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Abstract

Aim: To holistically synthesise the extent and range of literature relating to the employment of individuals with autism spectrum disorder (ASD).

Methods: Database searches of Medline, CINAHL, PsychINFO, Scopus, ERIC, Web of Science and EMBASE were conducted. Studies describing adults with ASD employed in competitive, supported or sheltered employment were included. Content analysis was used to identify the strengths and abilities in the workplace of employees with ASD. Lastly, meaningful concepts relating to employment interventions were extracted and linked to the International Classification of Functioning, Disability and Health (ICF) Cores Sets for ASD.

Results: The search identified 134 studies for inclusion with methodological quality ranging from limited to strong. Of these studies, only 36 evaluated employment interventions that were coded and linked to the ICF, primarily focusing on modifying ASD characteristics for improved job performance, with little consideration of the impact of contextual factors on work participation.

Conclusion: The ICF Core Sets for ASD are a useful tool in holistically examining the employment literature for individuals with ASD. This review highlighted the key role that environmental factors play as barriers and facilitators in the employment of people with ASD and the critical need for interventions which target contextual factors if employment outcomes are to be improved.

Keywords

Adult, intervention, strengths-based, vocational rehabilitation, work environment

Introduction

Autism spectrum disorder (ASD) is a lifelong neurodevelopmental condition with adult outcome studies revealing that few individuals with ASD live independently, have social relationships, or are employed, experiencing poor mental health and overall quality of life (Hendricks and Wehman, 2009; Howlin et al., 2013; Kirby et al., 2016; Levy and Perry, 2011; Magiati et al., 2014; Seltzer et al., 2004). However, some adults with ASD successfully gain post-secondary qualifications, participate in long-term employment, live independently and engage in social and romantic relationships (Eaves and Ho, 2008; Farley et al., 2009; Billstedt and Gillberg, 2005). It is likely that this variability in outcomes is, at least in part, attributable to the heterogeneity of ASD and variability in personal factors, such as intelligence quotient, language abilities, comorbid conditions (Howlin et al., 2004; Henninger and Taylor, 2013; Farley et al., 2009; Kirby et al., 2016; Magiati et al., 2014), environmental factors including family support, access to interventions, and the availability of support services (Holwerda et al., 2012; Levy and Perry, 2011). While research to date has largely focused on impairment, ASD may also be associated with strengths with the potential to leverage improvements in functioning and quality of life (de Schipper et al., 2015; Mottron et al., 2009).

Individuals with ASD possess strengths and abilities, which can be harnessed in the work environment, often performing well in jobs requiring systematic information processing and a high degree of accuracy, precision and repetition (Baldwin et al., 2014; de Schipper et al., 2016; Walsh et al., 2014). Capitalising on these strengths (Clifton and Harter, 2003) and focusing on the person-job-environment fit (Lorenz and Heinitz, 2014) could support successful

outcomes for people with ASD in a variety of employment contexts (Hendricks, 2010; Mawhood and Howlin, 1999). However, despite increasing recognition of the potential contribution that individuals with ASD can make in the workplace, they continue to experience many challenges securing and maintaining employment (Hendricks, 2010; Hurlbutt and Chalmers, 2004; Howlin and Moss, 2012). This is partly driven by models of service which continue to focus on remediating impairments, with little regard for the strengths of people with ASD, perpetuating low expectations and ultimately poor employment outcomes (Holwerda et al., 2012; Lorenz and Heinitz, 2014).

Australian adults with ASD participate in employment at a rate of 42%, in comparison to 53% of all individuals with disabilities, and 83% of individuals without disabilities (Australian Bureau of Statistics, 2009; Australian Bureau of Statistics, 2010). In the United Kingdom, 15% of adults with ASD of working age are in full-time paid employment (Mavranezouli et al., 2013; Rosenblatt, 2008), and only 34% (aged 21-48 years) have ever participated in 'some' form of employment, inclusive of independent work, self-employed or sheltered employment (Howlin et al., 2004). Similarly, in the United States 58% of young adults (aged 18-25 years) with ASD have worked for pay, and only 21% are in full-time employment (Bureau of Labor Statistics, 2013; Roux et al., 2015). While some individuals with ASD do find employment, many work in positions below their qualifications or skill level, working reduced hours and receiving lower rates of pay than their co-workers in comparative positions (Roux et al., 2015; Shattuck et al., 2012; Howlin et al., 2004). At the individual level, poor employment outcomes among adults with ASD negatively impact socioeconomic status, quality of life and mental health (Gerhardt

and Lainer, 2011; Wanberg, 2012; Fleming et al., 2013), and at the societal level on lost productivity and increased reliance on government funding (Krieger et al., 2012; Järbrink et al., 2007; Roux et al., 2013).

Employment commonly occurs within environments that are potentially challenging for individuals with ASD (Leonard et al., 2010; Müller et al., 2003; Nord et al., 2016). In the life area of work and employment, the hallmark impairments of ASD manifest in difficulties mastering the job application process, remembering and following instructions, interacting and communicating effectively with co-workers, and integrating into the workplace culture (Baldwin et al., 2014; Krieger et al., 2012; Müller et al., 2003). It is however likely that the low levels of participation in employment are influenced by environmental factors such as employers' attitudes and concerns over real and perceived barriers to employing individuals with ASD including accommodation costs, additional supervision needs, sick leave, workforce heterogeneity and concern in relation to employee productivity (Unger, 2002; Ju et al., 2013; Hernandez and McDonald, 2010). Common employment processes and practices such as traditional approaches to job advertising and interviewing (Strickland et al., 2013; Scott et al., 2015) and job descriptions requiring generic skills such as teamwork and social-communication skills that are not always essential to the job role, are also likely barriers to securing employment for this group (Fraser et al., 2011; Richards, 2012).

Employment services assist individuals with ASD with recruitment, the interview process, job placement, workplace accommodations and ongoing support. While employment services aim

at maximizing employment outcomes for individuals with ASD, they remain less than optimal and do not provide sufficient and appropriate supports (Lawer et al., 2009; Nicholas et al., 2014; Alverson and Yamamoto, 2016; Anderson et al., 2017). Often employment services overlook the social support needs and on-the-job training required by employees with ASD and have a tendency to treat their needs homogenously (Richards, 2012; Nicholas et al., 2014). Many employment service providers are not trained to comprehensively meet the unique and varying needs of ASD, nor do they have an understanding of the strengths of this population to assist with providing individualised ASD-specific support for employment success (Chen et al., 2015a; Müller et al., 2003). The costs associated with providing vocational supports for ASD may also be a barrier for employment services. The ASD group is considered one of the most costly populations to support in employment, receiving the highest varying and number of supports, remaining longer in the service system yet achieving comparatively poorer employment outcomes to other disabilities (Cimera and Cowan, 2009; Burgess and Cimera, 2014; Chen et al., 2015b; Seaman and Cannella-Malone, 2016). This is problematic given the increasing number of individuals with ASD requiring and utilising vocational support services (Burgess and Cimera, 2014). It is essential that our understanding about the type and level of support required improves, along with the role that extrinsic social and environmental factors play in fostering employment success for individuals with ASD (Nicholas et al., 2014; Kirby et al., 2016).

Employment for adults with ASD can be holistically conceptualised using the *International Classification of Functioning, Disability and Health* (ICF) framework. The ICF takes a

biopsychosocial perspective of health, providing a scientific basis and standardised language for coding and classifying health and health-related states (World Health Organization, 2001). The classification of health and health-related states are described in two parts, each consisting of two components. *Part 1 'Functioning and Disability'* includes the components of, *Body Functions and Structures* (i.e., physiological functioning and anatomical parts of the body) and *Activities* and *Participation* (i.e., execution of a task and involvement in a life situation respectively). *Part 2 'Contextual Factors'* includes the components of, *Environmental factors* (i.e., physical, social and attitudinal environment) and *Personal Factors* (i.e., social and cultural factors intrinsic to the individual) (World Health Organization, 2001). Using taxonomic principles and a hierarchical structure, the ICF organises three of the distinct components described above (i.e., Body Functions and Structures, Activities and Participation and Environmental Factors) into four levels of increasing detail (World Health Organization, 2001). The first level of categorisation refers to the relevant chapters within the ICF, with each chapter providing a general overview of the areas of functioning. Each chapter comprises of second, third and fourth level categories. For example, an ASD-relevant classification from the *Activities and Participation* component shows the hierarchical structure of the ICF:

- Level 1 chapter: d7 Interpersonal interactions and relationships
- Level 2 category: d710 Basic interpersonal interactions
- Level 3 category: d7104 Social cues in relationships
- Level 4 category: d71040 Initiating social interactions

The ICF perceives an individual's functioning and disability as a dynamic process resulting from interactions between the health condition and contextual factors, i.e., the outcome of work participation and employment is a result of the interaction of an individual with ASD and the environmental factors (McDougall et al., 2010; World Health Organization, 2001; Schneidert et al., 2003). Given the many factors influencing work participation and employment of individuals with ASD, the ICF framework is useful in capturing this complex group of intertwined variables and organising this information in a meaningful, interrelated and easily accessible way (World Health Organization, 2001). However, with more than 1650 categories to describe an individual's functioning, using the ICF in its entirety remains too generic and unfeasible (Finger et al., 2012; Stuckl et al., 2002). In an attempt to address this limitation, 'ICF Core Sets, or a condensed list of categories or domains of the ICF relevant to a specific health condition (e.g., ASD) or setting (e.g., the workplace)' (Finger et al., 2012)[p430], have been defined. The development of the ICF Core Sets for ASD enables consideration of functioning across the lifespan and understanding of participation in major life areas, including employment (Bölte et al., 2014; de Schipper et al., 2015; de Schipper et al., 2016; Bölte et al., 2017). The implementation of the ICF Core Sets for ASD will be particularly useful in organising the ASD employment literature according to the target of interventions in relation to *Body functions* and *Activities and Participation,* and the modality of the interventions in relation to *Environmental factors.* The organisation of the ASD employment literature will highlight the gaps in current employment interventions, while re-inforcing successful interventions and their associated outcomes.

Although the number studies examining employment interventions and outcomes has almost doubled in recent years, much remains unknown. This scoping review examines the extent and range of literature relating to the employment of individuals with ASD, employing the ICF as a framework to summarise and synthesise findings with the goal of informing future research and policy, and advancing evidence-based practice. As such, the primary objectives of this review were to: i) holistically and comprehensively review the employment literature and employ the ICF framework (World Health Organization, 2001); ii) explore measures used in evaluating employment outcomes; iii) identify the skills and abilities of individuals with ASD that contribute to successful employment; iv) describe, classify and link to the ICF current employment programs and interventions in ASD (Cieza et al., 2005); and v) summarise the overall outcomes of interventions and support programs.

Methods

A scoping review examined the employment of individuals with ASD, supporting the mapping of key concepts underpinning the research, synthesising the literature and identifying gaps in the evidence, ultimately supporting the dissemination of findings to consumers, researchers and policy makers (Arksey and O'Malley, 2005). The review adopted the methodology for scoping reviews articulated by Arksey and O'Malley's (Arksey and O'Malley, 2005) and refined by Daudt et al. (Daudt et al., 2013) and Levac et al. (Levac et al., 2010), in: (a) identifying the research aims and objectives; (b) searching for relevant studies; (c) systematically selecting studies; (d) charting data; (e) collating, summarising and reporting the results including a methodological assessment of quality; and (f) consulting with stakeholders to inform or validate study findings (Arksey and O'Malley, 2005).

Search strategy

Scoping search strategies promote a comprehensive and broad search of the literature, employing multiple sources (Levac et al., 2010). The literature was searched using electronic databases Medline (1966), CINAHL (1982), PsychINFO (1920), Scopus (1960), ERIC (1992), Web of Science (1972) and EMBASE (1947) for publications from their earliest records to their most recent (June 2018). A further computer search of reference lists of all relevant retrieved articles identified additional significant papers, and employment policies, reports and proceedings retrieved from relevant government websites, networks and organisations. Search terms used were grouped in relation to: (i) diagnosis; (ii) age; (iii) intervention; and, (iv) outcome (Table 1). Combinations of search terms were identified, truncated, exploded and adjusted to achieve optimal results with the assistance of a librarian to comply with each of the databases.

[Insert Table 1 about here]

Study selection

The scoping review process is iterative, involving a multidisciplinary team to ensure a transparent, replicable and rigorous process (Levac et al., 2010). Authors defined and refined the inclusion criteria, based on increasing familiarity with the literature (Arksey and O'Malley, 2005). Following the inventorying and study of abstracts, the research question was revised. Studies were included if, i) participants were individuals with ASD (including autism, Asperger's disorder or pervasive developmental disorder not otherwise specified (PDD-NOS), with or without an intellectual disability, and 18 years or older. Although the inclusion criteria

stipulated participants should be 18 years and older, studies were included if a subset of the participants were under the age of 18, but the mean age of participants was ≥18 years; ii) described the process of finding, gaining and maintaining employment (including the terms competitive, supported, sheltered employment, vocational activities, work experience or internships); iii) reported the use of any employment programs, interventions or vocational supports and iv) published or translated in English. Studies were excluded if the documents were a book or book chapter, editorial or opinion piece, and if they focused on transition planning. Four reviewers independently assessed the relevance of the selected articles.

Charting the data

Data were extracted from the selected articles according to the pre-determined framework (Arksey and O'Malley, 2005). Descriptive study characteristics were charted and organised by unique reference number, author, year of publication, country, design, participants, outcome measures, nature and stage of employment and quality and level of evidence.

Assessment of methodological quality

Methodological quality was independently assessed by two reviewers according to the *Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields* (Kmet et al., 2004), comprising a checklist of 10 items for qualitative studies and 14 items for quantitative studies, underpinning calculation of an overall score of study quality. Scores were represented as percentages with the strength of the evidence categorised as strong (> 80%), good (70-80%), adequate (50-70%) or limited (< 50%) (Lee et al., 2008). Any inconsistencies between reviewers were resolved by discussion. The same two reviewers also

218 determined the level of evidence of each study based on the guidelines developed by the
219 Joanna Briggs Institute (The Joanna Briggs Institute, 2014).

220 *Collating, summarising and reporting the results*

221 Search results were analysed using a combination of techniques. Descriptive analysis
222 characterised included studies, mapping the data, revealing the distribution of studies across
223 employment type, focus of employment programs or interventions and overall employment
224 outcomes (direct and indirect). Assessment of the methodological quality of included studies
225 provided an understanding of the strength of the evidence in relation to the study design
226 (Kmet et al., 2004). Content analysis was used to analyse the content of the literature
227 according to the pre-established categories of *"ASD-related abilities"* as described by de
228 Schipper et al. (de Schipper et al., 2016), quantitatively investigating the frequency of the
229 terms relating to ASD-related skills and abilities, and qualitatively focusing on the meaning and
230 interpretation of the strengths that individuals with ASD contribute to the workplace (Joffe and
231 Yardley, 2004).

232 ***Identifying and linking meaningful concepts to the ICF***

233 Meaningful concepts were identified and extracted in relation to the target and modality of
234 the intervention and then linked to the *Body functions*, *Activities and Participation* and
235 *Environmental factors* components according to the linking rules and procedures described by
236 Cieza et al. (Cieza et al., 2005; Cieza et al., 2002). In cases where concepts were too broad and
237 ICF categories could not be identified, specific codes were assigned, including; a) *"not definable*
238 *(nd)"*, when information provided by a meaningful concept was not sufficient to assign to an
239 ICF category; b) *"personal factor (pf)"*, when a concept was not contained in the ICF, but was

clearly a personal factor as defined by the ICF; c) *"not covered (nc)"*, when a concept was not contained within the ICF and was clearly not a personal factor; and d) *"health condition (hc)"*, when a concept referred to diagnosis or condition (Cieza et al., 2005). Identification and linkage of meaningful concepts to ICF categories were conducted independently by four researchers with linking experience, ensuring the quality and consistency of the results. Linking results of each of the researchers were compared, with any variance discussed to verify concepts and categories until consensus was reached.

Application of the ICF Core Sets for ASD

The linking process was informed by the ICF Core Sets for ASD (Bölte et al., 2017), which have been developed in response to the need for a standardised tool describing functioning in ASD across the lifespan (Bölte et al., 2014; Selb et al., 2015), with this review employing the *brief* ICF Core Sets for ASD inclusive of those categories essential in describing ASD (Cieza et al., 2004; Finger et al., 2012). The application of the *brief* ICF Core Sets for ASD was useful in identifying the targets of employment programs and highlighting the potential targets of future interventions. The targets, modality and outcomes of employment programs and interventions were linked to the *brief* ICF Core Sets for ASD at the second-level. Further linkage to the third and fourth-level was undertaken using the ICF Children and Youth version (ICF-CY) (World Health Organization, 2007), as a supplement to the core sets. The frequency of each category was counted in accordance with the rule that if the same category was assigned more than once to the same employment program or intervention, it was counted only once in the analysis (Selb et al., 2015).

Consulting with stakeholders

While considered an optional step in the review process (Arksey and O'Malley, 2005), consultation with consumers and the community was deemed an important and useful step in guiding all aspects of the review. Consultation with a community reference group occurred throughout the analysis and reporting of this review to validate findings and inform further stages of the research project.

Results

A total of 4,114 references were identified, reduced to 2,434 after the removal of duplicates and inappropriate reference types. Article titles and abstracts were reviewed according to the inclusion criteria, and when information for inclusion was lacking, full text copies of the articles were retrieved and reviewed, with a final *K*=134 articles meeting the inclusion criteria (Figure 1). The majority of identified articles were from the United States (*k*=87), followed by the United Kingdom (*k*=12), Australia (*k*=8) and Sweden (*k*=4). Eighty-four studies were quantitative, of which 22 studies extracted information from national databases rather than directly from participants, 44 were qualitative in design and five were reports and one used a mixed-methodology design. Given the high number of articles included in this review, the analysis of the 134 articles were divided into two categories, i) general articles relating to employment outcomes (*k*=98); and, ii) articles evaluating employment programs and interventions (*k*=36).

[Insert Figure 1 about here]

General articles relating to employment outcomes (k=98)

Quality assessment of studies and levels of evidence

A broad range of evidence was identified. The majority of research articles were rated from level II (quasi-experimental designs) through level V (expert opinion and bench research), with only four articles rated as level I evidence, according to the Joanna Briggs Institute hierarchy of scientific evidence for meaningfulness.

Overall the methodological quality of the included articles ranged from limited (*k*=18), to adequate (*k*=16), to good (*k*=12) to strong (*k*=52). (Kmet et al., 2004). Shortcomings of quantitative studies (*k*=59) included the absence of control groups, a lack of random allocation, small sample sizes, implementation of poorly described or non-standard interventions, along with non-blinded assessments and imprecise measurements of outcomes. Qualitative studies (*k*=33) were limited by failures to adequately report methodological design and procedures including the absence of discussion in relation to if findings achieved a saturation, participants self-selecting as having ASD rather than confirmation of diagnosis, collectively impacting on the transferability and credibility of findings. Table 2 summarises the descriptive characteristics of the employment outcome studies only (*k*=98).

[Insert Table 2 about here]

Employment settings

Articles were categorised according to employment type, including vocational skills training, such as work experience or an internship, and sheltered, supported or competitive employment. The majority of articles (*k*=98) focused on participants with ASD finding and securing roles in paid, supported or competitive employment, while 16 studies investigated

work experience or vocational skills training with the goal of individuals eventually obtaining supported or competitive employment (Allen et al., 2010a; Allen et al., 2010b; Arikawa et al., 2013; Briel and Getzel, 2014; Burgess and Cimera, 2014; Burke et al., 2010; Burke et al., 2013; Dotson et al., 2013; Gal et al., 2015b; Gilson and Carter, 2016; Hayes et al., 2015; Seaman and Cannella-Malone, 2016; Anderson et al., 2017; Baker-Ericzen et al., 2018; Rosen et al., 2017; Walsh et al., 2018). One study explored whether participating in sheltered workshops prior to engaging in supported open employment improved vocational outcomes for individuals with ASD (Table 2) (Cimera et al., 2012). A cluster of 20 articles explored and compared vocational outcomes across a variety of employment settings in relation to factors predicting outcomes (Holwerda et al., 2012; Howlin et al., 2004; Bush and Tassé, 2017) including, supports and services required (Autism Europe, 2014; Gladh and Sjölund, 2014; Hendricks, 2010; McDonough and Revell, 2010; Morgan and Schultz, 2012; Nicholas et al., 2014; Roux et al., 2015; Taylor and Seltzer, 2011; Taylor and Seltzer, 2012; Walsh and Hall, 2012; Rashid et al., 2017; Smith et al., 2017; Nicholas et al., 2017a), the associated costs of ongoing support employment services (Järbrink et al., 2007; Migliore et al., 2014; Cimera and Cowan, 2009), and quality of life outcomes (Garcia-Villamisar et al., 2002). Articles were reviewed for the stage of employment, including job preparation, job acquirement and job retention. While job termination is an important aspect of the employment process, it did not feature in the published research, other than a few papers addressing it as a discussion point. Articles predominantly focused on securing and maintaining a job, with less consideration for job preparation, an aspect more likely to be addressed in the transition literature, which was outside the scope of this review.

Outcome measures

Overall, measures utilised in the employment outcomes studies were primarily characterised as descriptive and observational, with several studies developing their own outcome tools (Howlin and Moss, 2012; Lorenz et al., 2016; Müller and Vangilder, 2014; Ohl et al., 2017). Outcomes were reported according to job type, hours worked, wages earned, and support services required, and were supplemented by employee self-reports and anecdotal employer accounts of job performance. The few studies employing standardised measures (*k*=16) utilised published measures to corroborate and standardise ASD diagnosis (e.g., Autism Diagnostic Interview-Revised), general intellectual abilities (e.g., Wechsler Adult Intelligence Scales), autistic trait severity (Social Responsiveness Scale version 2) and adaptive behaviour (Scales of Independent Behaviour-Revised). Four articles utilised standardised employment-related measures, including the Autism Work Skills Questionnaire (AWSQ) (Gal et al., 2015a), the Vocational Index (Taylor and Seltzer, 2012), the Work Performance Evaluation (WPE) (Katz et al., 2015) and one study examining perceived effort-reward balance at work using the Short Effort Reward Imbalance Questionnaire (ERI) (Ohl et al., 2017). Only three studies explored the impact of employment on quality of life (Gal et al., 2015b; Garcia-Villamisar et al., 2002; Katz et al., 2015).

Content analysis of ASD-related abilities contributing to employment

A sub-group of articles relating to employment outcomes were identified as recognising the skills and abilities that individuals with ASD bring to the workplace. According to the ICF, these specific ASD-related skills and abilities are considered *personal factors.* While personal factors are not classified within the ICF due to their unique and varying characteristics, their

contribution to an individual's disability and functioning may impact on the outcomes of an intervention (World Health Organization, 2001). Given ASD-related skills and abilities could not be linked to the ICF, content analysis was employed to identify the skills and abilities of individuals with ASD contributing to successful employment by examining and coding the results sections only of articles according to the ASD-related ability categories, as described by de Schipper et al. (de Schipper et al., 2016). In total, 14 studies described results which aligned either with the previously described strengths of participants with ASD (de Schipper et al., 2016), or with additional skills and abilities in relation to punctuality, low absenteeism, high quality of work, prompt task commencement and strong work ethic, included in the category of 'other' (Table 3).

[Insert Table 3 about here]

Articles evaluating employment programs and interventions (k=36)

A total of 36 articles describing and evaluating employment programs and interventions for individuals with ASD were included in the linking process. Articles comprised of a total of 556 participants, with a mean age of 23.6 (SD=6.4) years, of which 84% were male. Table 4 summarises the descriptive characteristics of the selected employment program and intervention studies (*k*=36).

[Insert Table 4 about here]

Quality assessment of studies and levels of evidence

The level of evidence of research evaluating employment programs and interventions was rated according to the Joanna Briggs Institute hierarchy of scientific evidence for meaningfulness, from level I (experimental designs) through to level V (expert opinion and bench research), with the majority of articles rated as level II evidence (quasi-experimental designs) (*k*=21) (The Joanna Briggs Institute, 2014). Many articles either described or evaluated the effectiveness of an employment program or intervention with common study designs including multiple-baseline (*k*=12), case studies (*k*=8), randomised controlled trials (*k*=7), cohorts (*k*=3), pretest-posttests (*k*=4) and case-control (*k*=2) (Table 4).

The methodological quality of program and intervention studies ranged from limited (*k*=8); adequate (*k*=12); good (*k*=3) and strong (*k*=13) (Kmet et al., 2004; Lee et al., 2008). Limitations included small sample sizes, a lack of employment outcome measures resulting in a reliance on employee self-report and anecdotal employer accounts on job performance in the workplace, costly implementation of technology-based interventions, and poor translation of interventions and programs into actual employment contexts.

Employment programs and interventions

Studies included in this review targeted the various stages of the employment process including preparing, finding and securing and maintaining employment (Table 4). Of the included studies, 13 focused on employment preparation using video modelling, role playing or group training in teaching the necessary social, communication and vocational skills commonly utilised in acquiring a job. One study primarily focused on gaining employment through Individual Placement Support (McLaren et al., 2017) and eight studies focused on maintaining

a job, primarily employing behavioural and task management strategies delivered through technology, simulation training or job coaches. The remaining 14 studies addressed two or more stages of the employment process, with programs and interventions initially targeting one stage and their respective outcomes targeting another, such as role play used in teaching the appropriate social-communication skills in preparing for a job interview, that when implemented resulted in successfully securing a job (Smith et al., 2014; Strickland et al., 2013). Comparison groups varied. A pre-post study evaluated a manual-based workplace intervention compared to a no treatment group of typically developing adults (Bonete et al., 2015). The Personal Digital Assistant intervention used a delayed RCT, with the control group receiving PDAs 12-weeks after beginning job placement (Gentry et al., 2015). An interview skills group RCT used waitlist control (Morgan et al., 2014). The remaining five RCTs included were all compared to no-treatment groups (Hayes et al., 2015; Smith et al., 2014; Strickland et al., 2013; Wehman et al., 2014; Wehman et al., 2016b).

Intervention outcomes

Three broad outcomes; employment status, vocational skills and executive functioning skills were evaluated (Table 4).

Employment status

Changes in employment status were examined in 12 of the 36 included studies (Burt et al., 1991; Ham et al., 2014; Hill et al., 2013; Hillier et al., 2007; Lynas, 2014; Mawhood and Howlin, 1999; Wehman et al., 2012; Wehman et al., 2013; Wehman et al., 2016b; Wehman et al., 2014; Baker-Ericzen et al., 2018; McLaren et al., 2017); measures utilised were descriptive in nature, such as employment level, wages earned, hours worked and job retention, only two

standardised measures used, including the Work Personality Profile and the Support Intensity Scale (SIS). The two RCTs by Wehman et al. (Wehman et al., 2014; Wehman et al., 2016b) evaluated the effectiveness of the 'Project SEARCH plus Autism' intervention, a transition-to-work support program in comparison to high school special education services as usual. The RCTs found a statistically significant increase in the number of participants in the experimental group employed following the program compared to controls (p=0.0001), with an 87% job retention rate at the 12-month follow-up compared to the control group's 12% job retention rate. A study by Mawhood and Howlin (Mawhood and Howlin, 1999) evaluated an autism-specific employment support program, with the experimental group attaining significantly higher rates of full-time or casual employment (p=0.01), higher wages (p=0.02) and requiring less support over a 2-year period (p=0.001) compared to the control group. The remaining studies reported increased job placement and retention for individuals with ASD following intensive work-training programs and job coaching. Overall, jobs were retained from between 6 and 30 months, wages earned ranged between US $5.01-$18 and an average of 25.45 hours/week were worked (Burt et al., 1991; Ham et al., 2014; Hillier et al., 2007; Wehman et al., 2012; Wehman et al., 2013; Wehman et al., 2014; Wehman et al., 2016b; Baker-Ericzen et al., 2018; McLaren et al., 2017).

Vocational skills

Twenty-three studies evaluated the change in vocational skills used in completing work-related tasks, socialising in the workplace and communicating, as shown in Table 4. A variety of standardised measures were used including the Job Observation and Behaviour Scale (Bennett et al., 2010), Evaluation for the Solutions to Interpersonal Conflicts and Osnabrück Ability to Work Profile (Bonete et al., 2015), The Scales of Independent Behaviour-Revised (Dotson et al.,

2013; Liu et al., 2013), Supports Intensity Scale (SIS) (Gentry et al., 2015; Wehman et al., 2014; Wehman et al., 2016b), Employee Performance Evaluation Report (Gentry et al., 2015), Social Responsiveness Scale-2 (Smith et al., 2014; Strickland et al., 2013), Social Skills Improvement Rating Scales (Walsh et al., 2018), repeatable battery for the assessment of neuropsychological status and Bell-Lysaker Emotion Recognition Task (Smith et al., 2014). A useability study of a video-modelling intervention found that individuals with ASD had greater difficulty selecting adaptive social responses during workplace scenarios compared to typically developing controls (P=0.02). Though reporting that the video-modelling intervention provided less choice than controls (p=0.01), they reported that it was more enjoyable (p=0.02) and personally relevant (p<0.05), indicating its potential in improving social skills in vocational contexts (Rosen et al., 2017). A RCT by Bonete et al. (Bonete et al., 2015) found the experimental group reported significantly higher social problem-solving skills (p<0.001) and socialisation in the workplace (p<0.001) compared to the control group. In a RCT by Gentry et al. (Gentry et al., 2015), personal digital assistants improved the experimental group's task organisation skills resulting in significantly less hours of job coaching support (p=0.013) compared to the control group. Another RCT evaluating interview performances using video modelling (Hayes et al., 2015) revealed significant improvements in interview performances (p<0.001) and associated grooming and hygiene (p=0.02) compared to the control group. A pre-post study (Liu et al., 2013) found their workplace training program to significantly improve the experimental group's social communication skills in the workplace (p=0.02) compared to the control group and found improvements in their social workplace behaviours (p=0.08). The RCT examining the effectiveness of interview skills training (Smith et al., 2014) revealed significantly greater skills in role-play performance for interviews (p=0.04) and improvements in self-confidence (p=0.06)

compared to controls. Strickland's RCT (Strickland et al., 2013) evaluated the effectiveness of teaching interview skills reporting the experimental group ($p<0.001$) demonstrated significantly more effective verbal skills during an interview than controls. A pilot study of the SUCCESS intervention, targeting cognitive and social skills, used an adapted version of the Social Skills Performance Assessment to provide a measure of social skills within a vocational context. Following the intervention, individuals with ASD showed improvements in both communicating with co-workers and requesting time off ($p<0.05$). While not reaching statistical significance, parents also reported improved hygiene in areas such as dressing professionally) (Baker-Ericzen et al., 2018). The remaining studies primarily evaluated the effectiveness of vocational skills training via observation and self-report measures (Allen et al., 2010a; Allen et al., 2010b; Bennett et al., 2010; Burke et al., 2010; Burke et al., 2013; Dotson et al., 2013; Gilson and Carter, 2016; Kellems and Morningstar, 2012; Lattimore et al., 2006; Lattimore et al., 2008; Lynas, 2014; Morgan et al., 2014; Rausa et al., 2016) reporting an increase in workplace social interaction skills and the completion of targeted vocational tasks.

Executive functioning skills

Changes in executive functioning skills were examined in 11 of 36 included studies (Arikawa et al., 2013; Gentry et al., 2012; Ham et al., 2014; Schall, 2010; Smith and Coleman, 1986; Baker-Ericzen et al., 2018), with five reporting positive changes in vocational skills, particularly in relation to employees' self-management of their workplace behaviours (Burke et al., 2010; Hayes et al., 2015; Liu et al., 2013; Morgan et al., 2014; Wehman et al., 2013). Outcome measures included observation (Arikawa et al., 2013; Burke et al., 2010; Ham et al., 2014; Smith and Coleman, 1986), self-report (Gentry et al., 2012; Hayes et al., 2015; Wehman et al., 2013) and functional behaviour assessments (Schall, 2010). Standardised measures were used

in only two studies. Liu et al. (2013) used the Observational Emotional Inventory Revised, reporting that their workplace training program improved the experimental group's emotional response to socialisation resulting in improved concept of self ($p=0.04$) compared to controls. The Delis-Kaplan Executive Functioning System (DKEF-S) and the Behavior Rating Inventory of Executive Functioning – Adult (BRIEF-A) was used to provide a measure of executive functioning in a pilot study of the SUCCESS intervention, with improvements in both assessments observed ($p<0.05$) post intervention (Baker-Ericzen et al., 2018). The RCT conducted by Hayes et al. (Hayes et al., 2015) demonstrated significant improvements in the experimental group in presenting ideas logically and succinctly during an interview ($p=0.009$). Overall, studies examining executive functioning skills found that job coaches who implemented support strategies and the use of technology, such as iPods, assisted in participants' task management, problem-solving and organisational skills, improved participants' ability to self-regulate their workplace behaviours, subsequently increasing their productivity.

Linking employment program and intervention results

In total, 2,372 meaningful concepts were extracted from the 36 selected articles describing the evaluation of employment programs and interventions for individuals with ASD, as described in the previous section. These concepts were linked according to the target of the intervention, in relation to *Body functions* and *Activities and Participation,* and the modality of the intervention in relation to *Environmental factors* (Appendix A). For example, an intervention targeting adults with ASD (*Body functions*) to improve their communication, professional behaviour and self-confidence skills in participating in a job interview (*Activities and Participation*), was

delivered via a virtual reality software program (*Environmental factor*) (Smith et al., 2014). According to this linking process, concepts were linked to a total of 131 unique ICF categories from the first to the fourth level of classification. The target of interventions accounted for 87% of linked categories, with the modality of the intervention only accounting for 13% of categories. In this review, the absolute and relative frequency for the 38 second-level ICF categories, with only the categories identified in at least 5% of the linked articles are reported. Three of the ICF components are represented by these categories, with 22 from *Activities* and *Participation*, eight from *Environmental factors* and eight from *Body functions* (Table 4). No categories were reported that related to *Body structures.*

Activities and Participation

The greatest contribution of meaningful concepts were second level categories within the *Activity and Participation* component of the ICF (Table 5). Six of the nine chapters are represented, with Chapter 3 *Communication* denoting the main target of employment programs and interventions, with the categories, d310 *Communicating with-receiving-spoken messages*, d315 *Communicating with-receiving-non-verbal messages*, d330 *Speaking,* d350 *Conversation* and comprising the focus of interventions in more than half the studies (*k*=20). Subsequently, Chapter 8 *Major life areas,* included the most frequently identified second level category, d845 *Acquiring, keeping and terminating a job,* which was both the target of programs or interventions and the measured outcome in the majority of studies (*k*=27). The chapters of *(d1) learning and applying knowledge, (d2) general tasks and demands*, (d5) *self-care* and *(d7) interpersonal interactions and relationships*, spanned the remaining categories associated with the intervention targets of the studies, which were overall aligned with well recognised work-related needs of individuals with ASD (Chen et al., 2015a).

[Insert Table 5 about here]

Environmental factors

Linking of meaningful concepts associated with *Environmental factors* component revealed that three of the five chapters were represented (Table 6). The most frequently linked category was e360 *Other professionals*, which described job coaches, employment coordinators and vocational rehabilitation counsellors, followed by e130 *Products and technology for education* representing products such as iPads, tablets, and specifically designed software targeting vocational skills. Concepts relating to *(e5) services, systems and polices* described vocational rehabilitation and disability support services assisting individuals with ASD to find and secure employment. It is important to note the linking process aimed to identify those environmental categories associated with employment interventions and processes and did not describe the work environment itself. For example, the code e125 *Products and technology for communication* may refer to the use of an iPad by individuals with ASD for communication purposes, but in this context the iPad was used as a tool to deliver an intervention targeting job interview skills (Gentry et al., 2015; Smith et al., 2014). The work environment itself was not modified or influenced to improve employment outcomes.

[Insert Table 6 about here]

Body functions

Two of the eight chapters of the *Body functions* component were represented in the included studies (Table 7). The majority of categories were linked to Chapter 1 *Mental functions.* The most prevalent categories included b122 *Global psychosocial functions*, b177 *Intellectual functions,* b140 *Attention functions* and b164 *Higher-level cognitive functions,* all of which

included ASD characteristics that are regularly targeted in interventions. This component demonstrated that interventions and programs targeted traits associated with ASD and varying difficulties in the process of preparing, finding and maintaining employment. The most frequently identified category was from the *Body functions* component, b122 *Global psychosocial functions*, indicative of the focus on interventions on impairment-related factors.

[Insert Table 7 about here]

Consultation with stakeholders

Focus groups were conducted with stakeholders comprising of adults with ASD, parents of individuals with ASD, employers, disability employment coordinators, practitioners and expert researchers. Stakeholders were presented with an opportunity to share their perceived concerns in relation to factors influencing the process of finding and securing a job for adults with ASD. Parents of adults with ASD stated:

> Success is achieved in the workplace when people have an understanding of ASD and positive experiences with previous employees with ASD.

Stakeholders also provided feedback regarding the results of the scoping review. The stakeholders' perceived employment concerns were validated by the findings from the scoping review and confirmed that the work environment plays a critical role in influencing employment opportunities and outcomes for people with ASD. While consultation with stakeholders improved the richness of the research process, further exploration of individual perspectives would likely refine feedback and enhance the translation process given the

diversity of the group. Such considerations may be beneficial when conducting future scoping review practices.

Discussion

Given that employment commonly occurs within complex environments, this scoping review used the ICF to enable a structured understanding of the factors contributing to finding and securing employment beyond the diagnosis and functioning levels of individuals with ASD (World Health Organization, 2001). This review found RCT and quasi-experimental evidence to support the effectiveness of employment interventions in adults with ASD in improving vocational skills, executive functioning in relation to job performance and employment status outcomes. Statistically significant improvements were reported for intervention participants compared to control participants across outcomes. While the research is limited, it points to the need for further interventions to be developed and evaluated.

To date, ASD research has largely focused on diagnosis and early intervention services for children, and as confirmed by the findings of the current review, a paucity of literature has focused on examining the relative effectiveness of interventions in adulthood (Schall et al., 2015; Howlin et al., 2015; Hedley et al., 2016). Of the 134 employment studies identified for inclusion in this review, only 36 were intervention-based. While these interventions studies had the stated collective purpose of improving employment outcomes, they were primarily impairment-focused, targeting their interventions at intrinsic individual ASD characteristics, with little consideration of contextual influences. Interventions targeted ASD traits commonly

associated with difficulties in finding and obtaining a job, such as executive functioning skills in relation to problem-solving, organisation, task management and behaviour regulation and social communication skills required in interviews and workplace interactions (American Psychiatric Association, 2013; Hendricks, 2010; Müller et al., 2003). While many of these interventions were effective in increasing measured vocational and executive functioning skills, many participants continued to remain unemployed. The continuing high rates of unemployment among participants following these interventions suggest that impairment-focused interventions alone are not sufficient in achieving and maintaining successful work-related outcomes for individuals with ASD (Ellenkamp et al., 2016).

One possible explanation to impairment-focused interventions could be the entrenched use of the medical model in underpinning interventions in adulthood. The medical model views ASD as a problem of the individual, requiring them to take responsibility for their disability and make the necessary personal adjustments to be eligible for employment (Dempsey and Nankervis, 2006). While the employment interventions examined in the current study did not require the individual with ASD to take responsibility for their disability, many targeted the associated traits of ASD, and subsequently developed interventions targeted at personal change to assist in eligibility in finding and keeping a job (Bonete et al., 2015; Gilson and Carter, 2016; Liu et al., 2013; Morgan et al., 2014). This was evident when linking employment interventions to the ICF Core Sets for ASD. The greatest number of categories were derived from the *Activities and Participation* component, with interventions targeting core ASD traits such as, communication (d3); learning and applying knowledge (d1) and general tasks and

609 demands (d2), with the outcome of acquiring, keeping and terminating a job (d8).
610 Communication had the greatest number of categories, with more than 50% of interventions
611 targeting the communication skills of individuals with ASD as the focus in improving
612 employment outcomes. The use of impairment-focused interventions was further supported
613 by the *Body functions* component indicating the most frequently targeted mental functions
614 (b1) included intellect (b117); global psychosocial functions (b122) and higher-level cognition
615 (b164) of individuals with ASD. In an attempt to move away from the traditional medical model
616 many interventions have incorporated environmental factors such as, products and technology
617 (e130) and job coaches (e360) in their approach (Allen et al., 2010a; Allen et al., 2010b;
618 Arikawa et al., 2013; Smith et al., 2014). However, these environmental factors have merely
619 been used as a means of delivering impairment-focused interventions, rather than being the
620 intervention itself, i.e., an electronic device (*environmental factor*) is used to assist individuals
621 with ASD in time and task management (*body function-executive functioning*) to improve work
622 performance (activities and participation) (Gentry et al., 2015). The categories identified within
623 the *Environmental factors* component indicated that support from allied health professionals,
624 co-workers and employers (e3), organised support from government-funded services (d5) and
625 products and technology (e1) interact with the employee with ASD and assist in determining
626 their level of functioning in the workplace.

627

628 These findings highlight the usefulness of the biopsychosocial model of the ICF, yet no
629 employment interventions examined in the current study have purposefully incorporated the
630 dynamic interaction between the person and the environment into their design.

Conceptualising employment interventions is hampered by the paucity of research addressing intervention design in adults with ASD (Hedley et al., 2016; Holwerda et al., 2012). However, advances such as the publication of the ICF Core Sets for ASD (Bölte et al., 2017) provide an opportunity to not only holistically synthesise the literature relating to employment of individuals with ASD, but develop interventions which consider functioning and disability and contextual factors.

Viewing individuals with ASD through an impairment-focused lens results in an imbalanced view of ASD and fails to recognise the many strengths and abilities of this group (Armstrong, 2010). It is recognised that ASD is associated with many strengths and abilities which could be utilised in work environments (de Schipper et al., 2016). In contrast to the medical model, a strengths-based approach views the positive aspects that an individual brings to the workplace such as their talents, skills and abilities and highlights areas of competence (Steiner, 2011). This perspective promotes opportunity, performance and productivity by harnessing and developing an individual's strengths rather than counteracting their weakness (Russo, 1999; Lorenz and Heinitz, 2014). In this review, only 14 articles considered the skills and abilities of employees with ASD, and the subsequent benefits that these strengths bring to the workplace (Table 3) (Scott et al., 2017). While the skills and abilities of employees with ASD were identified, not a single study utilised a strengths-based approach in improving employment outcomes. Only two of the 14 studies incorporated the skills and abilities of individuals with ASD as part of the job matching process (Hagner and Cooney, 2005; Hillier et al., 2007). If adult-based interventions are to be more effective across the employment process,

653 interventions should be conceptualised based on an integration of these dichotomous models.
654 Given its biopsychosocial underpinnings, the ICF is an approach which is likely to have
655 particular utility in this endeavor (World Health Organization, 2007). Such an integrative
656 approach to intervention development would focus on profiling an individual's barriers and
657 facilitators in acquiring a job and mitigating their weaknesses by promoting and supporting
658 their strengths.

659

660 This review also highlighted the lack of intervention studies considering environmental factors
661 and the key role that they play in facilitating or hindering work participation. Environmental
662 factors are integral in understanding the interaction between individuals with ASD and the
663 work context in which they are employed (Schneidert et al., 2003). While many studies
664 incorporated environmental factors into their interventions, such as employer and co-worker
665 support, the use of job coaches and technology, these factors were simply used as a means in
666 delivering or implementing the intervention targeting ASD characteristics. Of the 32
667 intervention-based studies, not one addressed the environmental factors as the primary target
668 of their intervention. This finding is concerning given the argument that disability can be
669 viewed as a social construct influenced by the environment (Shakespeare, 2013). The social
670 model approach challenges the concept of disability as solely the responsibility of the
671 individual and instead advocates for societal action in removing the barriers and modifying the
672 environment to promote full participation in all major life areas (Dempsey and Nankervis,
673 2006; Shakespeare, 2013). Employers are considered an environmental factor in the
674 employment process, many of which are often in influential positions to hire prospective

675 employees, implement workplace modifications, foster inclusive workplace cultures and
676 employ organisational policies and practices that remove barriers to work participation
677 (Erickson et al., 2014). In addition, the use of natural supports in the work environment
678 encourages co-workers in providing assistance, training and feedback to employees with ASD
679 (Storey, 2003). Natural supports are recognised for their consistency and reliability in the
680 workplace and often result in opportunities for social interaction and inclusion (Mank et al.,
681 1997). Despite their capacity to foster a tailored work environment for employees with ASD,
682 employers and co-workers are an overlooked and underutilised resource.

683 ## *Clinical implications*

684 Previous medicalisation of the characteristics associated with ASD has resulted in the
685 development of adult-based interventions focusing on impairment, leading to policies and
686 practices targeting individuals rather than the environment and social organisations
687 (Schneidert et al., 2003). This review provides a comprehensive overview of the contextual
688 factors that may be required for improving employment outcomes for individuals with ASD.
689 One such contextual factor are employers, who have previously demonstrated their capacity to
690 provide workplace accommodations (Hernandez et al., 2009; Hartnett et al., 2011). Many
691 employers unknowingly implement a generic approach to disability in the workplace, with a
692 limited knowledge of ASD and the unique needs and accommodations required by this
693 population (Richards, 2012). Employer interventions are needed to address both knowledge
694 and understanding of ASD in the workplace and the skills required in modifying the work
695 environment accordingly. Similarly, disability employment service providers may also benefit
696 from such education-based interventions, as education is critical in empowering behaviour

change and management (Daniali et al., 2016). Further consideration of contextual factors may include the use of natural support such as supervisors and co-workers to assist employees with ASD in completing work-related tasks, providing feedback and socialising by facilitating their job performance in the workplace (Storey, 2003). This may be achieved by providing ASD-specific education training and peer-mentoring programs to upskill supervisors and co-workers, increasing their awareness and understanding of ASD. Training programs are most likely to be cost-effective, time-efficient and easily implemented. Given the many benefits of peer-support in school-based environments for children and adolescents, such as positive behaviour change, increased cognitive, affective and social communication skills, inclusion and a sense of well-being (McCurdy and Cole, 2014; Locke et al., 2012; Schlieder et al., 2014), this approach is likely to be equally beneficial when effectively translated into the work environment.

Research gaps and future directions

This scoping review reveals several gaps in the literature. The majority of included studies did not use standardised outcome measures when evaluating employment outcomes, many of which were descriptive and observational in nature or designed specifically for a particular study without further validation. The findings from this review revealed a significant lack of reliable and valid measures assessing employment intervention outcomes for adults with ASD (Howlin et al., 2015). In order to address this issue, there is a need to explore and define what constitutes as a successful employment outcome for adults with ASD (Taylor, 2017). While the heterogeneity associated with ASD will make the process of defining employment success challenging, there will most likely be consensus in relation to the broader definitions of certain

outcomes including employment status, job satisfaction and engagement, financial gain and career growth and development. A better understanding of an individual's perceived quality of life as a result of employment may be a more effective way of capturing and unpacking success.

Limitations

There were several limitations associated with this review. Firstly, the inclusion criteria defined that only English text studies were to be included in this review, of which the majority represented a US-based perspective on employment outcomes for individuals with ASD. The lack of inclusion of non-English studies and an unequal representation across countries may present a biased view on the factors impacting employment outcomes. Next, given that adulthood and employment in ASD is an emerging area of research, much of the ASD employment literature that exists is either at a national level under the broader umbrella of disability, with many resources, services and programs lacking scientific rigour and an evidence-based approach in their development and implementation. Lastly, while a meta-analyses of the included studies would have increased the statistical power and enhanced estimates of the effect size of employment interventions, given the variability in outcomes and diffuse nature of the literature, this was not possible (Fagard, 1996).

Conclusion

This scoping review demonstrated the utility of the ICF as a comprehensive framework in reviewing and synthesising the employment literature in relation to the outcome measures used, the identified skills and abilities that individuals with ASD bring to the workplace, and the

overall outcomes of employment interventions and programs. This review also promoted a more balanced approach in working with adults with ASD, encouraging the consideration of contextual factors, both environmental and personal, and their potential to influence work participation. It is imperative that future research acknowledges the defined gaps in this review, amending future practices and research designs.

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Tables

Table 1. Search terms[a]

Diagnosis	Age	Intervention	Outcome
autis*, autism spectrum disorder, asperger*, pervasive development* disorder*, autistic disorder*	adult*, adolescent*, youth, young adult*	support*, service, program, training, vocation* rehabilitation provider, strategy, intervention, accommodation*, employer*, supervisor*, manager*, environment*	employ*, work*, job, vocation*, occupation*, participation, competitive employ*, supported employ*, sheltered employ*

[a]Terms were connected with 'OR' and between terms with 'AND'
*Search terms truncated and exploded

Table 2. Descriptive characteristics of general articles relating to employment outcomes (*k*=98)

Author, year, country	Design	Participants	Outcome measures	Type of employment				Employment stage			Quality and level of evidence
				W/I/ VT	S	SE	C	P	S	M	
Alverson et al., 2017, USA	Retrospective observational study using national database	Individuals diagnosed with ASD who were clients of VR services in the USA; N=49,623 (81% - 84% male from 2003 to 2012).	Using a database description of employment outcomes relating to: highest level of education attained at client's application, individual education plan status, employment status at application and case closure, total services received.				X		•		Strong (18/22) III
Anderson et al., 2017, Australia	Systematic review	Individuals diagnosed with ASD; N=62 (58 males, 4 females), Age: 14-42 years.	Quality and methodological assessment of evidence, classification of studies and treatment effects and replication standards	X	X	X	X	•			Strong (19/20) II
Andersson et al., 2015, Sweden	Online vignette study	Employers with hiring responsibilities N=212 (109 females, 100 males); Age: *M*=45 (11.47)	Questionnaire on employers' attitudes towards persons with various disabilities				X	•			Strong (19/22), V
Autism Europe, 2014, Czech Republic	Report	Individuals diagnosed with ASD	N/A		X	X		•	•	•	Limited (5/20), N/A
Autism Speaks, 2012, USA	Descriptive report	Stakeholders including individuals with ASD, family members, VR counsellors, service providers, academic experts and business leaders and entrepreneurs.	N/A				X		•	•	Limited (0/20), V
Autism Spectrum Australia, 2013, Australia	Online cross-sectional survey	Individuals diagnosed with AS or HFA; N=313 (71% male, 29% female); Age: *Mdn*=30 years (18-70 years)	Questionnaires profiling the experiences, needs and aspirations of adults with AS/HFA				X			•	Good (15/20), N/A
Baldwin et al., 2014, Australia	Online cross-sectional survey	Individuals diagnosed with AS, HFA, ASD or PDD-NOS; N=130 (88 males, 42 females); Age: *M*=35.6 (12.4)	Questionnaire on employment outcomes relating to: Type of occupation, occupational skill level, hours of work, type of job contract, workplace support, employment experiences				X			•	Strong (16/20), IV
Briel et al, 2014., USA	Structured interviews	Individuals diagnosed with ASD; N=18 (18-43 years; 15 males, 3 females)	Two-part interview instrument including demographic data and 7 open-ended questions	X				•			Adequate (13/20), V
Burgess and Cimera, 2014, USA	Case report database analysis	Individuals diagnosed with ASD; N=34, 501 (82.2% male, 17.8% female); Age: *M*= 20.32 years	Using a dataset description of employment outcomes relating to: successful employment, hours worked, wages earned, costs of services				X			•	Good (15/22), III

Table 2. Continued

Author, year, country	Design	Participants	Outcome measures	Type of employment				Employment stage			Quality and level of evidence
				W/I/ VT	S	SE	C	P	S	M	
Bush and Tassé, 2017, USA	Retrospective observational study using national database	Individuals diagnosed with ASD; N=2174 (76.7% male, 23.3% female), Age: M=34.53 (SD: .12.61) years Individuals with Down syndrome; N=1857 (53.9% male, 46.1% female), Age: M=40.87 (SD: .12.03) years Individuals with idiopathic intellectual disability; N=15,845 (54.3% male, 45.7% female), Age: M=44.77 (SD: 15.10) years	Using database description of employment factors relating to: demographic factors and ability to make 'choices' (such as choosing where you live, choosing case manager).		X		X		•		Strong (22/22) III
Capo, 2001, USA	Case study	Individual diagnosed with ASD; N=1 (22-year-old female)	Self-report			X		•	•	•	Limited (7/20), IV
Chen et al., 2015a, USA	Narrative literature review	Individuals diagnosed with ASD	N/A			X				•	Limited (9/20), IV
Chen et al., 2015b, USA	Case report database analysis	Individuals diagnosed with ASD; N= 5681 Transition group: *n*=2718 (18 years or younger; 2290 males, 428 females) Transition young adults: *n*=2162 (19-25; 1812 males, 349 females) Adults: *n*=801 (26 years and older; 669 males, 132 females)	Using a dataset description of employment outcomes relating to: employment status, hourly wages, hours worked, association of demographic covariates, success of rehabilitative services			X		•	•	•	Strong (15/18), IV
Cimera and Cowan, 2009, USA	Retrospective observational study	Individuals diagnosed with ASD; N= 11, 569 (80.3% males, 19.7% females); Age: *M*=28.8	Using a dataset description of employment outcomes relating to: cost of services, changes in wages earned and hours worked, successfully or unsuccessfully employed, conversion to dollar values				X			•	Good (14/18), III
Cimera and Burgess, 2011, USA	Retrospective observational study	Individuals diagnosed with ASD; N=19,436 (80.4% male, 19.5% female); Age: *M*=25.2	Using a dataset description of employment outcomes relating to: employment status, hours worked, wages earned, taxes paid, forgone wages, subsidies received, cost-efficiency, conversion to dollar values				X		•	•	Good (14/18), III
Cimera et al., 2012, USA	Case-control study	Individuals diagnosed with ASD; N=530 Sheltered: *n*=215 (80% males, 20 females); Age: *M*= 31.12 (9.07) Non-sheltered: *n*=215 (80% males, 20% females); Age: *M*=37.75 (8.9)	Using a dataset description of employment outcomes relating to: disabilities, rate of employment, wages earned, hours worked, cost of services		X			•			Good (14/18), IV

Table 2. Continued

Author, year, country	Design	Participants	Outcome measures	Type of employment				Employment stage			Quality and level of evidence
				W/I/ VT	S	SE	C	P	S	M	
Ditchman et al., 2017, USA	Network analysis using a national database	Individuals with ASD receiving VR services in the USA; N=2,129 (1,794 males, 335 females). Age: M=18.55 (SD:192) years	Using database description of employment factors relating to: demographics, employment outcomes and VR services received.				X		•		Strong (22/22) III
Foley and Staples, 2003, USA	Case study	Individuals diagnosed with ASD and ID; N=3 (22-35 years, all male)	Caregivers and staff communication needs survey, adapted measures for phonemic awareness, knowledge of letter sound, word identification, text comprehension and developmental spelling, parts of the Test of Early Reading Ability (TERA)			X		•	•	•	Adequate (11/20), IV
Gal et al., 2015a, Israel	Case-control study	Individuals diagnosed with HFASD and individuals without disabilities, N=139 With HFASD: *n*=37 (30 males, 7 females); Age: *M*=25.37 (6.94) Without HFASD: *n*=102 (77 males, 25 females); Age: *M*=24.71 (4.79)	Autism Work Skills Questionnaire (AWSQ)				X	•			Strong (16/20), II
Gal et al., 2015b, Israel	Pretest-posttest study	Individuals diagnosed with AS, ASD or PDD-NOS; N=25 (24 males, 1 female); Age: *M*=19.08	Quality of Life questionnaire (QOL-Q); Personal Wellbeing Index (PWI)	X				•		•	Adequate (15/22), II
Garcia-Villamisar et al., 2002, Spain	Quasi-experimental	Individuals diagnosed with ASD; N=55 Sheltered: n=26 (18 males, 8 females) Age: *M*=21.07 (4.18) Supported: n=25 (21 males, 4 females); Age: *M*=21.64 (3.75)	Quality of Life Survey (QLS)		X	X				•	Strong (19/22), III
Garcia-Villamisar and Hughes, 2007, Spain	Pretest-posttest study	Individuals diagnosed with ASD; Supported employment group: N=44 (32 males, 12 females); Age: *M*=25.52 (3.35) Control: sample not reported except for age: *M*=24.32 (4.34)	Cambridge Neuropsychological Tests: Automated Battery (CANTAB), Trail Making Test, Matching Familiar Figures Test, The Word Fluency Test			X				•	Strong (16/20), III
Gladh and Sjölund, 2014, Sweden	Pilot intervention evaluation	Individuals diagnosed with ASD	Self-assessment			X	X	•			Adequate (10/20), IV
Griffith et al., 2012, Wales	Semi-structured interviews	Individuals diagnosed with or self-reporting AS; N=11 (7 males, 4 females) Age: *M*=46.36 (7.17)	Interview question guide developed based on a literature review				X			•	Good (14/20), V

Table 2. Continued

Author, year, country	Design	Participants	Outcome measures	Type of employment				Employment stage			Quality and level of evidence
				W/I/VT	S	SE	C	P	S	M	
Hagner and Cooney, 2005, USA	Semi-structured interviews	Supervisors of employees with autism; N=14, age and gender not reported	Interview question guide developed based on a literature review of employment support services				X		•	•	Adequate (11/20), V
Hayward et al., 2018, Australia	Systematic review	Individuals with ASD; N=731 (n=229 females), Age: M=34.38 (7.71)	Effect sizes, outcomes and descriptive analysis				X		•	•	Adequate (13/20) IV
Hedley, 2016, Australia	Systematic review	Individuals diagnosed with ASD; N= 58,134 Qual: n=59 (91% males, 9% females); Age: *M*=24.84 (5.93) Quant: n=717 (79% males, 21 females); Age: *M*=24.24 (4.32) Database: n= 57, 172 (80% males, 20% female); Age: *M*=27.46 (7.73) Mixed: n=186 (74% males, 26% females); Age: *M*=27.93 (6.54)	Coding for background information			X	X	•	•	•	Adequate (12/18), I
Hendricks, 2010, USA	Narrative literature review	Individuals diagnosed with ASD	N/A			X	X	•	•	•	Limited (8/20), V
Higgins et al., 2008, USA	Narrative literature review	Individuals diagnosed with AS	N/A			X			•	•	Limited (7/20), V
Holwerda et al., 2012, Netherlands	Systematic review	Individuals diagnosed with ASD; Gender and age not reported	Quality and methodological assessment		X	X	X			•	Good (14/18), I
Holwerda et al., 2013, Netherlands	Cross-sectional study	Individuals diagnosed with ASD; N=563 (401 males, 162 females); Age: *M*=19.4 (2.4)	Using a database description of employment predictive factors relating to: demographics, self-esteem, self-knowledge, motivation, work expectations, living situation, perceived support, attitudes of parents regarding work, attitudes of social environment			X			•	•	Good (14/20), III
Howlin, 2000, UK	Review of longitudinal follow-up studies	Individuals diagnosed with HFA; N=123 (18 years and older; 86% males, 14% females)	N/A		X	X	X			•	Limited (8/20), IV
Howlin et al., 2004, UK	Longitudinal follow-up study	Individuals diagnosed with ASD; N=68 (61 males, 7 females); Baseline age: *M*=7.24 (3.1) Follow-up age: *M*=29.33 (7.97)	Autism Diagnostic Interview (ADI)-social functioning, standardised interview schedules, parental questionnaire, Wechsler Adult Intelligence Scale-Revised (WAIS-R)		X	X	X			•	Strong (18/22), III

Table 2. Continued

Author, year, country	Design	Participants	Outcome measures	Type of employment				Employment stage			Quality and level of evidence
				W/I/WT	S	SE	C	P	S	M	
Howlin et al., 2005, UK	Longitudinal follow-up study	Individuals diagnosed with AS or ASD; Participants-n=114 (male: female ration 4.2:1); Age: *M*=31.4 (9.3) Line manager: n=63 Employers: n=61 Prospects program staff: n=15 Age and gender not reported	Descriptions of employment outcomes relating to: number and type of jobs, cost-benefit analysis Participants (individuals with ASD), line managers, employers and staff interviewed on Prospects program experience			X				•	Strong (16/20), III
Howlin and Moss, 2012, UK	Narrative literature review	Individuals diagnosis with AS, ASD or PDD-NOS; N=1561 (16-57 years); gender not reported	Adapted adult functioning rating adopted				X		•		Limited (9/20), IV
Hurlbutt, 2004, USA	Semi-structured interviews	Individuals diagnosed with AS; N=6 (25-65 years; 3 males, 3 females)	Interview question guide regarding employment experiences				X		•	•	Good (14/20), IV
Järbrink et al., 2007, Sweden	Structured interviews	Individuals diagnosed with ASD; N=19 (84% male); Age: *M*=29.6	Client Service Receipt Inventory			X	X		•	•	Adequate (10/20), III
Johnson and Joshi, 2016, USA	Two-part study: Study 1: semi-structured interviews Study 2: online survey	Individuals diagnosed with ASD; Study 1: N=30 (24-58 years, gender not reported) Study 2: N=210 (64% male, 36% female); Age: *M*=31 (11.4)	Study 1: Interview question guide regarding work-related responses to ASD diagnosis Study 2: Online survey relating to implications of an ASD diagnosis for workplace well-being				X			•	Strong (16/20), V
Katz et al., 2015, Israel	Follow-up study	Individuals diagnosed with HFASD; N=26 (24 males, 2 females); Age: M=29.1 (5.4)	Work Performance Evaluation (WPE), QOL-Q				X	•		•	Strong (17/20), II
Kaya et al., 2016, USA	Retrospective observational study using national database	Individuals diagnosed with ASD who were clients of VR services in the USA; N=4,332 (84.7% male, 15.3% female), Age: 16-25 years.	Using a database description of employment factors relating to: demographic factors and VR services provided.				X		•		Strong (20/20) III
Kaya et al., 2018, Turkey	Quantitative correlational design using national database	Individuals diagnosed with ASD who clients of VR services in the USA; N=3,243 (83.1% male, 16.9% female), Age: 19-25 years.	Using database description of factors relating to demographics, employment outcomes and VR services received.				X		•		Strong (20/20) III
Keel et al., 2015, USA	Retrospective cohort study	Individuals diagnosed with ASD or PDD-NOS; N=100; Age: *M*=25; gender not reported	Descriptions of employment outcomes relating to: type of job, hours worked per week, wages earned and job retention			X			•	•	Adequate (11/20), V
Krieger et al., 2012, Switzerland	Semi-structured interviews	Individuals diagnosed with AS; N=6 (30-45 years; 4 males, 2 females)	Thematic interview question guide relating to contextual factors impacting successful employment				X			•	Strong (20/22), V

Table 2. Continued

Author, year, country	Design	Participants	Outcome measures	Type of employment				Employment stage			Quality and level of evidence
				W/I/VT	S	SE	C	P	S	M	
Lattimore et al., 2002, USA	Multiple probe baseline study	Individuals diagnosed with ASD; N=3 (25-29 years, all male)	Prework assessment, number of preferred tasks selected			X		•			Limited (6/20), II
Lattimore et al., 2003, USA	Multiple probe baseline study	Individuals diagnosed with ASD: N=5 (all male); Age: *M*=30	Prework assessment, on-the-job preference assessment			X		•			Adequate (12/20), II
Lawer et al., 2009, USA	Routine data-based study, case-control design	Individuals diagnosed with ASD; N= 1707 (18-65 years, 84% males, 16 females)	Using a database description of employment outcomes relating to: access to services, cost of services, competitive employment			X			•	•	Strong (20/22), IV
Lopez and Keenan, 2014, UK	Online survey	Individuals diagnosed with ASD, carers, practitioners; Individuals with ASD: n=46 (31 males, 15 females); Age: *M*= 39.7 (13.1) Carers: n=36 (5 males, 31 females); Age: *M*=53.33 (10.67) Practitioners including therapists, clinicians, educators, support workers, advisors: n=38 (8 males, 30 females); Age: *M*=44 (11.26)	Questionnaires collecting data on demographics, employment history, training				X		•	•	Adequate (12/20), IV
Lorenz et al., 2016, Germany	Online survey	Individuals diagnosed with ASD; N=66 (29 males, 36 females, 1 other); Age: *M*=35.96 (10.22)	Qualitative questionnaire with 28 open-formatted questions including the General Self-Efficacy Scale, Occupational Self-efficacy, Satisfaction with Life Scale, job satisfaction using a Likert scale				X		•	•	Strong (16/20), III
Lugas et al., 2010, USA	Retrospective observational study	Individuals diagnosed with ASD; N=3323 (16-26 years, gender not reported)	Using a database description of employment outcomes relating to: services received, employment status			X			•	•	Adequate (11/20), III
Mank et al., 1997, USA	Correlation study	Individuals diagnosed with a disability including ASD; N=462, (18-50 years, 59.1% males, 40.9% females) (ASD *n*=10)	Survey relating to outcomes and features to supported employment including job title, hours worked, wages, benefits, accommodation, worksite characteristics, typicalness of employment situation			X				•	Strong (20/20), IV
Mavranezouli et al., 2013, UK	Retrospective observational study	Individuals diagnosed with ASD without ID; N=50 (age and gender not reported)	Quality-Adjusted Life Year (QALY), description of cost data relating to: vocational rehabilitation services provided including potential accommodation savings and other NHS costs			X			•	•	Strong (17/18), IV
McDonough and Revell, 2010, USA	Narrative literature review	Individuals diagnosed with ASD; N=2 case studies (22-27 years, both male)	Situational assessments			X	X		•	•	Limited (9/20), IV

Table 2. Continued

Author, year, country	Design	Participants	Outcome measures	Type of employment				Employment stage			Quality and level of evidence
				W/I/ VT	S	SE	C	P	S	M	
McMahon et al., 2012, USA	Cohort study with a control group	Individuals diagnosed with ASD and ID; ASD group: n=170 (77.6% males, 22.4% females); Age: *M*=33 ID group: n=1459 (65.3% males, 34.7% females): Age: *M*=36	Using a database description of workplace discrimination allegations relating to: profiles, low number of cases, age, gender, industry				X		•	•	Good (15/20), IV
Migliore et al., 2012a, USA	Retrospective observational study	Individuals diagnosed with ASD; N=6952 (16-26 years, gender not reported)	Using a database description of employment outcomes relating to: number of individuals receiving services, rehabilitation rate, wages per hour and work hours				X		•		Limited (9/20), III
Migliore et al., 2012b, USA	Retrospective observational study	Individuals diagnosed with ASD; N= 2913 (16-26 years, gender not reported)	Using a database description of transition outcomes and predictors relating to VR services received including gaining integrated employment, hourly earnings, weekly work hours and post-secondary education improvement				X		•		Strong (16/20), IV
Migliore et al., 2014, USA	Correlation study using a national database	Individuals diagnosed with ASD; N= 6952 (16-26 years, gender not reported)	Using a database description of employment outcomes relating to: number of youth existing VR services, receiving services, rehabilitation rates, earning and work hours			X	X			•	Strong (17/20), III
Morgan and Schultz, 2012, USA	Narrative literature review	Individuals diagnosed with ASD; N=1 case study (19-year-old male)	Job-task assessment, social network assessment			X	X		•	•	Adequate (10/20), IV
Müller et al., 2003, USA	Semi-structured interviews	Individuals diagnosed with AS or ASD; N=18 (18-62 years; 13 males, 5 females)	Interview protocol on strategies for improving vocational placement and job retention services				X		•	•	Adequate (12/20), V
Müller and Vangilder, 2014, USA	Follow-up study	Individuals diagnosed with a disability including ASD; N=10 (17-24 years; 6 males, 4 females); ASD *n*=4	Developed a Job Readiness Assessment Tool (JRAT), 3 brief interview protocols regarding perceptions of participants' growth and ongoing challenges in the study				X		•		Good (17/22), II
Nesbitt, 2000, UK	Cross-sectional questionnaire	Organisations employing adults with AS; N=69; no age or gender reported	Developed questionnaire according to support needs and employment process			X			•		Adequate (12/20), III
Nicholas et al., 2014, Canada	Narrative literature review	Individuals diagnosed with AS; 18 years and older	N/A			X	X		•	•	Strong (20/20), IV

Table 2. Continued

Author, year, country	Design	Participants	Outcome measures	Type of employment				Employment stage			Quality and level of evidence
				W/I/ VT	S	SE	C	P	S	M	
Nicholas et al., 2017a, Canada	Qualitative analytic Focus groups	Individuals with ASD, family members, researchers, program and policy developers, practitioners, and interdisciplinary ASD trainees; N=120	Qualitative description analysis	X		X	X	•	•	•	Strong (16/20) V
Nicholas et al., 2017b, Canada	Mixed methods	Survey: senior clinicians and administrators of employment support programs; N=137 Qualitative interviews: Individuals with ASD, AS or PDD-NOS; N=71 (69% male, 31% female), Age range 18-65 years Parents/caregivers.; N=51	Survey: Likert scale responses relating to capacity to meet vocational needs, enhancing systems capacity, service planning and evaluation and community capacity Qualitative interviews: line by line coding and thematic analysis.				X	•	•	•	Strong (20/22) III
Nord et al., 2016, USA	Retrospective observational study	Individuals with and without ASD; ASD group: n=977; Age: *M*=33.94 (12.36) Without ASD group: n=7992; Age: *M*=41.42 (11.4) gender not reported	Using a dataset description of employment outcomes relating to community employment, diagnosis, age, behaviour, health, mobility				X		•	•	Strong (22/22), III
Nye-Lengerman, 2017, USA	Retrospective observational study using national database	Individuals diagnosed with ASD who were clients of VR services in the USA; N=10,209 (83.6% male, 16.4% female), Age: M=21.57 (SD: 7.13) years	Using a database description of employment factors relating to: demographic factors and VR services provided.				X		•		Strong (20/22) III
Ohl et al., 2017, USA	Cross-sectional survey	Individuals with AS; N=254 (55.12% males, 43.31% female), Age: M= 38.11 (SD: 13.02) years Employed subgroup; n=156 (59.48% male, 40.52% female), Age: M=38.87 (SD:12.97) years Unemployed subgroup: n=98 (50.52% male, 49.48% female), Age: M=36.93 (SD: 13.07) years	ASD Employment Questionnaire (ASDEQ), Short Effort-Reward Imbalance Questionnaire (ERI)				X		•	•	Strong (22/22) III

Table 2. Continued

Author, year, country	Design	Participants	Outcome measures	Type of employment				Employment stage			Quality and level of evidence
				W/I/VT	S	SE	C	P	S	M	
Parr and Hunter, 2013, USA	Semi-structured interviews	Individuals diagnosed with ASD; N=54 (46.3% males, 53.7% females	Interview question guide, five-point Likert scale of leadership behaviours work outcomes measured using 7-point Likert scales, 3-items from Michigan Organizational Assessment Questionnaire, organisational commitment using 8-items from the Affective Commitment Scale, work engagement using 6-items from Utrecht Work Engagement Scale				X		•	•	Good (20/26), V
Pillay and Brownlow, 2016, Australia	Systematic review	Individuals diagnosed with ASD; N= 3984 (16-55 years)	Quality Appraisal Checklist				X		•	•	Strong (18/20), I
Rashid et al., 2017, Canada	Synthesis review	Individuals with developmental disability, including ASD	Content analysis			X	X		•	•	Strong (18/20) II
Richards, 2012, UK	Qualitative database study	Individuals diagnosed with AS; Age and gender not specified	Using the database descriptions of exclusion processes relating to selection procedures, people management, physical and social environment, employer resistance to accommodations				X			•	Adequate (12/20), V
Rosqvist and Keisu, 2012, Sweden	Qualitative review	Individuals diagnosed with ASD; Sample size, gender and age not reported	Thematic coding de-constructing the notion of 'real jobs'				X		•	•	Limited (9/20), V
Roux et al., 2013, USA	Cross-sectional survey national database prospective longitudinal study	Individuals diagnosed with ASD; N=620 (85% males); Age: *M*=23.2	Using the database description of employment outcomes relating to: employment status, job type, number of jobs since high school and wages earned, functional skills 4-point Likert scale				X			•	Strong (20/22), III
Roux et al., 2015, USA	Cross-sectional survey national database prospective longitudinal study	Individuals diagnosed with ASD; 21-25 years; 80% males	National Longitudinal Transition Study-2 questionnaire relating to adult outcomes, health, post-secondary education, employment, living arrangements, social and community participation and safety and risk			X	X		•	•	Limited (9/24), N/A
Schall et al., 2015, USA	Retrospective observational records review	Individuals diagnosed with ASD; N=45 Project Search group: *n*=25 (18 males, 7 females); Age: *M*=23.12 (1.13) SE group: *n*=20 (19 males, 1 females); *M*=29.05 (10.95)	Individual employment records relating to intake, hourly billing, employment notes, employment outcomes, number of intervention hours, time in job, wages earned				X			•	Strong (18/20), III

Table 2. Continued

Author, year, country	Design	Participants	Outcome measures	Type of employment				Employment stage			Quality and level of evidence
				W/I/ VT	S	SE	C	P	S	M	
Schaller and Yang, 2005, USA	Correlation study using a national database	Individuals diagnosed with ASD; C: *n*=450 (84.2% males); Age: *M*= 25.3 (7.69) SE: *n*=365 (87.9% males); Age: *M*= 27.3 (7.23)	Using a database description of employment outcomes relating to: successful or unsuccessful close of VR support plan, case service cost, hours worked per week and weekly wages earned				X			•	Strong (20/20), III
Scott et al., 2015, Australia	Q sort method	Individuals diagnosed with ASD and their employers; ASD: *n*=40 (24 males, 16 females); Age: *M*= 29.1 (10.7) Employers: *n*=35 (16 males, 19 females); Age: *M*=44.6 (10.4)	Q sort pack including concourse statements developed from the literature and Q sort grid				X	•	•	•	Strong (20/20), III
Seaman and Cannella-Malone, 2016, USA	Narrative Literature review	Individuals diagnosed with ASD; N=203 (13-60 years; 178 males, 25 females)	Quality and methodological assessment of evidence	X					•		Strong (17/20), V
Shattuck et al., 2012, USA	Correlational study using national database prospective longitudinal study	Individuals diagnosed with ASD; ASD: *n*=680 (19-23 years; 86.9% males, 13.1% females)	Questionnaire relating to participation in postsecondary education and paid employment, length of time in high school, health, functional independence skills				X		•	•	Strong (18/20), III
Shattuck et al., 2015, USA	Narrative literature review	Individuals diagnosed with ASD; N=14,392 (18-65 years; 83% males)	N/A				X		•	•	Strong (20/20), V
Smith et al., 2015, USA	Follow-up survey	Individuals diagnosed with HFASD; N=23 VR-JIT: *n*=15 (73.3% males); Age: *M*=25 (6.9) Control: *n*=8 (75% males); Age: *M*=23.1 (3.3)	Bell-Lysaker Emotion Recognition Task (BLERT), Social Responsiveness Scale (SRS), self-confidence 7-point Likert scale, process measures including: change in job role-play performance, number of virtual VR-JIT trials completed and changes in VR-JIT performance across trials				X		•		Strong (18/20), V
Smith et al., 2017, USA	Systematic review	Individuals with disabilities, including ASD	Level of evidence, risk bias	X	X	X	X	•	•	•	Strong (19/20), I
Stuckey, 2016, USA	Online survey	Business executives in a hiring role; N=157 (97 males, 54 females, 6 other); age not reported	Online 14-item survey on knowledge of ASD				X		•	•	Strong (18/18), IV

Table 2. Continued

Author, year, country	Design	Participants	Outcome measures	Type of employment				Employment stage			Quality and level of evidence
				W/I/VT	S	SE	C	P	S	M	
Sung et al., 2015, USA	Case report database analysis	Individuals diagnosed with ASD; N=1696 (16-25 years; 857 males, 839 females)	Using a database description of employment outcomes relating to employment status at VR case closure, predictors including demographic characteristics, work incentives and VR services				X		•	•	Strong (20/20), IV
Taylor and Seltzer, 2011, USA	Cross-sectional subsample from a prospective longitudinal study	Individuals diagnosed with ASD; N=66 (80% males); Age: M=22.98 (1.51)	Adult day activities, Wide Range Intelligence Test, family income, ADI-Revised (ADI-R), Scales of Independent Behaviours-Revised (SIB-R) completed by mothers, revised Activities of daily living (ADL) Index		X	X	X		•		Strong (20/20), IV
Taylor et al., 2012a, USA	Systematic review	Individuals diagnosed with ASD; 13-30 years, gender not reported	Quality and methodological assessment of evidence				X		•	•	Strong (18/20), I
Taylor and Seltzer, 2012b, USA	Cross-sectional subsample from a prospective longitudinal study	Individuals diagnosed with ASD N=343 (73% males); Age: *M*=22.84 (9.58)	Descriptive profiling including: weekly participation in vocational or educational activities, numbers of hours of participation, job history	X	X	X	X		•	•	Strong (17/18), III
Taylor, 2014, USA	Longitudinal follow-up study	Individuals diagnosed with AS, ASD, or PDD-NOS; N=161 (72% males); Age: *M*=30.9 (8.3)	The Vocational Index, parents completed Behaviour Problems subscale of the SIB-R, ADI-R, residential status, demographic characteristics			X			•	•	Strong (19/20), III
Taylor et al., 2015, USA	Longitudinal correlational study	Individuals diagnosed with ASD; N=73 (79.5% males); Age: *M*=23.83 (6.83)	The Vocational Index, demographic characteristics, behavioural indices from Time 1 in longitudinal study, Waisman ADL Scale (W-ADL), subscale of the SIB-R, ADI-R, family indices including mother's support network, maternal depressive symptoms Centre for Epidemiological Studies-Depression Scale, maternal anxiety using the Anxiety subscale of the Profile of Mood States and maternal pessimism using the Pessimism scale of the Questionnaire on Resources and Stress				X		•	•	Strong (18/18), III
Van Wieren et al., 2008, USA	Cohort study with a control group	Individuals diagnosed with ASD and other disabilities including physical, sensory or neurological; ASD group: n= 98 (72 males, 26 females); Age: *M*= 36 Disability group: n=174,330 (54.7% males, 45.3% females); Age: *M*=44	Description of demographic characteristics, industry type, number and type of allegations				X		•	•	Strong (19/20), IV

Table 2. Continued

Author, year, country	Design	Participants	Outcome measures	Type of employment				Employment stage			Quality and level of evidence
				W/I/VT	S	SE	C	P	S	M	
Vogeley et al., 2013, Germany	Narrative literature review	Individuals diagnosed with HFASD; Sample, gender and age not reported	N/A			X			•	•	Limited (0/20), V
Walsh and Hall, 2012, UK	Critical review report	Individuals diagnosed with ASD; Sample size, gender and age not reported	Descriptively critiqued equity, integration, implementation and diagnosis and specialist interventions services for individuals with ASD			X	X		•	•	Limited (0/20), V
Walsh et al., 2014, Ireland	Narrative literature review	Individuals diagnosed with AS, ASD or PDD-NOS; N=78 (13-30 years; 72.2% males)	N/A				X		•	•	Strong (18/20), V
Wehman et al., 2014, USA	Narrative literature review	Individuals diagnosed with ASD; Sample size, gender and age not reported	N/A				X		•	•	Limited (2/20), V
Wehman et al., 2016a, USA	Retrospective records review	Individuals diagnosed with ASD; N=64 (52 males, 12 females); Age: *M*=26	Description of employment outcomes relating to: employment rate, job type, wages and benefits earned, weekly work hours, supports used, intervention time				X		•	•	Strong (16/18), V
Wei et al., 2015, USA	Cross-sectional subsample from a prospective longitudinal study	Individuals diagnosed with ASD; N=120 (15-18 years; 86.6% males)	Six survey items, parents answered employment-related questions and demographic characteristics				X		•	•	Strong (16/18), III
Westbrook et al., 2012, USA	Systematic review	Individuals diagnosed with ASD; N=101 gender and age not specifically reported	Quality and methodological assessment of evidence				X		•	•	Strong (18/20), II
Whetzel, 2014, USA	Narrative literature review	Individuals diagnosed with ASD; Sample size, gender and age not reported	N/A				X		•		Limited (0/20), V
Wilczynski et al., 2013, USA	Narrative literature review	Individuals diagnosed with ASD;	N/A				X		•	•	Limited (0/20), V

Note. W/I/VT: Work experience or internship or vocational training; S: Sheltered employment; SE: Supported employment; C: Competitive employment
P: Preparing for employment; S: Seeking or securing employment; M: Maintaining employment
ASD: Autism spectrum disorder; AS: Asperger's syndrome; HFASD: High functioning ASD; PDD-NOS: Pervasive developmental disorder not-otherwise specified, according to the DSM-IV (American Psychiatric Association, 2000); ID: intellectual disability
M: Mean; *Mdn*: Median; Qual: Qualitative; Quant: Quantitative
ADL: Activities of Daily Living; NHS: National Health Services; VR: Vocational Rehabilitation; VR-JIT: Virtual reality job interview training
TERA: Test of Early Reading Ability; AWSQ: Autism Work Skills Questionnaire; QOL-Q: Quality of Life Questionnaire; PWI: Personal Well-being Index; QLS: Quality of Life Survey; CANTAB: Cambridge Neuropsychological Tests Automated Battery (CANTAB); ADI-R: Autism Diagnostic Interview Revised; WAIS-R: Wechsler Adult Intelligence Scale Revised; WPE: Work Performance Evaluation; QALY: Quality Adjusted Life Year; JRAT" Job Readiness Assessment Tool; BLERT: Bell-Lysaker Emotion Recognition Test; SRS: Social Responsiveness Scale; SIB-R: Scales of Independent Behaviour Revised;
W-ADL: Waisman Activities of Daily Living Scale

Table 3. Article contribution to ASD-related skills and abilities in employment

Author and year	ASD-related skills and abilities[a]															
	Attention to detail	Other	Strong sense of morality	Intellectual functions	Technical abilities	Trustworthiness	Repetitive or monotonous tasks	Artistic skills	Visual perception	Good memory	Expertise in a specific area	Creative talents	Loyalty	Mathematical abilities	Kindness
Baldwin et al., 2014					•			•							
Briel and Getzel, 2014						•		•	•			•			
Burt et al., 1991									•						
Gal et al., 2015a	•	•					•								
Garcia-Villamisar and Hughes, 2007				•						•					
Hagner and Cooney, 2005	•	•				•				•					
Ham, 2014	•							•		•		•			
Hillier, 2007	•	•	•		•	•					•		•		
Holwerda et al., 2012				•											
Mawhood and Howlin, 1999	•	•	•												
Müller et al., 2003	•	•			•				•		•			•	
Müller and Vangilder, 2014	•	•	•		•	•	•						•		•
Stuckey, 2016	•	•	•	•											
Wehman et al., 2013				•			•								

[a]ASD-related skills and abilities list taken from de Schipper et al. (de Schipper et al., 2016)

Table 4. Descriptive characteristics of employment program and intervention studies (*k*=36) linked to the ICF

Reference	Design	Participants	Outcome measures	Intervention results	Type of employment	Employment stage	Quality and level of evidence	ICF category codes[a,b]
Allen et al., 2010a	Multiple baseline across participants	Individuals diagnosed with AS or PDD-NOS; N=3 (17-22 years, all male)	Observation of vocational skill acquisition; partial interval recording system	**Vocational skills** A 30% increase in acquisition and retention of targeted vocational skills post VM	W/I/VT	P	Adequate (11/22), II	**Second level:** b117, b122, b130, b760, d160, d220, d825, e125, e130 **Third level:** b1300, b1301, b1304, b7600, b7601, b7602, d2200, d2201, d2202, d2204, d8250, d8251, e1250, e1300
Allen et al., 2010b	Multiple baseline across participants	Individuals diagnosed with AS, ASD or PDD-NOS; N=4 (16-25 years, all male)	Observation of vocational skill acquisition; partial interval recording system	**Vocational skills** Participants learned to use targeted skills after watching VM	W/I/VT	P	Adequate (11/22), II	**Second level:** b117, b122, b130, b760, d160, d220, d825, d850, e125, e130 **Third level:** b1300, b1301, b1304, b7600, b7601, b7602, d2200, d2201, d2202, d2204, d8250, d8251, e1250, e1300
Arikawa et al., 2013	Case study	Individual diagnosed with AS; N=2, (*n*=1,30-year-old male)	On-the-job occupational therapy task analysis assessment (unspecified)	**Executive functioning skills** Problem-solving, planning, predicting, attention and concentration skills improved following on-the-job training and workplace modifications delivered by an occupational therapist	W/I/VT	P	Limited (9/20), IV	**Second level:** b117, b760, d155, d160, d175, d250 d845, e360, e590 **Third level:** b7600, d1550, d1601, d1750, d1751, d2500, d2504, d8451, e5900

Table 4. Continued.

Reference	Design	Participants	Outcome measures	Intervention results	Type of employment	Employment stage	Quality and level of evidence	ICF category codes[a,b]
Baker-Ericzen et al., 2017	Pilot study Pretest-posttest	Individuals with ASD; N=8 (78% male), Age: *M*=22.44 (3.55) years	Delis-Kaplan Executive Functioning System (D-KEFS), Behavior Rating Inventory of Executive Function – Adult (BRIEF-A), SRS-2, Social Skills Performance Assessment (SSPA), Functional Daily Living Questionnaire, Employment Interview, Participant Satisfaction Questionnaire	**Executive functioning skills** Increased participant reported BRIEF-A global composite scores (p=0.018), task monitoring, self-monitoring and planning/organizing (p<0.05). Improved D-KEF performance in sorting, deductive reasoning and planning (p<0.05). **Vocational skills** Participant reported improvement in social awareness and social motivation (p<0.05) scores on SRS-2. Increase in SSPA scores for 'chat with co-worker' and 'request time off' items (p <0.05) No significant change in daily living not related to work. Significant improvement in scheduling appointments item (p=0.02). **Employment status** 34% increase in paid employment at posttest (p=0.18). Salaries at posttest ranged from US$10 – US$18.	W/I/VT	P, S	Strong (19/20) II	**Second level:** b122, b140, b152, b164, d175, d220, d250, d310, d315, d330, d350, d570, d710, d720, d750, d845, e325, e330, e360 **Third level:** b1400, b1520, b1521, b1643, d1750, d1751, d2200, d2201, d2203, d3150, d3500, d3501, d3502, d3503, d3504, d5708, d7104, d7200, d7202, d7203, d7208, d7509, d8451 **Fourth level:** d71040, d71041
Bennet et al., 2010	Multiple baseline across participants	Individual diagnosed with ASD; N=3 (*n*=1, 22-year-old male)	Job Observation and Behaviour Scale (JOBS); normative data for accuracy and rate of task performance and feedback	**Vocational skills** Substantial improvements in work performance, maintained for 4-5 weeks following removal of the intervention	SE	M	Adequate (11/22), II	**Second level***:* b117, b122, b156, d155, d220, d845, e130, e360, e590 **Third level:** b1560, d1550, d1551, d2200, d2201, d2202, d8451, e1300, e1301, e5900
Bonete et al., 2015	Pretest-posttest	Individuals diagnosed with AS; N=50 (43 males, 7 females); Age: *M*=19.54 (3.46)	Evaluación de Solución de Conflictos Interpersonales (ESCI); Osnabrück Ability to Work Profile (O-AFP); Vineland Adaptive Behaviour Scales– Second Edition (VABS-II)	**Vocational skills** Significantly higher social problem-solving (p<0.001) and socialisation skills (p<0.001) post-treatment. Differences in comparison to the control group decreased post-treatment. Treatment was acceptable to families and participant adherence was high	W/I/VT	P	Strong (20/22), II	**Second level:** b117, b122, d155, d175, d310, d315, d330, d350, d710, d720, e325, e360 **Third level:** d1551, d1750, d1751, d3100, d3101, 3102, d3150, d3500, d3501. d3502, d3503, d3504, d7100, d7101, d7102, d7103, d7104, d7106, **Fourth level:** d71040, d71041

Table 4. Continued.

Reference	Design	Participants	Outcome measures	Intervention results	Type of employment	Employment stage	Quality and level of evidence	ICF category codes[a,b]
Burke, 2010	Multiple baseline across participants	Individuals diagnosed with AS, ASD or PDD-NOS; N=6 (18-27 years, all male)	Observation of target behaviours, recorded response of script prompt	**Vocational skills** Five out of six participants achieved criterion behaviour skills following the introduction of the cue system in addition to behavioural skills training **Executive functioning skills** The sixth reached criterion with behavioural skills training alone	W/I/VT	P	Adequate (11/22), II	**Second level:** b117, b122, b130, b760, d155, d160, d220, d250, d825, e125, e130 **Third level:** b1300, b1301, b1304, b7600, b7601, b7602, d1550, d1551, d2200, d2201, d2202, d2204, d2501, d2502, d2504, d8250, d8251, e1250, e1300
Burke et al., 2013	Multiple baseline across participants	Individuals diagnosed with AS, ASD or PDD-NOS; N=4 (19-28 years, all male)	Descriptions of task analysis (73-steps required to complete tasks); recorded task steps correctly completed; home time logs of video viewed; Universal Design Performance Measure for Productivity (UDPMP)	**Vocational skills** VM and prompting were effective with marked improvement in on-the-job performance of multi-step shipping tasks	W/I/VT	P	Adequate (11/22), II	**Second level:** b117, b122, b140, d155, d160, d175, d220, d825, e125, e130 **Third level:** b1400, b1401, b1402, d1550, d1551, d1750, d1751, d2200, d2201, d2202, d8250, d8251, e1250, e1300
Burt et al., 1991	Case study	Individuals diagnosed with ASD and ID; N=4 (21-29 years; 3 males, 1 female)	Autism Behaviour Checklist; description of employment outcomes	**Employment status** Competitive employment gained and retained between 6-30 months following an intensive training program	C	P	Limited (5/20), IV	**Second level:** b117, b122, d155, d175, d250, d310, d315, d330, d350, d710, d720, d845, e360, e330 **Third level:** d1550, d1551, d2500, d2501, d2502, d2503, d2504, d3100, d3101, d3102, d3150, d3500, d3501, d3502, d3503, d3504, d7100, d7101, d7102, d7103, d7104, d7106, d7200, d7202, d7203, d7204, d8450, d8451 **Fourth level:** d71040, d71041
Dotson et al., 2013	Multiple baseline across participants	Individuals diagnosed with AS, ASD or PDD-NOS; N=8 (*n*=5, 19-30 years; 2 males, 3 females)	The Scales of Independent Behaviour-Revised (SIB-R); description of the percentage of job steps performed correctly and without prompts	**Vocational skills** Improved job skills performance following teaching and working shifts in a natural work environment independently or alongside a peer. Teaching procedures resulted in job skill acquisition for worker, supervisor, and office staff	W/I/VT	P, M	Adequate (12/20), II	**Second level:** b117, b122, d155, d175, d220, d250, d310, d315, d330, d350, d825, d845, e325, e360 **Third level:** d1550, d1551, d1750, d2203, d2501, d2503, d2504, d3100, d3101, d3102, d3150, d3503, d8451

Table 4. Continued

Reference	Design	Participants	Outcome measures	Intervention results	Type of employment	Employment stage	Quality and level of evidence	ICF category codes[a,b]
Gentry et al., 2012	Case study	Individuals diagnosed with ASD; N=3 (20-60 years; 1 male, 2 females)	Self-report; description of the hours of supervision and workplace training and support	**Executive functioning skills** Improved task management, organisational skills and self-regulated behaviours using the PDA	C	M	Limited (9/20), IV	**Second level:** b140, b164, d230, d250, d845, e125, e130, e360, e590 **Third level:** b1400, b1641, b1642, d2300, d2301, d2305, d2306, d2501, d2503, d2504, d8451, e1251, e1301, e5900
Gentry et al., 2015	Delayed randomised controlled trial (RCT)	Individuals diagnosed with ASD; N=50 (42 males, 8 females); Age: *M*=24.0 (8.3)	Craig Handicap Assessment and Rating Technique (CHART); Supports Intensity Scale-Employment Subscale (SIS-EPS); Employee Performance Evaluation Report (EPER); description of the hours worked and job coach hours	**Vocational skills** Experimental group receiving PDA training to assist in task organisation required significantly less hours of job coaching support ($p = 0.013$) than the control group	C	M	Strong (20/24), II	**Second level:** b140, b164, d230, d250, d310, d330, d350, d845, e125, e130, e360, e590 **Third level:** b1400, b1641, b1642, d2300, d2301, d2305, d2306, d2501, d2503, d2504, d8451, d3100, d3101, d3103, d3503, d8451, e1251, e1301, e5900
Gilson and Carter, 2016	Multiple-probe, single-case experimental	Individuals diagnosed with ASD; N=3 (*n*=2, 18-26 years, both male)	Description of partial interval recording system on social and task-related interactions, job coach hours, methods and type of coaching delivered	**Vocational skills** Increased social interactions and task engagement when job coaches reduced proximity and delivered prompts using bug-in-ear devices. Effects maintained post-intervention	W/I/VT	P	Adequate (13/20), II	**Second level:** b122, b156, b164, d220, d350, d710, d840, e125, e130, e360 **Third level:** b1560, b1641, d2200, d2201, d3504, d7103, d7104, e1251, e1301 **Fourth level:** d71040, d71041
Ham, 2014	Case study	Individuals diagnosed with ASD; N=2 (1 female age not reported,1 23-year-old male)	Indirect and direct behaviour observation, anecdotal reports, description of the level of job coach support	**Employment status** Intensive job coaching assisted in job retention with fading supports for two or more years **Executive functioning skills** Improved self-regulated behaviour and task organisation skills	SE	S, M	Adequate (10/20), IV	**Second level:** b164, d250, d845, e325, e330, e360 **Third level:** b1641, b1642, d2501, d2502, d2503, d2504, d8451

Table 4. Continued

Reference	Design	Participants	Outcome measures	Intervention results	Type of employment	Employment stage	Quality and level of evidence	ICF category codes[a,b]
Hayes et al., 2015	RCT	Individuals diagnosed with ASD; N=15 (17-18 years; 13 males, 2 females)	VidCoach usage log, self-report on experience, interview performance rating scale (developed for the study)	**Vocational skills** Experimental group demonstrated significant improvement in interview performance($p<0.001$) and in hygiene and health care ($p=0.02$) **Executive functioning skills** Experimental group displayed significantly reduced fidgeting ($p=0.022$), improved skills in presenting ideas logically and succinctly ($p=0.009$). Control group displayed significant improvement in grammar and vocabulary usage ($p<0.001$)	W/I//VT	P	Limited (11/26), II	**Second level:** b117, b122, b140, d155, d220, d310, d315, d330, d350, d710, d825, d845, e125, e130 **Third level:** b1400, b1401, 1558, d2209, d3100, d3101, d3102, d3150, d3508, d7108, e1251, e1301
Hill et al., 2013	Case study	Individuals diagnosed with ASD; N=3 (23-26 years; 1 male, 2 females)	Self-report	**Employment status** Use of iPad device and support strategies culminated in increased independence, job placement and job retention.	SE	S, M	Limited (9/20), IV	**Second level:** b122, b140, b164, d250, d710, d845, e125, e130, e360 **Third level:** b1400, b1401, b1641, b1642, d2501, d2503, d2504, d7108, d8451, e1251, e1301
Hillier, 2007	Observational cohort study without a control group	Individuals diagnosed with ASD; N=9 (18-36 years; 8 males, 1 female)	Assessment Worksheet, Socialisation Scale, Job Satisfaction Index, Program Satisfaction Measures (all designed for the study), case notes	**Employment status** 78% increase in employment rates; wage ranged between US $5.15-$8.99 per hour, hours worked ranged between 4-40 per week. Average job retention of 12.5 months	C	P, S, M	Good (14/20), II	**Second level:** b117, d220, d250, d310, d330, d350, d710, d720, d845, e360 **Third level:** d2204, d2503, d2504, d3100, d3101, d3102, d3508, d7203 d8450, d8451
Kellems and Morningstar, 2012	Multiple-probe baseline across participants	Individuals diagnosed with AS or ASD; N=4 (20-22 years; all male)	Percentage of independent task steps completed correctly	**Vocational skills** Functional relation found between VM using iPods and increase in the percentage of work tasks steps correctly completed. All participants maintained performance on first two vocational skills for up to 30 days	SE	M	Adequate (11/20), II	**Second level:** b122, b140, b164, d155, d160, d220, d845, e130 **Third level:** b1400, b1641, d1558, d1608, d2200, d8451, e1308

Table 4. Continued

Reference	Design	Participants	Outcome measures	Intervention results	Type of employment	Employment stage	Quality and level of evidence	ICF category codes[a,b]
Lattimore, 2006	Multiple-probe baseline across participants	Individuals diagnosed with ASD and ID; N=3 (30-42 years; all male)	Percentage of independent task steps completed correctly for job-site training and simulation training	**Vocational skills** Acquisition of work-related skills increased with both job-site and simulation training compared to job-site training only, 88% of tasks completed independently; effects maintained post intervention	SE	M	Adequate (11/22), II	**Second level:** b117, b122, d155, d220, d845, d859, e360, e585, e590 **Third level:** d1558, d2200, d8450, e5850, e5900
Lattimore, 2008	Multiple-probe baseline across participants	Individuals diagnosed with ASD and ID; N=4 (29-32 years; all male)	Percentage of job task steps completed independently	**Vocational skills** Acquisition of work-related skills in simulation training improved independent job performance; skills maintained 1-31 weeks post intervention	SE	M	Adequate (12/22), II	**Second level:** b117, b122, d155, d220, d845, d859, e360, e585, e590 **Third level:** d1558, d2200, d8450, e5850, e5900
Liu et al., 2013	Pretest-posttest	Individuals diagnosed with ASD and ID; N=14 (10 males, 4 females); Age: *M*=24.6 (10.04)	Work Personality Profile (WPP), SIB-R, Observational Emotional Inventory Revised (OEI-R)	**Vocational skills** Improved workplace social behaviours in WPP (p=0.08); significant differences in workplace social communication in SIB-R (p=0.02) **Executive functioning skills** Significant difference in emotional response to socialisation in the workplace, better concept of self (p=0.04); limited generalised emotional behavioural control	C	P, M	Strong (17/20), II	**Second level:** b117, b122, b152, d155, d220, d310, d315, d330, d335, d349, d350, d710, d720, e398, e590 **Third level:** b1521, d2200, d3102, d3150, d3500, d3504, d3350, d7104, d7108, d7202, e5900 **Fourth level:** d71041
Lynas, 2014	Longitudinal observation cohort study without a control group	Individuals diagnosed with HFASD; N=67 (63 males, 4 females, age not reported)	Description of employment outcomes in relation to: employed in full-time, part-time, work experience, and feedback questionnaire	**Employment status** 56% of adults using program were employed in FT/PT positions; 66% had at 2-3 work experience opportunities **Vocational skills** Increased more than 40% in social, communication and impendence skills	SE	S, M	Good (14/20), V	**Second level:** b117, b122, d155, d470, d720, d840, d845, d860, e360, e590 **Third level:** d1558, d4709, d7203, d8450, d8451, e5900

Table 4. Continued

Reference	Design	Participants	Outcome measures	Intervention results	Type of employment	Employment stage	Quality and level of evidence	ICF category codes[a,b]
Mawhood and Howlin, 1999	Case-controlled study	Case: individuals diagnosed with HFA; n=30 (27 males, 3 females); Age: *M*=31.1 (9.1) Control: individuals matched in intellectual and linguistic; n=20 (all male); Age: *M*=28 (6.1)	Rosenberg Self-Esteem Inventory, follow-up questionnaires in relation to support satisfaction, wages, hours worked, and relationships formed, Work Personality Profile, and feedback from employers	**Employment status** Experimental group had significantly higher rates of FT/casual employment (p=0.01), higher wages (p=0.02) and required less supported over time (p=0.001); no significant difference in hours worked (hours between 31.3-36.5); wages ranged from £3.71-£9.49	SE	S, M	Adequate (17/26), II	**Second level:** b117, b122, d720, d840, d845, e325, e330, e360, e590 **Third level:** d7203, d8450, d8451, e5900
McLaren et al., 2017	Pilot study Pretest-posttest	Individuals with ASD; N=5 (4 males, 1 females); Age: 19-28 years.	Demographic information, employment status, hourly wages, qualitative interviews	**Employment status** All participants obtained competitive employment in field of choosing. Wages ranged from US$8.00-$15.00 per hour. In addition, qualitative improvement was reported for daily living	SE	S	Limited (7/22), II	**Second level:** b117, b122, b40, b152, d570, d750, d760, d845, e360, e590 **Third level:** b1400, d5708, d7508, d7600, d8450, d8451, e5900
Morgan et al., 2014	Pilot RCT	Individuals diagnosed with ASD; N=28 (27 males, 1 female) Intervention: *n*=13; Age: *M*=25.08 (5.85) Control: *n*=15; Age: *M*= 24 (4.8)	Mock interviews, Social Pragmatic Scale (developed for study); VABS-II; Patient Health Questionanire-9 (PHQ-9)	**Vocational skills** Experimental groups had increased gain in social-pragmatic skills in mock interview, no significant difference in social adaptive behaviours between groups **Executive functioning skills** No significant differences in depressive symptoms	C	P	Good (18/24), I	**Second level:** b117, b122, d310, d315, d330, d335, d350, d599, d845, e325, e360 **Third level:** d3500, d3501, d3502, d3503, d3504, d3102, d3150, d3350, d8450
Rausa et al., 2016	Multiple baseline across behaviours	Individual diagnosed with ASD; N=1, 23-year-old male	Imitation Disorders Evaluation; percentage of the response criteria completed correctly	**Vocational skills** VM improved listening, responding to orders and complaints and using professional speech with customers; skills maintained at 6-week follow up	C	P	Strong (22/22), II	**Second level:** b117, b122, b140, d155, d210, d310, d330, d350, d360, d845, e130 **Third level:** b1400, d1558, d3600, d2105, d3102, d3503, d8451, e1308

Table 4. Continued

Reference	Design	Participants	Outcome measures	Intervention results	Type of employment	Employment stage	Quality and level of evidence	ICF category codes[a,b]
Rosen et al., 2017	Usability evaluation Case-control study	Individuals with ASD; N=20 (18 males, 2 females), Age: *M*=18.7 (1.2) years. Typically developing controls; N=20 (18 males, 2 females), Age: *M*=16.4 (0.5) years.	Demographics, identification of adaptive/maladaptive social responses, Intrinsic Motivation Inventory (IMI), Relevance Questionnaire, Facilitator Observation Form.	**Vocational Skills** Individuals with ASD had greater difficulty than controls in selecting adaptive strategies to respond to work-related social dilemma scenarios (p=0.02). ASD group rated higher enjoyment (p=0.02) and less perceived choice (p=0.01) than control group. Individuals with ASD rated the applicated as more personally relevant than controls (p<0.05).	N/A	P	Strong (20/22) II	**Second level:** b117, b122, b140, d175, d310, d330, d350, d710, d740, d825, e125, e130, e360 **Third level:** b1400, d3500, d3501, d3502, d3503, d7100, d7103, d7108, d7400, e1250, e1300
Schall, 2010	Case study	Individual diagnosed with ASD; N=1, 25-year-old male	Functional behaviour assessment, observation of behaviour frequency	**Executive functioning skills** Positive behaviour support reduced problem behaviour through replacement strategies and positive reinforcement	C	M	Limited (4/20), V	**Second level:** b122, b164, d335, d349, d845, e325, e330, e360 **Third level:** b1641, d3551, d8450, d8451
Smith and Coleman, 1986	Case study	Individuals diagnosed with ASD and ID; N=3 (25-27 years, all male)	Behaviour observation, description of the number of tantrums, performance rate per hour	**Executive functioning skills** Behaviour management either reduced frequency of eliminated aggressive and oppositional behaviour and increased productivity	C	M	Limited (8/18), IV	**Second level:** b117, b122, d330, d349, d710, d845, e360 **Third level:** d7108, d8451
Smith et al., 2014	RCT	Individuals diagnosed with ASD; Intervention: *n*=16 (12 males, 4 females); Age: *M*= 24.9 (6.7) Control: *n*=10 (8 males, 2 females); Age: *M*=23.2 (3.0)	Social Responsiveness Scale-2 (SRS-2); Repeatable battery for the assessment of neuropsychological status (RBANS); Bell-Lysaker Emotion Recognition Task (BLERT); Emotional perspective-taking task (advanced social cognition) based on the number of correct responses	**Vocational skills** Experimental group had significantly greater skills in interview role-play performance (p=0.04) and self-confidence (p=0.06) than controls	C	P, S	Strong (19/20), I	**Second level:** b117, b122, b140, d155, d220, d310, d330, d350, d360, d720, d845, e125, e130, e360 **Third level:** b1400, b1402, d1558, d2200, d3102, d3108, d3503, d3608, d7200, d8450, e1251, e1301,

Table 4. Continued

Reference	Design	Participants	Outcome measures	Intervention results	Type of employment	Employment stage	Quality and level of evidence	ICF category codes[a,b]
Strickland et al., 2013	RCT	Individuals diagnosed with AS or HFA; N=22, all male Intervention: *n*=11; Age: *M*=18.21 (1.03) Control: *n*=11; Age: *M*=17.66 (1.27)	Interview Skills Rating Instrument (developed for study); SRS	**Vocational skills** Experimental group had significantly more effective verbal skills for job interviews than the control group (p<0.000)	C	P, S	Strong (22/22), I	**Second level:** b117, b122, b140, d155, d220, d250, d310, d315, d330, d335, d350, d360 d720, d845, e125, e130, e360 **Third level**: b1400, d1558, d2200, d2501, d2502, d2503, d3100, d3102, d3150, d3350, d3503, d3608, d7203, d8450, e1251, e1301
Walsh et al., 2018	Pilot study Multiple probe design	Individuals with ASD with co-occurring ID; N=7, Age (19.2 – 22.3 years, 4 males, 3 females)	Observation during performance probes, SRS-2, Social skills Improvement Rating Scales (SSiS), ACCESS placement test	**Vocational skills** Significant increase in target social skills (8-14% of skills observed at baseline, 73-100% observed at posttest), significant increase in Social skills improvement rating scales score (p<0.05). Increase in ACCESS placement scores (p<0.05). Decrease in problem behaviors.	W/I/VT	P	Strong (19/20), II	**Second level:** b117, b1220, b140, d210, d230, d240, d330, d350, d570, d710, d720, d750, d835, e125, e130, e360 **Third level:** b1400, d2108, d2308, d2400, d2401, d3500, d3501, d3503, d3504, d5708, d7102, d7103, d7202, d7500, e1250, e1300
Wehman et al., 2012	Prospective cohort study	Individuals diagnosed with ASD; N=33 (19-59 years, *M*=25; 25 males, 8 females)	Description of employment outcomes in relation to: job title, wages, hours worked per week, benefits, average employment intervention specialist time	**Employment status** 82% successfully gain competitive employment with the assistance of an employment specialist, earning the same or similar wages as co-workers, working *M*=22.53 hours/week, wages ranged from US$7.25- $10.50	C	S, M	Strong (15/18), III	**Second level:** b117, b122, d132, d720 d845, e135, e360, e590 **Third level:** d7203, d8450, d8451, e1358, e5900
Wehman et al., 2013	Case study	Individuals diagnosed with AS or ASD; N=2 (19-20 years, both male)	Self-rated evaluation measure on work performance across the dimensions: performance of job skills, production rate, accuracy, communication, interaction with co-workers, appearance and safety	**Employment status** Both employed in different job positions for 20 hours/week; average wages US $9.14 **Vocational skills** Employment program role -playing managed and improved social interactions and workplace social behaviour **Executive functioning skills** Improved self-management and organisational skills	C	S, M	Strong (19/22), V	**Second level:** b122, b164, d155, d250, d310, d315, d330, d349, d350, d710, d720, d840, d845, e135, e330, e360 **Third level:** b1641, b1642, d1558, d2502, d3100, d3102, d3150, d3508, d7203, d8450, d8451, e1358

Table 4. Continued

Reference	Design	Participants	Outcome measures	Intervention results	Type of employment	Employment stage	Quality and level of evidence	ICF category codes[a,b]
Wehman, 2014	Preliminary RCT	Individuals diagnosed with AS, ASD or PDD-NOS; N=40 Intervention: *n*=24 (18 males, 6 females); Age: *M*=19.96 (1.09) Control: *n*=16 (11 males, 5 females); Age: *M*=19.13 (1.09)	SIS, interviews to collect demographic and employment status information	**Employment status** Significant difference in employment attainment for experimental group (p=0.000), maintained at 3-month follow-up, increase in hours worked over 3-months; wages ranged from US$9.00-$9.63 per hour, no significant difference for employment support required	C	S, M	Strong (17/18), I	**Second level:** b122, b164, d155, d220, d250, d310, d315, d330, d349, d350, d710, d720, d840, d845, e135, e330, e360 **Third level:** b1641, b1642, d1558, d2208, d2502, d3100, d3102, d3150, d3508, d7203, d8450, d8451, e1358
Wehman et al., 2016b	RCT	Individuals diagnosed with AS, ASD or PDD-NOS; N=49 Intervention: *n*=31 (24 males, 7 females); Age: *M*=20.23 (1.13) Control: *n*=18 (11 males, 7 females); Age: *M*=19.33 (1.42)	SIS, interviews to collect demographic and employment status information	**Employment status** Intervention group more likely to be employed than control (p<0.001). Intervention group employment rates were: 74.2% at graduation and 90.3% at 3-month follow up. One-year post-graduation 87.1% maintained employment. Significant increase in wages in intervention group compared to control (p=<0.001). Intervention group wages ranged from US$9.53 to US$10.66 per hour. Control group wages ranged from US$9.67 to US$10.00 per hour. At 12-month-follow up intervention group worked more hours than control group (p=0.027). Significant improvement in SIS scores for intervention group compared to control (p<0.001).	C	S, M	Strong (19/20), I	**Second level:** b122, b164, d155, d220, d250, d310, d315, d330, d349, d350, d710, d720, d840, d845, e135, e330, e360 **Third level:** b1641, b1642, d1558, d2502, d3100, d3102, d3150, d3508, d7203, d8450, d8451, e1358

Note. W/I/VT: Work experience or internship or vocational training; S: Sheltered employment; SE: Supported employment; C: Competitive employment
P: Preparing for employment; S: Seeking or securing employment; M: Maintaining employment
ASD: Autism spectrum disorder; AS: Asperger's syndrome; HFASD: High functioning ASD; PDD-NOS: Pervasive developmental disorder not-otherwise specified, according to the DSM-IV (American Psychiatric Association, 2000); ID: Intellectual disability
M: Mean; RCT: Randomised controlled trial; VM: video modelling; FT/PT: Full-time/ Part-time; PDA: Personal digital assistant
JOBS: Job Observation Behaviour Scale; ESCI: Evaluación de Solución de Conflictos Interpersonales; O-AFP: Osnabrück Ability to Work Profile; VABS-II: Vineland Adaptive Behaviour Scales–Second Edition; UDPMP: Universal Design Performance Measure for Productivity; SIB-R: Scales of Independent Behaviour-Revised; CHART: Craig Handicap Assessment and Rating Technique; SIS-EPS: Supports Intensity Scale-Employment Subscale; EPER: Employee Performance Evaluation Report; WPP: Work Personality Profile; Observational Emotional Inventory Revised; PHQ-9: Patient Health Questionanire-9; SRS-2: Social Responsiveness Scale-Second edition; RBANS: Repeatable battery for the assessment of neuropsychological status; BLERT: Bell-Lysaker Emotion Recognition Task
[a] ICF categories within the table can be found in ICF-CY version as developed by the World Health Organization (World Health Organization, 2007)
[b]ICF category codes defined according to the ICF Core Sets for ASD (Bölte et al., 2017) and linked according to the ICF linking rules (Cieza et al., 2005)

Table 5. Absolute and relative frequencies of ICF categories from the Activity and Participation component of employment programs and intervention studies (*k*=36)

Second level category code	Category code description	N (%)
d845	Acquiring, keeping and terminating a job	27 (75%)
d155	Acquiring skills	18 (50%)
d220	Undertaking multiple tasks	18 (50%)
d330	Speaking	18 (50%)
d350	Conversation	18 (50%)
d310	Communicating with-receiving-spoken messages	16 (44%)
d250	Managing one's own behaviour	14 (38%)
d720	Complex interpersonal interactions	14 (38%)
d710	Basic interpersonal interactions	14 (38%)
d315	Communicating with-receiving-nonverbal messages	11 (31%)
d175	Solving problems	7 (19%)
d825	Vocational training	7 (19%)
d160	Focusing attention	6 (17%)
d349	Communication-producing, other specified and unspecified	6 (17%)
d840	Apprenticeship (work preparation)	6 (17%)
d335	Producing nonverbal messages	4 (11%)
d230	Carrying out daily routine	3 (8%)
d360	Using communication devices and techniques	3 (8%)
d570	Looking after one's health	3 (8%)
d750	Informal social relationships	3 (8%)
d210	Undertaking a single task	2 (6%)
d859	Work and employment, other specified and unspecified	2 (6%)

Table 6. Absolute and relative frequencies of ICF categories from the Environmental Factors component of employment program and intervention studies (*k*=36)

Second level category code	Category code description	N (%)
e360	Other professionals	28 (78%)
e130	Products and technology for education	16 (44%)
e125	Products and technology for communication	13 (36%)
e590	Labour and employment services, systems and polices	11 (31%)
e330	People in positions of authority	8 (22%)
e325	Acquaintances, peers, colleagues, neighbours and community members	7 (19%)
e135	Products and technology for employment	4 (11%)
e585	Education and training services, systems and polices	2 (6%)

Table 7. Absolute and relative frequencies of ICF categories from the Body Functions component of employment program and intervention studies (*k*=36)

Second level category code	Category code description	N (%)
b122	Global psychosocial functions	31 (86%)
b117	Intellectual functions	25 (69%)
b140	Attention functions	12 (33%)
b164	Higher-level cognitive functions	11 (31%)
b760	Control of voluntary movement functions	4 (11%)
b130	Energy and drive functions	3 (8%)
b156	Perceptual functions	2 (6%)

Supplementary material

SI Table. Employment program and intervention studies linked to the component of the ICF[a] according to target, modality and outcome of interventions (*k*=36)

Author	Purpose of the intervention	Target of the intervention		Modality of the intervention	Outcome of the intervention
		Body functions	Activities and Participation	Environmental Factors	
Allen et al., 2010a, USA	To evaluate the use of video modelling (VM) to teach individual with ASD the necessary skills to perform in a WalkAround air-inflated mascot	**Second level:** b117, b122, b130, b760 **Third level:** b1300, b1301, b1304, b7600, b7601	**Second level:** d160, d220, d825 **Third level:** d2200, d2201, d2202, d2204, d8250, d8251,	**Second level:** e125, e130 **Third level:** e1250, e1300	**Second level:** b122, d825 **Third level:** d8251
Allen et al., 2010b, USA	To investigate the use of VM for acquisition of selected vocational skills by individuals with ASD, and evaluate the feasibility of individuals with ASD tolerating wearing WalkAround air-inflated costume for short periods of time	**Second level:** b117, b122, b130, b760 **Third level:** b1300, b1301, b1304, b7600, b7601, b7602,	**Second level:** d160, d220, d825, d850 **Third level:** d2200, d2201, d2202, d2204, d8250, d8251	**Second level:** e125, e130 **Third level:** e1250, e1300	**Second level:** b122, d825 **Third level:** d8251
Arikawa et al., 2013, Japan	To provide an overview of employment support by an occupational therapist for people with developmental disabilities and the roles they should engaged in and the necessary support they should provide	**Second level:** b117, b760 **Third level:** b7600	**Second level:** d155, d160, d175, d250 d845 **Third level:** d1550, d1601, d1750, d1751, d2500, d2504, d8451	**Second level:** e360, e590 **Third level:** e5900	**Second level:** d845 **Third level:** d8451
Baker-Ericzen et al., 2017, USA	To investigate the feasibility, acceptability and initial estimates of outcomes of the Supported Employment Comprehensive Cognitive Enhancement and Social Skills (SUCCESS) program in improving social-cognitive skills in young adults with ASD in a vocational training setting.	**Second level:** b122, b140, b152, b164 **Third level:** b1400, b1520, b1521, b1643	**Second level:** d175, d220, d250, d310, d315, d330, d350, d570, d710, d720, d750, d845 **Third level:** d1750, d1751, d2200, d2201, d2203, d3150, d3500, d3501, d3502, d3503, d3504, d5708, d7104, d7200, d7202, d7203, d7208, d7509, d8451 **Fourth level:** d71040, d71041	**Second level:** e325, e330, e360	**Second level:** b164, d175, d250, d315, d570, d720, d845 **Third level:** d3150, d5708, d7203, d8451
Bennett at al., 2010, USA	To examine the effects of covert audio coaching (CAC) on job performance of supported employees in community employment	**Second level***:* b117, b122, b156 **Third level:** b1560	**Second level:** d155, d220, d845 **Third level:** d1550, d1551, d2200, d2201, d2202, d8451	**Second level:** e130, e360, e590 **Third level:** e1300, e1301, e5900	**Second level:** d155, d845 **Third level:** d1550, d1551, d8451
Bonete et al., 2015, Spain	To test the effectiveness of the Interpersonal Problem-solving for Workplace Adaption Programme for adults with ASD, and evaluate its feasibility	**Second level:** b117, b122,	**Second level:** d155, d175, d310, d315, d330, d350, d710, d720 **Third level:** d1551, d1750, d1751, d3100, d3101, 3102, d3150, d3500, d3501. d3502, d3503, d3504, d7100, d7101, d7102, d7103, d7104, d7106 **Fourth level:** d71040, d71041	**Second level:** e325, e360	**Second level:** b122, d155 **Third level:** d1550, d1551

SI Table. Continued

Author	Purpose of the intervention	Target of the intervention		Modality of the intervention	Outcome of the intervention
		Body functions	Activities and Participation	Environmental Factors	
Burke, 2010, USA	To evaluate the efficacy of behavioural skills training and a novel personal digital assistant (PDA)-based performance cue system on individuals' with ASD abilities to perform complex workplace behaviours	**Second level:** b117, b122, b130, b760 **Third level:** b1300, b1301, b1304, b7600, b7601, b7602	**Second level:** d155, d160, d220, d250, d825 **Third level:** d1550, d1551, d2200, d2201, d2202, d2204, d2501, d2502, d2504, d8250, d8251	**Second level:** e125, e130 **Third level:** e1250, e1300	**Second level:** b122, d155, d825 **Third level:** d1550, d1551, d8251
Burke et al., 2013, USA	To test computer software that enhances job training and job performance through VM, video prompting and feedback via a computer tablet	**Second level:** b117, b122, b140 **Third level:** b1400, b1401, b1402	**Second level:** d155, d160, d175, d220, d825 **Third level:** d1550, d1551, d1750, d1751, d2200, d2201, d2202, d8250, d8251	**Second level:** e125, e130 **Third level:** e1250, e1300	**Second level:** d155, d825 **Third level:** d1550, d1551, d8251
Burt et al., 1991, USA	The effects of a training program for adults with ASD, using a behavioural skills approach to enable employment	**Second level:** b117, b122,	**Second level:** d155, d175, d250, d310, d315, d330, d350, d710, d720, d845, **Third level:** d1550, d1551, d2500, d2501, d2502, d2503, d2504, d3100, d3101, d3102, d3150, d3500, d3501, d3502, d3503, d3504, d7100, d7101, d7102, d7103, d7104, d7106, d7200, d7202, d7203, d7204, d8450, d8451 **Fourth level:** d71040, d71041	**Second level:** e330, e360	**Second level:** d155, d845 **Third level:** d1550, d1551, d8450, d8451
Dotson et al., 2013, USA	To determine the effectiveness of a group teaching procedure in increasing skill levels of individuals learning a subset of self-employment skills, and to evaluate the effects of extending teaching to the natural environment on performance	**Second level:** b117, b122	**Second level:** d155, d175, d220, d250, d310, d315, d330, d350, d825, d845, **Third level:** d1550, d1551, d1750, d2203, d2501, d2503, d2504, d3100, d3101, d3102, d3150, d3503, d8451	**Second level:** e325, e360	**Second level:** b122, d155, d845 **Third level:** d1550, d1551, d8451
Gentry et al., 2012, USA	Case studies examining individuals with ASD who have been trained to use the Apple iPod Touch PDAs as vocational supports in their workplaces and impact on their functional performance and behaviour	**Second level:** b140, b164 **Third level:** b1400, b1641, b1642	**Second level:** d230, d250, d845 **Third level:** d2300, d2301, d2305, d2306, d2501, d2503, d2504, d8451	**Second level:** e125, e130, e360, e590 **Third level:** e1251, e1301, e5900	**Second level:** d845 **Third level:** d2501, d2503, d2504, d8451
Gentry et al., 2015, USA	To determine if the use of an Apple iPod Touch would reduce the need for personal supports in performing job tasks and building on-the-job confidence	**Second level:** b140, b164, **Third level:** b1400, b1641, b1642	**Second level:** d230, d250, d310, d330, d350, d845 **Third level:** d2300, d2301, d2305, d2306, d2501, d2503, d2504, d8451, d3100, d3101, d3103, d3503, d8451	**Second level:** e125, e130, e360, e590 **Third level:** e1251, e1301, e5900	**Second level:** d845 **Third level**: d2501, d2503, d2504, d8451

SI Table. Continued

Author	Purpose of the intervention	Target of the intervention		Modality of the intervention	Outcome of the intervention
		Body functions	Activities and Participation	Environmental Factors	
Gilson and Carter, 2016, USA	A pilot study examining the effect of a CAC job coaching package including audio cuing, social-focused coaching and reducing the proximity of job coaches	**Second level:** b122, b156, b164 **Third level:** b1560, b1641	**Second level:** d220, d350, d710, d840 **Third level:** d2200, d2201, d3504, d7103, d7104 **Fourth level:** d71040, d71041	**Second level:** e125, e130, e360 **Third level:** e1251, e1301	**Second level:** d840 **Third level:** d7103, d7104 **Fourth level:** d71040, 71041
Ham, 2014, USA	To describe successful employment for two individuals with ASD taking part in Project SEARCH	**Second level:** b164 **Third level:** b1641, b1642	**Second level:** d250, d845 **Third level:** d2501, d2502, d2503, d2504, d8451	**Second level:** e325, e330, e360	**Second level:** d845 **Third level:** d8451
Hayes et al., 2015, USA	To evaluate the efficacy of mobile device delivering peer and self-modelling/promoting support for job interviews across industries	**Second level:** b117, b122, b140 **Third level:** b1400, b1401	**Second level:** d155, d220, d310, d315, d330, d350, d710, d825, d845 **Third level:** d1558, d2209, d3100, d3101, d3102, d3150, d3508, d7108,	**Second level:** e125, e130 **Third level:** e1251, e1301	**Second level:** d155 **Third level:** d1558
Hill et al., 2013, USA	To investigate the use of the iPad as an employment support tool in increasing independence and success for individuals with ASD in a program that provided employment support	**Second level:** b122, b140, b164 **Third level:** b1400, b1401, b1641, b1642	**Second level:** d250, d710, d845 **Third level:** d2501, d2503, d2504, d7108, d8451	**Second level:** e125, e130, e360 **Third level:** e1251, e1301	**Second level:** d845 **Third level:** d8451
Hillier, 2007, USA	To evaluate the effect of a 2-year vocational support program on employment rates and participant income, and explore the factors impacting job satisfaction, social integration and employers' evaluations of job performance for individuals with ASD	**Second level:** b117	**Second level:** d220, d250, d310, d330, d350, d710, d720, d845 **Third level:** d2204, d2503, d2504, d3100, d3101, d3102, d3508, d7203 d8450, d8451	**Second level:** e360	**Second level:** d845 **Third level:** d8451
Kellems and Morningstar, 2012, USA	To evaluate the effectiveness of using VM delivered through an Apple iPod for teaching job-related tasks to individuals with ASD	**Second level:** b122, b140, b164 **Third level:** b1400, b1641	**Second level:** d155, d160, d220, d845 **Third level:** d1558, d1608, d2200, d8451	**Second level:** e130 **Third level:** e1308	**Second level:** b122, d155, d845 **Third level:** d1508, 8451
Lattimore, 2006, USA	To compare the effects of job-site training supplemented with simulation training to job-site training alone in the acquisition of job skills for individuals with ASD	**Second level:** b117, b122	**Second level:** d155, d220, d845, d859 **Third level:** d1558, d2200, d8450	**Second level:** e360, e585, e590 **Third level:** e5850, e5900	**Second level:** b122, d155, d845 **Third level:** d1508, d8450
Lattimore, 2008, USA	To explore simulation training of supported work skills before adults with ASD received on-the-job skills training and evaluate simulation training materials that are different to the actual job site	**Second level:** b117, b122,	**Second level:** d155, d220, d845, d859 **Third level:** d1558, d2200, d8450	**Second level:** e360, e585, e590 **Third level:** e5850, e5900	**Second level:** b122, d155, d845 **Third level:** d1508, d8450

SI Table. Continued

Author	Purpose of the intervention	Target of the intervention		Modality of the intervention	Outcome of the intervention
		Body functions	Activities and Participation	Environmental Factors	
Liu et al., 2013, Hong Kong	To explore the effectiveness of a workplace training programme targeted at enhancing work-related behaviours in individuals with ASD and intellectual disabilities	**Second level:** b117, b122, b152, **Third level:** b1521	**Second level:** d155, d220, d310, d315, d330, d335, d349, d350, d710, d720 **Third level:** d2200, d3102, d3150, d3500, d3504, d3350, d7104, d7108, d7202 **Fourth level:** d71041	**Second level:** e398, e590 **Third level:** e5900	**Second level:** d155, d349 **Third level:** d7108
Lynas, 2014, UK	To prepare individuals with ASD for employment using a customised employment approach to develop and improve their employability skills	**Second level:** b117, b122	**Second level:** d155, d470, d720, d840, d845, d860 **Third level:** d1558, d4709, d7203, d8450, d8451	**Second level:** e360, e590 **Third level:** e5900	**Second level:** b122, d840, d845 **Third level:** d1558, d8450, d8451
McLaren et al., 2017, Lebanon	To evaluate the use of an Individual Placement Support (IPS) model in assisting young adults with ASD to obtain and maintain competitive employment.	**Second level:** b117, b122, b140, b152 **Third level:** b1400	**Second level:** d570, d750, d760, d845 **Third level:** d5708, d7508, d7600, d8450, d8451	**Second level:** e360, e590 **Third level:** e5900	**Second level:** b152, d570, d750, d760, d845 **Third level:** d5708, d7508, d7600, d8451
Mawhood and Howlin, 1999, UK	To explore the outcomes of 2-year supported employment project for individuals with high functioning ASD	**Second level:** b117, b122	**Second level:** d720, d840, d845 **Third level:** d7203, d8450, d8451	**Second level:** e325, e330, e360, e590 **Third level:** e5900	**Second level:** d845 **Third level:** d8450, d8451
Morgan et al., 2014, USA	To evaluate the efficacy of an interview skills curriculum delivered in a group format for individuals with ASD in improving their social-pragmatic skills required for a job interview	**Second level:** b117, b122	**Second level:** d310, d315, d330, d335, d350, d599, d845 **Third level:** d3500, d3501, d3502, d3503, d3504, d3102, d3150, d3350, d8450	**Second level:** e325, e360	**Second level:** d845 **Third level:** d8451
Rausa et al., 2016, AUS	To examine the effectiveness of VM in teaching job-related telephone skills to individuals with ASD	**Second level:** b117, b122, b140 **Third level:** b1400	**Second level:** d155, d210, d310, d330, d350, d360, d845 **Third level:** d1558, d3600, d2105, d3102, d3503, d8451	**Second level:** e130 **Third level:** e1308	**Second level:** b122, d155, d845 **Third level:** 1558, d8451
Rosen et al., 2017, Israel	To evaluate the usability of *Ready, Set, Work!*, a job readiness video modelling application for adolescents with and without ASD	**Second level:** b117, b122 b140 **Third level:** b1400	**Second level:** d175, d310, d330, d350, d710, d740, d825 **Third level:** d3500, d3501, d3502, d3503, d7100, d7103, d7108, d7400	**Second level:** e125, e130, e360 **Third level:** e1250, e1300	**Second level:** d710, d825 **Third level:** d7100, d7103, d7108
Schall, 2010, USA	To describe the positive behaviour support model implement in community workplace to adapt socially appropriate behaviour for individuals with ASD	**Second level:** b122, b164, **Third level:** b1641	**Second level:** d335, d349, d845 **Third level:** d3551, d8450, d8451	**Second level:** e325, e330, e360	**Second level:** d845 **Third level:** d8451
Smith and Coleman, 1986, USA	To facilitate the adjustment of individuals with ASD in the workplace through behaviour management practices	**Second level:** b117, b122,	**Second level:** d330, d349, d710, d845 **Third level:** d7108, d8451	**Second level:** e360	**Second level:** d710, d845 **Third level:** d7108, d8451

SI Table. Continued

Author	Purpose of the intervention	Target of the intervention		Modality of the intervention	Outcome of the intervention
		Body functions	Activities and Participation	Environmental Factors	
Smith et al., 2014, USA	To evaluate the effectiveness of virtual reality job interview training in improving job interview skills and enhancing self-confidence in individuals with ASD	**Second level:** b117, b122, b140 **Third level:** b1400, b1402	**Second level:** d155, d220, d310, d330, d350, d360, d720, d845 **Third level:** d1558, d2200, d3102, d3108, d3503, d3608, d7200, d8450	**Second level:** e125, e130, e360 **Third level:** e1251, e1301	**Second level:** b122, d155, d845 **Third level:** d1508, d8450
Strickland et al., 2013, USA	To evaluate the effectiveness of an internet accessed training program in teaching job interview skills using theory of mind, video models, visual supports and virtual reality training for individuals with high functioning ASD	**Second level:** b117, b122, b140 **Third level**: b1400	**Second level:** d155, d220, d250, d310, d315, d330, d335, d350, d360 d720, d845 **Third level:** d1558, d2200, d2501, d2502, d2503, d3100, d3102, d3150, d3350, d3503, d3608, d7203, d8450	**Second level:** e125, e130, e360 **Third level:** e1251, e1301	**Second level:** b122, d155 **Third level:** d1508
Walsh et al., 2018, Ireland	To evaluate the effectiveness of the Adolescent Curriculum for Communication and Effective Social Skills (ACCESS) program and video modelling in increasing the social communication skills required for workplace inclusion for adults with ASD	**Second level:** b117, b122 b140 **Third level:** b1400	**Second level:** d210, d230, d240, d330, d350, d570, d710, d720, d750, d835 **Third level:** d2108, d2308, d2400, d2401, d3500, d3501, d3503, d3504, d5708, d7102, d7103, d7202, d7500	**Second level:** e125, e130, e360 **Third level:** e1250, e1300	**Second level:** d330, d350, d710, d720, d825 **Third level:** d3500, d3501, d3503, d3504, d7102, d7103, d7202
Wehman et al., 2012, USA	To examine the effects of supported employment in finding and maintaining competitive employment for individuals with ASD	**Second level:** b117, b122,	**Second level:** d132, d720 d845 **Third level:** d7203, d8450, d8451	**Second level:** e135, e360, e590 **Third level:** e1358, e5900	**Second level:** d845 **Third level:** d8450, d8451
Wehman et al., 2013, USA	To describe the components of Project Search and its adaptation for individuals with ASD including behavioural supports, structure, social and visual supports and role-playing	**Second level:** b122, b164, **Third level:** b1641, b1642,	**Second level:** d155, d250, d310, d315, d330, d349, d350, d710, d720, d840, d845 **Third level:** d1558, d2502, d3100, d3102, d3150, d3508, d7203, d8450, d8451	**Second level:** e135, e330, e360 **Third level:** e1358	**Second level:** d845 **Third level:** d8450, d8451
Wehman, 2014, USA	To examine the preliminary results of the effectiveness of a securing employment for individuals with ASD taking part in the Project Search employment program	**Second level:** b122, b164, **Third level:** b1641, b1642	**Second level:** d155, d220, d250, d310, d315, d330, d349, d350, d710, d720, d840, d845 **Third level:** d1558, d2208, d2502, d3100, d3102, d3150, d3508, d7203, d8450, d8451	**Second level:** e135, e330, e360 **Third level:** e1358	**Second level:** d220, d845 **Third level:** d2208, d8450, d8451
Wehman et al., 2016b, USA	To examine the effectiveness of obtaining job skills and securing employment for individuals with ASD taking part in the Project Search employment program	**Second level:** b122, b164, **Third level:** b1641, b1642	**Second level:** d155, d220, d250, d310, d315, d330, d349, d350, d710, d720, d840, d845 **Third level:** d1558, d2502, d3100, d3102, d3150, d3508, d7203, d8450, d8451	**Second level:** e135, e330, e360 **Third level:** e1358	**Second level:** d845 **Third level:** d8450, d8451

Note: [a]ICF categories within the table can be found in ICF-CY version as developed by the World Health Organization (2007).
VM: Video modelling; ASD: Autism spectrum disorder; CAC: covert audio coaching; PDA: Personal Digital Assistant