

A Systematic Literature Review of Interventions to Improve Work-Related Social Skills of
Individuals with Autism Spectrum Disorder

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Abstract

Individuals with autism spectrum disorder (ASD) experience impairments in social communication, which may affect their ability to develop social skills necessary for successful employment. It is unclear which types of interventions have been used to teach specific work-related social skills to individuals with ASD and what the overall effectiveness of those interventions has been. This article reviewed the literature on interventions targeting improvement in work-related social skills of individuals with ASD. Database searches yielded 1,140 articles; 14 articles met inclusion criteria. Interventions that incorporated several common elements (e.g., modeling, rehearsals, feedback) or used visually-based, technological approaches resulted in improved work-related social skills. However, high-quality research is needed, as is research that occurs in competitive, integrated workplace settings.

Keywords: autism spectrum disorder, social skills, employment, intervention

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While work experience and technical skills help job seekers qualify for employment opportunities, social skills are critical to obtain and maintain employment. Fundamental social skills include communicating with others, understanding and participating in the social environment, developing social relationships with others, initiating interactions, maintaining social reciprocity, taking another's perspective, and inferring interests of others (Bellini et al., 2007). Within employment settings, requesting clarification, being on time, respecting personal boundaries, following instructions, asking for help when needed, interacting with customers, and responding appropriately to performance feedback have all been rated as important to the work success of individuals with disabilities (Agran et al., 2016). These skills are critical in employment in order to establish and maintain relationships with supervisors, co-workers, and customers and to understand and adhere to work-related social norms and expectations.

Employment and ASD

Persistent work-related social skills deficits may help explain the dismal employment outcomes facing many individuals with autism spectrum disorder (ASD). Research conducted in the last decade indicates that youth with ASD experience low rates of employment in the years following high school (Roux et al., 2015; Shattuck et al., 2012), and these difficulties persist even with participation in vocational rehabilitation services (VR; Burgess & Cimera, 2014; Chen et al., 2015). Adults with ASD also experience sustained difficulties in obtaining and maintaining employment. Specifically, they often struggle with high rates of underemployment and unemployment and concomitant issues with low wages and high job turnover (Chan et al., 2018; Hendricks & Wehman, 2009).

Special education and VR policies focus on ways to improve competitive, integrated employment outcomes for individuals with disabilities. The most recent authorization of the Individuals with Disabilities Education Act (IDEA; 2004) continues the mandate that special education teams develop transition plans and activities that align with students' strengths and interests and help prepare them for postsecondary employment. The Workforce Innovation and Opportunity Act (WIOA; 2014) focuses in part on improving competitive, integrated employment outcomes for individuals with significant disabilities through state VR systems. It also seeks to strengthen the transition from school to work for youth with disabilities, through mandated pre-employment transition services delivered during high school, increased collaboration with school and community partners, and earmarked funding for this population. Yet even with these policies in place, employment outcomes for individuals with ASD remain low (Burgess & Cimera, 2014; Chan et al., 2018; Chen et al., 2015; Roux et al., 2015; Shattuck et al., 2012). Research is needed that identifies effective interventions for increasing skills needed for workplace success and that results in improved employment outcomes for individuals with ASD.

For individuals with ASD, developing the work-related social skills needed to obtain and maintain employment may be challenging, due in part to social-communication deficits associated with ASD. Diagnostic criteria for ASD describe sustained deficits in social-emotional reciprocity (e.g., issues with conversational turn-taking or initiating and responding to social interactions); understanding and using nonverbal communication; and developing, sustaining, and understanding social relationships (American Psychiatric Association, 2013). In workplace settings, individuals with ASD may experience specific difficulties in demonstrating work-related social skills related to accepting correction, interacting professionally with customers,

communicating with co-workers, meeting social expectations, and following business rules and procedures (Wehman et al., 2012; Wehman et al., 2017).

Individuals with ASD self-report that limitations in social skills, such as difficulties working as part of teams, not getting along with others at work, and limited involvement in workplace social relationships, may explain, in part, poor employment outcomes (Hurlbutt & Chalmers, 2002) and also identify difficulties in communicating with and relating to others as one of the most negative aspects of employment (Baldwin et al., 2014). These findings suggest a need for interventions that address the core deficits of ASD in workplace settings in order to improve employment prospects and job retention of individuals with ASD.

Previous Reviews of Interventions

Within the past decade, multiple literature reviews and meta-analyses have examined the effectiveness of social skills interventions for individuals with ASD. They have investigated school-based interventions for children with ASD (Bellini et al., 2007), psychosocial interventions for adults with ASD (Bishop-Fitzpatrick et al., 2013), behavioral interventions for youth and adults with ASD (Roth et al., 2014), self-management interventions for students with ASD (Carr et al., 2014), social skills interventions utilizing single case experimental designs (Wang et al., 2013), and group-based social skills training for children and adolescents with ASD (White et al., 2007). However, researchers have not reviewed the literature on specific, work-related social skills interventions for individuals with ASD. It is unclear which types of interventions have been used to teach work-related social skills, which specific work-related social skills have been targeted, and what the overall effectiveness of the interventions has been. Moreover, it is unknown if intervention studies focusing on work-related social skills meet criteria to be considered quality research.

Purpose

The purpose of this paper is to review the literature on work-related social skills interventions for transition-aged youth and adults with ASD, while highlighting interventions that resulted in improved social skills outcomes and synthesizing key elements across studies. The review was guided by the following research questions: What are effective interventions to improve the work-related social skills of transition-aged youth and adults with ASD? Do reviewed studies meet research quality indicator standards?

Method

Search Procedures

The researchers conducted database searches via ERIC, Education Research Complete, and PsycInfo, using the following search terms: *autis** OR *asperg** OR *ASD* OR “*pervasive developmental*” OR *PDD* OR “*developmental disabilit**” OR *DD* AND *employ** OR *work* OR *transition* OR *community* AND *intervention* OR *treatment* AND “*social skill**” OR “*interpersonal skill**” OR “*interpersonal communication*” OR “*social group**” OR “*social behavior**” OR *conversation** OR *cooperation* OR “*social communication*” OR “*social initiation**” OR “*social response**” OR “*eye contact*” OR *reciprocity*. The researchers included variations of ASD and related diagnoses in search terms to locate older articles with ASD-related diagnostic labels written prior to the publication of the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (i.e., Aspergers syndrome; AS; Pervasive Developmental Delay – Not Otherwise Specified; PDD-NOS). Search terms associated with work, employment, and community were used to identify studies occurring within work-related settings. The researchers included a range of social skill-related search terms, described by Bellini et al. (2007), to locate studies targeting different types of social skills. Database searches were conducted on March 11,

2018, and articles published between 2005 and March 11, 2018 were reviewed. This timeframe was selected in order to align search results with the publication of the 2005 *Exceptional Children* special issue on quality indicators in special education research.

Inclusion and Exclusion Criteria

The researchers established several criteria for inclusion in the literature review. First, included studies had to utilize an experimental approach, meaning that variables were systematically manipulated, results were replicated across or within individuals, and changes in dependent variables were measured (McMillan, 2016). Second, at least one dependent variable reported in the study had to measure a social skills outcome related to interpersonal communication, social behavior, conversation, cooperation, social communication, social initiation, social response, eye contact, or social reciprocity. To ensure that included articles focused on work-related social skills, at least one intervention in the study had to occur in a work-related setting, which included: employment locations, work-based learning experience settings, community volunteer sites, internship locations, sheltered workshops, day support programs, or other instructional settings where the focus of the activity was on employability or work-related skills. Also, at least one participant in the study had to be identified as an individual with ASD or a related disability category, such as autism, AS, or PDD-NOS. Since other disabilities may co-occur with ASD, studies with participants who were identified as having both ASD and a secondary disability were included in the literature review. To establish that studies focused on transition-aged youth or adults with ASD, participants with ASD had to be 14 or older, since transition planning and activities frequently begin between ages 14 and 16 for students with disabilities. Finally, studies had to be published in peer-reviewed journals and written in English to be considered for inclusion.

Case studies, qualitative studies, descriptive designs, and correlational designs were not included since the review focused on interventions to improve work-related social skills. To that end, studies that did not occur in a work-related setting (e.g., traditional academic classroom settings, home environments) were excluded as well. Finally, because peer review is an essential element of high-quality research, the researcher excluded non-peer reviewed literature (e.g., dissertations, theses) from the systematic literature review.

Article Selection Process

The search of databases identified 1,140 records. After duplicate articles were removed, 918 records remained. Preliminary screening of articles' titles and abstracts using inclusion criteria narrowed the field to 54 articles. If articles met inclusion criteria, or if it was unclear if they met criteria, then articles were read in their entirety and coded by the first author. Of the 54 full-text articles assessed for eligibility, 40 were excluded because they did not meet inclusion criteria. Four studies did not meet experimental research criteria, five did not include dependent variables that measured social skills, 28 studies did not take place in a work-related setting, one did not include a participant with ASD, one did not include a participant who was aged 14 or older, and one was not published in a peer-reviewed journal. Ultimately, 14 articles met the criteria for inclusion in the final literature review. Please see Figure 1 for information on the article selection process.

The first author also coded selected articles to determine if they met criteria to be considered quality research. The *Exceptional Children* quality research indicators for group experimental/quasi-experimental designs and single-subject designs were used to code each included article (Gersten et al., 2005; Horner et al., 2005). The researchers chose these indicators

because of their longstanding acceptance and wide use throughout the field of special education research.

Reliability

The researchers used secondary coding to provide evidence of the reliability of the coding process. The fourth author coded a random sample of 30% of the titles/abstracts ($n = 275$) from the database search results, minus article duplications, to demonstrate the reliability of the article selection coding process. The fifth author coded a random sample of 30% of selected articles ($n = 5$) to ensure selected articles met inclusion criteria. Finally, the second author coded another sample of 30% of selected articles ($n = 5$) to evaluate the reliability of the quality indicator coding process. For each round of secondary coding, intercoder agreement was calculated by dividing the total number of agreements into the total number of agreements plus disagreements and multiplying by 100 (Kazdin, 1982). Intercoder agreement for the titles/abstracts screening process was 97%, intercoder agreement for the full article review was 100%, and intercoder agreement for evaluating the research quality of each of the included articles was 93%.

Results

Researchers identified 14 articles that met inclusion criteria for the systematic literature review of work-related social skills interventions for transition-aged youth and adults with ASD. Reviewed studies utilized a wide range of interventions to improve social skills outcomes, but also included several common elements across studies. Analysis of research quality indicators indicated that 60% of group-based design studies and 100% of the single subject design studies met a majority of essential indicators for quality research designs. Please see Table 1 for specific information on samples, social skills measures, and results of included studies.

Effective Interventions to Improve Work-Related Social Skills

Researchers targeted a wide range of work-related social skills and used various interventions to improve participants' skill performance. Several themes across studies emerged, including the use of group-based/curricular approaches, virtual reality, BST, social skill components within larger intervention packages, and visual schedules.

Group-Based/Curricular Approaches

Multiple studies utilized group-based/curricular programs to teach a range of work-related social skills within training settings. While studies varied in both skills targeted and programmatic details, five studies documented clear positive effects of the group-based/curricular programs on participants' work-related social skills. In the first instance, Morgan et al.(2014) implemented a 12-week interview skills curriculum for 28 young adults with ASD and found that treatment group participants scored significantly higher on a mock interview assessment and a standardized measure of social skills. Bonete et al. (2015) focused on a different aspect of work-related social skills, but also reported promising findings. They developed an intervention to teach social problem-solving skills to young adults with AS ($n = 50$) and documented demonstrated significant changes in 50% of the AS group participants' scores after treatment on a task-based measure of social problem solving.

Several researchers targeted multiple work-related social skills within group-based/curricular approaches and described increases in skills post-intervention. Oswald et al. (2018) created the ACCESS program, which focused on workplace social functioning, development of social networks, increasing self-determination and coping skills, and decreasing anxiety in individuals with ASD aged 18 to 38. In a randomized controlled trial of the program, trend-level increases ($p = 0.09$) in social skills for treatment group participants ($n = 28$) were

reported post-intervention. In another example of a multi-skill, curricular intervention, Baker-Ericzén et al. (2018) evaluated the initial outcomes of a manualized curriculum, SUCCESS, on a range of cognitive and social skills for nine young adults with ASD, and found moderate to large effect sizes across performance measures ($d = 0.53-1.83$) and self and parent reports of social skills ($d = 0.44-0.93$).

Both Liu et al. (2013) and Walsh et al. (2017) combined group-based training with additional elements to improve study participants' work-related social skills. Liu et al. (2013) combined twice weekly educational sessions with work task practice for adults with ASD, ages 18 to 40, within a sheltered workshop setting ($n = 14$). They documented significant differences in pre- and posttest scores on measures of social communication skills and workplace social behaviors, (e.g., appearance, self-control, and level of supervision). In an interesting use of technology within an existing social skills curriculum, Walsh et al. (2017) combined direct instruction a comprehensive curriculum with video modeling to improve work-related social skills for young adults with ASD and intellectual disabilities (ID) attending a VR training center program. Using a multiple probe design across behaviors, replicated across seven participants, Walsh and colleagues found improvements in peer-, adult-, and self-related social skills after instruction, with 8-41% of skills demonstrated pre-teaching compared to 73-100% of skills demonstrated post-teaching and at follow up three months later.

Finally, two studies utilizing group-based/curricular approaches reported findings that did not show clear positive effects of the intervention. Ashman et al. (2017) compared the efficacy of a social skills training group to a more generalized social support group for adults with ASD. No significant differences between groups were found on standardized measures of social cognition, social performance, or functional skills at posttest, although there was a trend towards

significance and a moderate effect size reported for increased social cognition skills for treatment group participants. Mathrick et al. (2017) conducted a study evaluating the effectiveness of an interview skills treatment package for youth with language disorders, including ASD ($n = 12$, 33% of sample had ASD diagnosis). Although the authors reported significant increases and large effect sizes for differences in positive non-verbal and verbal social communication skills over time, it was unclear if changes in performance were attributable to specific components of the training package or to practice effects, given the lack of a control group in the study design (Mathrick et al., 2017).

Virtual Reality in Social Skills Instruction

One study identified through this review used virtual reality to improve work-related social cognition and interview skills. In an investigation focused on social cognition training with individuals with high-functioning Autism (HFA), Kandalaf et al. (2013) found substantive increases in social perception and improved conversational skills, although not to the level of significance, for eight young adults with HFA. Over the course of the two-week study, participants interacted with a coach and a confederate clinician in a variety of virtual reality settings, including a job interview and a workplace. The authors posited that the performance-based *Social Skills Performance Assessment, Version 3.2(2)*, which was used to measure conversational skills through role plays, may not have been sensitive enough to changes in behavior, or may lack ecological validity when compared with real-life conversations.

Behavioral Skills Training

Three reviewed studies incorporated behavioral skills training (BST) with other supports to teach work-related social skills to young adults with ASD. In two related single-subject research studies, Burke et al. (2010) combined BST with a performance cue system (PCS) to

teach social-vocational task skills to six young adults with ASD. In the first study, BST was initially introduced, and one out of three participants reached criterion performance using BST alone. With the introduction of PCS, the other two participants showed dramatic improvements in skill performance, achieving mastery criterion after three training sessions. In the second study, three different participants were introduced to PCS immediately following baseline, and BST was provided as alternate training if the 80% accuracy performance criterion was not met by the second training session. Two participants met performance mastery criteria with the introduction of PCS, while a combination of PCS followed by BST led to criterion-level performance for the third participant. In the final study investigating the use of BST with additional supports, Grob et al.(2019) combined BST with stimulus prompts to teach a variety of skills (e.g., making confirming statements when given direction, asking for a task model, apologizing, asking for feedback, asking for help with materials) to adults with ASD in a training environment. Using a multiple baseline design across behaviors and replicated across three participants, the researchers documented that BST with stimulus prompts led to multiple skill acquisition and skill generalization across settings and supervisors for two participants. For the third participant, increases in work-related social skills were not observed until a monetary reinforcer strategy was introduced.

Targeting Social Skills Through Larger Intervention Packages

Two studies (Gentry et al., 2015; Wehman et al., 2017) measured work-related social skill outcomes as part of intervention packages exploring other related outcomes. Gentry et al. (2015) investigated how iPod Touch devices could reduce the need for job coach supports for young adults with ASD. In this delayed randomized control trial, 55 participants were trained to use iPod Touch devices for work-related tasks. While job coaches provided substantively fewer

hours of support to participants in the iPod Touch group, no significant differences were detected between groups on a measure of support needed for workplace interactions and on a measure of work performance that evaluated relationships with coworkers and the public. In the second study in this category, Wehman et al. (2017) examined the effect of a community-based internship program, which incorporated ASD-specific instructional and behavioral strategies, on work outcomes for youth with ASD and significant support needs ($n = 54$), who were transitioning from high school to work. They found support needs, including social communication support at work, decreased significantly for treatment group participants, but not for control group participants.

Visual Schedules

Visual schedules were used in one reviewed study to teach work-related social skills. Specifically, White et al. (2011) investigated how activity schedules could be used to teach youth with ASD to work cooperatively on vocational tasks. Six males with ASD, ranging in age from 16-19, all of whom had significant deficits in language, self-care, and socialization, participated in the multiple baseline across pairs of participants study. Activity schedules were used to teach participants to work cooperatively to clean a kitchen, clean an office, or replenish kitchen supplies, and each of the three pairs of participants met the 80% criterion level for completing tasks cooperatively using a single schedule.

Use of Research Quality Indicators Within Reviewed Studies

The research rigor of the included studies was assessed using quality indicator checklists developed from the 2005 *Exceptional Children* special issue on quality research. Specific quality indicator checklists were aligned with methodological design, organized by those with group experimental/quasi-experimental designs (Gersten et al., 2005) and single-subject designs

(Horner et al., 2005). Four out of the 10 group-based studies could not be assessed for research quality using these criteria, because they utilized one-group pre-experimental designs (Baker-Ericzén et al., 2018; Kandalajt et al., 2013; Liu et al., 2013; Mathrick et al., 2017). It is important to note, however, that these same studies were also designated as pilot studies.

The remaining 10 studies met many, but rarely all of the specified quality indicators for each methodology. Within group designs, the six studies assessed for research quality satisfied quality indicator requirements related to participant descriptions, sample attrition, clear/replicable descriptions of the intervention, use of multiple measures to evaluate intervention's effect, and appropriate data analysis techniques. Studies utilizing group designs were less consistent in providing measures of fidelity of implementation (Ashman et al., 2017; Bonete et al., 2015; Gentry et al., 2015; Wehman et al., 2017) and in providing comprehensive information on the reliability and validity of assessment instruments (Ashman et al., 2017; Morgan et al., 2014; Oswald et al., 2018). Researchers found strong adherence to quality indicators related to description of participants and settings, operationalization of dependent variables, description of intervention procedures, and reporting of interobserver agreement in the five single subject research studies included in the review. Conversely, single-subject studies lacked sufficient description of participant selection processes (Burke et al., 2010; Walsh et al., 2017), used minimal data points in multiple phases (Burke et al., 2010), or omitted social validity measurement entirely (Grob et al., 2018; White et al., 2011).

Discussion

The purpose of this systematic literature review was to identify effective interventions for improving work-related social skills of transition-aged youth and adults with ASD. Database searches located 14 articles that investigated the effects of different interventions on the

acquisition of multiple social skills. Interventions that incorporated extensive modeling, role-playing, and feedback or used visually oriented, technology-based approaches to teach skills resulted in substantive improvements in social skills across groups and/or time. However, only two of the reviewed studies situated interventions in competitive, integrated workplace settings.

Key Elements in Improving Work-Related Social Skills

While the type of interventional approach differed across studies, researchers used several common instructional strategies to teach work-related social skills. Key elements included: discussion/explication of social skills, work-related examples, direct instruction on social skills, role play/rehearsals, performance feedback, and small group activities. Interventions utilizing group-based/curricular approaches that incorporated these elements to teach a range of skills resulted in moderate to large effect sizes in measures of social cognition (Ashman et al., 2017), social skills performance (Bonete et al., 2015), or both (Baker-Ericzén et al., 2018), along with significant increases in social adaptive functioning (Oswald et al., 2018). BST was used in three single-subject design studies reviewed here, and these studies utilized several of the aforementioned instructional strategies, including direct instruction on work-related social skills, skill modeling, role plays/rehearsals, and performance feedback, with documented increases in targeted skill performance. In these studies, BST was paired with some type of visual support (e.g., visual cues delivered through i-phones, text prompts) to facilitate skill development. These promising results suggest sustained opportunities for modeling, practice, and explicit feedback may assist individuals with ASD in improving work-related social skills.

Researchers also incorporated technology use into interventions to increase work-related social skills for youth and adults with ASD. Kandalaf et al. (2013) utilized instruction in virtual reality settings to teach interview skills and on-the-job skills related to interacting with co-

workers and managing workplace conflicts and found statistically significant gains in social perception scores over time, along with improvements in conversational skills (Kandaloft et al., 2013). Walsh et al. (2017) described dramatic improvements in social skills performance for seven young adults with ASD/ID when video models were incorporated into the social skills curriculum. These technology-based studies also provided multiple opportunities for instruction, practice, and individualized feedback. However, these studies were unique in that they utilized technology in order to minimize potentially distracting stimuli and to highlight key aspects of social interactions – features that may be particularly helpful for learners with ASD, who may struggle to identify pertinent social cues (American Psychiatric Association, 2013). Using technology to teach social skills may also play to visual processing strengths that individuals with ASD often possess, by situating instruction within distinctively visual environments (Hume et al., 2009).

Intervention Settings and Targeted Skills

Findings from this systematic literature review revealed gaps in current research. First, work-related social skills intervention research thus far has been conducted primarily in segregated workplaces, training environments, or university-based clinics. While the immediate settings were quite heterogeneous (e.g., community-based social support group, specialized supported employment job training program, analog fire safety assemblies, group-based instructional settings, virtual reality environment, training centers), only two of the reviewed interventions occurred in competitive, integrated workplace settings (Gentry et al., 2015; Wehman et al., 2017). The dearth of studies occurring within competitive, integrated work environments is concerning given sustained calls to increase competitive, integrated employment outcomes for individuals with ASD and other significant disabilities (Carter et al., 2012; Nord et

al., 2013; Wehman et al., 2018). It is unclear the extent to which social skill improvements documented in segregated or classroom environments would generalize to, or be relevant in, competitive, integrated community-based workplace settings. Second, work-related social skills interventions often used broad curricula that targeted work-related social skills within a wider range of skills, or they focused specifically on teaching interview skills. Additional research is needed that targets and measures the social skills required to successfully maintain employment within specific business contexts (e.g., accepting correction from supervisors, requesting clarification, interacting with coworkers and customers). Finally, the majority of research conducted on work-related social skills thus far has included adult participants with ASD who have exited high school. Given recent federal mandates to expand community-based work experiences for youth with disabilities, research is needed that includes transition-aged high school students with ASD and investigates the effectiveness of interventions implemented within community-based work experience programs.

High Quality Research

While multiple studies included many of the research quality indicators for each of the designs, several methodological components were lacking across studies. Most notably, four out of the 10 group-based studies used one-group pre-experimental designs (Baker-Ericzén et al., 2018; Kandalaf et al., 2013; Liu et al., 2013; Mathrick et al., 2017). Although all of these articles were designated as pilot studies, significant threats to internal validity remain, due to decreased experimental control (McMillan, 2016). In addition, six of the of group studies were characterized by small sample sizes, which may have limited the utility of inferential statistical measures in evaluating outcomes. Fidelity of implementation measures (Gersten et al., 2005) were also missing from several group design studies (e.g., Gentry et al., 2014; Kandalaf et al.,

2012). However, it should be noted that the individualized nature of many relevant work-related social skills supports was consistently highlighted across studies (e.g., Gentry et al., 2014; Wehman et al., 2017), which may confound efforts to more rigorously measure intervention fidelity. Researchers also described concerns about the sensitivity of existing standardized social skills instruments to measure specific changes in participant performance post-intervention (Gentry et al., 2015; Kandalaf et al., 2015; Walsh et al., 2017). This warrants consideration, given that the use of broad performance measures can limit estimates of intervention effectiveness (Gersten et al., 2005) and points to the need for the development of more sensitive measures of social skills performance. Finally, two of the reviewed single-subject studies (Grob et al., 2018; White et al., 2011) did not assess social validity of the interventions (Horner et al., 2005). Examination of how single-subject research can lead to practical improvements in participants' lives is a well-established tenet of this methodology (Baer et al., 1968; Horner et al., 2005). Careful assessment of the social validity of an intervention (e.g., the intervention's acceptability, feasibility, and/or usability to participants and key stakeholders) provides important information to practitioners and stakeholders about whether or not a given intervention would be appropriate or useful within a specific context.

Implications

Research Implications

More research is needed to evaluate the effectiveness of specific instructional strategies on the development of fundamental workplace-based social skills of transition-aged youth and adults with ASD. Research is lacking that targets and measures specific social skills needed by individuals with ASD in day-to-day employment settings (e.g., accepting correction from supervisors, greeting customers, interacting with co-workers, asking for help). Implicit in this

recommendation is a secondary call for research that takes place in competitive, integrated workplace settings. Given documented difficulties that individuals with ASD may experience in transferring social skills to new environments (Bellini et al., 2007), it is critical that work-related social skill interventions are conducted in “real life” workplaces to examine the impact of interventions that are embedded in authentic contexts on skill performance.

Results of the analysis of quality standards within included studies also reveals a continued need for more rigorous methodological research. While the use of RCT design in this area is promising, development of evidence-based practices within this subset of employment research will rely on replicability of findings. As a result, future researchers should consider methods of balancing the obvious need to individualize social skills interventions with that of developing and measuring intervention fidelity. Likewise, for single-subject researchers, the increased use of rigorous social validity measures is imperative in order to situate the practical impact of specific interventions, given the expansive range of skills and competencies that fall under the umbrella of social skills.

These findings highlight the need to improve the quality of the research being conducted for two main reasons. First, we need a base of strong research so that future studies can be guided by the previous studies. When basic research is not strong, it makes it much more difficult to justify the direction of new research in the field. Second, we need to be sure that studies in this field use strong research methodology to give greater credibility to the interpretation of the results. The interpretation of the results of a study or group of studies provides guidance to the field; they use that to determine whether to implement the intervention or strategy and under which circumstances. However, if the methodology has significant limitations, it is much more difficult to determine the implication for practice. A

recommendation to improve the quality of research moving forward is critical given the impact that social skills have on the ability of individuals with ASD to find and keep employment. A failure to conduct high quality research on interventions and strategies designed to improve social skills can mean a continuation of poor employment outcomes for this population of young adults. There is a challenge in implementing this recommendation as field-based research rarely can be implemented as purely as lab-based research where all the variables can be controlled. However, the goal of continuing to strengthen these studies should remain a top priority.

Implications for Practitioners

The findings from this systematic literature review suggest that when providing instruction in work-related social skills to individuals with ASD, practitioners should consider utilizing approaches that include modeling of specific social skills, multiple opportunities for practicing skills, and explicit, individualized feedback on performance. This recommendation aligns with previous research, which highlights the effectiveness of these strategies in social skill instruction (Roth et al., 2014; White et al., 2007). Special educators, VR counselors, and job coaches should also consider how they can expand opportunities for individuals with ASD to practice these skills in the workplace settings in which the skills are used. Conducting social skills instruction within work-based environments may help ensure that skills targeted for instruction are relevant to the workplace setting and may decrease the need for skill transfer and generalization, which can be difficult for learners with ASD (Agran et al., 2016; Bellini et al., 2007).

Also, this systematic literature review highlights how technology-based strategies can be useful in teaching work-related social skills. The findings indicate that technology-based strategies, such as video modeling or instruction in virtual reality environments, may assist

individuals with ASD in improving social skills when they do not have “real life” access to similar social contexts, need instruction prior to encountering similar social situations, or have difficulties discerning relevant social cues within specific contexts. Because individuals with ASD often experience strengths in visual processing, technologically-oriented approaches that incorporate visual modalities may better support learners with ASD in their acquisition of work-related social skills (Hume et al., 2009).

Policy Implications

Through IDEA and WIOA, federal policies and funding emphasize competitive, integrated employment outcomes for individuals with disabilities. Yet this systematic literature review highlights how little work-related social skills research has occurred within competitive, integrated workplace settings for adults and transition-aged youth with ASD. Federal support for research in this area is needed to investigate how training in work-related social skills can increase employment opportunities and performance of individuals with ASD. Furthermore, despite requirements to address social skills during the transition planning process, many transition-aged youth with ASD may not be receiving research-supported strategies or may not be receiving them in ways that can be used in workplace settings. Technical assistance, through online resources and training opportunities, should be made widely available to transition teams to assist them in developing competitive, integrated work experiences within their local communities and teaching work-related social skills within those settings. To help ensure individual students have access to these types of work experiences while in high school, competitive, integrated employment goals should be written into students’ IEP transition plans (Wehman et al., 2018). Ultimately, strengthening these transition requirements could help improve post-school employment outcomes for youth with ASD.

Limitations

This systematic literature review has several limitations. First, only peer-reviewed journal articles were included, which could have resulted in publication bias. The inclusion of dissertations and other types of articles may have yielded dissimilar results and ultimately led to a different understanding of effective work-related social skill interventions. Also, the researchers used database searches to identify potential articles. Incorporating other search strategies, such as ancestral and hand searches, may have unearthed additional articles relevant to the area of work-related social skills. Finally, the findings of this systematic literature review were necessarily constrained by the procedures used in it, and other studies may have been published since the literature review was conducted.

Conclusion

This systematic review identified 14 intervention-based articles that focused on improving work-related social skills of individuals with ASD. The studies varied extensively in regard to settings and targeted social skills. In addition, methodological weaknesses limited the ability to draw substantive inferences from findings of several reviewed articles. However, results point to promising approaches for increasing work-related social skills by utilizing key elements of explication/direct instruction, role play/rehearsals, and performance feedback and by incorporating visually-based, technological approaches to instruction. Future research is needed that focuses on improving specific work-related skills necessary in competitive, integrated workplace settings. Identifying effective interventions in these areas will be critical in assisting individuals with ASD in both job retention and career growth.

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Table 1*Characteristics of Studies Focused on Increasing Work-Related Social Skills*

Reference	Sample	Design	Social Skills Outcome Measure(s)	Results
Ashman et al. (2017)	N = 19, 68% Male, ages 19-61, mean IQ 103.6 (TG) and 109.0 (CG)	RCT	Reading the Mind in the Eyes, Reading the Mind in the Voice, Social Responsiveness Scale–2nd edition (SRS-2)	Increased social cognition scores for social skills training group (0.53 -0.74)
Baker-Ericzén et al. (2018)	N = 8, 78% Male, ages 18-29, 75% White, no co-occurring ID	PE	SRS-2, Social Skills Performance Assessment (SSPA)	Improvements across all measures (0.44 - 1.83)
Bonete et al. (2015)	N = 100, 86% Male, ages 16-29, mean IQ 96.23 (TG)	QE	Assessment of Social Problem-Solving task, Vineland Adaptive Behavior Scales – 2 nd edition (VABS-II), Osnabruck Ability to Work Profile	Effect size differences between groups on measures decreased at posttest
Burke et al. (2010)	S1: N = 3, 100% Male, ages 20-27, 1 participant Asian-American, 2 participants White, IQ range 70-85 S2: N = 3, 100% Male, ages 18-20, IQ range 106-121	S1: MBD S2: MBD	Event recording of required social responses during analog work situation	S1: 1 participant reached criterion (80%) with BST alone, 2 participants reached criterion with introduction of PCS S2: 2 participants reached criterion (80%) with PCS, 1 participant required combination of PCS and BST to reach criterion
Gentry et al. (2015)	N = 50, 84% Male, ages 18-60, 60% White, 30% African-American, 6% Hispanic, 2% Asian	RCT	Support Intensity Scale (SIS), Employee Performance Evaluation Report (EPER)	No significant differences between groups in support needs ($p = 0.26$, $p = 0.31$) or work performance ($p = 0.47$, $p = 0.61$)
Grob et al. (2019)	N = 3, ages 19-27, 67% Male, IQ scores for 2	MBD	Occurrence/non-occurrence of making confirming statements, asking for a task	2 participants acquired and generalized skills, 1 participant required immediate

	participants provided – 84 and 70		model, apologizing, asking for task feedback, and asking for help	monetary reinforcement to demonstrate skills
Kandalaft et al. (2013)	N = 8, ages 18-26, 75% Male, 87.5% White, IQ range 99-122	PE	Advanced Clinical Solutions for WAIS-IV and WMS-IV Social Perception Subtest, Facial Expressions of Emotion Stimuli and Tests, Reading the Mind in the Eyes, Triangles, SSPA	Increases in measures of theory of mind and emotion recognition (0.53 - 0.69), improved conversational skills approaching significance ($p = 0.053$)
Liu et al. (2013)	N = 14, ages 18-40, 71.4% Male, mean IQ 72.5	PE	Work Personality Profile, Scale of Independent Behaviour–Revised, Observational Emotional Inventory Revised	Significant improvements in workplace social behaviors ($p = 0.089$), social communication ($p = 0.028$), emotional- coping abilities ($p = 0.008$)
Mathrick et al. (2017)	N = 12, ages 17-18, 75% Male, 33% of sample diagnosed with ASD	PE	Scored mock job interviews using behavioral coding	Increases in positive non-verbal behaviors and positive verbal behaviors (3.1, 6.88)
Morgan et al. (2014)	N = 28, ages 18-36, 96% Male, 86% White, 7% Hispanic, 7% African- American; mean IQ 103.0	RCT	Scored mock job interviews using observational tool, Social Pragmatic Scale, VABS-II	Residual gain scores for mock interviews significantly higher for experimental group (0.87), increase in adaptive skills (1.09)
Oswald et al. (2018)	N = 44, ages 18-38, 70% Male, 73% White; mean IQ 102	RCT	Adaptive Behavior Assessment System, Adult Form, 3 rd ed.	Trend-level increases in social adaptive functioning for treatment group participants ($p = 0.09$)
Walsh et al. (2017)	N = 7, ages 19-22, 57% Male, 100% White, IQ range 52-66	MPD	Performance probes, SRS-2, Social Skills Improvement System Rating Scale, ACCESS placement test	73-100% of skills demonstrated post- teaching and at 3-month follow-up, increase in social skills (0.58), decrease in social impairment (0.03), improved placement test scores (0.63)
Wehman et al.	N = 49, ages 18-21, 71% Male, 45% African-	RCT	SIS	Support intensity needs of treatment group decreased ($p < 0.0001$)

(2017) American, 51% White,
4% Asian

White et al. (2011)	N = 6, ages 16-19, 100% Male	MBD	% of task components completed accurately and only once by each pair	All 3 pairs met 80% criterion for completing tasks cooperatively using single schedule
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Note. TG = Treatment Group; CG = Control Group; RCT = Randomized Controlled Trial; PE = Pre-Experimental; QE = Quasi-Experimental; S1 = Study 1; S2 = Study 2; BST = Behavioral Skills Training; PCS = Personal Digital Assistant Cueing System; MBD = Multiple Baseline Design; MPD = Multiple Probe Design. Effect sizes are reported in parentheses whenever available; otherwise, *p*-values are used to indicate significance.