What is the effectiveness of vocational skills group programmes for adolescents (15-18 years old) with Intellectual Disability, ASD and/or ADHD?

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This evidence-based review has been prepared by masters-entry students as part of Occupational Therapy Field Practice 4 at the University of South Australia. Due to limitations of assignment requirements reviews are limited in terms of number of evidence sources. Conclusions and implications for clinical practice reported are provisional based on the evidence identified in this review and should be contextualized to local practice, clinical expertise and patient values. For further information on the review process please contact Kobie.Boshoff@unisa.edu.au

Abstract

Background: Many adolescents with neurodevelopmental disabilities have goals of obtaining and maintaining employment, while vocational skills group programmes provide a means of developing important work-related skills. Such skills include communication, coping skills, adapting to change and problem solving. **Review question:** What is the effectiveness of vocational skills group programmes for adolescents (15-18 years old) with Intellectual Disability, ASD and/or ADHD? **Data sources:** Peer-reviewed databases including Medline, Ovid Emcare, Embase amd PsycINFO. **Appraisal and synthesis methods:** The methodological quality of included studies was assessed using a modified McMaster Critical Review Form for Quantitative Studies. A scoring system was devised to provide an indication of overall study quality. The NHMRC hierarchy of evidence matrix was also used to determine the level of evidence. **Results:** Two studies met the inclusion criteria and were considered in the review (Bonete et al., 2015; Connor et al., 2020), providing promising results supporting the implementation of group vocational skills programmes. Improvements were observed in social problem-solving and functioning, adaptive behaviour, and self-efficacy immediately post-intervention, though whether these improves are maintained longer-term is undetermined. **Limitations:** Despite relatively high critical appraisal scores, methodological shortcomings increase the risk of bias in study results. Specifically, both studies employed a convenience sample and did not randomise participants. The sampling procedures used increase the threat of selection and expectation biases, while assessment instruments developed for neurotypical populations were generally employed, posing as a threat to the validity of measures in the reviewed studies. **Conclusions and implications of key findings:** Few studies that met the review inclusion criteria were identified. While there were additional studies investigating employment skills group programmes in the literature search, these did not include participants who were under

the age of 18 years old. The studies reviewed provide promising findings and approaches that can be used within group interventions. Future research may benefit from implementing larger randomised controlled trials, and both measures that have been validated for the population of interest (i.e., adolescents with neurodevelopmental disabilities) and that indicate generalisability of skills learnt in session to real-world outcomes (e.g., employment obtainment and retention).

Introduction

Adolescents with neurodevelopmental disabilities, such as Attention-Deficit/Hyperactivity Disorder (ADHD), Intellectual Disability (ID) and Autism Spectrum Disorder (ASD) often have difficulties learning and developing appropriate skills to prepare for gaining vocational employment, such as communication, coping skills, adapting to change and problem solving (APA, 2013).

For example, many adults with autism wish to engage in work and community occupations and have expressed their need for additional support and training to both find and retain a job (Sosnowy et al., 2018). Work-related social skills have been identified as an area of particular importance (Chen et al., 2014). Group-based interventions conducted in controlled and supportive settings are of interest as they provide opportunities for practicing skills in a social setting with peers, and guidance from facilitators (Tse et al., 2007). According to the AOTA (2020, p. 77), group interventions involve the "use of distinct knowledge of the dynamics of group and social interaction and leadership techniques to facilitate learning and skill acquisition across the lifespan". This model of treatment provision provides an environment where clients can learn, and practice skills required to obtain and maintain vocational employment. The PICO and research question for the current review are summarised in Table 1.

Table 1. PICO and Clinical Review Question

Population	Adolescents aged 15-18 years old with a diagnosis of ID, ASD and/or ADHD.
Intervention	Group work/employment skills programs which target building skills related to obtaining and maintaining vocational employment (e.g., work readiness skills such as resume writing, interview skills, organisational skills, social skills). Implemented by allied health practitioners (e.g., psychology, occupational therapy, developmental educator, speech pathology).
Comparison	No intervention/usual care control group, typically developing peers or pre-intervention (for pre-post single group designs).
Outcome/s	Quantitative outcomes including: o Employment obtainment, retention and satisfaction o Employment in assisted (e.g., disability employment services) vs. open employment o Psychological outcomes (e.g., quality of life, confidence) o Social outcomes (e.g., social connections, social skills).
Clinical Question	What is the effectiveness of vocational skills group programmes for adolescents (15-18 years old, inclusive) with ID, ASD and/or ADHD?

Method

The search strategy and databases searched are outlined in Table 2. All database searches were conducted on Oct 3rd, 2021. The search strategy was devised with assistance from a University of South Australia librarian. Database searches are provided in Appendix B. Inclusion and exclusion criteria for the review are listed in Table 3.

Table 2. Search Strategy

Databases Searched	Key Word Search Terms	Limits Used
Medline Ovid Emcare (formally CINAHL) Embase PsycINFO	student* or youth* or adolescen* or teen* or young* person* or minor* AND ((Intellect* or mental or cognit*) adj2 (disabilit* or disable* or disorder* or condition)) or Autism Spectrum Disorder or ASD or Autis* or asperger* or "Attention Deficit Disorder with Hyperactivity" or ADHD) AND ((Vocation* or employ* or work* or profession* or job or supported employ*) adj3 (group* or program* or intervention* or training or educat* or instruct* or support* or transition* or skill*)) AND treatment outcome or efficac* or effect*	Written in English Studies with human participants only

Table 3. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Group programmes (containing at least 3 participants) involving multiple sessions. Described as work/employment skills interventions which target work readiness skills (e.g., resume writing, social skills, organization, problem solving). Programmes conducted in clinical settings/controlled environments (i.e., clinic based as opposed to on-the-job/internships). Adolescents with a diagnosed neurodevelopmental disability (specifically; intellectual disability, ASD or ADHD). Articles in English Studies including a sample in which the age range includes participant/s who are/is less than 18 years old. Reports employment related (i.e., obtainment, retention, satisfaction), psychological or social quantitative outcomes. Primary research studies. Studies conducted in a Western context. Published in previous 20 years. Quantitative studies, including: • RCTs. • Comparative studies with or without concurrent controls (e.g., non-randomised experimental trial). • Case series with either post-test or pre-test/post-test outcomes.	Language other than English One-on-one interventions (incl. non-group interventions or specific strategies that do not involve group work). Studies which assess effectiveness of specific strategies that assist in completing vocational tasks (e.g., effects of video prompting/problem solving strategy/model reinforcement counseling on completion of vocational tasks). Studies involving only participants aged >18. Conference papers/abstracts. Editorials, opinion pieces, points of view, comments. Consensus statements. Qualitative studies. Case studies. Secondary research (incl. textbooks, systematic reviews and meta-analyses). Relevant systematic reviews and meta-analysis identified for pearling to locate additional studies of interest. Interventions targeting skills that could relate to work readiness, but are not described as specifically targeting vocational/work-related skills (e.g., excluding interventions targeting general 'social skills').

Results

A PRISMA flow chart is provided in Appendix A. This figure outlines the screening process and provides reasons for exclusion at the full-text stage. 2184 papers were screened at title and abstract and 24 at full text. A systematic review by Campanaro et al. (2021) was identified within the search and considered relevant to the PICO. One potentially relevant study from this review was identified and added to the screening at the full-text stage. Following full-text screening, two relevant articles remained (Bonete, Calero & Fernandez-Parra, 2015; Connor et al., 2020).

Study characteristics, intervention details, and outcomes and findings are presented in Tables 4, 5, and 6, respectively. Statistically significant findings in Table 6 are indicated in green text.

The methodological quality of included studies was assessed using a modified McMaster Critical Review Form for Quantitative Studies. The McMaster Critical Review Form (Law et al., 1998) was chosen as it is applicable to a wide range of study designs, has been widely published, and is freely available. Appraisal scores are summarised in Appendix C, indicating a score of 85% for the Bonete et al. (2015) study and 92% for the Connor et al. (2020) study.

Table 4. Study Characteristics

Study	Design	NHMRC Level	Participants	Comparison	Measurement Time-Points
Bonete et al. (2015)	Comparative study with concurrent controls	III-2	n = 50 (43 male, 7 female), 16-29 years old, diagnosed with Asperger syndrome (AS), global IQ within limits of normality. Exclusion criteria: comorbid major psychiatric disorders (including ADHD, OCD) or other disorders, learning disability or any history of illness or injury involving the brain.	Control group (CG) of **typically developing peers** matched for gender, age and non-verbal IQ standard scores. There was no intervention for the CG. Results were used for sample comparisons.	Pre-treatment Post-treatment (i.e. immediately after completion intervention). 3-month follow-up questionnaire
Connor et al. (2020)	Comparative study without concurrent controls	III-3	n = 26, (21 male, 5 female), 17-23 years old (M = 20.4, SD = 1.5), IQ (range: 65-138, M = 96.3, SD = 17.9), without intellectual disability diagnosed with Autistic Disorder, Asperger's Disorder, pervasive developmental disorder—not otherwise specified (PDD-NOS) according to DSM-IV-TR. Referred to as participants with high-functioning autism (HFASD). Comorbidities incl. Anxiety (23.1%), ADHD (23.1%), Depression (15.4%), Epilepsy (3.8%), OCD (3.8%), Diabetes (3.8%). Inclusion criteria incl. no current participation in other work-related social skills intervention.	N/A	Pre-treatment Post-treatment (i.e. within two weeks of project completion) Follow-up: 8-10 weeks after project completion

Table 5. Study Intervention Details

Study	Programme	Characteristics/Approach	Who delivered it	Frequency	Setting
Bonete et al. (2015)	Interpersonal Problem-Solving Skills for Workplace Adaptation (SCI-Labour)	Mediational approach adopted for learning. Therapist's aim was to provide clues to understand and verbalise, session by session, the phases regarding the solution of interpersonal problems. Supported by examples on common interpersonal problems that take place in a work environment in combination with participant personal experiences. Sequential training in a cognitive and metacognitive process. Two homework tasks given at the end of each session.	Psychologist trained in mediation approach and experienced in working with people with ASDs.	75-minute sessions, delivered once a week for 10 weeks.	Ten AS groups held over an academic year with between four and six participants with ASDs. Community settings.
Connor et al. (2020)	The Assistive Soft Skills and Employment Training (ASSET) program	Work related soft skills taught using social-cognitive approach. Group format created opportunities to explicitly practice skills through peer interaction and group activities with the guidance of facilitators and provision of immediate feedback. Guided by a manual, which included lesson plans, handouts, agendas, and calendars. Each	Two doctoral students and one postdoctoral fellow involved in curriculum development and monitoring for treatment fidelity. Group facilitators and research assistants had	90-minute group session followed by a social hour, once a week for 8 weeks.	3–6 students from similar educational backgrounds and career goals (college students with a career focus, or transition-age youth with an entry-level employment focus).

Study	Programme	Characteristics/Approach	Who delivered it	Frequency	Setting
		session structured with use of a PowerPoint presentation embedded with videos and variety of materials/supplies for group activities. Explicit teaching of soft skills via didactic instruction, modeling, role-play, and feedback in skills execution. Implicit teaching targeted using activity-based group games. ASD-specific modifications include use of video-modeling and feedback, visual agendas, multi-media visuals. At beginning of each session, a warm-up activity that implicitly targeted core components of the session's theme were used. Questions, probing and clarifying statements, and summaries used to promote group discussion. Explicit instruction given regarding the importance of using learned skills outside of group. Weekly homework assigned, then shared and discussed near the beginning of each subsequent session.	minimum of a master's degree in occupational therapy, rehabilitation counseling, or special education. Facilitators were trained and supervised by a faculty member who attended sessions and conducted weekly team meetings with all facilitators, research assistants, and technical support assistants. Interdisciplinary design and validation make delivery amenable to facilitation by a wide range of helping professions (e.g. counseling, OT, social work, special education).		Six intervention groups run over a 3-year period Delivered in a community-based conference room, followed by a social hour (food shared, participants afforded opportunities to apply skills with peers and facilitators).

See Appendix D for summary of intervention programme structure as reported by authors.

Table 6. Study Outcomes and Findings

Study	Outcome Area	Measure	Type	Findings Reported
Bonete, Calero & Fernandez-Parra (2015)	Social Problem-Solving (Primary Outcome)	Evaluación de Solución de Conflictos Interpersonales (ESCI): Assessment of Social Problem-Solving Task: Total	Performance Measure	Statistically sig. within-subject improvement (p<.0001, d = 0.473) 50% of participants showed statistically significant change (RCI > 1.96) for at least one area of the social problem-solving task (ESCI-E, ESCI-C or ESCI-S)
		ESCI-E: Emotion Dimension	Performance Measure	No sig. change
		ESCI-C: Situational Concordance Dimension	Performance Measure	Statistically sig. within-subject improvement (p<.0001, d = 0.240)
		ESCI-S: Solutions Dimension	Performance Measure	Statistically sig. within-subject improvement (p<.0001 d = 0.419)
	Adaptive Behaviour (Secondary Outcome)	Vineland Adaptive Behaviour Scales–Second Edition (VABS-S): Total	Parent Report	Statistically sig. within-subject improvement (p<.0001, d=0.555) 42% obtained statistically significant change (RCI > 1.96) Sig. decrease in difference between AS and GC groups[1]
		VABS-S: Relations	Parent Report	Statistically sig. within-subject improvement (p<.005, d = 0.736) Sig. decrease in difference between AS and GC groups[1]
		VABS-S: Leisure	Parent Report	Statistically sig. within-subject improvement (p<.005, d = 0.239)
		VABS-S: Coping	Parent Report	Statistically sig. within-subject improvement (p<.005, d = 0.665) Sig. decrease in difference between AS and GC groups[1]
	Work Personality Profile	Osnabrück Ability to Work – Participant report (O-AFP-P)[2]	Self-Report	LA subscale showed significant within-subject improvement (p =.003), small effect size (as reported by authors, no Cohen's d) No sig. change in SIC or SAM subscales.

Study	Outcome Area	Measure	Type	Findings Reported
	(Secondary Outcome)	(Secondary Outcome Measure) – 3 subscales: *learning ability* (LA), *social communication and interactional competence* (SIC), *social adaptation and motivation* (SAM)		4% showed statistically significant change (RCI > 1.96)
		Osnabrück Ability to Work – Tutor report (O-AFP-T)[1] (Secondary Outcome Measure)	Tutor-Report	2% showed statistically significant change (RCI > 1.96) No sig. change in LA, SIC or SAM subscales.
	Intervention Feasibility	Completion/attendance	Observational	96% intervention completion rate. 70% overall attendance rate.
		Homework compliance/completion	Observational	Participant compliance with homework assignments, defined as at least partially completed between-session assignments, ranged from 20% to 100% across participants (mean compliance = 87%).
		Programme Satisfaction Survey	Self-Report	In general, participants seemed to be satisfied with what they learned from the programme (M = 33.74, SD = 11.48). Possible total score range was 12-48 (higher scores indicate greater satisfaction).
		3-month follow-up questionnaire	Self-Report & Parent Report	100% of participants and parents agreed that intervention should be funded by public or private enterprise and recommended the programme for someone with their condition. As a group, participants reported a medium change (a score of 3) on majority of items (which referred to the steps trained during the programme)

Study	Outcome Area	Measure	Type	Findings Reported
Connor et al. (2020)	Social Functioning (Primary outcome)	Social Functioning Questionnaire (SFQ)	Self-Report	T2 vs. T1: statistically sig. improvement (p = .042, d = 0.44), medium effect size T3 vs. T1: statistically sig. improvement (p = .048, d = 0.50), medium effect size
		Social Responsiveness Scale (SRS-2): Social cognition	Unclear	T2 vs. T1: statistically sig. improvement (p = .013, d = 0.70), medium effect size T3 vs. T1: sig. change not maintained
		SRS-2: Social communication	Unclear	T2 vs. T1: no sig. change T3 vs. T1: no sig. change
	Self-Efficacy (Primary Outcome)	General Self Efficacy Scale (GSE)	Self-Report	T2 vs. T1: statistically sig. improvement (p <.001, d = 0.87), large effect size T3 vs. T1: statistical sig. improvement (p = .014, d = 0.67), medium effect size
		Perceived Empathic Self-Efficacy Scale (PESE)	Self-Report	T2 vs. T1: statistically sig. improvement (p = <.001, d = 1.50), large effect size T3 vs. T1: sig. change not maintained
		Perceived Social Self-Efficacy Scale (PSSE)	Self-Report	T2 vs. T1: statistically sig. improvement (p = <.001, d = 0.93), large effect size T3 vs. T1: sig. change not maintained
	Psychological Wellness (Secondary Outcome)	Patient Health Questionnaire-9 (PHQ-9): Depression	Self-Report	T2 vs. T1: no sig. change T3 vs. T1: no sig. change
		General Anxiety Disorder Questionnaire-7 (GAD-7): Anxiety	Self-Report	T2 vs. T1: no sig. change T3 vs. T1: statistically sig. improvement (p = .01, d = 0.68), medium effect size

d = Cohen's D, RCI = Reliable Change Indices (Jacobson and Truax, 1991), T1 = Pre-treatment, T2 = Post-treatment (i.e. within two weeks of project completion), T3 = Follow-up: 8-10 weeks after project completion.

[1]Spanish translation of German scale version, Work Personality Profile.

[2]Authors compared the Asperger Syndrome (AS) group pre and post measures with typically developing peers control group (CG) measures. T-test comparisons were calculated for both groups, pre-treatment and post-treatment. The effect sizes based on post-treatment scores were compared with the effect sizes found at baseline for the AS group compared with the CG. Significant change was indicated by an effect size difference decrease of >0.80 (Cohen's d). The purpose of this analysis was to determine whether the AS group performed more similarly to the CG after the intervention, compared to before the intervention.

Discussion

The reviewed studies by Bonete et al. (2015) and Connor et al. (2020) provide promising results supporting the implementation of group work skills programmes for adolescents with neurodevelopmental disabilities. Improvements were observed in social problem-solving and functioning, adaptive behaviour, and self-efficacy immediately post-intervention, though whether these improvements are maintained longer-term is undetermined. Bonete et al. (2015) also explored programme feasibility with results indicating high satisfaction and attendance. Finally, the authors provide useful approaches to implementing work skills groups with adolescents and young adults. Bonete et al. (2015) utilised a mediational approach which tasks someone considered more competent than the participant/s (i.e. a facilitator) with the role of addressing and emphasising learning difficulties, providing continuous performance feedback and assisting participants to engage in thinking processes, while modifying the environment and stimuli, to facilitate learning (Tzuriel, 2013). Alternatively, Connor et al. (2020) employed a social-cognitive approach which identifies self-efficacy as a key driver of work-related social engagement (Lent and Brown, 1996). Additionally, Connor et al. (2020) utilized a range of ASD-specific strategies within in the program (see Table 5), in addition to a focus on practicing skills in a 'social hour' at the end of each session. However, it is important to acknowledge limitations in the research which impacts the applicability and generalisability of findings. Limitations of the review include the absence of a second reviewer. This threatens the rigor of the screening process as it is possible that relevant articles may have been overlooked. Additionally, the narrow search criteria which excluded non-English language articles and those published more than 20 years ago, decreases the breadth of potentially relevant studies. Such decisions were pragmatic, based on limited time and human resources available for the review.

Overall, few studies that met the review inclusion criteria were identified. While there were additional studies investigating employment skills group programmes in the literature search, these did not include participants who were under the age of 18 years old. It is proposed that the lack of relevant studies may be due to difficulties in obtaining consent for research from adolescents and youth with ASD, due to communication difficulties or reluctance of parents to have their child participate in research. It is important that further research endeavours to include adolescent participants to further elucidate whether such interventions may be beneficial for individuals who may be seeking employment pre-adulthood, and how programmes may be tailored to younger people. Additionally, both studies in the review did not include participants with an intellectual disability, thereby reducing the applicability of findings to this population.

As highlighted by Bonete et al. (2015), the studies do not utilise outcome measures which measure generalisability of results in natural settings outside of sessions. For example, measures do not consider employment outcomes, such as skill acquisition, job attainment and job retention. Further, in the study by Bonete et al. (2015) which included a self-report and tutor-reported measure of work abilities, this measure had generally not improved post-intervention. Future research may benefit from exploring the transferability of skills learnt, including longer-term follow-up to determine whether such skills have been applied in other settings.

In relation to limitations pertaining to outcome measures, both Bonete et al. (2015) and Connor et al. (2020) note that due to the scarcity of measures that have been specifically designed for participants with neurodevelopmental disabilities, assessment instruments developed for neurotypical populations were generally employed (Cunningham, 2012). This poses as a threat to the validity of measures in the reviewed studies. Of the measures used, the Social Responsiveness Scale (SRS-2) utilised by Connor et al. (2020) is specifically

devised as a measure of deficits in social behaviour associated with ASD (Bruni, 2014) and the Vinelands Adaptive Behaviour Scales (2nd Ed) utilised by Bonete et al. (2015) is used to support diagnosis of intellectual and developmental disabilities (Sparrow et al., 2005). However, additional measures used by the authors were instruments developed for neurotypical populations. Hence, there is a need for measures to be utilised in future research which are suitable for the population of interest.

Despite relatively high critical appraisal scores, methodological shortcomings of study designs of included studies increase the risk of bias in results. Specifically, both studies employed a convenience sample and did not randomise participants. Though Bonete et al. (2015) used a matched group of typically developing peers as control group, future research would benefit from utilising a wait-list control group which is comparable to the experimental group (Smith et al., 2007).

Missing data in the Connor et al. (2020) study also threatens the validity of results. It is possible that outcomes may be positively conflated as those with missing data may have performed more poorly than those whose data was included in the analysis. That is, those who were not benefitting from the intervention may have opted to drop-out, thereby positively skewing the results. Due to outlined reasons, the current findings should be looked upon speculatively.

The sampling procedures used in the included studies increase the threat of selection and expectation biases. That is, participants were aware that they were receiving a work-skills intervention and may have been both motivated to improve as well as expecting to improve. This may have been particularly reflected in the self-report measures, where participants and/or their parents may have scored more favourably than they would have if they were unaware of the treatment condition. Additionally, the relatively small sample sizes reduce the reliability of findings. Overall, future studies can improve methodological rigour by

undertaking randomised controlled trials with large sample sizes and including blinding of assessors and participants where possible.

Clinical 'Bottom Line'

The effectiveness of vocational skills group programmes for adolescents (15-18 years old) with Intellectual Disability, ASD and/or ADHD is inconclusive based on current available research, though the studies reviewed provide promising findings and approaches that can be used within group interventions. Future research may benefit from implementing larger randomised controlled trials, and both measures that have been validated for the population of interest (i.e., adolescents with neurodevelopmental disabilities) and that indicate generalisability of skills learnt in session to real-world outcomes (e.g., employment obtainment and retention).

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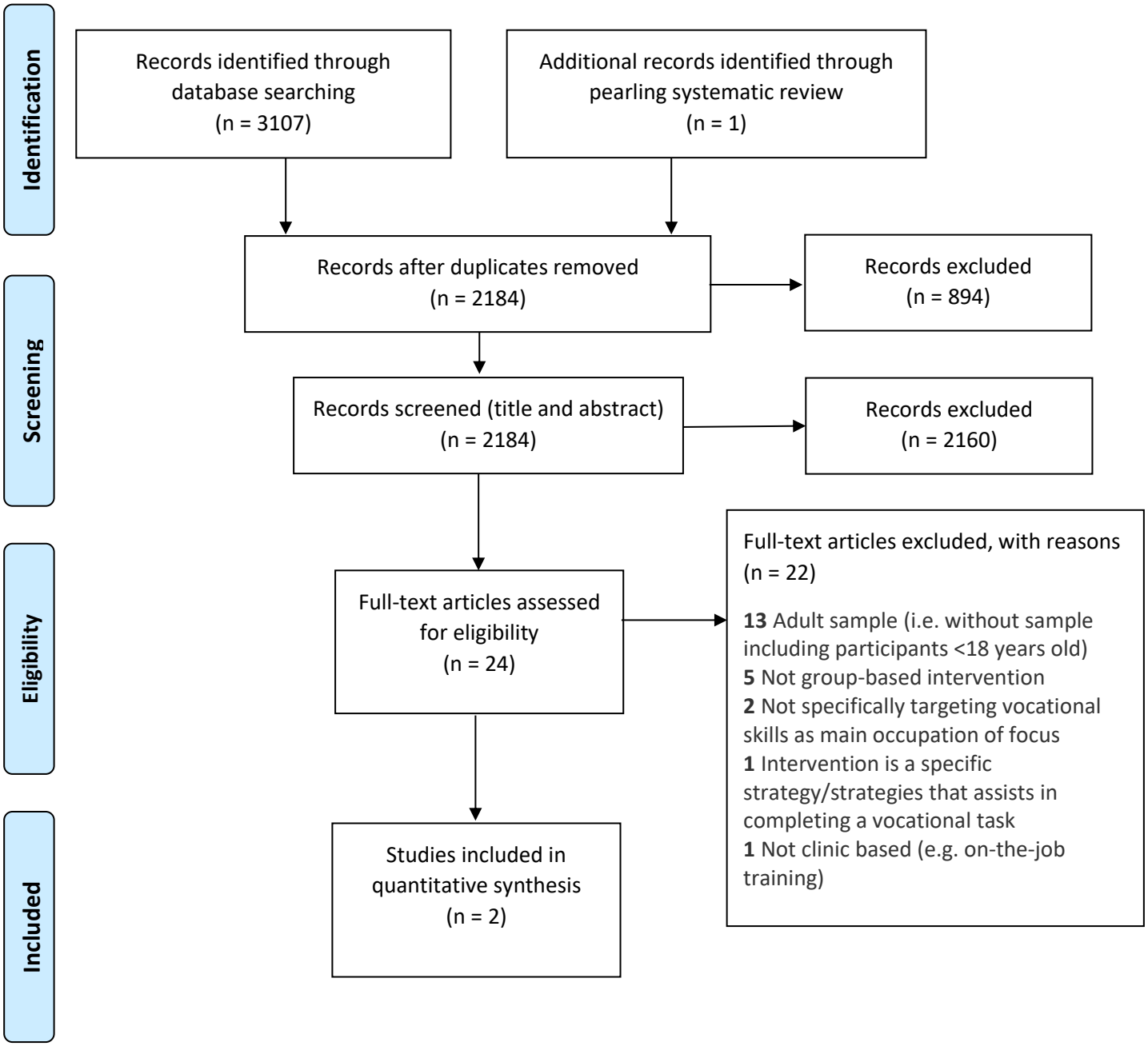
Appendix A. Modified PRISMA Flowchart



Appendix B. Database searches

Database: Medline

#	Searches	Results
1	Adolescent/	2125427
2	Students/	66820
3	Minors/	2674
4	(student* or youth* or adolescen* or teen* or young* person* or minor*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	2784067
5	1 or 2 or 3 or 4	2784067
6	Neurodevelopmental Disorders/	3293
7	exp Autism Spectrum Disorder/	35052
8	Attention Deficit Disorder with Hyperactivity/	31248
9	(((Intellect* or mental or cognit*) adj2 (disabilit* or disable* or disorder* or condition)) or Autism Spectrum Disorder or ASD or Autis* or asperger* or "Attention Deficit Disorder with Hyperactivity" or ADHD).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	441499
10	6 or 7 or 8 or 9	443496
11	Rehabilitation, Vocational/	9561
12	((Vocation* or employ* or work* or profession* or job or supported employ*) adj3 (group* or program* or intervention* or training or educat* or instruct* or support* or transition* or skill*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	187997
13	11 or 12	195261
14	5 and 10 and 13	2688
15	Treatment Outcome/	1057694

16	(treatment outcome or efficac* or effect*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	10945514
17	15 or 16	10945514
18	14 and 17	933
19	limit 18 to (english language and humans)	809

Database: Embase Classic + Embase

#	Searches	Results
1	Adolescent/	1760657
2	Student/	121904
3	"minor (person)"/	753
4	(student* or youth* or adolescen* or teen* or young* person* or minor*).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]	2783030
5	1 or 2 or 3 or 4	2783030
6	exp autism/	79444
7	Attention Deficit Disorder with Hyperactivity/	25184
8	(((Intellect* or mental or cognit*) adj2 (disabilit* or disable* or disorder* or condition)) or Autism Spectrum Disorder or ASD or Autis* or asperger* or "Attention Deficit Disorder with Hyperactivity" or ADHD).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]	267632
9	vocational rehabilitation/	11173
10	((Vocation* or employ* or work* or profession* or job or supported employ*) adj3 (group* or program* or intervention* or training or educat* or instruct* or support* or transition* or skill*)).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]	258360
11	9 or 10	266378
12	Treatment Outcome/	896084
13	(treatment outcome or efficac* or effect*).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]	12226028
14	12 or 13	12226028
15	6 or 7 or 8	280543
16	5 and 11 and 14 and 15	696
17	limit 16 to (human and english language)	645

Database: Ovid Emcare

#	Searches	Results
1	Adolescent/	371371
2	Student/	95068
3	"minor (person)"/	211
4	(student* or youth* or adolescen* or teen* or young* person* or minor*).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword]	731674
5	1 or 2 or 3 or 4	731674
6	exp autism/	31286
7	Attention Deficit Disorder with Hyperactivity/	7159
8	(((Intellect* or mental or cognit*) adj2 (disabilit* or disable* or disorder* or condition)) or Autism Spectrum Disorder or ASD or Autis* or asperger* or "Attention Deficit Disorder with Hyperactivity" or ADHD).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword]	95516
9	vocational rehabilitation/	4039
10	((Vocation* or employ* or work* or profession* or job or supported employ*) adj3 (group* or program* or intervention* or training or educat* or instruct* or support* or transition* or skill*)).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword]	116455
11	9 or 10	118666
12	Treatment Outcome/	237072
13	(treatment outcome or efficac* or effect*).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword]	2198147
14	12 or 13	2198147
15	6 or 7 or 8	99374
16	5 and 11 and 14 and 15	363
17	limit 16 to (human and english language)	328

Database: APA PsycInfo

#	Searches	Results
1	exp Adolescent Behavior/ or exp Adolescent Attitudes/ or exp Adolescent Development/ or exp Adolescent Health/	78072
2	exp High School Students/ or exp Students/	279279
3	(student* or youth* or adolescen* or teen* or young* person* or minor*).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]	1202750
4	Neurodevelopmental Disorders/	2931
5	exp Autism Spectrum Disorders/	47748
6	Attention Deficit Disorder with Hyperactivity/	27151
7	(((Intellect* or mental or cognit*) adj2 (disabilit* or disable* or disorder* or condition)) or Autism Spectrum Disorder or ASD or Autis* or asperger* or "Attention Deficit Disorder with Hyperactivity" or ADHD).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]	281041
8	4 or 5 or 6 or 7	282427
9	Vocational Rehabilitation/	6181
10	((Vocation* or employ* or work* or profession* or job or supported employ*) adj3 (group* or program* or intervention* or training or educat* or instruct* or support* or transition* or skill*)).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]	180105
11	9 or 10	183079
12	Treatment Outcomes/	36453
13	(treatment outcome or efficac* or effect*).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]	1603114
14	12 or 13	1614465
15	1 or 2 or 3	1204464
16	8 and 11 and 14 and 15	1415
17	limit 16 to (human and english language)	1325

Appendix C. Critical Appraisal of Included Studies

			3		4		5			6					
Study	**1**	**2**	**A**	**B**	**A**	**B**	**A**	**B**	**C**	**A**	**B**	**C**	**D**	**7**	**Total Score**
Bonete et al. (2015)	Y	Y	Y	N	Y	Y	Y	N/A	N/S	Y	Y	Y	Y	Y	11/13
Connor et al. (2020)	Y	Y	Y	N	Y	Y	Y	N/A	Y	Y	Y	Y	Y	Y	12/13

Y = Yes, N = No, N/A = not applicable, N/S = not stated

1 = Purpose, 2 = Background literature, 3A = Sample description, 3B = Sample justification, 4A = Reliability of outcome measures, 4B = Validity of outcome measures, 5A = Intervention description, 5B = Contamination, 5C = Co-intervention, 6A = Statistical significance, 6B = Analysis methods, 6C = Clinical importance, 6D = Drop-outs, 7 = Conclusions.

Appendix D Summary of Intervention Programme Structure as Reported by Authors

Bonete, Calero & Fernandez-Parra (2015)

Session	Didactic lesson	Content of the session
1.	Introduction	Interpersonal problem-solving skills can be trained; description of Asperger Syndrome's characteristics
2.	Conversational skills	Importance of listening; starting and maintaining conversation; asking questions
3.	Identifying and defining a problem	Participating; following instructions; looking for 'clues' to discover a problem; personal problems vs. interpersonal problems; defining problems
4.	Different points of view	Detecting and expressing your own feelings; understanding other's feelings; changing perspectives; expressing affection.
5.	Thinking of causes	Influence of different factors on an interpersonal problem; collecting information about causes; different causes of problems
6.	Generating solutions	Generating different solutions; making decisions
7.	Considering consequences; choosing the best option	Examining consequences for each solution; consequences based on time versus consequences based on severity
8.	Plan of action; detecting obstacles	Developing a plan of action for the chosen solution; looking for possible obstacles and factors influencing the final result
9.	Evaluating actions and facing failures	Assessing results; feedback; dealing with failure through concrete actions and feelings
10.	Reviewing the process	Going through the whole resolution process. Applying the full handout to a personal situation for each participant and share it with the group.

Connor et al. (2020)

Session	Topic	Examples of key points of the session
1	Introduction	a. An overview of the ASSET program b. Getting to know each other c. Setting expectations and ground rules
2	Communication	a. Different types of communication (verbal vs. non-verbal; in-person/phone/electronic) b. Appropriate and expected ways of communication across situations and settings c. Elements of successful communication in employment settings d. Different types of personality and communication styles in the workplace
3	Attitude and enthusiasm	a. Proper ways to display enthusiasm in a job position b. Showing positive attitude toward the job c. Presenting strengths and weakness in a confident and professional way
4	Teamwork	a. Understanding ways to contribute in a team setting b. Characteristics of good team leaders and team members c. Identifying individual strengths and needs regarding teamwork
5	Networking and digital identity	a. Strategies to build, expand, and maintain personal networks b. Importance and convenience of using technology as a modern networking approach c. Ways to manage your digital identity in a virtual society
6	Critical thinking and problem solving	a. Significance of critical thinking skills to solve work-related problems b. Introduction to effective ways to problem solve (IDEAL model) c. Strategies to answer behavioral questions calmly and effectively
7	Professionalism	a. Essential elements of professionalism b. Linkage between soft skills and professionalism c. Differences between professional vs unprofessional behaviors in various settings d. Ways to improve professional behaviors
8	Graduation	a. Summary of the program b. Presentation of individual/group project c. Celebration and certificate presentation