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THE EFFECTIVENESS OF LANGUAGE AND VOCATIONAL
TRAINING ON GAINFUL EMPLOYMENT IN YOUNG
ADULTS WITH AUTISM SPECTRUM DISORDERS

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Structured Abstract

Clinical Question: Do young adults with ASD (P) who receive language + vocational training (I) as opposed to language-only training (C) experience an increase in gainful employment postgraduation (O)?

Method: Systematic Review

Study Sources: CINAHL Complete and PsycInfo® via EBSCOhost, American Speech-Language-Hearing Association (ASHA) journals, Google Scholar

Search Terms: ASD OR autism spectrum disorders AND employment OR independence OR young adult OR vocational OR communication OR language

Number of Included Studies: 10

Primary Results: Several studies investigated the effectiveness of targeted vocational intervention on improving employability and job performance. Seven out of the 10 included a language component in intervention.

Conclusion: Current evidence suggests that when effective communication is explicitly taught, in addition to targeted vocational skills, outcomes are maximized for independence into adulthood. The effects of vocational skills are augmented particularly in interpersonal skills in targeted intervention.

The Effectiveness of Language and Vocational Training on Gainful Employment in Young Adults With Autism Spectrum Disorders

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Clinical Scenario

Rosa has been working as a speech-language pathologist for 5 years. Her passion lies in working with individuals with autism spectrum disorder (ASD). She recently transitioned from working in a school-based program to an adult-based program. The individuals in her program range from 18 to 45 years old. There are various types of community engagement opportunities available to participants in the program ranging from attending college, to volunteering in the community for a few hours per week, to limited work in sheltered workshops, to vocational-based coaching for paid employment.

Joseph is on Rosa's caseload. He is a 19-year-old male who is presently working part-time in a retail store that sells automotive supplies. He has many skills that would be deemed desirable by an employer. He is precise and punctual. He is methodic and works very hard. Furthermore, he is socially motivated and enjoys being with others. He is academically competitive with his neurotypical peers and attends a private, midsized, local college. He is an automotive enthusiast. Joseph attends Rosa's adult program for social skills support. Rosa enjoys working with him and focuses on having conversations and establishing and maintaining peer relationships. She feels that he has great potential and would like to support him in advancing his level of independence.

Joseph demonstrates challenges with interview skills such as staying on topic, selling himself tactfully, and understanding and using nonverbal cues. He struggles with interpersonal communication such as understanding how to approach superiors, knowing when to ask for assistance, and knowing how to ask for help in the workplace. He enjoys being a part of the team but has difficulty navigating the nuances of group dynamics. He does not receive constructive criticism well.

After working with Joseph for 6 months, Rosa determined that he has the potential to be gainfully

employed but several behaviors are blocking his advancement. She searched through two textbooks and two resource manuals but could not find support for treatment that was applicable to Joseph. Recalling that she had taken a course in her graduate program on autism across the lifespan, she contacted her previous professor. Her professor encouraged her to search through the peer-reviewed literature for evidence to support both language and vocational intervention. She recalled the emphasis in her class on the critical interface between explicit language and vocational training, particularly when working with young adults with ASD. Although the interface of these two areas was an enigma for Rosa in the moment, she quickly learned that language intervention alone would not support vocational success and vice versa. She was eager to learn more from the literature to find support for the most efficacious intervention for Joseph.

Background Information

Autism spectrum disorder (ASD) is a neurodevelopmental disorder. Individuals with ASD demonstrate impairments in two major areas: social communication (both linguistic and nonlinguistic) and behavioral/sensory interests (American Psychiatric Association, 2013). At present, the Centers for Disease Control (2018) states that 1 in 59 children are diagnosed with ASD. More specifically, ASD affects 1 in 37 boys and 1 in 151 girls (Baio et al., 2018). Individuals with ASD do not attend to the environment and associated language in the same way as their neurotypical counterparts. These differences can negatively affect language acquisition and development (American Speech-Language-Hearing Association, n.d.). These challenges, combined with a myriad of skills deficits, can contribute to challenges obtaining and maintaining gainful employment in adulthood.

Although the college process opaquely prepares students for the workforce (e.g., study skills equivalent to being prepared for the workday), students with ASD struggle to generalize such skills and require explicit training. For instance, students with ASD need to be overtly taught standard job interview expectations such as arrival time and dress code. Many individuals with ASD remain unemployed (Hendricks & Wehman, 2009; Wagner et al., 2005) in part because they lack skills that were overlooked or presumed to have been acquired. Taylor and Seltzer (2011) reported this population to be gainfully employed between 4.1% and 11.8%. Adults with ASD experience difficulty acclimating to new job settings and maintaining jobs (Hendricks & Wehman, 2009; Howlin, 2000; Hurlbutt & Chalmers, 2004; Jennes-Coussens et al., 2006; Müller et al., 2003).

In a systematic review of vocational interventions, Taylor and colleagues (2012) found only five peer-reviewed studies with only weak evidence supporting vocational interventions. Taylor and colleagues (2015) conducted a 10-year longitudinal study evaluating both personal (e.g., gender, maladaptive behaviors, level of intellectual ability) and contextual characteristics (e.g., family income, service availability) of adults with ASD. Taylor and colleagues (2015) examined trajectories of vocational and educational activities of these individuals with an average age of 30 years at study onset. Results suggested that employment status declined over the decade, as measured by the Vocational Index (from a score of 5 to a score of 4; Taylor & Seltzer, 2012).

Clinical Question

Rosa adopted the PICO format to formulate the clinical question and guide the search for evidence. The PICO format defines P as the population, I the intervention, C the comparison treatment (or nontreatment control), and O the outcome (Brown, 2019; Dollaghan, 2007). Using the PICO format, Rosa asked, “Do young adults with ASD (P) who receive language + vocational training (I) as opposed to language-only training (C) experience an increase in gainful employment postgraduation (O)?

Search for the Evidence

The studies Rosa included in her review met the following conditions: (1) included young adults with ASD, (2) included young adults with ASD who were seeking

vocational support, (3) included an experimental design, (4) provided original data, and (5) were published between January 1, 2012, and March 15, 2020, in a peer-reviewed journal.

Rosa searched for evidence in three electronic databases via EBSCOhost (CINAHL, MEDLINE, and PsycInfo) as well as Google Scholar and journals from the American Speech-Language-Hearing Association (ASHA). Rosa used the following key terms related to the PICO question to guide her search: autism spectrum disorders, ASD, employment, independence, young adult, vocational, communication, language. Because using these terms in isolation yielded an exorbitant number of references to review, Rosa elected to use the key terms in combination (i.e., ASD OR autism spectrum disorders AND employment OR independence OR young adult OR vocational OR communication OR language). In addition, she checked the references of all relevant articles to identify any other applicable studies.

Rosa’s literature search yielded 90 potential articles for review. She reviewed the titles and abstracts of the 90 studies and rejected them if participants were not young adults with ASD and/or if the intervention explored did not include vocational skills and language. Rosa read through the remaining 10 studies to determine continued eligibility and decided to include them in the final corpus for this review.

Six hundred participants with ASD were represented in the 10 retrieved studies. The age of participants in these studies ranged from 16 to 68 years. Participants had a diagnosis of either ASD, Asperger’s syndrome, or were described as having high-functioning autism.

The duration of intervention varied broadly, ranging from 5 days to 19 weeks. Three studies were surveys and therefore did not estimate duration and frequency of intervention (Coleman & Adams, 2018; Gal et al., 2015; Ohl et al., 2017). In all cases, intervention was provided on a weekly basis, usually ranging in duration from 45- to 90-minute sessions. Of the 600 participants were assigned to receive treatment, 115 participants were assigned to control groups. Of the participants in the control groups, 102 were neurotypical.

The three survey studies focused on barriers to employment (Coleman & Adams, 2018), unique employment profiles in individuals with ASD (Gal et al., 2015), and employment outcomes data (Ohl et al., 2017). Two studies consisted of randomized controlled trials (Gentry et al., 2015; Murza et al., 2014). Gentry

and colleagues (2015) focused on the use of augmentative alternative communication (AAC) while in the workplace. Murza and colleagues (2014) focused on vocabulary and making inferences in social contexts. Collectively, these strategies contribute to effective communication in adult life, particularly related to gainful employment.

Three investigations were nonrandomized controlled trials and were conducted as a multiple baseline across participants (Burke et al., 2013), mixed-method treatment study (Hagner et al., 2014), and single-subject pilot case study (O'Neill et al., 2017). Burke and colleagues (2013) investigated the use of a tablet and video modeling to support vocational training in four participants. Outcomes demonstrated that use of this technology significantly increased job performance, particularly with multistep tasks. Hagner and colleagues (2014) used a mixed-method design in which they conducted a sequence of six meetings for person-centered planning. Strategies toward independence were acquired to 62% of participants. O'Neill and colleagues (2017) conducted a single-subject pilot study in which they used assistive technology to model appropriate social behavior in real-world scenarios. Results demonstrated increased communication that is easily transferrable to the workplace.

The remaining studies were nonexperimental (Babb et al., 2019; Gentry et al., 2012; Murza & Nye, 2013). Babb and colleagues (2019) conducted a single case study in which the use of visual scene displays was monitored in four vocational settings related to library work. Motor and communication activities were monitored, with positive outcomes for both. Gentry and colleagues (2012) conducted three case studies, each evaluating the use of an iPod touch® for task management in the workplace. All three cases demonstrated improvement in communication in the workplace because of intervention. Finally, Murza and Nye (2013) conducted a feasibility study in which pragmatic language was explicitly taught with a focus on social skills in the workplace. Unlike the two other studies mentioned, this work evaluated participant satisfaction. Participant satisfaction was rated as high across all three participants, demonstrating feasibility of this program for more controlled experimental work.

Evaluating the Evidence

Significant differences were calculated as *p* values in studies with controlled conditions (Gentry et al., 2015;

Murza & Nye, 2013). Gentry and colleagues (2012) conducted three case studies on the use of an iPod touch during work activities. One outcome measure was consistent use of the device to facilitate independence during work. All three participants consistently used their devices, even 1 year after intervention. Although Gentry and colleagues (2015) did not find significant differences in job performance, they did find significant differences in the amount of training required when they compared traditional language intervention and intervention using an assistive device ($p = 0.0122$).

Murza and Nye (2013) provided four-step explicit pragmatic instruction with standardized measures offered both pretest and posttest. The Watson-Glaser Critical Thinking Appraisal (Watson & Glaser, 1964) demonstrated a significant increase in skills ($p = .033$), as did the Prutting Pragmatic Protocol (Prutting & Kirchner, 1987; $p = .016$). Ironically, there were no significant differences noted on the three subtests of the Awareness of Social Interference Test ($p = .428$, $p = .128$, $p = .970$). Additionally, Murza and Nye (2013) found significant improvement in strategy use for social skills such as generating answers to main idea questions ($p = .007$) and prediction questions ($p = .05$). These results suggest that the participants were able to acquire appropriate strategies but continued to experience challenges in underlying social skills when not explicitly trained.

Gal and colleagues (2015) worked toward establishing validity on the Autism Work Skills Questionnaire (AWSQ) to determine differences between participants with and without ASD. The authors conducted multiple analysis of variants (MANOVA) which yielded significant differences ($p < 0.001$) between ASD and neurotypical groups in their vocational skills after training. These differences not only supported use of this tool as a valid measure but also suggested unique work profiles with noted strengths in individuals with ASD.

Studies without controlled conditions were also included in this investigation (Babb et al., 2019; Burke et al., 2013; Coleman & Adams, 2018; Hagner et al., 2014; Ohl et al., 2017; O'Neill et al., 2017). In these cases, qualitative outcomes or percent of increase or percent of completion were reported. One study reported percent increase and effect sizes (Babb et al., 2019).

Using a multiple baseline across participants design, Burke and colleagues (2013) pilot tested the use of a particular computer software for video modeling on tablets

at jobsites. The authors measured percent of steps correct during task completion for four participants with ASD. All participants achieved 100% accuracy with this training. Results suggested that use of tablets and video modeling is useful in preemployment training, particularly in multistep tasks involving packaging and shipping.

Hagner and colleagues (2014) conducted a study evaluating person-centered planning (PCP) which allows an individual with a disability to be an active participant in their planning toward independence and adulthood. Individuals with ASD were offered proactive strategies for active engagement in this process (e.g., establishing rapport before planning meetings, flexible meeting formats). The percent of evidence of accommodation was identified to 62%, and this modification increased productivity during planning sessions.

O'Neill and colleagues (2017) conducted a pilot case study integrating use of AAC devices with videos to improve participation in community and vocational activities. These videos represented visual scene displays (VSDs). The authors measured percent of steps correct across three community- and vocational-based contexts, with a minimum of 60% improvement across tasks.

Babb and colleagues (2019) used a multiple baseline across activities method to explore the impact of VSDs with AAC on vocational tasks. The authors calculated percentage of steps mastered when given video-modeling instruction for vocational skills in one individual with ASD. The authors also calculated effect sizes of these data, using Tau-*U*. A large effect size was calculated when Tau-*U* was weighted at 1.0 ($p = .000$). All tasks were met to 90% or higher, indicating mastery with this intervention.

Coleman and Adams (2018) conducted a survey investigating four areas: vocational status (in Arizona), barriers to employment, efficacy of governmental supports, and options to improve employment. One hundred seventy-one respondents participated, with a makeup of 73% of parents of adults with ASD, 25% adults with ASD, and 2% jointly responding (i.e., individuals with ASD together with their guardians). The most common reported barriers were advancing beyond the initial interview, finding an appropriate job for which to apply, lack of transportation, uncertainty of which specific job to apply for, and the inability to hold a job for the long term.

Ohl and colleagues (2017) conducted a cross-sectional study exploring employment characteristics and histories of employed and unemployed adults with ASD as well as

factors that contributed to their employment status. Using an online survey, 38.58% of their 254 respondents were unemployed with a vast majority not receiving employment assistance. These data contribute to a needs assessment for the value of language and social skills training for adults with ASD in vocational settings.

Collectively, all data reviewed here have shown positive outcomes of socially focused language intervention on vocational skills. Although underemployment and/or unemployment remains an issue for individuals with ASD, explicit task training, paired with language intervention, can offer hope for increased independence and improved quality of life into adulthood.

As observed here, there are several forms of evidence available in peer-reviewed literature (e.g., literature reviews, single case studies, randomized controlled trials), each with its own level of impact for the profession. However, readers cannot assume that all peer-reviewed work is of high quality (Orlikoff et al., 2015). Understanding this, Rosa decided to evaluate each of the studies with respect to level of evidence and methodological quality.

Level of Evidence

When reviewing the obtained evidence, Rosa used the ASHA-adopted standards of level of evidence to categorize the studies (Robey, 2004). Descending from highest level of evidence to lowest, Level 1a and 1 evidence include meta-analyses and randomized controlled trials, respectively. Level 2 involves a well-designed, nonrandomized controlled study (e.g., multiple baseline, mixed method, single subject). Level 3 evidence involves nonexperimental studies such as correlational, retrospective, and case studies. Finally, level 4 evidence consists of observational studies without controls and reports by experts. Studies retrieved in Rosa's literature search were varied, ranging in classification from level 1 to level 3 (see Table 1).

Study Quality

Rosa evaluated the quality of vocational studies using the Physiotherapy Evidence Database (PEDro) scale (Maher et al., 2003) for the two group studies (see Table 2). The PEDro scale assesses the internal and external validity of randomized and nonrandomized controlled trials. The Single-Case Experimental Design (SCED) scale (Tate et al., 2008) is an evaluation of the strength of single-subject design research and was used for five single-subject design studies (see Table 3).

The Evidence-Based Decision

Rosa selected 10 studies in her search for evidence to determine an intervention strategy to help Joseph. The findings of her review show promising outcomes for improved vocational and communication skills in individuals with ASD. Overall, these studies demonstrated that intervention that combined vocational skills and language intervention was associated with improved abilities to communicate and function more independently in a vocational setting.

As a result of this review of the evidence, Rosa decided to develop a pilot program at the higher education level. She connected with a local private university that has a center for individuals who self-identify as neurodiverse (including ASD). The focus of this center is to support students' individual needs in the areas of academic, social, and vocational skills. Rosa worked with the program to develop a job-focused initiative. Students would be offered individualized, vocationally focused instruction. Participants like Joseph could engage in weekly discussions focused on their target employment goals and how to communicate successfully in the workplace. Although the university's program had already offered vocational services (Battaglia & Becker, 2017; Nagler & Shore, 2013), the innovation Rosa introduced is the connection with language.

The U.S. Department of Education (2020) recommends a multidisciplinary team to execute transition planning for individuals with ASD. The opportunity for interprofessional practice (Health Professions Network Nursing and Midwifery Office, Department of Human Resources for Health, 2010) between and across speech-language pathology, social work, and vocational domains could maximize outcomes. "Talking Success," a social skills group with a focus on vocational skills and transition to adulthood, will be designed as an interdisciplinary transitional program aligned with these recommendations.

Students (including Joseph) will attend a weekly communication group that will begin by identifying their desired location of employment and specific duties within the site. Weekly meetings will focus on building specific interview skills for each student's self-identified goal (e.g., active listening, formulating alternative responses). Connection with the human resources department at the desired employment location will be established and maintained as part of ongoing program development. This initiative will be directed by a social worker who will be

supported by weekly meetings held by Rosa. The group will be facilitated by two supervised graduate students studying speech-language pathology along with support from a vocational trainer.

Authors' Note

Dana Battaglia is a practicing SLP and earned her PhD in communication sciences and disorders at the CUNY Graduate Center. She is an associate professor in the Department of Communication Sciences and Disorders at Adelphi University. Her research interests include investigations of word associations in individuals with ASD, language issues across the lifespan in these individuals, as well as scholarship of teaching and learning (SoTL).

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Table 1. Review of 10 Studies With Levels of Evidence

Participants	Study	Design	Intervention/ comparison	Intensity/duration	Relevant outcome measures	Major findings
Level 1: Well-designed randomized controlled trials						
28 participants in immediate start group and 27 participants in delayed start group	Gentry et al. (2015)	Controlled/ randomized	Received iPod touch for social support at a vocational training rather than face-to-face prompting in job settings; used a delayed randomized controlled trial model	One group began use of assistive technology immediately, while the second began after 12 weeks. Study concluded after 24 weeks.	Training in the use of assistive technology significantly reduces the need for job coaching support by workers with ASD without reducing job performance. Participants who started using assistive technology immediately required significantly less face-to-face job coaching than the group who started after 12 weeks of face-to-face training.	Although there was no significant difference in the level of functional work performance, there was a significant difference in the amount of training required for participants without the PDA as compared to those with the PDA ($p = 0.0122$).
26 participants; 13 in experimental group and 13 in control group	Murza et al. (2014)	Controlled/ randomized	Treatment: explicit instruction of components of inference generation, categories of inference, and increasingly independent strategy use; 4-step reading comprehension strategy designed to help generate inferences while reading	2x/week for 60 minutes over the course of 6 weeks	The explicit 4-step strategy was effective in improving participant ability to generate inferences in reading and certain metacognitive abilities. No evidence of generalizing to social contexts.	Participants in treatment group improved ability to answer main idea questions, $F(1, 22) = 8.74$, $p = .007$, $g = 1.15$, 95% CI [0.32, 1.97]; and prediction questions $F(1, 22) = 4.37$, $p = .05$, $g = .80$, 95% CI [0.01, 1.59]
Level 2: Well-designed nonrandomized controlled trials						
4 participants with ASD	Burke et al. (2013)	Multiple baseline across subjects design	Jobsite testing delivered via tablet to provide users with video modeling, video prompting, and feedback to enhance job training and job performance	Over 5 to 7 days was considered the intervention condition. Task analysis was completed, which resulted in a list of 104 possible task steps that needed to be completed for error-free shipping of product.	Task completion (task required 73 steps) and treatment evaluation inventory short form used to assess validity and feasibility of intervention	None of the participants performed to criterion during baseline. After intervention, all 4 participants demonstrated immediate improvements in job performance. Video modeling and prompting were effective in completing a multistep task.
47 participants	Hagner et al. (2014)	Mixed-method treatment study	Assessment of person-centered planning outcomes	6-meeting sequence over the course of 6 weeks	Person-centered planning can be implemented for transition-age youth to enhance participation in transition planning.	Evidence of accommodation strategies in 29 participants (62%)
1 participant with ASD who used an AAC	O'Neill et al. (2017)	Single-subject pilot case study	Use of visual scene display app and modeling to improve target social behavior in real-world social scenarios	5 sessions per week, split between 3 social/target behaviors in different locations for a total of 16 intervention sessions; baseline and intervention sessions occurred over a 5-week period	Task analysis of target activities with social validation from caregivers and teachers; results suggest noticeable increases in communication during the three target tasks.	Across three contexts (print shop, public transportation, and paper shredding), participant increased minimally 60% in performance.

Table 1. Review of 10 Studies With Levels of Evidence (continued)

Level 3: Nonexperimental studies (e.g., correlational, retrospective, case studies)									
1 participant with ASD	Babb et al. (2019)	Single-case multiple-baseline across activities	Use of visual scene displays in 4 vocational activities in a library setting	Brief instruction sessions, which included a model of an app in 3 intervention activities with one generalization activity, baseline, intervention, and maintenance sections occurred over 19 sessions.	Percentage of steps completed independently in each task measured for both motor and communication tasks.	A significant change of performance to mastery (90% or higher) was observed in all 4 tasks (checking in library books, putting books away, making die-cut prints, and shredding). Results provide evidence that video VSDs may provide effective support both for learning a new skill in a vocational context and as a method of AAC.			
172 respondents	Coleman & Adams (2018)	Survey data; no control	Original vocational survey completed by 172 participants with ASD across Arizona	One-time survey/data collection	Questions regarding employment, vocational supports, and barriers to employment; additionally, ratings for vocational rehab services were included	Employment without supports (28%); employment with some support or in a supportive environment (18%); 40% unemployment. Major barriers included not getting interviews (59%), difficulty applying (39%), difficulty maintaining employment (22%), and issues of transportation (28%). Unemployment remains a critical issue in adults with ASD.			
102 neurotypical controls and 37 individuals with high-functioning ASD	Gal et al. (2015)	Survey/questionnaire data	Use of the Autism Work Skills Questionnaire (AWSQ) to determine differences between participants with and without ASD	N/A	Significant differences were found between the work skills of the control and HFASD group in almost all domains. Findings suggest unique working profiles among persons with HFASD, and authors suggest the importance of targeting job opportunities within individuals' skill sets.	Multiple analysis of variance (MANOVA) showed significant differences between the groups in their working skills [$F(6, 71) = 24.13, p < 0.001, \eta^2 = .67$] with the scores of neurotypical participants significantly higher than the scores of people with ASD suggesting they have better work-related skills.			
3 participants	Gentry et al. (2012)	3 case studies	Use of an iPod touch to provide support for task management and organization within the workplace	1 week of training and 6 weeks of device use in a work setting	Use of the PDA as a support for individuals in 3 case studies resulted in improved functional performance and reduced behavioral difficulties in the workplace.	Employment outcomes indicated increased function and reduced behavioral instances in the work setting.			

Table 1. Review of 10 Studies With Levels of Evidence (continued)

13 adults with ASD, 18–44 years old; all had a HS diploma	Murza & Nye (2013)	Pretest/posttest intervention study Nonexperimental, feasibility study	Pragmatic language program designed to target comprehension and use of pragmatic language in various social and workplace scenarios. Investigated the preliminary effects of intervention to improve social inference ability and pragmatic language comprehension and use.	1x/week, 90 minutes in duration, over 14 weeks; total treatment of 21 hours. Small group (2–6 participants)	Four-step explicit pragmatic intervention can be considered feasible. Also, participant satisfaction ratings were reported as high.	WGCTA = Watson-Glaser Critical Thinking Appraisal (Watson & Glaser, 1964), $p = .033$ PPP = Prutting Pragmatic Protocol (Prutting & Kirchner, 1987), $p = .016$ Posttest measures on 3 subtests of the TASIT (The Awareness of Social Inference Test) not significantly different: Emotional evaluation, $p = .428$, Social Inference Minimal $p = .128$, and Social Inference Enriched $p = .970$.
Level 4: Observational studies with controls						
254 adults with ASD	Ohl et al. (2017)	Cross-sectional study	N/A	N/A	Employment outcome data gathered from the ASD Employment Questionnaire (ASDEQ) and the Short Effort Reward Imbalance (ERI) Scale which is part of the survey. Disability disclosure and education level are factors that contribute to employment.	61.42% of respondents were employed; 38.58% were unemployed. Over half of the participants reported job imbalance on the Short ERI Scale. The vast majority did not receive any job assistance. Participants who disclosed their ASD diagnosis to their employer were more than three times as likely to be employed than those who did not disclose. Education level was also a significant predictor of employment status.

Table 2. PEDro Scale (Maher et al., 2003) for Two Group Studies

Number	Description	Gentry et al. (2015)	Murza et al. (2014)
1	Eligibility criteria were specified	+	+
2	Subjects were randomly allocated to groups	+	+
3	Allocation was concealed	+	+
4	Baseline similarity	+	+
5	There was blinding of all subjects	+	+
6	Blinding (therapists)	n/a/+*	+
7	Blinding (assessors)	+	-
8	Measures of at least one key outcome were obtained from more than 85% of the subjects initially allocated to groups.	+	+
9	All subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least one key outcome was analyzed by "intention to treat."	+	+
10	The results of between-group statistical comparisons are reported for at least one key outcome.	+	+
11	The study provides both point measures and measures of variability for at least one key outcome.	+	+
	Total PEDro score	11 of 11	10 of 11

* Gentry et al. (2015) used a video and not a face-to-face model.

Table 3. Evaluation of Five Publications According to the Single-Case Experimental Design (SCED) Scale (Tate et al., 2008)

Item	O'Neill et al. (2017)	Murza & Nye (2013)	Babb et al. (2019)	Burke et al. (2013)	Gentry et al. (2012)
1. Clinical history*	+	+	+	+	+
2. Target behaviors	+	+	+	+	+
3. Design	+	+	+	+	+
4. Baseline	+	+	+	+	+
5. Sampling behavior during treatment	+	+	+	+	+
6. Raw data record	+	+	+	+	+
7. Inter-rater reliability	+	+	+	+	-
8. Independence of assessors	+	+	+	+	-
9. Statistical analysis	-	+	+	+	-
10. Replication	+	+	+	+	+
11. Generalization	+	+	+	+	+
Total SCED score	9 of 10	10 of 10	10 of 10	10 of 10	7 of 10

* Not counted in score