)	III	<ul style="list-style-type: none"> • Assignment is not random • No control of extraneous variables • No causality. Relationship between variables examined. 	Correlational studies, predictive designs, model testing designs, regression analyses

Data from Newhouse R, Dearholt S, Poe S, et al. The Johns Hopkins Nursing Evidence-Based Practice Rating Scale. 2005. Baltimore, MD: The Johns Hopkins Hospital; Johns Hopkins University School of Nursing.

Table 3. Principles of Supported Employment

Component	Description
Presumption of Employment	Anyone with a desire to work, can work, regardless of severity of disability.
Integrated Employment	Individuals with disabilities should work in competitive, integrated jobs within the community.
Comparable Wages	Individuals with disabilities should earn commensurate wages and benefits as those without disabilities performing similar work.
Self-determination	The individual with the disability should have control over guiding the job search process.
Focus on Strengths	Individuals with disabilities are viewed in terms of abilities rather than deficits.
Power of Supports	Focus is placed on identifying and installing vocational supports that will promote independence in the workplace.
Systems Change	The SE approach recognizes the need for traditional systems that do not foster CIE outcomes to be changed.

Adapted from Wehman P, Revell WG, Brooke V. Competitive Employment: Has it become the “first choice” yet? J Disabil Policy Stud 2003;14(3):163-173; with permission.

Table 4. Key Components for Success of the PS+ASD Supports Model

Component	Description
Internships	Students are immersed in a work setting for over 700 hours of internship experience. Internships are customized to meet individual student's strengths, needs, interests, and preferences.
Instructional Strategies	Evidenced-based teaching strategies such as applied behavior analysis are used to teach vocational, social, academic, and communication skills.
Vocational Assessment Practices	Opportunities to assess skills and needs in applied settings are maximized due to the extensive amount of time spent in the work setting.
Resume/Work History	Students leave the program with a developed resume, references, contacts, and applied skills developed in a work setting which bolster employability.
Seamless Transition to Adult Services	Students begin working with adult service provider agencies immediately upon entering the PS+ASD program so supports are installed long before they graduate.
Meeting Business Needs	Internships are real jobs which fill a real need within the business so students learn to meet high expectations for work standards.

Table 6 Example State VR Services

Service Category	Description
VR Counseling	Guidance services promoting CIE outcomes, including counseling related to benefits, vocational goals, social issues, medical problems, etc.
Assessment Activities	Evaluative activities designed to determine personal strengths, vocational interests, concerns related to employment and desired employment outcomes.
Diagnostic and Treatment	Activities designed to determine beneficial therapies (e.g., occupational or physical therapy), medications, or

	intervention needs related to employment.
College or University Training	Support to aid with the pursuit of advanced training in a college, university, or technical school for degree, non-degree or certificate programs.
Job Search Assistance	Assistance with interviewing, locating jobs, and building resumes, etc.
Job Development	Activities related to securing a proper job match, which include networking with businesses and evaluating potential businesses for fit.

Adapted from Kaya C, Chan F, Rumrill P, et al. Vocational rehabilitation services and competitive employment for transition-age youth with autism spectrum disorders. J Vocat Rehabil 2016;45(1):13-83; with permission.

Table 7. Employment Intervention Components & Levels of Evidence

Intervention	Recommendation Based on Research	Support Needs of Individuals Included	Components of Intervention
PS+ASD	Strongly Recommended	Significant Support Needs, Including those with IDD	<ul style="list-style-type: none"> • Internships • ABA Instructional Strategies • Personalized Vocational Assessment Practices • Gain Resume/Work History • Seamless Transition to Adult Services • Meeting Business Needs
SE	Strongly Recommended	Varied Across the Spectrum of Cognitive Abilities	<ul style="list-style-type: none"> • Job Seeker Profile • Job Development • Job Site Training • Long Term Supports
VR	Recommended	Not Determined in Studies	<ul style="list-style-type: none"> • Job Placement • On-the-job Support • On-the-job Training

			<ul style="list-style-type: none"> • Maintenance • Information Referral • Diagnostic and Treatment Services • Vocational Training • Job Search Assistance • Job Readiness Training • Other VR-provided services not listed
High School Transition Services	Recommended	Varied Across the Spectrum of Cognitive Abilities	<ul style="list-style-type: none"> • Paid job prior to graduation • Participating in intensive school-to-work programs • Career Counseling • Transition Planning Services • Early Transition Services (starting at 14) • Postsecondary Education Counseling • Self-advocacy Training • Job readiness training
CE	Emerging as Recommended	Significant Support Needs, Including those with IDD	<ul style="list-style-type: none"> • Discovery • Job search planning • Customized job development and negotiation • On-the-job support • Post-employment support
Technology Supports for work skills and schedules	Emerging as Recommended	Varied Across the Spectrum of Cognitive Abilities	<ul style="list-style-type: none"> • Cognitive digital aids • Digital task analyses • Visual task prompts • Navigation tools • Task reminders • Virtual Reality Job Interview Training

		(VR-JIT)	
Sheltered Workshops	Not Recommended	Varied Across the Spectrum of Cognitive Abilities	<ul style="list-style-type: none"> • Segregated non-competitive work settings • Enclave-based work • Subminimum wage employment

Table 5. Articles by Level of Methodological Rigor

Article	Method	Population	Intervention	Outcomes	Country
Smith ¹⁸ 2015	Level I: RCT	Youth with ASD ages 18-31 <i>n</i> = 26	Virtual Reality Interviewing	<ul style="list-style-type: none">At a 6-month follow-up, participants who received the VR-JIT training were more likely than controls to obtain a competitive position (though not necessarily employment as competitive volunteering was included in the outcome measures).	USA
Gentry ¹⁹ 2015	Level I: RCT	Adults with ASD <i>n</i> = 50	Personal Digital Assistant	<ul style="list-style-type: none">Individuals who were trained to use the digital assistant required less job coaching hours during the first 12 weeks of employment compared to control participants.	USA
Wehman ¹⁵ 2017	Level I: RCT	Youth with ASD ages 18-21 <i>n</i> = 49	Project SEARCH with ASD Supports	<ul style="list-style-type: none">CIE outcomes observed for 90% of participants within 3 months of completing the intervention and 87% were still employed 12 months later. Only 6% of control participants were employed at 3 months post-graduation and 12% at a 12 month follow-up.All employed SEARCH graduates were hired at or above minimum U.S. federal wage.	USA

Wehman ¹⁶ 2014	Level I: RCT	Youth with ASD ages 18-21 <i>n</i> = 40	Project SEARCH with ASD Supports	<ul style="list-style-type: none"> • CIE outcomes observed for 87.5% of SEARCH participants compared to only 6.25% of the control group who received transition services as usual. 	USA
Wehman ⁴ 2019	Level I: RCT	Individuals with ASD age 18-21 <i>n</i> = 156	Project SEARCH with ASD Supports	<ul style="list-style-type: none"> • CIE outcomes observed for 73.4% of SEARCH participants one year after completion compared to 17% of control participants who received transition services as usual. • Employed SEARCH graduates earned at or above U.S. federal minimum wage. • Employed SEARCH participants worked an average of 20 hours per week. 	USA
Whittenburg ¹⁷ 2019	Level I: RCT	Adults with ASD (18-22) <i>n</i> = 14	Project SEARCH with ASD Supports for Military Connected Participants	<ul style="list-style-type: none"> • 83.3% (5 of 6) secured competitive employment positions following program completion compared to 0% of controls. • 4 of 5 positions secured were federal positions 	USA
Howlin ²⁶ 2005	Level II: Quasi- Longitudinal/Experimental	Adults (18- 56) with autism or Asperger syndrome	National Autistic Society (NAS) Prospects (focus on work	<ul style="list-style-type: none"> • 68% of clients became employed • Job secured in 13 industries with the majority in administration, office/clerical, or technical work. 	United Kingdom

		<i>n</i> = 114	preparation, job searching, and workplace support)		
Lynas ²⁷ 2014	Level II: Quasi-Experimental	Youth and adults with autism spectrum condition (ASC)	Project ABLE (supported employment model)	<ul style="list-style-type: none"> • 56% of adult participants (18 years and older) ultimately achieved full or part-time employment. • The most common type of employment was retail (47%) followed by administration (24%). 	Ireland
		<i>n</i> = 72			
McLaren ²⁵ 2017	Level II: Quasi-Experimental	Young adults with ASD and a comorbid psychiatric disorder	Pilot: Individual Placement and Support for ASD	<ul style="list-style-type: none"> • All five participants secured competitive employment jobs. • Wage and number of hours were higher for participants after completing the IPS model than achieved in prior jobs before participating in the IPS model. 	USA
		<i>n</i> = 5			
Wehman ²³ 2012	Level II: Quasi-Experimental	Adults with ASD <i>n</i> = 33	Personalized supported employment services	<ul style="list-style-type: none"> • 82% of 33 participants achieved CIE. • Employment outcomes included an average of 22.5 hours and a range of 8 to 40 hours per week. • Participants all earned at or above U.S. federal minimum wage. • All participants earned comparable benefits to non-disabled coworkers performing similar work for similar hours per week. 	USA

Alverson ¹⁰ 2018	Level III: Secondary Data Analysis - RSA-911	Youth and adult VR clients with ASD <i>n</i> =47,312	State VR services	<ul style="list-style-type: none"> • Case closure associated with greater number of VR services received. • Odds of becoming employed increased nearly five-fold with each additional service. 	USA
Alverson ²⁸ 2017	Level III: Secondary Data Analysis- RSA-911	Youth and adult VR clients with ASD <i>n</i> =49,623	State VR services	<ul style="list-style-type: none"> • More VR services associated with better CIE outcomes. • Clients obtaining CIE used two times as many services as those that did not obtain CIE. • Mean of 37% secured CIE (successful case closure) over 10 years. 	USA
Brooke ²² 2018	Level III: Secondary Data Analysis- Agency Records	Adults with ASD referred for employment services <i>n</i> =139	Extended supported employment services	<ul style="list-style-type: none"> • 104 participants achieved CIE outcomes. • Job retention was 74.3% at 18 months. 	USA
Burgess ²⁹ 2014	Level III: Secondary Data Analysis- RSA-911	Individuals under age 22 with ASD and a VR case closure <i>n</i> =34,501	State VR services	<ul style="list-style-type: none"> • 36% were successfully employed through VR services. • Transition-age students with ASD were more likely to be employed via VR services than the overall population of individuals using VR services. 	USA

Chen ³⁰ 2015	Level III: Secondary Data Analysis- RSA-911	Adults with ASD <i>n</i> =5,681	State VR services	<ul style="list-style-type: none"> • The following services positively predicted CIE for transition-age individuals; postsecondary education, occupational/vocational training, and on-the-job training • The following services positively predicted CIE across all age groups; counseling/job guidance, job placement assistance, and on-the-job support • However, the majority who obtained a job were underemployed. 	USA
Chiang ³⁸ 2013	Level III: Secondary Data Analysis- NLTS2	Youth and young adults with ASD <i>n</i> =830	Transition to employment supports through secondary school	<ul style="list-style-type: none"> • Career counseling during high school associated with higher likelihood of being employed after leaving high school. 	USA
Cimera ³⁹ 2013	Level III: Secondary Data Analysis- RSA-911	Transition- age young adults with ASD <i>n</i> = 906	Two additional years of early (i.e., age 14) transition services	<ul style="list-style-type: none"> • Young adults with autism who received an additional two years of early transition services (i.e., starting at age 14) were significantly more likely to be employed than matched pairs in states who began transition services at age 16 	USA

Cimera ⁴² 2012	Level III: Secondary Data Analysis- RSA-911	Adults with autism <i>n</i> = 430	Sheltered workshop participation	<ul style="list-style-type: none"> Individuals who were in sheltered workshops prior to entering supported employment had no difference in the rate of employment but earned less in wages and received higher service costs than matched peers who were not in sheltered workshops. 	USA
Ditchman ³¹ 2018	Level III: Secondary Data Analysis- RSA-911	Youth and young adults (ages 16-24) with ASD <i>n</i> = 2,219	State VR services	<ul style="list-style-type: none"> Receiving a greater number of the following six services lead to better employment outcomes; assessments, counseling, job placement, on-the-job training, job search support, transportation services. 	USA
Kaya ³² 2016	Level III: Secondary Data Analysis- RSA-911	Youth and young adults (ages 16-25) with ASD <i>n</i> = 4,322	State VR services	<ul style="list-style-type: none"> Use of the following services lead to an increased likelihood of CIE; on-the-job support, job placement services, rehabilitation technology, occupational/vocational training, job search assistance, vocational counseling and guidance, and job readiness training. Higher levels of education and receiving a greater number of VR services was associated with CIE outcomes. 	USA
Kaya ³³ 2018	Level III: Secondary Data Analysis- RSA-911	Young adults (ages 19-25) with ASD <i>n</i> = 3,243	State VR services	<ul style="list-style-type: none"> Better CIE outcomes associated with receipt of the following services; job placement, on-the-job support, on-the-job training, maintenance, information referral, and diagnostic and treatment services. 	USA
Migliore ³⁴ 2012	Level III:	Youth and young adults	State VR	<ul style="list-style-type: none"> Job placements services was the strongest 	USA

	Secondary Data Analysis-RSA-911	(ages 16-26) with ASD <i>n</i> =2,913	services	predictor of CIE outcomes.	
Nye-Lengerman ³⁵ 2017	Level III: Secondary Data Analysis-RSA-911	Adults with ASD <i>n</i> =15,679	State VR services	<ul style="list-style-type: none"> • Lower likelihood of CIE at case closure with use of administrative rather than community-based supports. 	USA
Schall ²¹ 2015	Level III: Secondary Data Analysis-Agency Records	Youth and young adults with ASD <i>n</i> =45	SE with or without Project SEARCH plus ASD Supports	<ul style="list-style-type: none"> • Project SEARCH plus ASD supports group required fewer intervention hours, earned more, and had higher job retention rates than those with ASD receiving SE without ASD specific supports. 	USA
Wehman ⁴⁰ 2016	Level III: Secondary Data Analysis-Agency Records	Youth and young adults with ASD (age 19-59 with mean age of 26) <i>n</i> =64	SE services	<ul style="list-style-type: none"> • 98.4% (63 of 64) participants secured CIE positions using SE 	USA

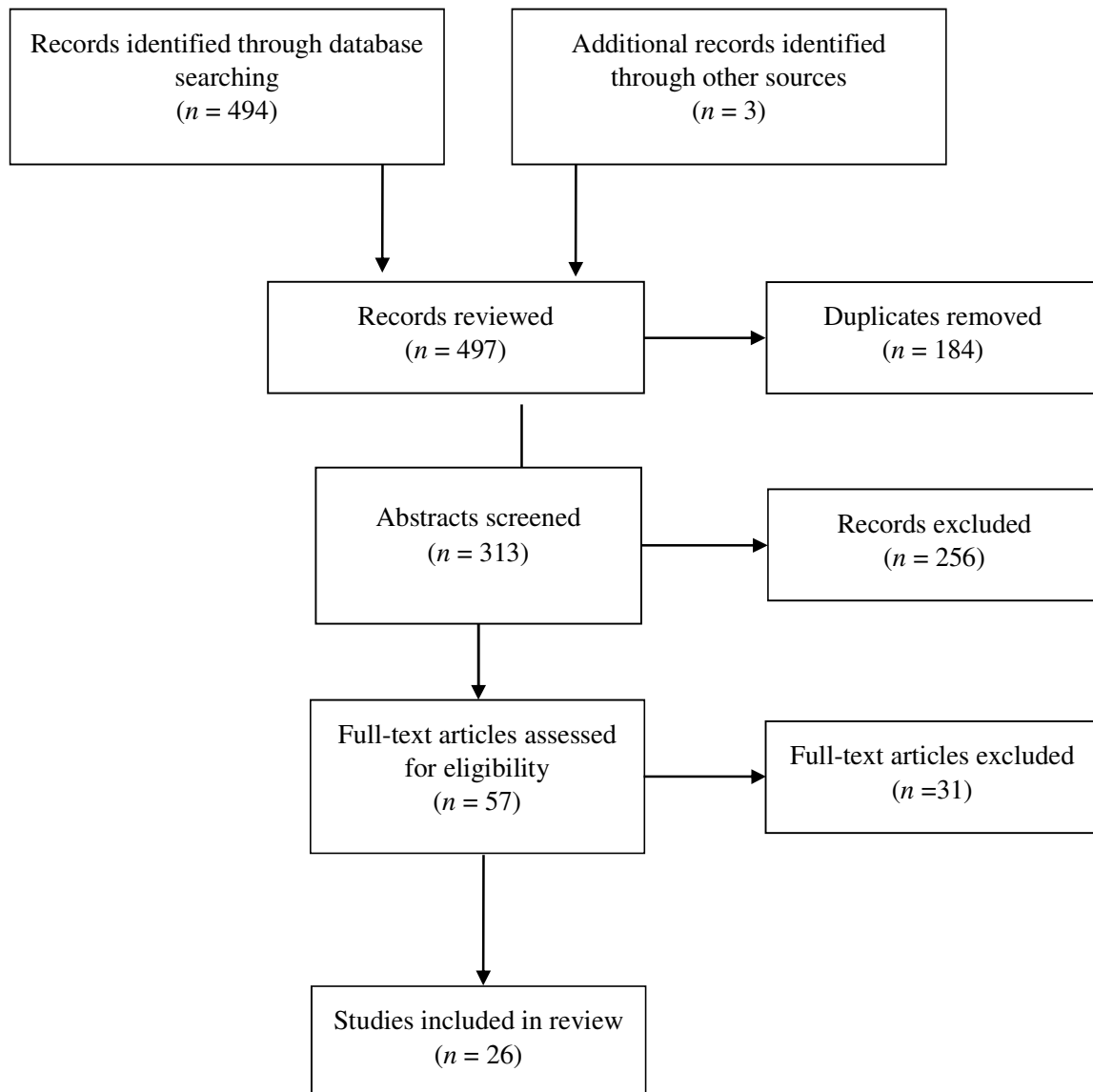


Figure 1. Article Selection Process by Stage.