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REVIEW PAPER

A Systematic Review of Interventions on Self-Determination for Autistic Individuals and Those with a Learning Disability: an Ecological Approach

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Abstract
Developing self-determination for autistic young people and those with a learning disability can improve adulthood outcomes and quality of life. Understanding self-determination through an ecological framework, which accounts for the interaction between the individual and their environment, can bridge the gap between intervention research and educational practice. This systematic review brings together all interventions aimed at developing global self-determination for autistic young people and those with a learning disability aged 15–25. Overall, 27 articles met the inclusion criteria, evaluating 19 different self-determination interventions. There is emerging evidence that interventions conducted in real-world settings can improve self-determination for autistic young people and those with a learning disability; however, further research is needed on the role of different aspects of the environment.

Keywords Self-determination · Autism · Learning disability · Intervention · Transition

Introduction

Historically, autism has been regarded as a childhood condition, which resulted in a significant lack of understanding and research on the experiences of autistic adults and how they can lead fulfilling lives (Bellon-Harn & Manachaiah, 2021; Pellicano et al., 2022). Recent years have seen an increase in attention to autism adulthood research; however, this population continues to receive the least funding in autism research (Cervantes et al., 2021). Therefore, a need remains for research focusing not only on the opportunities and challenges of autistic adults, but also on appropriate services and support for transitioning to adult life. The concept of self-determination is recognised as important in understanding the transition from school to adulthood as it has been linked to improved outcomes and quality of life (Lachapelle et al., 2005; Shogren & Shaw, 2016).

Estimates show that 65/10,000 of the worldwide population is autistic (Zeidan et al., 2022). Autism is a lifelong neurodevelopmental condition characterised by differences in communication and interaction and how an individual perceives and interacts with the world (American Psychiatric Association, 2013). Early descriptions of autism have characterised it as a childhood condition, but research in the recent decades has provided a clearer picture of prevalence rates throughout the life cycle, as well as wider understanding and recognition of autism at different life stages (Elsabbagh et al., 2012). Autistic individuals show preferences for predictability and routines; thus, the introduction of new environments and expectations that come with the transition to adulthood can bring significant challenges (American Psychiatric Association, 2013). Autistic adults have shorter life expectancy (Hirvikoski et al., 2016), experience higher

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risks of having a sensory impairment (e.g. deafness/hearing loss and blindness/sight loss), of physical disability (Rydzewska et al., 2018), cardiovascular problems (Cashin et al., 2018), and high rates of early parkinsonism (Starkstein et al., 2015). Co-occurring mental health conditions are highly prevalent in the autistic population (Lai et al., 2019), and suicidal ideation and attempts are higher than in the general population (Zahid & Upthegrove, 2017). In the UK, less than a third of working age autistic people are in a form of employment, the lowest rate of any disabled group (Buckland, 2024), are socially disadvantaged (Brugha et al., 2011), and over-represented in homeless populations (Churchard et al., 2019).

It is estimated that over a third of autistic individuals also have a learning disability,[1] although estimates vary among studies due to a range of factors such as resource availability, community awareness, and sociodemographic factors (Autism & Developmental Disabilities Monitoring Network, 2012; Katusic et al., 2021; Maenner, 2021; Shenouda et al., 2023; Zeidan et al., 2022). Learning disability is lifelong and is defined by the Department of Health (2001, p. 14) as:

> *'a significantly reduced ability to understand new or complex information, to learn new skills (impaired intelligence), with a reduced ability to cope independently (impaired social functioning), which started before adulthood.'*

Individuals with a learning disability also experience poor life outcomes including higher rates of mortality (Abuga et al., 2021), health inequalities (Emerson et al., 2016), delays in care or treatment (White et al., 2023), limited adulthood opportunities such as being in paid employment (Nuffield Trust, 2023) or housing choice (Blood et al., 2024). They are also overrepresented in homeless populations (Durbin et al., 2018) and experience higher rates of mental health conditions (Cooper et al., 2007).

Higher levels of self-determination have been found to lead to more positive transition outcomes for students with disabilities generally, including academic (Lee et al., 2010), employment, financial independence, independent living (Wehmeyer & Garner, 2003; Wehmeyer & Palmer, 2003), and more positive quality of life and life satisfaction (Nota et al., 2007). Moreover, Cobb et al., (2009, p. 108) saw self-determination as 'a key component of high-quality transition services'. The 1989 National Conference on Self-Determination marked the beginning of a movement of promoting self-determination in special education, following the development of Self-Determination Theory (SDT) by Deci and Ryan (1985). Self-determination has been widely defined and used in special education and disabilities literature (Field, 1996). In the present review, we understand self-determination as defined by Campeau et al., (1993, p. 2):

> *'choosing and enacting choices to control one's life – to the maximum extent possible – based on knowing and valuing oneself, and in pursuit of one's own needs, interests and values.'*

According to Abery (1994), most initial research in self-determination as an educational outcome was focused on measuring characteristics and skills of the individual, which has led to conclusions of deficits for students with disabilities. This individually focused interpretation caused 'a lack of appreciation of the important role that a person's ecological contexts play in the development and use of skills relevant to self-determination' (Abery, 1994, p. 350). In order to challenge this deficit-based model, Abery and Stancliffe (1996, p. 114) propose an ecological framework for self-determination, conceptualizing it as 'a product of an ongoing interaction between individuals and the multiple environments within which they function'. Wehmeyer (2003) argues that regarding self-determination from an ecological perspective does not disregard other theoretical traditions that focus on important individual skills and capacities, but rather that it includes the individual and all of their capacities in the broader context. Abery and Stancliffe (2003, p. 27) note that self-determination does not simply 'lie within the person', but rather it is:

> *'the product of both the individual and the environment - of the person using the skills, knowledge and beliefs at his/her disposal to act on the environment with the goal of obtaining valued and desired outcomes'.*

The ecological framework of self-determination is based on Bronfenbrenner's bioecologial model of human development. Bronfenbrenner (1974) developed this approach in response to his belief that much previous research had been ecologically invalid due to being conducted through laboratory-based experiments that did not reflect children's everyday lives. Bronfenbrenner (1979, p. 8) proposed the study of human development in context, through 'a theory of environmental interconnections and their impact on the forces directly affecting psychological growth'. This is composed by four layers, often represented through concentric circles to identify a range of environmental influences with the developing child at the centre: microsystem, mesosystem, exosystem, and macrosystem (Bronfenbrenner, 1989). Bronfenbrenner (1979, p. 16) argued that human development is a result of the 'interaction between the growing human organism and its environment', and this should be the foundation of behavioural science. According to Wehmeyer et al.

[1] We use 'learning disability' instead of 'intellectual disability' because the term is more positively perceived and more commonly used in the UK and is the preferred term of self-advocates (Cluley, 2018).

(2010), developing self-determination interventions from an ecological model, which focuses on emphasising both the capacity of the person and modifying the environment to ensure success, is particularly relevant for autistic students. This environment might be supportive or thwarting/controlling of the needs for autonomy, competence, and relatedness associated with self-determination (Ryan & Deci, 2017). Environments range from being supportive to actively creating barriers to the exercise of self-determination; therefore, an understanding of individual characteristics as well as the influence of ecology are needed (Abery & Stancliffe, 2003). Wachs (1983) explains that models of the physical environment looking at its impact on development are not productive, but rather researchers should consider which specific aspects of the environment are relevant for what aspects of the development and for which individuals. Wachs (1987, p. 292) introduced the ecological question below, which frames the discussions of this review:

> *'Under what environments (situations, programs and settings) have what kinds of persons (the diverse characteristics of all youth with disabilities) changed in what kinds of behaviors (school and therapeutic persistence, violent behavior)?'*

Constructing the self-determination of autistic young people and/or learning disabilities through an ecological framework means looking at the individual's strengths, skills, and knowledge, as well as the characteristics of their immediate environments. Difficulties such as those with social communication and social interaction can hinder spontaneity of skill demonstration, which leads to increased adult prompting and support (Hume et al., 2009). Moreover, strict stimulus control when teaching specific skills can enhance student reliance on adult cues and increase the likelihood of prompt dependence and increased passivity (Hume et al., 2009). When looking at the school context, evidence suggests that teachers' views on students' self-determination can be impacted by students' social and communication difficulties (Carter et al., 2006).

Being aware of areas of interest is also important in the ecological framing of self-determination, particularly for autistic students, as they represent manifestations of choice and preference (Zager & Wehmeyer, 2019) and can lead to increased motivation and engagement (Koegel et al., 2010). Differences in executive functioning profiles should also be taken into consideration particularly when designing and implementing self-determination interventions for autistic students and/or learning disabilities. Of particular interest in relation to the expression of self-determination are the ability to plan multi-step sequences of events and dealing with new situations and information (Hume et al., 2014). Furthermore, goal setting and attainment, also related to promoting self-determined behaviour, can present challenges due to the sequential characteristic of goal-directed behaviour (Chou et al., 2017).

Constructing the self-determination of autistic young people and/or learning disabilities through an ecological framework can be achieved through environments that are supportive of the needs for autonomy, competence, and relatedness (Ryan & Deci, 2017; Zager & Wehmeyer, 2019). For school-based self-determination interventions, an autonomy-supportive environment includes opportunities for students to choose, self-direct, and self-regulate their learning, which is structured around their strengths, interests, and curiosity, to create meaningful and purposeful learning (Zager & Wehmeyer, 2019). Teaching staff play an essential role in providing autonomy-supportive environments, through behaviours such as active listening, allowing time for independent work, being less directing and demanding, placing emphasis on praising mastery, and responding to student-generated questions (Reeve, 2002). Competence supports involve educational practices that encourage students to believe that they are capable and competent (Zager & Wehmeyer, 2019). This does not imply the acquisition of certain skills, but rather a perception of oneself as competent, which can be encouraged through a focus on mastery goals and collaboration, instead of competition and performance goals. It can involve provisions of structure and positive feedback, optimally challenging learning activities that are based on students' interests, encourage self-directing and self-regulating. Teachers should also provide students with appropriate tools and feedback to promote success and feelings of efficacy (Niemiec & Ryan, 2009). Lastly, an environment that is supportive of relatedness is one that enables individuals to experience a sense of belonging and connection with others. When students' strengths are recognised, interests are emphasised, and volitional action is supported (autonomy supports); when students believe they are capable and competent (competence supports), they are more likely to feel a sense of belongingness and that others care about them (Zager & Wehmeyer, 2019). Thus, an environment in which both autonomy and competence supports are present should also provide support for relatedness. Niemiec and Ryan (2009, p. 139) explain that relatedness in the classroom is 'deeply associated with a student feeling that the teacher genuinely likes, respects, and values him or her'. Thus, students who experience this are more likely to feel more motivated and engaged in their learning. Relatedness-supportive teaching has been identified as being related to teachers showing enthusiasm towards students' work, offering a rational and meaningful purpose for work, and providing supportive feedback (Zager & Wehmeyer, 2019).

Despite the increasing interest in research on self-determination for autistic students, there is a lack of empirical intervention research for this population (Chou et al., 2017; Wehmeyer et al., 2010). However, a recent review conducted

by Morán et al. (2021) identified 18 studies looking at factors impacting development or interventions on self-determination that included at least one autistic student. Autistic individuals with a learning disability face selection bias in research. Russell et al. (2019) found that over 90% of autistic research participants did not have a learning disability, a shared feature in all areas of autism research. The present systematic review was conducted as part of a wider project looking at the development of teaching practice to support the self-determination of autistic students with learning disabilities (Cristescu, 2023). The study was conducted in an all-through autism specialist school in England, UK, where the *2015 Special Educational Needs and Disabilities (SEND) Code of Practice: 0 to 25 years* (Department for Education, 2015) provides guidance and details of the legal requirements that must be followed by local authorities, health bodies, schools, and colleges. The study was based on a collaboration with autistic students with learning disabilities aged 16–19 and their teaching staff to develop teaching practice to promote self-determination and better transition outcomes. With this in mind, along with the shared poor outcomes and opportunities previously discussed and the overlap between autism and learning disabilities, the present review includes self-determination interventions for both populations for students aged 15–25. The choice to expand the age range for the participants in the studies included in the review was to be in line with the English SEND Code of Practice, which provides guidance for pupils up to the age of 25 and also emphasises the importance of *transitions planning* at the age of 15 years. Furthermore, the ecological framework provides a different approach to Morán et al. (2021)'s and an updated systematic review of self-determination interventions. Studies were included if they were published from 1985 when SDT was developed and before the end of 2023 when the present review was conducted.

Therefore, the present review set out to (1) identify and synthesise interventions that target self-determination for autistic young people and/or learning disabilities aged 15–25, (2) analyse interventions through an ecological lens of constructing self-determination, and (3) provide practical implications for educational practice.

Method

Search Strategy and Selection

The search strategy was developed by consulting systematic reviews and meta-syntheses on self-determination and related topics. An initial scoping phase was conducted using the terms *self-determination* AND *review* in the search engine Google Scholar, which was followed by searching for *self-determination* AND *disab** AND *review* on the EBSCO, Medline PsychInfo, Scopus, and Web of Science databases. The search strategies of the seven systematic reviews on self-determination identified (Algozzine et al., 2001; Chambers et al., 2007; Cobb et al., 2009; Fowler et al., 2007; Konrad et al., 2007; Malian & Nevin, 2002; Wood et al., 2005) were used to construct the search strategy for the present review (see Table 1). Due to the scarcity of research regarding self-determination in individuals with autism, systematic reviews in the areas of learning disability research have been also consulted in order to ensure that the chosen terms provide an even more robust search: autism (Gunning et al., 2019; Parsons et al., 2011; Peñuelas-Calvo et al., 2019; Schlosser & Wendt, 2008; Williams et al., 2004) and learning disability (Brown & McCann, 2018; Dagnan et al., 2018; Kozma et al., 2009; Scior, 2011; Verdonschot et al., 2009). The search terms used in the seven reviews on self-determination, along with those on autism and learning disability, were combined to create the current search strategy (Table 1). In addition, one systematic review looking at self-determination for autistic students was also identified (Morán et al., 2021), which included intervention studies and studies looking at stakeholder perceptions. Furthermore, the systematic review by Cobb and Alwell (2009) on transition planning/coordinating interventions for young people with disabilities uses an ecological framework and contributed to the conceptualisation and analysis of the current systematic review.

Initial searches combining the three groups of search terms with the Boolean operator 'AND' brought no relevant results, confirming the selection bias previously discussed. Thus, the second Boolean operator was changed to 'OR' as follows: self-determination AND (autism OR learning disability). This was not only helpful in regards to the prevalence of learning disability in the autistic population, but also because looking at the broader field allows for more lessons to be learned about the effectiveness of self-determination interventions.

The previously mentioned systematic reviews were also used to inform the choice of databases, which are as follows: EBSCO (including British Education Index, Child

Table 1 Search terms for the systematic review on the effectiveness of interventions aimed at promoting the self-determination of young people with a diagnosis of autism and/or learning disabilities

Self-determination	Autism	Learning disability
Self-determination	Autis*	Intellectual* disab*
Self determination	Asperger*	Intellectual impair*
	Pervasive develop*	Intellectual function*
		Learning disab*
		Learning disorder*
		Learning impair*
		Developmental* disab*
		Developmental* impair*
		Mental* retard*
		Mental* handicap*
		Mental* impair*

Development and Adolescent Studies, Education Abstracts, Education Resource Information Center, Educational Administration Abstracts), Ovid (including PsychInfo, MEDLINE), ProQuest (Education Collection, International Bibliography of the Social Sciences, Social Science Database), Web of Science (Core Collection), and Scopus.

Table 1 presents the final search terms used to identify the studies included in the present review, compiled after consulting the previously mentioned systematic reviews, and following testing to ensure a robust approach.

Inclusion Criteria

The studies included in this systematic review met all the following inclusion criteria:

1. Published in a peer-reviewed journal in English
2. Published between 1985 and 2023
3. Collected primary data regarding the implementation of a programme/intervention/approach related to self-determination
4. Included at least one participant with autism or learning disability
5. Included at least one participant between the ages of 15–25

The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) was used to guide the selection process for the articles included (Page et al., 2021; see Fig. 1).

For each of the five databases identified, five searches were carried out, resulting in a total of 1127 articles being

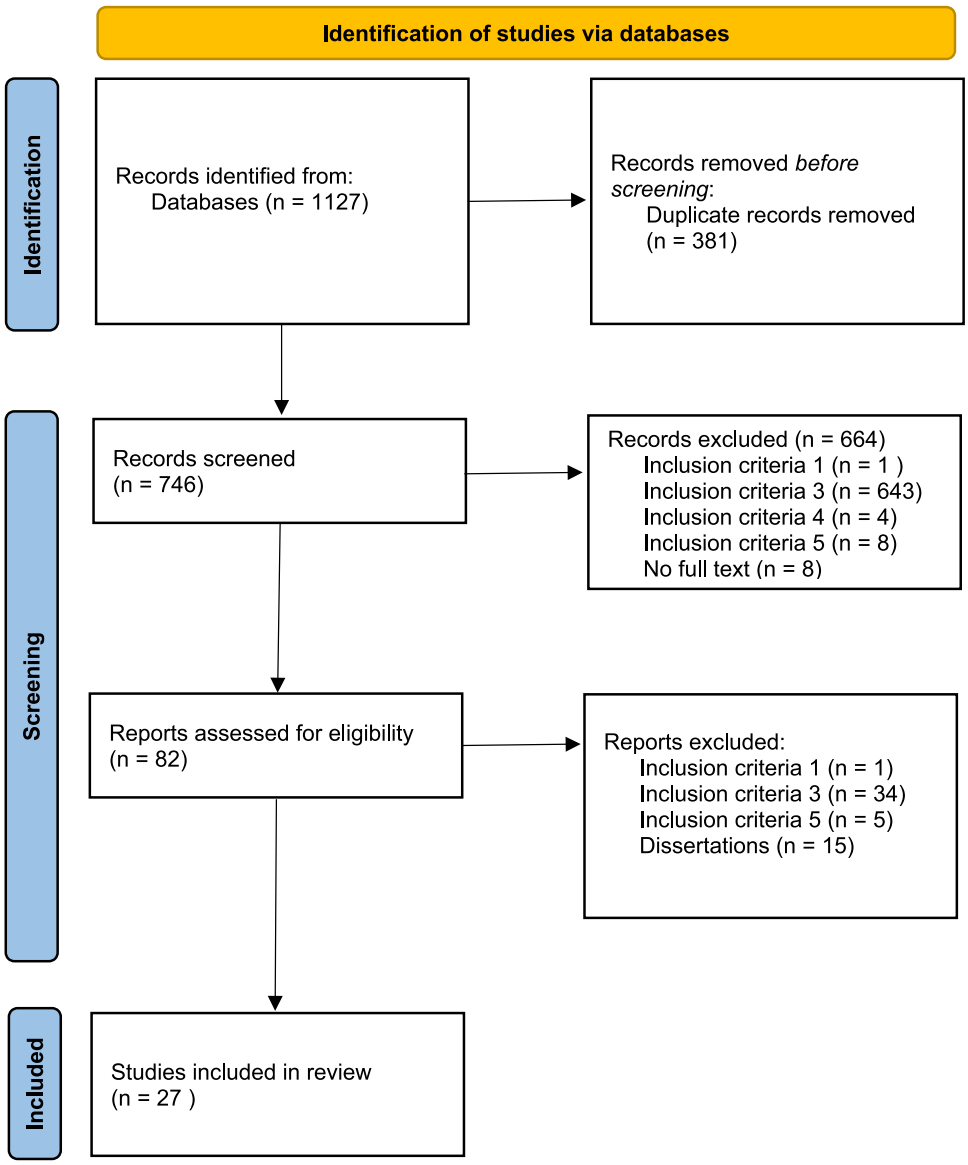


Fig. 1 PRISMA 2020 flow diagram for the systematic review on the effectiveness of interventions aimed at promoting the self-determination of young people with a diagnosis of autism and/or learning disabilities (see Page et al., 2021)

identified. At the end of the computerised search, the journals *Career Development and Transition for Exceptional Individuals*, *Career Development for Exceptional Individuals*, and *Journal of Special Education* were selected for hand searching, as they included at least three of the articles identified. Three further articles were identified by title, but their abstracts determined that they did not meet the inclusion criteria. Therefore, no further articles were included, and this offered reassurance of the veracity of the computerised searches.

The articles identified were imported to the referencing software EndNote8. After duplicates were removed, 746 articles remained. Articles were screened by title and abstract first, and then by reviewing the full text to ensure that all inclusion criteria were met, leading to a total of 27 articles to be included in the systematic review (Table 2).

Data Extraction and Analysis

For each of the 27 articles included, the following details were extracted: participant characteristics (e.g. gender, age, ethnicity, diagnosis, consent), location of data collection, intervention (e.g. type, duration, characteristics, who it was designed and implemented by, flexibility of implementation), and methodology (e.g. research design, outcome measures, behaviors, social validity, generalisation, maintenance).

The first author was the primary assessor and screened all studies at all stages of the review. The second author independently assessed 10% of studies at the initial screening phase for eligibility, documenting reasons for exclusion, and also assessed 10% of studies at full text screening. Inter-rater reliability was high at 94%. The reviewer was blind to the journals or authors of the studies reviewed.

The studies included in the review were evaluated through the four-level model by Kirkpatrick and Kirkpatrick (2006), which was developed to include the different approaches that occur when evaluating the effectiveness of an intervention/programme. Level 1 refers to *reaction*; thus, evaluation from this perspective means measuring how those participating in the programme react to it, what Kirkpatrick and Kirkpatrick (2006) refer to as *customer satisfaction*, or what is also referred to as social validity. Level 2 looks at evaluating *learning*, that is the extent to which participants change attitudes, knowledge, and skills as a result of their involvement with the intervention. Level 3 looks at changes occurring in *behaviour*. These can often be seen as the most important when evaluating interventions; however, according to Kirkpatrick and Kirkpatrick (2006), bypassing levels 1 and 2 is a serious mistake because it can limit effectiveness to changes in behaviour. Lastly, level 4 refers to *results*, in the form of wider impact, generalisability, or maintenance of skills and knowledge, that occurred after participants were involved in an intervention.

Results

Participant Characteristics

Most studies (22) were conducted after 2010, and only one before 2000 (Cross et al., 1999). A total of 3383 participants took part, with sample sizes ranging from 4 to 493. The majority of participants (59.8%) identified as male ($n = 2{,}024$), 35% as female ($n = 1{,}184$), and 0.02% as transgender ($n = 1$), with missing or not reported information from 174 participants. These findings are in line with those of other self-determination systematic reviews (Burke et al., 2020; Fowler et al., 2007; Konrad et al., 2007), which found that most participants were male.

The inclusion criteria required for at least one participant to be between the ages of 15–25; thus, for the studies included, participants' ages ranged from 10 to 38 years old. The most common diagnosis was learning disability (34%, $n = 1142$) followed by intellectual disability ranging from mild to severe/profound (29%, $n = 986$), referred to under the following terms: intellectual disability (15%, $n = 503$), mental retardation (11%, $n = 374$), and intellectual impairment (3%, $n = 109$). The remaining participants had other or multiple disabilities not directly specified (12%, $n = 414$), emotional/behavioural conditions (4%, $n = 143$), mental health conditions (including depression, anxiety, and schizophrenia) (5%, $n = 171$), other health impairments (3%, $n = 99$), and physical disabilities including vision and hearing impairments (1%, $n = 43$). ADHD/ADD (less than 2%, $n = 54$) and speech disorders (2%, $n = 74$) were also less common amongst participants. These findings are in accordance with those of Algozzine et al. (2001) and Burke et al. (2020) in which learning disability and intellectual disability, respectively, were also the most common diagnoses for the participants in the studies they included.

Moreover, 15 of the 27 studies included participants who had a diagnosis of autism/ASD/Asperger's Syndrome/PDD-NOS and their age ranged from one to 47 years old (combined, this gave a total of 292 (9%) of the 3383 participants across all 27 studies). Only in four studies (Bellon-Harn & Manachaiah, 2021; Chou, 2020; Hagner et al., 2012; Oswald et al., 2018) out of the 15 studies all participants were autistic. No studies reported including participants who self-identified as autistic. This lack of representation of autistic individuals is not surprising and mirrors that of Burke et al. (2020) who found that only 3.4% of the over 3000 participants in the studies included were autistic. Furthermore, this contributes to the evidence on the sampling bias which can exclude autistic individuals with a learning disability. All four studies required participants to have a formal diagnosis of autism, three

Table 2 Characteristics of studies included in the systematic literature review on the effectiveness of interventions aimed at promoting the self-determination of young people with a diagnosis of autism and/or learning disabilities

Study	Participants		Study design			Measures			Intervention			Intervention delivered by			Setting		Findings	
	Autistic	Learning disability	Pre-experimental	Quasi-experimental	True experiment	Arc's Self-Determination Scale	AIR Self-Determination Scale	Other e.g. GAS	SDLMI	WFA	Other e.g. the *Beyond High School model*	Teachers	Researchers	Other e.g. self-directed	School/university	Other e.g. online	Improvement of self-determination	Positive maintenance data
Bellon-Harn and Manachaiah (2021)	✓		✓			✓					✓			✓		✓	✓	
Chao (2020)		✓			✓	✓					✓	✓			✓		✓	
Chou (2020)	✓				✓			✓			✓	✓			✓		✓	
Cross et al. (1999)		✓		✓		✓					✓	✓			✓		✓	
Farmer et al. (2015)		✓		✓				✓			✓		✓		✓		✓	
Garrels and Palmer (2020)	✓	✓	✓				✓		✓			✓			✓		✓	
Hagner et al. (2012)	✓				✓	✓					✓		✓			✓	✓	
Kim (2021)		✓			✓			✓			✓			✓	✓		✓	
Lee et al. (2008)	✓	✓			✓	✓	✓	✓	✓			✓			✓		✓	
Lee et al. (2011)	✓	✓			✓	✓	✓			✓		✓			✓		✓	
Oswald et al. (2018)	✓				✓			✓			✓			✓		✓	✓	
Palmer et al. (2004)		✓		✓		✓		✓	✓				✓		✓		✓	

Table 2 (continued)

Study	Participants		Study design			Measures			Intervention			Intervention delivered by			Setting		Findings	
	Autistic	Learning disability	Pre-experimental	Quasi-experimental	True experiment	Arc's Self-Determination Scale	AIR Self-Determination Scale	Other e.g. GAS	SDLMI	WFA	Other e.g. the *Beyond High School model*	Teachers	Researchers	Other e.g. self-directed	School/university	Other e.g. online	Improvement of self-determination	Positive maintenance data
Palmer et al. (2012)		✓	✓			✓			✓	✓	✓	✓			✓		✓	
Powers et al. (2012)	✓	✓			✓	✓					✓			✓	✓		✓	✓
Seong et al. (2015)	✓	✓			✓	✓	✓				✓	✓			✓		✓	
Sheppard and Unsworth (2011)	✓	✓	✓				✓	✓			✓			✓	✓		✓	✓
Shogren et al. (2020)	✓	✓			✓			✓	✓	✓		✓			✓		✓	
Shogren et al. (2018)	✓	✓			✓			✓	✓		✓	✓			✓		✓	
Shogren et al. (2019)	✓	✓	✓					✓	✓			✓			✓		✓	
Sowers and Swank (2017)	✓				✓	✓					✓			✓		✓	✓	✓
Wehmeyer et al. (2006)		✓	✓			✓		✓	✓	✓	✓	✓	✓		✓			
Wehmeyer et al. (2000)		✓	✓			✓	✓	✓	✓			✓			✓		✓	
Wehmeyer et al. (2011a, 2011b)	✓	✓			✓	✓	✓			✓		✓			✓		✓	

Table 2 (continued)

Study	Participants		Study design			Measures			Intervention			Intervention delivered by			Setting		Findings	
	Autistic	Learning disability	Pre-experimental	Quasi-experimental	True experiment	Arc's Self-Determination Scale	AIR Self-Determination Scale	Other e.g. GAS	SDLMI	WFA	Other e.g. the *Beyond High School model*	Teachers	Researchers	Other e.g. self-directed	School/university	Other e.g. online	Improvement of self-determination	Positive maintenance data
Wehmeyer et al. (2013)	✓				✓	✓	✓		✓	✓	✓	✓			✓		✓	
Wehmeyer et al., (2011a, 2011b)	✓				✓	✓	✓			✓	✓	✓			✓		✓	
Wehmeyer et al. (2012)	✓				✓	✓	✓		✓			✓			✓		✓	

of which refer to a score in the ASD range on the Autism Diagnostic Observation Schedule (ADOS) (Hagner et al., 2012) or ADOS-2 (Oswald et al., 2018), or on the Autism Quotient-10 (AQ-10) (Bellon-Harn & Manachaiah, 2021). Two studies included autistic adults exclusively (Bellon-Harn & Manachaiah, 2021; Oswald et al., 2018), and three studies had inclusion criteria related to communication: ability to read and type in English and no barriers to using a computer (Bellon-Harn & Manachaiah, 2021), ability to communicate needs, preferences, and interests verbally or using alternative methods (Chou, 2020), spoken language and an a verbal IQ ≥ 70 (Oswald et al., 2018). The two studies focusing on autistic adults had inclusion criteria related to education: high school graduate (Oswald et al., 2018) and accepted to and/or enrolled in college (Bellon-Harn & Manachaiah, 2021).

A total of 19 studies reported data on participants' ethnicity, some studies reporting only on a part of the participants, with missing or not reported information for 674 participants. Of the remaining 2709 participants, 1675 (62%) identified as Caucasian/White, 508 (19%) as Hispanic, 407 (15%) as African American, and less than 100 for each Asian/Pacific Islander, Native American/Alaskan Native, other, and multi-ethnic. Out of the 19 studies that reported on participants' ethnicity, all but one (Zhang, 2001) included a majority of Caucasian/White participants, with one study (Hagner et al., 2012) including them exclusively. These findings are not surprising and are in accordance with those of Burke et al. (2020) who also found a majority of Caucasian/White participants.

Furthermore, in 19 of the studies, details are given regarding participants' consent. In more detail, two studies ask only for parental/caregiver consent (Lee et al., 2008; Palmer et al., 2004), five studies only for informed consent or assent from the young people themselves (e.g. Farmer et al., 2015; Sowers & Swank, 2017), and 12 ask for both (e.g. Oswald et al., 2018; Palmer et al., 2012).

Environments (Settings and Locations)

Although being conducted in a school setting was not an inclusion criterion, 23 of the 27 studies were conducted in schools or universities. Out of these, the majority ($n = 16$) mentioned being at least partially conducted in high schools, four in middle schools, one in an educational residential unit, and two in universities. The remaining four studies were conducted either in an institute (Oswald et al., 2018), programme offices and coffee shops (Sowers & Swank, 2017), online (Bellon-Harn & Manachaiah, 2021), or partially in the family homes (Hagner et al., 2012). This is in accordance with the findings of Fowler et al. (2007) and Konrad et al. (2007), who also found that the majority of studies were conducted in school settings. Most studies (22) were

conducted in the USA, with two in Taiwan (Chao, 2020; Chou, 2020), and one in each Australia (Sheppard & Unsworth, 2011), Korea (Kim, 2021), and Norway (Garrels & Palmer, 2020).

Overview of Interventions

A total of 19 different interventions (programmes/approaches) was identified, the most evaluated being the *Self-Determined Learning Model of Instruction* (*SDLMI*) (Wehmeyer et al., 2000), in 11 (41%) studies, six of which looked at its effectiveness exclusively (Garrels & Palmer, 2020; Lee et al., 2008; Palmer et al., 2004; Shogren et al., 2019; Wehmeyer et al., 2000). The SDLMI is a teaching model based on theory in self-determination, designed to shape educators' instruction to be student-directed rather than teacher-directed. It does not aim to deliver standardised content, but rather to organise instruction and supports for individualised goal-setting and attainment.

The second most frequently evaluated intervention is the *Whose Future Is It Anyway* (*WFA*) (Wehmeyer et al., 2004), evaluated in seven studies, out of which exclusively in two (Lee et al., 2011; Wehmeyer et al., 2011a, 2011b). The WFA is a student-directed transition planning process from secondary education to adult life emphasising the young person's preferences, interests, and needs (Lee et al., 2011). It consists of six sections and 36 sessions introducing the concept of transition and transition planning and enabling to self-direct learning on areas such transition services, goal-setting, self-awareness, and decision-making. A further study evaluates an adaptation of *WFA*, *Whose Future Is It*? (Shogren et al., 2019).

Other interventions included are *The Next S.T.E.P. Curriculum* (Wehmeyer et al., 2013, 2011a, 2011b; Zhang, 2001), *The Beyond High School model* (Palmer et al., 2012; Wehmeyer et al., 2006), *The ChoiceMaker curriculum* (Cross et al., 1999; Wehmeyer et al., 2013), *The Self-Directed IEP* (Seong et al., 2015; Wehmeyer et al., 2011a, 2011b), *Self-Advocacy Strategy* (Wehmeyer et al., 2013, 2011a, 2011b), the *Chinese Idiom Self-Determination Curriculum* (Chao, 2020), *Navigation of Social Engagement (NOSE)* (Chou, 2020), a *Theme-Based Garden Book Making* (Kim, 2021), and a web-based and mobile application support program (Bellon-Harn & Manachaiah, 2021). One study compared the effectiveness of two self-determination interventions (Cross et al., 1999), another two looked at the single and combined impact of two self-determination interventions (Shogren et al., 2018, 2020), and a further one looked at the differential impact of using technology alongside a self-determination intervention (Lee et al., 2011). Two studies also implemented interventions not targeting self-determination in the control groups (Powers et al., 2012; Seong et al., 2015). Three further studies evaluated the impact of more than two self-determination interventions (Wehmeyer et al., 2006, 2013, 2011a, 2011b). Burke et al. (2020) also found the SDLMI to be the most frequently used intervention in the 34 studies included, followed by WFA, Self-Advocacy Strategy, and the NEXT S.T.E.P Curriculum.

In the majority of studies (18), the interventions were implemented exclusively by teachers/teaching staff, who in 17 of those cases received prior training from the researchers conducting the studies. In two studies, those who delivered the intervention were referred to as coaches (in one case being stated they were a parent/relative), in one the intervention was delivered by career advisors, one was self-directed, in three by researchers, and another by both researchers and teaching staff. Burke et al. (2020) also found that in the majority (76.5%) of their studies the interventions were implemented by people natural to the settings, who received prior training from researchers or project staff.

The implementation involved varying levels of flexibility across the 27 studies. This is not surprising given the majority of studies were conducted in the real-world by individuals natural to the settings, as previously discussed. This flexibility can be seen in the structure of the implementation, such as using only parts of the intervention (Cross et al., 1999; Lee et al., 2011) or combining two or more interventions (Shogren et al., 2018; Wehmeyer et al., 2006). Context specific adaptations are also mentioned by Powers et al. (2012), as well as those of materials (Sowers & Swank, 2017), or specific to the individual participants (Shogren et al., 2019; Wehmeyer et al., 2000). It is also valuable to note that in two studies, teachers selected the intervention they found most suitable for their students from a list provided by researchers (Wehmeyer et al., 2013, 2011a, 2011b). This reinforces the idea of the crucial role that teachers play when looking at the development of young people's self-determination within a school setting.

The majority of interventions had an instructional approach, often focused on goal setting, planning, and achieving. This is not surprising given that most studies are conducted in school settings and with young people preparing for transition from school. The interventions often involve questions and worksheets (e.g. Cross et al., 1999; Farmer et al., 2015; Sowers & Swank, 2017), lessons (e.g. Lee et al., 2011; Oswald et al., 2018), meetings (e.g. Hagner et al., 2012), coaching sessions (e.g. Powers et al., 2012), or a combination of those, which are focused on the young person's goals. A different type of intervention is the ERU programme, which is embedded in the running of the setting (Sheppard & Unsworth, 2011).

Research Design

All 27 studies undertook an experimental design and collected pre- and post-test measures, meaning standardised assessments were used to measure certain characteristics

both before and after the intervention was implemented. Out of these, seven studies had a *pre-experimental design*, thus involving only one group of participants (e.g. Palmer et al., 2012; Sheppard & Unsworth, 2011). There were four studies with a quasi-experimental design: Cross et al. (1999), Farmer et al. (2015), Palmer et al. (2004), and Zhang (2001); the majority being *true experiments* (16)—studies that included comparison/control groups and random allocation of participants: e.g. Hagner et al. (2012) and Lee et al. (2008).

Shogren et al. (2018) highlighted the need to engage all members of the stakeholder community in planning for systematic change and to promote top-down and bottom-up change, but unfortunately, none of the 27 studies took a participatory approach, with the exception of Oswald et al. (2018) who briefly described the involvement of stakeholders in designing the intervention evaluated.

Self-Determination Behaviours

As previously discussed, one of the inclusion criteria was that the studies evaluated interventions targeting self-determination; thus, all 27 studies measured overall self-determination. Aside from this, 15 studies included at least one other target behaviour, such as skills and knowledge related to transition (Powers et al., 2012; Seong et al., 2015; Wehmeyer et al., 2011a, 2011b) or career planning (Hagner et al., 2012; Sowers & Swank, 2017), access to the general education curriculum (Palmer et al., 2004, 2012), goal achievement (Shogren et al., 2018, 2019), social problem-solving (Chou, 2020), and student involvement (Wehmeyer et al., 2006). This is not a surprising finding given the view of self-determination as a set of skills or through a goal-focused lens and is in accordance with Burke et al. (2020), who found that more than half (18) of the studies included measured skills related to self-determination. However, it is interesting to note that only 12 of the 34 studies included measured changes in overall self-determination (Burke et al., 2020).

Effectiveness of Interventions

Measures

Each of the 27 studies included at least one standardised test/assessment that measured participants' overall self-determination. The most popular measure was *The Arc's Self-Determination Scale* (*SDS*) (Wehmeyer, 1995), which was used in 18 studies. SDS is a self-report 72-item measure of self-determination which collects data on four essential characteristics of self-determined behaviour: autonomy, self-regulation, psychological empowerment, and self-realisation (Wehmeyer et al., 2011a, 2011b). This was followed by the *American Institutes for Research (AIR) Self-Determination Scale* (Wolman et al., 1994), which includes a student self-report (AIR-S), an educator, and a parent version. Out of these, the AIR-S was used in 10 studies, three of which also included the educator version. A total of eight studies used both the SDS and the AIR-S. A third most used measure was the *Goal Attainment Scaling* (*GAS*) (Kiresuk et al., 1994), being used in seven studies, to measure progress on attaining specific goals. Other self-determination measures used included the *Self-Determination Student Scale* (Farmer et al., 2015), the *Seven Component Self-Determination Skills Survey* (Oswald et al., 2018), and the newly developed *Self-Determination Inventory: Student-Report* (SDI:SR) (Shogren et al., 2014b) and *Parent/Teacher-Report* (SDI:PTR) (Shogren et al., 2014a) in Shogren et al. (2018) and Shogren et al. (2019).

All studies measured participants' self-determination pre- and post-intervention, and all but one Wehmeyer et al. (2006) reported an increase in scores at least on one of the assessments used, albeit not all were statistically significant. This is in accordance with the findings of Burke et al. (2020) who found that all studies suggested positive outcomes for at least one skill associated with self-determination. Despite this, some important conclusions are drawn from several studies regarding the measures and their accuracy, which are discussed below.

Farmer et al. (2015) demonstrated the importance of involving participants in the interpretation of the findings. Participants' understanding of self-determination affected the way they interacted with the data collection tools. As participants developed their understanding, their answers changed as they realised that they did not fully understand the questions and their implications at the beginning, and the nature of the study did not allow them to go back and change their answers. This is particularly important to note as it is a common feature of self-determination interventions to teach the young people about the meanings and implications of certain skills and concepts; thus, it would be valuable to capture these changes. On a similar note, Shogren et al. (2019) suggested that further research should focus on exploring whether teachers are observing actual changes in students' self-determination or if their perceptions of capacity change because of training and implementing interventions. This highlights a need for training for teachers regarding awareness of capacity for self-determination and an understanding of supportive environments.

Some studies note differences on participants' scores on the two most popular measures: SDS and AIR-S. One study argues that the difference in scores, which showed significant increases on the SDS, but not AIR-S, is due to the nature of the intervention and the skills taught being more closely linked with the former measure (Seong et al., 2015). Another study found that students in both experimental and control

groups increased their self-determination scores over time (three-year study) on both measures; however, the impact of the intervention was only significant on the AIR-S (Wehmeyer et al., 2013). For the AIR-S, students in the intervention group increased scores by almost triple the points as did students in the control group. The authors explain that these findings are not surprising as high school is a time when young people acquire skills and abilities to become more self-determined, and that having structured instruction in doing so enhances this development more than it would occur normally. On the other hand, the SDS showed no intervention effect; thus, all students regardless of group demonstrated the same pattern of change regarding self-determination scores (Wehmeyer et al., 2013). The authors explain that these differences confirm insights previously encountered, that the two measures assess different aspects of the self-determination construct. The AIR seems to be measuring student capacity and opportunity for self-determination, which may be more significantly influenced by exposure to interventions. Therefore, the AIR might be more sensitive to short-term changes regarding skills, attitudes, and environmental opportunities for self-determination. On the other hand, Wehmeyer et al., (2011a, 2011b) found that significant improvements in self-determination scores showed only on the SDS, and not on the AIR, which is again attributed to the different aspects measured. The SDS aims to capture self-determination status at a certain point in time, whereas the AIR looks at the opportunities and skills that lead to it. One study noted differences between the student self-report and teacher versions of the *Self-Determination Inventory* (Shogren et al., 2019), only the latter showing significant increases. Similar to Wehmeyer et al. (2006) this is attributed to a need for longer and more repeated exposure for young people to see the changes in themselves. A suggestion is also made regarding a need for shorter term indicators and ways to determine the factors that might impact student self-report (Shogren et al., 2019).

Evaluation

Aside from the quantifiable effectiveness shown through the use of standardised measures previously discussed, the studies were evaluated through the Kirkpatrick and Kirkpatrick (2006)'s four-level model.

Level 1 refers to *reaction* or *social validity*, for which data was collected in only eight studies included in the review, out of which two from the young people only (Farmer et al., 2015; Sowers & Swank, 2017) and six from both the young people and those implementing the interventions (e.g. Lee et al., 2008; Oswald et al., 2018). All eight studies reported positive reactions from the participants. The young people believed that the interventions were useful and enjoyed taking part in them (Farmer et al., 2015; Lee et al., 2011; Oswald et al., 2018), felt they improved knowledge and skills (Lee et al., 2008; Sowers & Swank, 2017), and wished for the support they received to continue (Sowers & Swank, 2017; Wehmeyer et al., 2000).

Level 2, which looks at evaluating participants' *learning*, was reported in seven of the studies included. This data was collected through structured interviews (Cross et al., 1999), session notes (Farmer et al., 2015), anecdotal information from teachers (Seong et al., 2015), criterion-referenced measures, or knowledge assessments (Lee et al., 2011; Palmer et al., 2004; Powers et al., 2012; Wehmeyer et al., 2011a, 2011b). The target areas for which participants' learning was evaluated were frequently related to transition planning and engagement (Cross et al., 1999; Lee et al., 2011; Powers et al., 2012; Wehmeyer et al., 2011a, 2011b), reflection and progress on goals, plans, and participants' strengths (Farmer et al., 2015), problem-solving and study planning skills (Palmer et al., 2004), or participation in IEP meetings (Seong et al., 2015). The findings supported the effectiveness of the interventions and showed increases in goals related to employment, education, residential, and leisure (Cross et al., 1999), self-determination (Farmer et al., 2015), knowledge and skills regarding transition (Lee et al., 2011; Wehmeyer et al., 2011a, 2011b), problem solving and study skills (Palmer et al., 2004), and participation in IEP meetings (Seong et al., 2015).

Level 3 looks at changes occurring in *behaviour*, which were previously discussed. Gathering participants' views can not only provide a developed understanding of the effectiveness of an intervention, but can also provide insights that are not captured by standardised assessments of behaviour, or even contradict the results they show. As seen in Farmer et al. (2015), participants' understanding of self-determination developed as a result of the intervention, as did their interaction with the standardised assessments. All 27 studies evaluate the effectiveness of self-determination interventions through an experimental research design; thus, it is not surprising that they all measure changes in at least one behaviour.

Level 4 refers to *results*, wider impact, generalisability, or maintenance of skills. Looking at the 27 studies, this level of evaluation is the one that receives the least attention, with only five studies making at least a reference related to participants' results after being involved in an intervention. These include references made to generalisation of skills (Cross et al., 1999; Oswald et al., 2018; Sheppard & Unsworth, 2011), maintenance (Sowers & Swank, 2017), or outcomes (Powers et al., 2012; Sheppard & Unsworth, 2011; Sowers & Swank, 2017). Regarding the generalisation of skills, no study reports gathering data in a rigorous manner, which is not surprising given the real-world nature of the majority of studies. Cross et al. (1999) found that students showed limited ability to use the new skills during IEP meetings, and Oswald et al. (2018) reported that parents/

carers were educated on how to facilitate generalisation of skills. Although only three studies reported on collected data regarding the maintenance of behaviour or skills, all of their findings were positive, with skills and behaviours being maintained (Powers et al., 2012; Sowers & Swank, 2017) and even increased at follow-up (Sheppard & Unsworth, 2011). The interventions also showed to have positive effects on participants' outcomes such as employment and high school completion (Powers et al., 2012; Sowers & Swank, 2017), opportunities for self-determination at home (Sheppard & Unsworth, 2011), and engagement in career planning (Sowers & Swank, 2017).

Discussion

In this systematic literature review, we identified published studies that examined interventions on self-determination for individuals with autism and/or learning disability. The analysis of the results of this review provided evidence that there is a range of interventions effective in increasing young people's self-determination particularly in the school context. However, some important insights arising from these results will be discussed within an ecological context to further inform research, policy, and practice, structured on Wachs' (1987) ecological question.

'The People'

This review set out to identify the evidence regarding self-determination interventions for young people aged 15–25 with a diagnosis of autism and/or a learning disability. The 27 studies included demonstrate that there is empirical evidence that self-determination and related skills can be taught and enhanced through a range of interventions for this target population. This age group is the one receiving most attention in self-determination research, with only eight studies having been excluded for not meeting this criterion. These findings are mirrored by Algozzine et al. (2001) who found that adolescents were included in the majority of studies looking at self-determination interventions. This insight is not surprising given that self-determination is often looked at in the context of transition and transition-related goals when leaving formal education. However, it is important to note that recommendations are made that self-determination instruction begins earlier than around the time a young person is preparing to leave school, although this needs further investigation (Lee et al., 2011; Wehmeyer et al., 2006). Furthermore, the young people should be given sufficient time, as well as opportunities to practice these skills (Zhang, 2001) in the environments or similar ones to those in which they are expected to use them in (Cross et al., 1999).

The 27 studies bring valuable evidence that self-determination interventions are effective for young people aged 15–25 with a diagnosis of learning disability, the most common diagnosis for the participants included in the studies. However, little attention is given to the relation between a certain diagnosis and the impact of an intervention, as well as having relatively little representation for participants with other diagnoses. It is particularly important to consider the underrepresentation of autistic participants (including those with a diagnosis of ASD, Asperger's Syndrome, and PDD-NOS) that represented only 9% of the over 3000 participants included in the studies.

Chou et al. (2017) stated that no self-determination studies have been undertaken to look exclusively at autistic individuals, either descriptively or as an intervention study. They attributed this gap partly to the lack of instruments to have been normed with this population and the uncertainty regarding their usefulness. Furthermore, the unique characteristics of autistic students and/or learning disabilities imply more targeted self-determination instruction. Their unique profiles of strengths, skills, and knowledge should be taken into consideration, as well as different learning profiles and preferences (Chou et al., 2017; Hume et al., 2009; Zager & Wehmeyer, 2019). This systematic review found that some targeted investigation into self-determination interventions for autistic young people has been done, such as Hagner et al. (2012) and Oswald et al. (2018). Both studies bring initial evidence that targeted interventions, where consideration is given to the characteristics of autistic young people, can lead to enhanced self-determination and post-school outcomes. What is important to note about these two studies is the direct involvement of the young people's families, who received training and support as part of the interventions. For the transition planning approach, families attended group sessions on person-centred planning and received support during the meetings (Hagner et al., 2012), and for the ACCESS Program, they attended a group that followed the same topics as those for the young people, as well as having homework assignments to work on collaboratively (Oswald et al., 2018). Despite this early evidence, the underrepresentation of autistic people in self-determination intervention research shows that further evidence is needed to determine the effectiveness of self-determination interventions for this population. Taking insights from Hagner et al. (2012) and Oswald et al. (2018), future research should focus on the role of the family on both the development and implementation of self-determination interventions.

Although data regarding participants' experiences of the intervention is collected only in eight studies in this review, the reactions are positive and promising. The young people have found their experiences enjoyable and interesting (Oswald et al., 2018), the skills and knowledge useful and beneficial (Farmer et al., 2015; Lee et al., 2011), and wished

for the support they received to continue (Sowers & Swank, 2017). Similarly, teachers implementing the interventions found them accessible, appropriate, and useful for their students (Lee et al., 2011; Wehmeyer et al., 2000). These findings are supportive of the effectiveness of self-determination interventions, as they are shown to be useful not only through standardised measures, but also through the experiences of those engaging with them. This is particularly valuable in the context of self-determination and motivation for autistic young people and/or learning disabilities, although further research is needed.

Another significant implication revealed by this review is that the majority of studies (17) reported that young people's consent/assent was sought (e.g. Palmer et al., 2012). This could be linked to the context of self-determination with goals often related to empowerment, but nevertheless, this finding is a promising one. Whether this has an impact on the previously discussed positive experiences of the interventions deserves further investigation and could also be linked to motivation and attrition. Although the seeking of consent from the young people is an important strength of these studies, no information is given regarding how the information was presented, and the methods/tools used to ensure that the consent received was informed. This information and the learnings from the process would be valuable to future researchers and would foster a culture of open science and shared research practice.

'The Environments'

Self-determination does not occur in a vacuum; thus, is it valuable to consider the characteristics of the environment in which it occurs. The majority of studies in this review were conducted with participants in their natural settings. Their proven effectiveness in such settings is an encouraging finding, especially as most studies took place in school settings which are complex in nature. Thus, it is important for teaching staff to know that self-determination can be taught and enhanced through targeted interventions within school settings, 23 of the 27 studies bringing evidence to support this. There is however an increasing awareness that multiple factors from the environment come into play, such as time, training, and perception of those implementing the interventions, and the different characteristics of the individuals, their interaction needing further exploration.

Without disregarding the effectiveness of the interventions evaluated, it is worth noting that most studies were conducted in the USA. This could in part be due to the increasing attention given to self-determination as an educational goal which began in the USA in the 1990s. A closer look at the exact location of the studies reveals that at least nine (for which the exact location was clearly stated in the articles) were conducted in Midwestern states of the USA. It would be valuable to explore the impact of educational legislation on the effectiveness of these interventions; however, none of the studies explore this. An interesting observation to make is about one study conducted outside of the USA, in Australia, which takes a very different approach in the intervention and its implementation (Sheppard & Unsworth, 2011). The ERU programme takes an embedded approach to self-determination, meaning that opportunities for self-determined behaviours are part of the daily running of the setting in which it is implemented. The implementation of such a programme is likely to have been facilitated by the setting's residential nature; however, it would have been valuable to know if this was impacted by existing educational policy.

The reviewed studies provide little exploration of the impact of the research contexts on effectiveness, but some valuable conclusions are drawn. Firstly, there is a recognition that opportunities should be provided for young people to practice the skills and knowledge acquired through interventions, particularly in different contexts, especially in those they are expected to use them in (Zhang, 2001). Furthermore, environments should be ready to honour the choices and preferences of the young people, that is, where they are not directly involved, family and professionals should be aware of the learning, and provision should be in place to meet requests (Cross et al., 1999). This supports existing evidence of the essential role of teacher behaviour in constructing an autonomy-supportive environment, such as responding to student-generated questions, being less directing and demanding, and placing emphasis on praising mastery (Reeve, 2002).

Secondly, promoting self-determination for autistic young people and/or learning disabilities should be ongoing and not restricted to a short module of instruction (Cross et al., 1999). Although most studies involve the implementation of interventions for a specified period of time, there is a recognition that this should begin early and be continuous (Lee et al., 2011; Wehmeyer et al., 2006). This is also reinforced by young people's views of the experience, who wished for the support received during the interventions to continue (Sowers & Swank, 2017). The effect of time is also one that needs further exploration, as there is an indication that natural maturation can influence the development of self-determination (Wehmeyer et al., 2011a, 2011b).

The complex and varied nature of the school settings in which the majority of studies were conducted can bring limitations when evaluating effectiveness. The presence of bias can occur in professionals implementing the intervention and impact reporting on outcome measures (Oswald et al., 2018). This adds to existing evidence of the impact of students' social and communication differences on teachers' perspectives of their self-determination (Carter et al., 2006). Challenges also arise when looking at the impact of various factors or characteristics of individuals, as exact

matching of context and environments can be difficult to achieve in the real world (Lee et al., 2008; Wehmeyer et al., 2012). However, the 27 studies demonstrate that despite complexity and variance in environments, self-determination can be enhanced for individuals with a range of needs. It is important for professionals to note the role this can play when looking at effectiveness, and the young person's individual and immediate context should be given careful consideration.

The role of teachers or professionals implementing interventions is offered little investigation, but some important insights are expressed. As Wehmeyer et al., (2000, p. 451) explain, the success of an intervention 'is dependent upon the person implementing it'. This involves an awareness of each individual's needs and support needed to access the materials involved, as well as for opportunities for the practising of skills and knowledge (Cross et al., 1999; Wehmeyer et al., 2000). This relates to the ecological framework of supportive environments previously discussed and the essential role played by teachers in a classroom context in providing supports for meeting students' needs. As discussed, this can not only lead to enhanced self-determination, but also to increasing young people's own awareness of it, as well as improving post-school outcomes. One of the studies noted that what teachers did had a more significant impact on the target behaviour than anything the students did (Lee et al., 2008). This is in accordance with Reeve (2002), who found that what teachers did had a more significant impact than what teachers said. Garrels and Palmer (2020) found that teachers saw an increase in opportunities for students to practice self-determined behaviour; students self-reported related skills did not seem to develop as quickly. The authors believe this could be linked to the aspect of time, and that opportunities provided in the environment should be sustainable to encourage development of self-determination and related skills. Teaching practice is thus essential to consider in the implementation of self-determination interventions and deserves further consideration.

It would also be important in this context to explore the relationship between implementing self-determination interventions and professional learning and development for teaching staff, but unfortunately, none of the studies identified address this. According to Timperley (2011), both professional learning and development are intentional, systematic, and ongoing processes. They should involve active interaction with information in a way that challenges previous assumptions and creates new knowledge (Timperley, 2011). This alone does not lead to the transformation of practice but should involve promoting staff empowerment 'to use their agency to align their values and practices' (Brennan & King, 2022, p. 175). Staff development and learning do not occur within a vacuum, and they must be conceptualised as a complex system rather than an event, taking into consideration the different elements of the environment and how they interact and combine with one another (Opfer & Pedder, 2011). Evidence shows that the effectiveness of professional learning and development is increased through collaboration (Opfer & Pedder, 2011). A better understanding of the impact of collaboration and other elements of training, information transfer, and knowledge creation are needed in the wider field, which is demonstrated by the lack of investigation in the context of self-determination interventions.

The 27 studies have shown that there is a range of interventions effective in improving self-determination. There are some that have been more widely investigated (SDLMI, WFA), and some for which research is still in its early stages (e.g. the ACCESS Program). They have been effectively implemented by teaching staff in schools, who received a form of training prior to the studies. It would be valuable to investigate the role of training staff in the effectiveness of interventions, although no studies provide any evidence or insights into this. What is particularly important to note for practice is the flexibility with which these interventions have been implemented. Some studies showed effectiveness of implementing only parts of an interventions (e.g. Lee et al., 2011), or combining them (e.g. Shogren et al., 2018), as well as while adapting materials to contexts (Powers et al., 2012) or individuals (Shogren et al., 2019). This is a valuable strength of the interventions evaluated, particularly as most are designed to be implemented in complex and varied school settings for individuals with a range of needs. Shogren et al. (2020) found more positive self-reported outcomes for students taking part in SDLMI than when this was combined with WF. The authors conclude that this could be linked to the former being less intensive, allowing teachers more flexibility to adapt to individual needs, whereas WF is a scripted curriculum.

However, it is also important to highlight that most interventions had an instructional approach. They often involved worksheets and questions (e.g. Farmer et al., 2015), lessons (e.g. Oswald et al., 2018), and coaching sessions (e.g. Powers et al., 2012), mostly focused on goal setting, planning, and achieving. Furthermore, they were all implemented for a specific period of time. While this brings valuable evidence, in a context where increasing attention is given to self-determination as developing through the interactions of the individual with the environment, more attention should be given to interventions that are embedded, such as the ERU programme (Sheppard & Unsworth, 2011). Initial evidence is also brought about the positive effect of using technology, which was shown to increase effectiveness of self-determination interventions (Lee et al., 2011; Wehmeyer et al., 2011a, 2011b).

'The Behaviours'

The 27 studies bring valuable evidence that self-determination and related skills can be improved through targeted interventions for young people with range of needs aged 15–25. All studies showed increases in scores after participants were involved in an intervention. Thus, the studies contribute to the growing body of knowledge that self-determination can be taught and enhanced successfully for young people with disabilities. Furthermore, evidence is brought that other related behaviours can be effectively targeted such as transition knowledge and skills (e.g. Seong et al., 2015), career planning (e.g. Hagner et al., 2012), and goal achievement (e.g. Shogren et al., 2018).

The review showed that there is a range of standardised measures for self-determination that can be used when evaluating effectiveness. Some have been more widely and frequently used, such as *The Arc's Self-Determination Scale* (*SDS*) and *the AIR Self-Determination Scale*, and some are in their initial stages of development, such as the *Self-Determination Inventory: Student-Report* (SDI:SR) and *Parent/Teacher-Report* (SDI:PTR). It is important to note that the two most frequently used tools, the *SDS* and *AIR-S* (Student version), are both self-report measures, meaning the young people rate themselves on the given items. Although this is an encouraging finding as it brings contributions to the growing area of involving young people in research, consideration should be given to the way each individual engages with the measure and its items.

Self-determination interventions can involve lessons on the concept and related ones; thus, young people's knowledge and understanding can change and impact the way they self-report, as seen in Farmer et al. (2015). The initial data analysis of the scores showed little to no intervention effect; however, when participants were consulted, they expressed that the intervention was beneficial and that their self-awareness and self-regulation, in particular, improved. When participants were asked for their interpretation of these differences, it was identified that the data collection measures were not sensitive to the typical flow of the academic semester: at the start, they felt more positive and in control, but as demands increased, participants reported a decline in their self-determination levels. Furthermore, the relation between the young person and the individual providing/assisting with the measuring tools should be given careful consideration, particularly if this is a new relationship, such as having an external researcher. As Farmer et al. (2015) showed, as the study progressed, young people's trust in the researchers developed and their answers became more honest, as they explained at the end of the study. Similarly, some of the studies noted differences between the measures, which they partly attributed to the young people needing more time or repeated exposure to the intervention to increase their awareness of the changes in their self-determination (Wehmeyer et al., 2006).

It is also valuable that teaching staff are aware of the differences between measuring tools, if choosing to use them in their practice. The 27 studies have found some differences between the two most popular measures, the SDS and the AIR-S, which they partly attributed to them measuring different aspects of self-determination. Thus, the AIR scales measure student capacity and opportunity, which might be more sensitive to changes following interventions, while the SDS appears to measure precursors to the development of self-determined behaviour (Wehmeyer et al., 2013). Furthermore, certain interventions measure skills that are more or less directly measured by the specific measuring tools; thus, an awareness is needed to determine which is most suitable (Seong et al., 2015). The SDS is said to measure one's self-determination status at a given time, whereas the AIR scales look at the opportunities and skills leading to it. Therefore, in the context of constructing self-determination from an ecological framework, the latter appears most appropriate; however, further research is needed to understand the differences between the two measures.

It is important to note that despite a robust approach to conduct the present review, a number of limitations arise. The authors acknowledge that the construction of self-determination from an ecological framework includes cultural norms and perceptions. Due to the scarcity of research in the topic of the review and an aim to provide an updated overview of self-determination interventions for autistic young people and/or learning disabilities, no exclusion criterion was used based on the locations of the studies. Cultural norms play a role in shaping not only the construction and manifestation of self-determination, but also the construction of disability itself. The review shows that there are differences in the types of interventions developed in different continents, and further research should investigate if this is related to cultural norms or other factors that contribute to setting research agendas. The authors also acknowledge that the inclusion criteria to have at least one participant aged 15–25 brings further limitations. This means that the studies included in the review involve participants outside of this age range, therefore making it more difficult to apply the findings to this group. Similar limitations arise when looking at participant diagnoses. Further research should look more closely at the characteristics of the individual and their interactions with the environment for a better understanding of the development of self-determination from an ecological perspective.

Implications for Research, Policy, and Practice

The systematic review showed that individual participant characteristics are given little attention when evaluating the

effectiveness of self-determination interventions. Exploring the impact of demographic aspects such as gender and ethnicity could bring valuable contributions to the development of interventions. Only two studies (Wehmeyer et al., 2013, 2011a, 2011b) noted the potential impact of gender on effectiveness of interventions, but further investigation is needed to provide more meaningful insights. Such developments could contribute to developing targeted interventions, suited to participants' characteristics, and thus maximise effectiveness.

Similarly, the effect of age and diagnosis should also receive increased attention. Although the present review included only studies with participants aged 15–25, suggestions are made regarding the potential benefits of beginning interventions earlier (Lee et al., 2011; Wehmeyer et al., 2006). Regarding diagnostic labels, the review shows that targeted interventions can lead to increased self-determination for young people with a range of needs, with most evidence being brought for those with a learning disability. However, further research is needed to determine the differential effect of self-determination interventions on young people with different needs. On this matter, it is also important to mention the scarcity of empirical research regarding self-determination interventions targeted specifically at autistic young people, although recent years show an increase in attention. Although there were only four studies evaluating interventions for this population specifically, they demonstrate that the self-determination of young people with autism can be increased through interventions tailored to their specific needs. However, these are only small-scale, recent developments, and further exploration is needed.

All studies included had an experimental design; thus, there is a need for development in this area of self-determination research. One study highlights the need to involve the stakeholder community in research in order to collaborate for systematic change (Shogren et al., 2018). Two other studies demonstrate the benefits of involving stakeholders in development of interventions (Oswald et al., 2018) and interpretation of findings (Farmer et al., 2015), and the contributions these can bring to insights and improved effectiveness. Furthermore, the studies show a scarcity regarding social validity data, even though the few studies that collected it brought promising results (e.g. Lee et al., 2008). Having a better understanding of stakeholders' experiences of the interventions can support their development and further effectiveness.

The review provided evidence that self-determination measures have been widely used with a range of participants, and further research is needed to understand how they relate to specific participant groups and contexts. The systematic review showed that differences exist in relation to which aspect of self-determination is measured, particularly for the popular SDS and AIR scales, but further evidence is required to identify what makes them most suited to specific contexts (e.g. Seong et al., 2015). Thus, by understanding the specific characteristics of measures and how they respond to certain individual or environmental aspects, a more accurate picture of effectiveness can be provided.

The review also showed a scarcity of research on the impact of specific characteristics of the environment on effectiveness of interventions. Even though most studies were conducted in real-world settings, which represents a strength to their demonstrated effectiveness, the complexity and variability of their different elements is little explored. An important aspect to consider is the impact of a supportive versus controlling classroom environment. There is some recognition of this in the studies included; however, no formal investigation takes place (Cross et al., 1999; Zhang, 2001). An increased understanding of the effects of a supportive over a controlling environment could lead to an even further increase in the effectiveness of self-determination interventions.

An evaluation of the impact of the immediate educational policy and legislation could also bring a better understanding of what contributes to the effectiveness of self-determination interventions. The review shows that, unfortunately, no investigations or insights into this aspect have been formulated so far. Furthermore, most empirical research regarding self-determination interventions for young people with autism and/or a learning disability aged 15–25 has been conducted in the USA. An initial look at a study conducted in Australia (Sheppard & Unsworth, 2011) shows different principles used in the intervention and its implementation, which would be valuable to explore in relation to the local legislative context. Similarly, the embedded implementation of an intervention instead of one over a short, fixed period of time needs further exploration, as most studies belong to the latter category.

The review also highlights the lack of attention given to the role of teaching staff and their practice in the implementation of self-determination interventions in school settings. A few insights are provided regarding the role of those implementing the interventions and the need for an increased awareness of the impact they can have (Cross et al., 1999; Wehmeyer et al., 2000). However, formal investigation is needed to better understand this role, as well as that of the different aspects of teaching practice, and how they can support or hinder effectiveness.

Conclusions

The present review brings together the evidence of self-determination for young people with autism and/or learning disability through an ecological framework. The review showed that there is evidence for a range of interventions

that can enhance the self-determination of young people with autism and/or learning disability. These have been shown to be effective in real-world school environments, under a range of conditions and for individuals with varying needs and purposes. The findings of the review add to the current understanding that interventions targeted at developing the self-determination of autistic students remain limited. Furthermore, another gap is highlighted in the construction of self-determination from an ecological perspective through exploring the impact of a supportive classroom environment. The studies provided little indication of how teachers can create an environment supportive of self-determination and how their practice can be adapted to suit this. However, the significant role of teachers in implementing interventions is recognised (Wehmeyer et al., 2000), as well as in providing opportunities for the practice of skills and self-determined behaviours (Cross et al., 1999; Lee et al., 2008). Therefore, further work is needed to explore the relationship between student characteristics such as age, gender and diagnosis, and those of the environment in the context of the development of self-determination, including the immediate context of the educational setting and the wider educational policy. This research should be conducted with the meaningful involvement of stakeholders with lived experience at the different stages of the research inquiry. Researchers should focus their efforts on further development of self-determination measures, as well as those that capture social validity of interventions and generalizability of skills. These in turn can facilitate an effective translation to educational practice, and in the long-term impact educational policy.

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Declarations

Conflict of Interest The authors declare no competing interests.

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References

Abery, B., & Stancliffe, R. (1996). The ecology of self-determination. In D. J. Sands, & M. L. Wehmeyer (Eds.), *Self-determination across the life span: Independence and choice for people with disabilities (p. 111–145).* Baltimore: Paul H. Brookes.

Abery, B. H., & Stancliffe, R. J. (2003). An ecological theory of self-determination: Theoretical foundations. *Theory in Self-Determination: Foundations for Educational Practice, 25*, 25–43.

Abery, B. (1994). A conceptual framework for enhancing self-determination. In M. Hayden & B. Abery (Eds.), *Challenges for a service system in transition* (pp. 345–380). Baltimore: Brooks.

Abuga, J. A., Kariuki, S. M., Kinyanjui, S. M., Boele van Hensbroek, M., & Newton, C. R. (2021). Premature mortality, risk factors, and causes of death following childhood-onset neurological impairments: A systematic review. *Frontiers in Neurology, 12*, 627824. https://doi.org/10.3389/fneur.2021.627824

Algozzine, B., Browder, D., Karvonen, M., Test, D. W., & Wood, W. M. (2001). Effects of interventions to promote self-determination for individuals with disabilities. *Review of Educational Research, 71*(2), 219–277.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5™, 5th ed*. American Psychiatric Publishing, Inc. https://doi.org/10.1176/appi.books.9780890425596

Autism and Developmental Disabilities Monitoring Network. (2012). Prevalence of autism spectrum disorders–Autism and Developmental Disabilities Monitoring Network, 14 sites, United States, 2008. *MMWR Surveillance Summaries, 61*(3), 1–19.

Bellon-Harn, M., & Manachaiah, V. (2021). Functionality, impact, and satisfaction of a web-based and mobile application support program for students with autism spectrum disorder. *Online Learning Journal, 25*(2), 190–207. https://doi.org/10.24059/olj.v25i2.2204

Blood, L., Ribenfors, F., Hatton, C., & Marriott, A. (2024). Moving house: How much choice do people with learning disabilities have about where they live? *British Journal of Learning Disabilities, 52*(1), 140–149. https://doi.org/10.1111/bld.12558

Brennan, A., & King, F. (2022). Teachers' experiences of transformative professional learning to narrow the values practice gap related to inclusive practice. *Cambridge Journal of Education, 52*(2), 175–193.

Bronfenbrenner, U. (1974). Developmental research, public policy, and the ecology of childhood. *Child Development, 45*(1), 1–5.

Bronfenbrenner, U. (1979). The ecology of human development: Experiments by nature and design. *Harvard University Press Google Schola, 2*, 139–163.

Bronfenbrenner, U. (1989). The developing ecology of human development: Paradigm lost or paradigm regained. *Paper presented at the biennial meeting of the Society for Research on Child Development*. Kansas City, MO.

Brown, M., & McCann, E. (2018). Sexuality issues and the voices of adults with intellectual disabilities: A systematic review of the literature. *Research in Developmental Disabilities, 74*, 124–138.

Brugha, T. S., McManus, S., Bankart, J., Scott, F., Purdon, S., Smith, J., Bebbington, P., Jenkins, R., & Meltzer, H. (2011). Epidemiology of autism spectrum disorders in adults in the community in England. *Archives of General Psychiatry, 68*(5), 459–465.

Buckland, R. (2024). The Buckland Review of Autism Employment: Report and recommendations. Department of Work and Pensions: London, UK. Accessed 3 April 2024

Burke, K. M., Raley, S. K., Shogren, K. A., Hagiwara, M., Mumbardó-Adam, C., Uyanik, H., & Behrens, S. (2020). A meta-analysis of interventions to promote self-determination for students with disabilities. *Remedial and Special Education, 41*(3), 176–188.

Campeau, P., Wolman, J., & Mithaug, D. (1993). *Research on self-determination in individuals with disabilities*. Palo Alto, CA: American Institutes for Research.

Carter, E. W., Lane, K. L., Pierson, M. R., & Glaeser, B. (2006). Self-determination skills and opportunities of transition-age youth with emotional disturbance and learning disabilities. *Exceptional Children, 72*(3), 333–346. https://doi.org/10.1177/001440290607200305

Cashin, A., Buckley, T., Trollor, J. N., & Lennox, N. (2018). A scoping review of what is known of the physical health of adults with autism spectrum disorder. *Journal of Intellectual Disabilities, 22*(1), 96–108.

Cervantes, P. E., Matheis, M., Estabillo, J., Seag, D. E. M., Nelson, K. L., Peth-Pierce, R., Hoagwood, K. E., & Horwitz, S. M. (2021). Trends over a decade in NIH funding for autism spectrum disorder services research. *Journal of Autism and Developmental Disorders, 51*(8), 2751–2763. https://doi.org/10.1007/s10803-020-04746-3

Chambers, C. R., Wehmeyer, M. L., Saito, Y., Lida, K. M., Lee, Y., & Singh, V. (2007). Self-determination: What do we know? Where do we go? *Exceptionality, 15*(1), 3–15.

Chao, P.-C. (2020). Using Chinese idioms to teach adolescents with intellectual disabilities self-determination skills. *Social Behavior and Personality: An International Journal, 48*(5), 1–11.

Chou, Y. C. (2020). Navigation of social engagement (NOSE) project: Using a self-directed problem solving model to enhance social problem-solving and self-determination in youth with autism spectrum disorders. *Education and Training in Autism and Developmental Disabilities, 55*(1), 101–114. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85081210048&partnerID=40&md5=0999c1f2dfe3ce806e885901f7037d70.

Chou, Y.-C., Wehmeyer, M. L., Palmer, S. B., & Lee, J. (2017). Comparisons of self-determination among students with autism, intellectual disability, and learning disabilities: A multivariate analysis. *Focus on Autism and Other Developmental Disabilities, 32*(2), 124–132.

Churchard, A., Ryder, M., Greenhill, A., & Mandy, W. (2019). The prevalence of autistic traits in a homeless population. *Autism, 23*(3), 665–676. https://doi.org/10.1177/1362361318768484

Cobb, R. B., & Alwell, M. (2009). Transition planning/coordinating interventions for youth with disabilities: A systematic review. *Career Development for Exceptional Individuals, 32*(2), 70–81.

Cobb, B., Lehmann, J., Newman-Gonchar, R., & Alwell, M. (2009). Self-determination for students with disabilities: A narrative metasynthesis. *Career Development for Exceptional Individuals, 32*(2), 108–114.

Cooper, S.-A., Smiley, E., Morrison, J., Williamson, A., & Allan, L. (2007). Mental ill-health in adults with intellectual disabilities: Prevalence and associated factors. *British Journal of Psychiatry, 190*(1), 27–35. https://doi.org/10.1192/bjp.bp.106.022483

Cristescu, A. L. (2023). *Collaborating to improve teaching practice: Developing an approach to promote self-determination in a school for students with autism* [Doctoral dissertation, University of Birmingham]. https://etheses.bham.ac.uk//id/eprint/13828/

Cross, T., Cooke, N. L., Wood, W. M., & Test, D. W. (1999). Comparison of the effects of MAPS and ChoiceMaker on student self-determination skills. *Education and Training in Mental Retardation and Developmental Disabilities*, 34(4), 499–510.

Dagnan, D., Jackson, I., & Eastlake, L. (2018). A systematic review of cognitive behavioural therapy for anxiety in adults with intellectual disabilities. *Journal of Intellectual Disability Research, 62*(11), 974–991.

Deci, E. L., & Ryan, R. M. (1985). The general causality orientations scale: Self-determination in personality. *Journal of Research in Personality, 19*(2), 109–134. https://doi.org/10.1016/0092-6566(85)90023-6

Department for Education. (2015). *Special educational needs and disability code of practice: 0 to 25 years*. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/398815/SEND_Code_of_Practice_January_2015.pdf

Department of Health. (2001). *Valuing people: A new strategy for learning disability for the 21st century-a White Paper*. Stationery Office.

Durbin, A., Isaacs, B., Mauer-Vakil, D., Connelly, J., Steer, L., Roy, S., & Stergiopoulos, V. (2018). Intellectual disability and homelessness: A synthesis of the literature and discussion of how supportive housing can support wellness for people with intellectual disability. *Current Developmental Disorders Reports, 5*(3), 125–131. https://doi.org/10.1007/s40474-018-0141-6

Elsabbagh, M., Divan, G., Koh, Y. J., Kim, Y. S., Kauchali, S., Marcín, C., Montiel-Nava, C., Patel, V., Paula, C. S., & Wang, C. (2012). Global prevalence of autism and other pervasive developmental disorders. *Autism Research, 5*(3), 160–179.

Emerson, E., Hatton, C., Baines, S., & Robertson, J. (2016). The physical health of British adults with intellectual disability: Cross sectional study. *International Journal for Equity in Health, 15*(1), 11. https://doi.org/10.1186/s12939-016-0296-x

Farmer, J. L., Allsopp, D. H., & Ferron, J. M. (2015). Impact of the personal strengths program on self-determination levels of college students with LD and/or ADHD. *Learning Disability Quarterly, 38*(3), 145–159.

Field, S. (1996). Self-determination instructional strategies for youth with learning disabilities. *Journal of Learning Disabilities, 29*(1), 40–52.

Fowler, C. H., Konrad, M., Walker, A. R., Test, D. W., & Wood, W. M. (2007). Self-determination interventions' effects on the academic performance of students with developmental disabilities. *Education and Training in Developmental Disabilities*, 43(17), 270–285.

Garrels, V., & Palmer, S. B. (2020). Student-directed learning: A catalyst for academic achievement and self-determination for students with intellectual disability. *Journal of Intellectual Disabilities, 24*(4), 459–473. https://doi.org/10.1177/1744629519840526

Gunning, C., Breathnach, Ó., Holloway, J., McTiernan, A., & Malone, B. (2019). A systematic review of peer-mediated interventions for preschool children with autism spectrum disorder in inclusive settings. *Review Journal of Autism and Developmental Disorders, 6*, 40–62.

Hagner, D., Kurtz, A., Cloutier, H., Arakelian, C., Brucker, D. L., & May, J. (2012). Outcomes of a family-centered transition process for students with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 27*(1), 42–50.

Hirvikoski, T., Mittendorfer-Rutz, E., Boman, M., Larsson, H., Lichtenstein, P., & Bölte, S. (2016). Premature mortality in autism spectrum disorder. *The British Journal of Psychiatry, 208*(3), 232–238.

Hume, K., Loftin, R., & Lantz, J. (2009). Increasing independence in autism spectrum disorders: A review of three focused interventions. *Journal of Autism and Developmental Disorders, 39*, 1329–1338.

Hume, K., Boyd, B. A., Hamm, J. V., & Kucharczyk, S. (2014). Supporting independence in adolescents on the autism spectrum. *Remedial and Special Education, 35*(2), 102–113.

Katusic, M. Z., Myers, S. M., Weaver, A. L., & Voigt, R. G. (2021). IQ in autism spectrum disorder: A population-based birth cohort study. *Pediatrics*, *148*(6), 1–9.

Kim, S. Y. (2021). Effects of theme-based garden book making in capstone design on self-determination and social skills of college students with developmental disabilities. *Journal of People,*

Plants, and Environment, 24(1), 75–84. https://doi.org/10.11628/ksppe.2021.24.1.75

Kiresuk, T. J., Smith, A., & Cardillo, J. E. (1994). *Goal attainment scaling: Applications, theory, and measurement*. Lawrence Erlbaum Associates, Inc.

Kirkpatrick, D., & Kirkpatrick, J. (2006). *Evaluating training programs: The four levels*. Berrett-Koehler Publishers.

Koegel, L. K., Singh, A. K., & Koegel, R. L. (2010). Improving motivation for academics in children with autism. *Journal of Autism and Developmental Disorders, 40*, 1057–1066.

Konrad, M., Fowler, C. H., Walker, A. R., Test, D. W., & Wood, W. M. (2007). Effects of self-determination interventions on the academic skills of students with learning disabilities. *Learning Disability Quarterly, 30*(2), 89–113.

Kozma, A., Mansell, J., & Beadle-Brown, J. (2009). Outcomes in different residential settings for people with intellectual disability: A systematic review. *American Journal on Intellectual and Developmental Disabilities, 114*(3), 193–222.

Lachapelle, Y., Wehmeyer, M. L., Haelewyck, M. C., Courbois, Y., Keith, K. D., Schalock, R., Verdugo, M. A., & Walsh, P. N. (2005). The relationship between quality of life and self-determination: An international study. *Journal of Intellectual Disability Research, 49*(10), 740–744.

Lai, M.-C., Kassee, C., Besney, R., Bonato, S., Hull, L., Mandy, W., Szatmari, P., & Ameis, S. H. (2019). Prevalence of co-occurring mental health diagnoses in the autism population: A systematic review and meta-analysis. *The Lancet Psychiatry, 6*(10), 819–829. https://doi.org/10.1016/S2215-0366(19)30289-5

Lee, S.-H., Wehmeyer, M. L., Palmer, S. B., Soukup, J. H., & Little, T. D. (2008). Self-determination and access to the general education curriculum. *The Journal of Special Education, 42*(2), 91–107.

Lee, S.-H., Wehmeyer, M. L., Soukup, J. H., & Palmer, S. B. (2010). Impact of curriculum modifications on access to the general education curriculum for students with disabilities. *Exceptional Children, 76*(2), 213–233.

Lee, Y., Wehmeyer, M. L., Palmer, S. B., Williams-Diehm, K., Davies, D. K., & Stock, S. E. (2011). The effect of student-directed transition planning with a computer-based reading support program on the self-determination of students with disabilities. *The Journal of Special Education, 45*(2), 104–117.

Maenner, M. J. (2021). Prevalence and characteristics of autism spectrum disorder among children aged 8 years—Autism and developmental disabilities monitoring network, 11 sites, United States, 2018. *MMWR. Surveillance Summaries*, *70(11),* 1–16.

Malian, I., & Nevin, A. (2002). A review of self-determination literature: Implications for practitioners. *Remedial and Special Education, 23*(2), 68–74.

Morán, M. L., Hagiwara, M., Raley, S. K., Alsaeed, A. H., Shogren, K. A., Qian, X., Gómez, L. E., & Alcedo, M. Á. (2021). Self-determination of students with autism spectrum disorder: A systematic review. *Journal of Developmental and Physical Disabilities, 33*(6), 887–908. https://doi.org/10.1007/s10882-020-09779-1

Niemiec, C. P., & Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. *Theory and Research in Education, 7*(2), 133–144.

Nota, L., Ferrari, L., Soresi, S., & Wehmeyer, M. (2007). Self-determination, social abilities and the quality of life of people with intellectual disability. *Journal of Intellectual Disability Research, 51*(11), 850–865.

Nuffield Trust. (2023). *Supporting people in employment*. nuffieldtrust.org.uk/resource/supporting-people-in-employment Accessed 15 May 2024.

Opfer, V. D., & Pedder, D. (2011). Conceptualizing teacher professional learning. *Review of Educational Research, 81*(3), 376–407.

Oswald, T. M., Winder-Patel, B., Ruder, S., Xing, G., Stahmer, A., & Solomon, M. (2018). A pilot randomized controlled trial of the ACCESS program: A group intervention to improve social, adaptive functioning, stress coping, and self-determination outcomes in young adults with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 48*, 1742–1760.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., & Brennan, S. E. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *bmj*, *372, 1–9.*

Palmer, S. B., Wehmeyer, M. L., Gipson, K., & Agran, M. (2004). Promoting access to the general curriculum by teaching self-determination skills. *Exceptional Children, 70*(4), 427–439.

Palmer, S. B., Wehmeyer, M. L., Shogren, K. A., Williams-Diehm, K. L., & Soukup, J. H. (2012). An evaluation of the Beyond High School model on the self-determination of students with intellectual disability. *Career Development and Transition for Exceptional Individuals, 35*(2), 76–84.

Parsons, S., Guldberg, K., MacLeod, A., Jones, G., Prunty, A., & Balfe, T. (2011). International review of the evidence on best practice in educational provision for children on the autism spectrum. *European Journal of Special Needs Education, 26*(1), 47–63. https://doi.org/10.1080/08856257.2011.543532

Pellicano, E., Fatima, U., Hall, G., Heyworth, M., Lawson, W., Lilley, R., Mahony, J., & Stears, M. (2022). A capabilities approach to understanding and supporting autistic adulthood. *Nature Reviews Psychology, 1*(11), 624–639.

Peñuelas-Calvo, I., Sareen, A., Sevilla-Llewellyn-Jones, J., & Fernández-Berrocal, P. (2019). The "Reading the Mind in the Eyes" test in autism-spectrum disorders comparison with healthy controls: A systematic review and meta-analysis. *Journal of Autism and Developmental Disorders, 49*, 1048–1061.

Powers, L. E., Geenen, S., Powers, J., Pommier-Satya, S., Turner, A., Dalton, L. D., Drummond, D., & Swank, P. (2012). My Life: Effects of a longitudinal, randomized study of self-determination enhancement on the transition outcomes of youth in foster care and special education. *Children and Youth Services Review, 34*(11), 2179–2187.

Reeve, J. (2002). Self-determination theory applied to educational settings. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research (pp. 183–203).* University of Rochester Press.

Russell, G., Mandy, W., Elliott, D., White, R., Pittwood, T., & Ford, T. (2019). Selection bias on intellectual ability in autism research: A cross-sectional review and meta-analysis. *Molecular Autism, 10*, 1–10.

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Press.

Rydzewska, E., Hughes-McCormack, L. A., Gillberg, C., Henderson, A., MacIntyre, C., Rintoul, J., & Cooper, S.-A. (2018). Prevalence of long-term health conditions in adults with autism: Observational study of a whole country population. *British Medical Journal Open, 8*(8), e023945.

Schlosser, R. W., & Wendt, O. (2008). Effects of augmentative and alternative communication intervention on speech production in children with autism: A systematic review. *American journal of speech-language pathology*, 17(3), 212–230.

Scior, K. (2011). Public awareness, attitudes and beliefs regarding intellectual disability: A systematic review. *Research in Developmental Disabilities, 32*(6), 2164–2182.

Seong, Y., Wehmeyer, M. L., Palmer, S. B., & Little, T. D. (2015). Effects of the self-directed individualized education program on self-determination and transition of adolescents with disabilities. *Career Development and Transition for Exceptional Individuals, 38*(3), 132–141.

Shenouda, J., Barrett, E., Davidow, A. L., Sidwell, K., Lescott, C., Halperin, W., Silenzio, V. M. B., & Zahorodny, W. (2023). Prevalence and disparities in the detection of autism without

intellectual disability. *Pediatrics*, *151*(2). https://doi.org/10.1542/peds.2022-056594

Sheppard, L., & Unsworth, C. (2011). Developing skills in everyday activities and self-determination in adolescents with intellectual and developmental disabilities. *Remedial and Special Education, 32*(5), 393–405.

Shogren, K. A., & Shaw, L. A. (2016). The role of autonomy, self-realization, and psychological empowerment in predicting outcomes for youth with disabilities. *Remedial and Special Education, 37*(1), 55–62.

Shogren, K., Wehmeyer, M., Palmer, S., Forber-Pratt, A., Little, T., & Lopez, S. (2014a). *Self-determination inventory: Parent/teacher report*. Kansas University Center on Developmental Disabilities.

Shogren, K., Wehmeyer, M., Palmer, S., Forber-Pratt, A., Little, T., & Lopez, S. (2014b). *Self-determination inventory: Student report [pilot version]*. Kansas University Center on Developmental Disabilities.

Shogren, K. A., Burke, K. M., Anderson, M. H., Antosh, A. A., Wehmeyer, M. L., LaPlante, T., & Shaw, L. A. (2018). Evaluating the differential impact of interventions to promote self-determination and goal attainment for transition-age youth with intellectual disability. *Research and Practice for Persons with Severe Disabilities, 43*(3), 165–180.

Shogren, K. A., Burke, K. M., Antosh, A., Wehmeyer, M. L., LaPlante, T., Shaw, L. A., & Raley, S. (2019). Impact of the self-determined learning model of instruction on self-determination and goal attainment in adolescents with intellectual disability. *Journal of Disability Policy Studies, 30*(1), 22–34.

Shogren, K. A., Hicks, T. A., Burke, K. M., Antosh, A., LaPlante, T., & Anderson, M. H. (2020). Examining the impact of the SDLMI and whose future is it? Over a two-year period with students with intellectual disability [Article]. *American Journal on Intellectual and Developmental Disabilities, 125*(4), 217–229. https://doi.org/10.1352/1944-7558-125.3.217

Sowers, J.-A., & Swank, P. (2017). Enhancing the career planning self-determination of young adults with mental health challenges. *Journal of Social Work in Disability & Rehabilitation, 16*(2), 161–179.

Starkstein, S., Gellar, S., Parlier, M., Payne, L., & Piven, J. (2015). High rates of parkinsonism in adults with autism. *Journal of Neurodevelopmental Disorders, 7*, 1–11.

Timperley, H. (2011). *Realizing the power of professional learning*. McGraw-Hill Education.

Verdonschot, M. M., De Witte, L. P., Reichrath, E., Buntinx, W. H., & Curfs, L. M. (2009). Community participation of people with an intellectual disability: A review of empirical findings. *Journal of Intellectual Disability Research, 53*(4), 303–318.

Wachs, T. D. (1983). The use and abuse of environment in behavior-genetic research. *Child Development*, 54(2), 396–407.

Wachs, T. D. (1987). Developmental perspectives on designing for development. In Weinstein, C. S., & David, T. G. (Eds) *Spaces for children: The built environment and child development* (pp. 291–307). Springer.

Wehmeyer, M. L., & Garner, N. W. (2003). The impact of personal characteristics of people with intellectual and developmental disability on self-determination and autonomous functioning. *Journal of Applied Research in Intellectual Disabilities, 16*(4), 255–265.

Wehmeyer, M. L., Palmer, S. B., Agran, M., Mithaug, D. E., & Martin, J. E. (2000). Promoting causal agency: The self-determined learning model of instruction. *Exceptional Children, 66*(4), 439–453.

Wehmeyer, M. L., Palmer, S. B., Lee, Y., Williams-Diehm, K., & Shogren, K. (2011a). A randomized-trial evaluation of the effect of whose future is it anyway? On self-determination. *Career Development for Exceptional Individuals, 34*(1), 45–56.

Wehmeyer, M. L., Palmer, S. B., Williams-Diehm, K., Shogren, K. A., Davies, D. K., & Stock, S. (2011b). Technology and self-determination in transition planning: The impact of technology use in transition planning on student self-determination. *Journal of Special Education Technology, 26*(1), 13–24.

Wehmeyer, M. L., Shogren, K. A., Palmer, S. B., Williams-Diehm, K. L., Little, T. D., & Boulton, A. (2012). The impact of the self-determined learning model of instruction on student self-determination. *Exceptional Children, 78*(2), 135–153.

Wehmeyer, M. L., Palmer, S. B., Shogren, K., Williams-Diehm, K., & Soukup, J. H. (2013). Establishing a causal relationship between intervention to promote self-determination and enhanced student self-determination. *The Journal of Special Education, 46*(4), 195–210.

Wehmeyer, M. L., & Palmer, S. B. (2003). Adult outcomes for students with cognitive disabilities three-years after high school: The impact of self-determination. *Education and training in developmental disabilities*, 38(2), 131–144.

Wehmeyer, M. L., Lawrence, M., Kelchner, K., Palmer, S. B., Garner, N., & Soukup, J. H. (2004). *Whose future is it anyway? A student-directed transition planning processs (2nd ed.). Lawrence, KS: Beach Center on Disability.*

Wehmeyer, M. L., Garner, N., Yeager, D., Lawrence, M., & Davis, A. K. (2006). Infusing self-determination into 18—21 services for students with intellectual or developmental disabilities: A multi-stage, multiple component model. *Education and training in developmental disabilities*, 41(1), 3–13.

Wehmeyer, M. L., Shogren, K. A., Zager, D., Smith, T. E., & Simpson, R. (2010). Research-based principles and practices for educating students with autism: Self-determination and social interactions. *Education and Training in Autism and Developmental Disabilities*, 45(4), 475–486.

Wehmeyer, M. L. (1995). The Arc's Self-Determination Scale: Procedural guidelines. The Arc of the United States, Arlington, Texas.

Wehmeyer, M. L. (2003). Self-determination: A review of the construct. In Wehmeyer, M. L., Abery, B. H., Mithaug, D. E., & Stancliffe, R. J. (Eds) *Theory in Self-determination: Foundations for Educational Practice* (pp. 5–24) Charles C Thomas Publisher.

White, A., Sheehan, R., Ding, J., Roberts, C., Magill, N., Keagan-Bull, R., Carter, B., Chauhan, U., Tuffrey-Wijne, I., & Strydom, A. (2023). *Learning from lives and deaths - People with a learning disability and autistic people (LeDeR) report for 2022*. www.kcl.ac.uk/research/leder

Williams, J. H., Whiten, A., & Singh, T. (2004). A systematic review of action imitation in autistic spectrum disorder. *Journal of Autism and Developmental Disorders, 34*, 285–299.

Wolman, J., Campeau, P., Dubois, P., Mithaug, D., & Stolarski, V. (1994). AIR self-determination scale and user guide. *Palo Alto, CA: American Institute for Research, 26*, 1–47.

Wood, W. M., Fowler, C. H., Uphold, N., & Test, D. W. (2005). A review of self-determination interventions with individuals with severe disabilities. *Research and Practice for Persons with Severe Disabilities, 30*(3), 121–146.

Zager, D., & Wehmeyer, M. (2019). *Teaching adolescents and young adults with autism spectrum disorder: Curriculum planning and strategies*. Routledge.

Zahid, S., & Upthegrove, R. (2017). *Suicidality in autistic spectrum disorders. Crisis, 38(4) 237-246.*. Routledge.

Zeidan, J., Fombonne, E., Scorah, J., Ibrahim, A., Durkin, M. S., Saxena, S., Yusuf, A., Shih, A., & Elsabbagh, M. (2022). Global prevalence of autism: A systematic review update. *Autism Research, 15*(5), 778–790. https://doi.org/10.1002/aur.2696

Zhang, D. (2001). The effect of Next STEP instruction on the self-determination skills of high school students with learning disabilities. *Career Development for Exceptional Individuals, 24*(2), 121–132.

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