

Review

# Psychosocial Interventions for the Enhancement of Psychological Resources among Dyslexic Adults: A Systematic Review

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**Abstract:** Dyslexic employees are likely to be more at risk of low levels of personal resources because of their cognitive makeup compared to their non-dyslexic counterparts. Low personal resources, in turn, may lead to low employability because of difficulties in positively facing transitions. This research aimed to systematically review evidence on interventions for improving psychological resources in dyslexic adults. We searched Scopus, ERIC EBSCOhost, PsycINFO, Social Science Citation Index Web of Science, and Universe up to May 2020. We also examined the reference lists of published studies. We included studies that compared any intervention format against no intervention, any other intervention considered as a comparator by the authors, or that had no control group. Participants were dyslexic adults aged minimum 18 years old. We included four studies with 278 participants. Studies were run in the UK, Sweden, and Finland. Two studies involved a control group, and two studies were observational. Interventions varied between studies in intensity, duration, and format (individual and small groups). Risk of bias was unclear for most risk criteria. Findings from this review show that there is initial evidence suggesting initiatives can be effective in supporting a set of personal resources, i.e., self-confidence, organization, time, and stress-management, which are important in allowing dyslexic adults' positive adjustment in the workplace. Yet, more studies are needed to improve outcome assessment and study design.

**Keywords:** dyslexia; dyslexic adults; employability; intervention; psychological resources; psychosocial interventions; systematic review

## 1. Introduction

In the European Employment Strategy for more growth and jobs, higher employability is seen as a precondition for achieving increased employment rates, whereby employability refers to the combination of factors enabling individuals to progress towards or enter into employment, stay in employment, and progress during their careers [1]. To increase employability, the EU identified a set of actions focusing on improving the quality and relevance of training, making skills more visible and comparable, and improving understanding of skills demands to enable people to make better career choices, find good quality jobs and improve their life chances [2]. Understanding employability as a set of actions to make skills more visible and comparable becomes important especially in the context of learning disabilities, particularly dyslexia, often referred to as a hidden disability as its characteristics are not always evident to the untrained eye [3]. Indeed, dyslexic adults may lack the psychosocial resources needed to translate their soft skills effectively in the work environment.

While to date dyslexia has been defined as difficulties in accuracy or fluency of reading, later awareness has raised towards the recognition that it typically encompasses more problems than

those related to decoding and spelling words, which manifest across the lifespan and stem for a slower acquisition of literacy skills [4,5]. Accordingly, scholars proposed a definition of developmental dyslexia in terms of inefficiency in working memory, the information processing system fundamental to learning and performance in conventional educational and work settings [4]. Thus, dyslexia has a particular impact not only on verbal and written communication but also on organization, time management, planning and adaptation to change [4], which make a case for the urge to frame the challenges of employability interventions for dyslexic adults. Evidence shows that deficits in underlying cognitive processes persist well into adulthood [6], which is likely to negatively affect an individual's adaptability and the personal factors that are key in defining one's employability [7,8]. If coupled with estimates that between 5 and 10% of the population experience dyslexia, which equates to around 700 million people worldwide [9,10], the priority of shedding light on how to sustain employability skills effectively among dyslexic adults becomes clear.

In this paper, we will focus on the available empirical evidence to define the effectiveness of interventions aiming to support and enhance the personal resources of dyslexic adults, with the final aim of enhancing their opportunities of getting a job, keeping it, and progressing in their career, i.e., their employability. In doing so, our goal is to map the employability landscape for dyslexic adults and identify possible gaps in the literature, so as to inform both future research and the design of effective policies and intervention initiatives.

### *1.1. Beyond Literacy Skills: Psychosocial Facets of Dyslexia*

While systematic evidence on the nature of dyslexia in the adult population is still scarce, an agreement exists that problems experienced by dyslexic people extend beyond literacy skills to include planning, low levels of personal resources such as self-efficacy, self-regulation, and coping difficulties [4] (p. 10). Specifically, personal resources refer to positive self-evaluations commonly linked to resiliency and an individual's sense of ability to control and impact the environment in a successful manner [11].

According to the working memory model, dyslexia is characterized by weakness with low order processing related to remembering words, letters, and numbers, which leads to disruption in self-regulating and other higher-level processing when demands on speech and language are high [12]. In turn, undermined executive functions, e.g., in terms of organization, self-regulation and planning, affect self-image and self-awareness [13], and expose the individual to the risk of lack of confidence, low self-esteem, and anxiety [14–17]. In the long term, such a process is likely to result in persistent low levels of personal resources among dyslexic adults which, if not addressed, is likely to impact one's professional and private life domains negatively.

Addressing such psychosocial facets of dyslexia is particularly needed to enable dyslexic adults' participation in the work environment and to allow them to thrive in it. While dyslexic people can develop personal coping strategies to face the demands of their present contexts [15,18], current work environments are dynamic and require individuals to be able to adapt and self-manage their job characteristics quickly and, accordingly, their coping strategies [19,20]. However, confronting ever-changing job demands and learning how to manage them, specifically require those skills that are most impacted by working memory deficits that are typical of dyslexia [21]. Accordingly, the work experience can be disruptive, particularly if dyslexic adults do not have the resources and the knowledge needed to face such amplified demands proactively. Indeed, evidence from research shows that adults with learning disabilities report lower employment rates, earnings, and are employed in lower-skill positions compared to their counterparts without disabilities [22,23].

On the other side, research highlights that the provision of appropriate accommodation or development of compensatory strategies can increase the likelihood of successful employment for dyslexic adults [24,25]. Specifically, previous research pinpointed the role of psychosocial resources, i.e., self-awareness and self-regulation, sense of personal control, goal setting, person–environment fit,

and positive cognitive reframing of dyslexia, as key success factors allowing successful life experiences among dyslexic adults [4,24–28].

### *1.2. Enabling Agency at Work: Interventions to Enhance Psychosocial Resources among Dyslexic Adults*

Overall, there is some agreement that initiatives designed to assist dyslexic people in the development of their personal resources and self-management strategies can be beneficial to successful adjustment in the workplace and other transitions during adulthood [3,4]. Improving efficient functioning in everyday life tasks has been argued as the major focus in adult interventions, where interventions should be designed to remediate the psychological consequences that living with dyslexia has caused [29]. Moreover, research in work and organizational psychology has to date provided evidence on the role of intervention programs to help people deal with stressful or demanding work situations. For example, evidence from research shows that interventions can be effective to sustain employability, career competencies [30] and proactivity at work [31]. In addition, research shows that different sets of personal resources (e.g., self-efficacy, hope, resiliency, self-confidence, problem-solving) are malleable and can be developed through short training interventions [32–34].

Yet, surprisingly, there seems to be a dearth of research on the effectiveness of interventions to improve such psychosocial resources among dyslexic adults, by which a person's strengths can be reinforced to support impaired cognitive areas [29]. Indeed, agreement on the positive role of interventions seems to be informed mainly by common sense and professional judgments rather than on evidence from evaluation studies [35]. However, deepening understanding on whether and how interventions can be effective in supporting dyslexic adults' employability via improved adjustment to the workplace and higher personal resources is crucial to inform effective and efficient policy design and intervention initiatives.

### *1.3. The Present Study*

This paper aims to review evidence on interventions to support psychological resources among dyslexic adults. In doing so, we aim to (1) map evidence on interventions to support dyslexic adults' psychological resources and assess their quality; (2) investigate the characteristics of such interventions with regard to (i) duration and intensity, (ii) group size, (iii) type and topics, (iv) personnel administering the interventions, (v) materials, methods, and assignments; (3) ascertain intervention effectiveness in enhancing (i) psychological resources and (ii) employment status. Finally, based on results from the available evidence, we identify key implications for both researchers and practitioners in the design and evaluation of interventions that are key for employability enhancement among dyslexic adults.

## **2. Method**

We conducted a systematic review according to the recommendations of the Cochrane group [36] and following the PRISMA guidelines [37]. A systematic review is a method to identify, assess and analyze published primary studies to investigate a research question, with a view to finding gaps in up-to-date knowledge [38,39]. Systematic reviews can contain a meta-analysis of numerical data from the included studies. Yet, this is not always the case, as the inclusion of a meta-analysis depends on the research question and the characteristics of the studies included, which cannot be too different to combine in order to avoid biased estimates [40]. In this research, given our research question, the small number of studies and high heterogeneity [41,42], we did not include a meta-analysis of the combined findings.

### *2.1. Literature Search*

We run the searches from December 2019 until May 2020. We limited the search by English language only, of intervention studies published until May 2020. We searched the following databases: Scopus, ERIC EBSCOhost, PsycINFO, Social Science Citation Index Web of Science, and Universe.

In addition, we examined the reference lists of published studies to identify further relevant studies. The following search terms were used in Abstract, Title, and Keywords:

(Dyslexia OR spelling disorder OR developmental spelling disorder OR specific spelling disorder OR developmental reading disorder OR reading disability OR reading disorder)

AND

(Workplace OR employee OR workers OR work OR work environment OR employees OR organization OR job)

AND

(Intervention OR treatment OR therapy OR therapeutics OR training OR remediation OR instruction OR exercises OR teaching).

## 2.2. Study Selection Criteria

Given the dearth of research on intervention effectiveness to improve psychological resources among dyslexic adults [3], we decided to maximize inclusivity and that no specific controls were required. Intervention studies may have been compared against no intervention, any other intervention considered as a comparator by the authors, or have no control group. To be considered in the review, studies had to be published in peer-reviewed journals, and include any intervention strategy (e.g., training, workshops, coaching sessions) consisting at least partially of tasks and/or assignments aiming at improving or sustaining a personal resource in terms of positive self-evaluations linked to either resiliency or the individual's sense of ability to control and impact the environment in a successful manner. Interventions could be individualized or group-based. The included studies had to report measures of the targeted personal resources, and study participants had to be dyslexic adults aged minimum 18 years old. In addition, studies had to predominantly include subjects without other developmental disorders (e.g., autism spectrum disorders), comorbid psychiatric disorders (e.g., depression), or neurological diseases (e.g., epilepsy). Manuscripts written in English or Italian were considered.

Studies focusing on interventions targeting professionals and/or people working with dyslexic adults and staff who support dyslexic adults were excluded from this review. In addition, exclusion criteria comprised reviews, study protocols, commentaries or discussion papers, unpublished dissertations/theses and grey literature. Studies that were not written in English or Italian were also excluded.

### 2.2.1. Primary Outcomes

When planning the review, we considered the following primary outcomes: any quantitative measure of self-efficacy, hope, optimism, resilience, proactivity, time-management, stress management, including proactive-preventive coping [43], self-regulation, self-awareness, self-confidence, and organization skills. Measures could be established, validated, much-cited tools or researcher-generated, study-specific tools. Qualitative reports that referred to the same constructs cited above were also considered.

### 2.2.2. Secondary Outcomes

Any quantitative measure of work status (e.g., employed/unemployed) at different time points after the intervention was considered as a secondary outcome. No specific time-frame for assessing secondary outcomes was selected.

## 2.3. Assessment of Risk of Bias in Included Studies

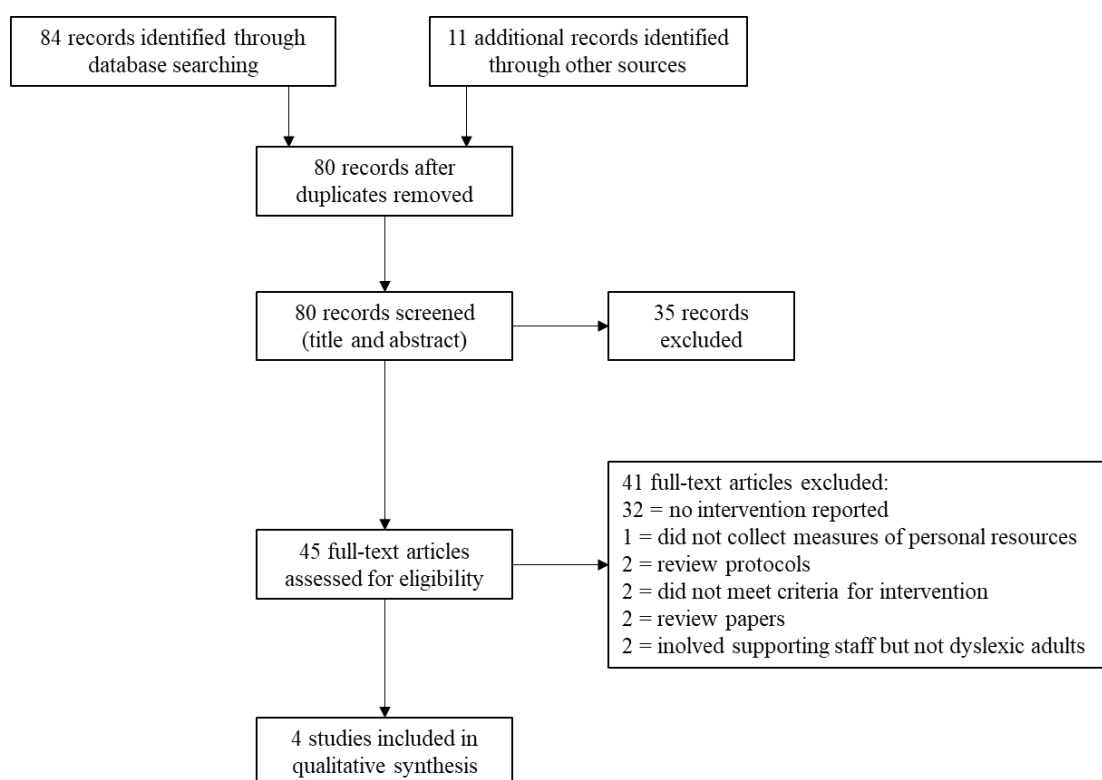
Following the Cochrane Handbook for Systematic Reviews of Interventions [44], we rated each study at low, unclear, or high risk of bias, on the following seven domains: random sequence generation (selection bias), allocation concealment (selection bias), blinding of participants and

personnel (performance bias), blinding of outcome assessment (detection bias), incomplete outcome data (attrition bias), selective reporting (reporting bias), and other bias.

### 3. Results

#### 3.1. Results of the Search

We conducted our searches from December 2019 until May 2020. The search yielded a total of 95 records. After removal of 15 duplicates, we screened the titles and abstracts of the remaining 80 records against the inclusion criteria reported above and identified 45 potentially relevant study reports. Of these, 41 reports were rejected for different reasons (see Figure 1).



**Figure 1.** Flow Diagram.

Hence, as reported in Figure 1, this review includes four studies from four reports.

#### 3.2. Included Studies

Four intervention studies with a total of 278 participants (first endpoint after intervention) met the inclusion criteria for this review [29,45–47], see Table 1.

**Table 1.** Characteristics of the Studies Included.

Reference	Country	Participants in Analyses	Age	Gender	SES	Inclusion Criteria	Exclusion Criteria	Population	Intervention
Beetham (2017)	UK	Intervention = 12 (RR = NR) Control = NA	M = NR(NR) Range NR	NR	NR	NR	NR	Individuals working at a UK University who approached the centre for guidance related to dyslexia and other specific learning disabilities.	<ul style="list-style-type: none"> <li>Coaching, M = 4 sessions</li> </ul>
Doyle (2015)	UK	Intervention = 95 (RR = 76%) Control = NA	M = NR (NR) Range 23–55	Male: 53% Female: 47%	NR	NR	NR	Full-time workers in a wide range of employment roles, covering both the public and private sector.	<ul style="list-style-type: none"> <li>Coaching intervention, M = 4.6 sessions</li> <li>Duration: mean = 9.86 h coaching/employee</li> </ul>
Jensen (2000)	SW	Intervention = 42 (RR = 70%) Control = 16	Intervention M = 34.6 (11) Control M = 38.3 (9) Range NR	<ul style="list-style-type: none"> <li>Intervention group: Male: 60%</li> <li>Control group: Male: 63%</li> </ul>	NR	DSM-IV criteria for R&WD	<ul style="list-style-type: none"> <li>Do not meet DSM-IV criteria for R&amp;WD</li> <li>Cognitive impairments other than language problems</li> <li>Psychiatric disorders</li> <li>High intelligence and high cognitive compensation</li> <li>Lack of motivation</li> </ul>	Unemployed persons with R&WD.	<ul style="list-style-type: none"> <li>Duration: 20 weeks</li> <li>Groups of 15 members each</li> <li>Individual and group training on reading and writing</li> <li>Project works</li> </ul>
Nukari (2020)	FI	Baseline: <ul style="list-style-type: none"> <li>Individual intervention = 39</li> <li>Group intervention = 36</li> <li>Control = 39</li> </ul> 5-month endpoint: <ul style="list-style-type: none"> <li>Individual intervention = 38</li> <li>Group intervention = 36</li> <li>Control = 39</li> </ul> 10-month endpoint: <ul style="list-style-type: none"> <li>Individual intervention = 38</li> <li>Group intervention = 35</li> <li>Control = 34</li> </ul> 15-month endpoint: <ul style="list-style-type: none"> <li>Individual intervention = 34</li> <li>Group intervention = 29</li> <li>Control = 27</li> </ul>	Baseline: M = 25.1 (5.8) Range NR	Baseline (N = 118): <ul style="list-style-type: none"> <li>Male: 20%</li> <li>Female: 80%</li> </ul>	NR	<ul style="list-style-type: none"> <li>18 to 35 years old</li> <li>Clinically confirmed DD</li> <li>Limited abilities in studies, work, or employment related to DD</li> <li>Subjective and objective need for intervention because of DD</li> <li>Native language was Finnish</li> </ul>	Evaluated via interview and questionnaires before assessments: <ul style="list-style-type: none"> <li>Neurological illnesses</li> <li>Other learning disabilities than dyslexia</li> <li>Diagnosed or suspected ADHD</li> <li>Psychiatric diagnoses</li> <li>Severe depressive symptoms</li> <li>Alcohol or drug abuse</li> <li>Neuropsychological intervention received at the age of 16 years or later</li> </ul>	Young adults with dyslexia	<ul style="list-style-type: none"> <li>Individual-format</li> <li>Group-format</li> <li>12 sessions</li> <li>Home assignments</li> <li>Topics included: setting goals, reading, writing, memory strategies, stress management, time management, self-knowledge and self-esteem.</li> </ul>

Notes. SES = Socio-economic status. In the references, only the first author is reported. UK = United Kingdom. SW = Sweden. FI = Finland. M = Mean. Standard deviations are reported in parenthesis after mean. RR = response rate. NA = Not available. NR = Not reported. DD = Developmental dyslexia. DSM-IV = Diagnostic and statistical manual of mental disorders, 4th edition. R&WD = Reading and writing disabilities.

Among these, two studies compared at least an intervention group to a control group [29,47]. In only one study, the authors provided information about the randomization of participants, which was stratified according to age, gender, and education, and performed by a blinded statistician [29]. In another study, the authors reported that the control group was matched with the experimental group for reading and writing disabilities, sex, age, length of education, and nonverbal IQ [47]. However, it is worth noting that in the latter study, the two groups were quite different in terms of sample size, i.e., the intervention group consisted of 42 participants while the control group counted 16 people.

Concerning the location of the studies, one study was carried out in Finland [29], one in Sweden [47], and two in the UK [45,46].

Participants' characteristics are reported in Table 1, which shows that only two studies reported descriptive information (e.g., mean age) at least at baseline [29,47], and only one report included information about participants' age range [46]. One report did not specify the participants' gender [45]. Only two studies reported information concerning the number of dropout participants clearly [29,47], making it impossible to draw any conclusion about dropouts' similarities or differences among the different intervention studies. Among the studies included in the review, only one study specifically targeted unemployed participants [47], while others generally referred to employed participants [45,46] or young adults with dyslexia, without information concerning their employment status [29].

The criteria used to recruit dyslexic adults differed between studies. One study reported that dyslexia was confirmed based on performance in five different tests from batteries for dyslexia [29], and another study reported that reading and writing disabilities were assessed using interviews and neuropsychological testing based on the DSM-IV criteria [47]. The two remaining studies did not provide any information regarding criteria for participants' dyslexia assessment, but they referred to specific initiatives undertaken to support dyslexic adults in the workplace [45,46].

### 3.3. Risk of Bias in Included Studies

Of the four intervention studies included in the review, two included a control group and, among these, only one provided information regarding randomization of the participants to the study groups [29].

#### 3.3.1. Selection Bias: Random Sequence Generation and Allocation Concealment

Information provided in published reports that included a control group indicated that one study allocated participants using a stratified random number table performed by a blinded statistician [29]. Accordingly, in this case, the study was rated at low risk of bias for sequence generation and allocation concealment. On the other side, no such information was provided in the other study that involved a control group [47]. Hence, in this case, the risk of bias was rated unclear.

#### 3.3.2. Performance Bias: Blinding of Participants and Personnel

Participatory interventions led by people who must be aware of what they are doing make it difficult, if not impossible, to ensure blinding of personnel delivering the interventions [48]. On the other side, blinding of participants is less problematic when participants in the two conditions (intervention vs. control) are not aware of the existence of the other group. While the two studies included in the review that comprehended a control group described that participants in such a condition took part in the intervention (s) when the study was over, only one study reported that participants were advised not to mention which group they belonged to [29], while no details are provided about participants' awareness regarding their allocation to the two conditions in the other report [47]. Given that no information is available regarding participants' adherence to the instructions provided [29], risk of bias was rated unclear in both studies.

### 3.3.3. Detection Bias: Outcome Assessment

None of the studies included in the review provided information concerning measures described to blind outcome assessors from knowledge of which intervention a participant received [29,47]. Hence, risk of bias was judged in both cases unclear.

### 3.3.4. Attrition Bias: Incomplete Data Outcome

Both studies including a control group [29,47] reported information concerning attrition and exclusions from the analyses, including the number in each group and reasons for attrition and exclusions. Therefore, we judged the two studies at low risk of attrition bias.

### 3.3.5. Reporting Bias: Selective Outcome Reporting

One study referred to its study protocol published in advance [29]. However, when comparing the study protocol to the published report, a number of secondary outcome measures that are listed in the protocol, and of interest to this review, do not appear in the final report, i.e., goal achievement, quality of life, mood, and social and cognitive-behavioural strategies [29]. The other report included in the review comprehending a control group did not refer to any study protocol [47]. Accordingly, in both cases risk of bias was rated unclear.

### 3.3.6. Other Potential Sources of Bias

No study reported any other potential sources of bias. Hence, we rated the two studies including at least two groups [29,47] at low risk of other potential sources of bias.

## 3.4. Interventions

The studies included in this review used intervention programmes that differed in terms of duration, group size, type and topics, intensity, materials, methods, and assignments, and personnel administering the interventions.

### 3.4.1. Duration and Intensity

In one report, the intervention model consisted of 12 sessions that were administered to either 10-people groups or one-to-one training, where, in the former case, each session lasted 1.5 h and, in the latter, 2 h [29]. Another report described findings from a coaching intervention lasting on average 4.6 sessions, with an average of 9.86 h of coaching per employee, over 2–6 months [46]. In one study, the intervention lasted 20 weeks, including four weeks apprenticeship [47]. Here, no information was reported regarding the duration of each session. Finally, one report provided information concerning the overall duration of the study, i.e., approximately three years, and the fact that most of the participants reported having received three sessions of coaching but the overall mean was four sessions. No details about the time intervals between sessions were provided [45].

### 3.4.2. Group Size

Two reports described one-to-one interventions [29,46], and two reports presented group-based interventions with varying group sizes, ranging from up to 10 participants [29] to groups of 15 participants [47]. For one of the included studies, no clear information concerning the group size was reported [45].

### 3.4.3. Type and Topics

One report included both an individual and a group intervention [29]. Here, of the overall number of sessions of the interventions, three sessions of the individual format (i.e., the included topics referred to setting goals, time-management, self-knowledge and self-esteem) and four sessions of the group intervention (setting goals, stress management, time-management, self-knowledge and self-esteem)



focused on the primary outcomes of this review. However, the authors noted that in individual interventions, content delivery was tailored based on therapists' assessment.

Another study reported findings from a group-based intervention focused on encouraging and improving motivation and cooperation and enhancing participants' self-confidence [47]. However, no specific information was provided concerning the number of sessions devoted to such specific topics within the overall intervention, which also dealt with literacy skills, mathematics and others.

The report presenting findings from a coaching intervention listed a range of topics resulting from individual meetings [46]. Among these, two of the three macro topics covered by this intervention focused on the primary outcomes of this review, i.e., organization and time-management. However, the content of the coaching sessions seemed to be highly differentiated based on participants' experiences, leading to various themes, including stress management topics.

One report presented information concerning "guidance" and "support" related to dyslexia. However, there were no details concerning how guidance was provided apart from a reference to a session of coping strategy coaching [45].

#### 3.4.4. Personnel Administering the Interventions

One report described an intervention study administered by therapists that were qualified neuropsychologists, where adherence to the intervention protocol was monitored with discussions throughout the interventions [29].

In another study included in this review, coaching sessions were provided by coaches with a background in professional workplace coaching, occupational psychology or both, with varying years of experience [46]. In addition, the authors reported that coaches were not recruited based on specific experience with dyslexia but instead based on a shared approach towards self-directed learning.

Two studies included in the review did not provide information regarding the professional roles of personnel administering the interventions [45,46].

#### 3.4.5. Materials, Methods, and Assignments

In one report, where both an individual and a group intervention were described, the authors reported that all sessions had specific materials and home assignments [29]. Moreover, the sessions were tailored according to participants' needs and neuropsychological profiles, and the methods used in both formats included psychoeducation, teaching compensatory strategies, and offering psychological support to cope with dyslexia.

In a coaching intervention, the design included the development of a coaching summary from the dyslexic participant with the involvement of his/her own manager at work and the coach, to be refined through discussion to fit between topics considered relevant for performance improvement in the current work role [46]. Overall, the coaching intervention described in this report was based on developing self-awareness through reflective and qualitative interviewing and the development of behavioural strategies to self-manage problems. It included techniques such as symbolic modelling to assist the development of positive models based on previous experiences and iterative, dialogic processes between the participants and the coaches.

Likely, in a report describing a group-based intervention, the authors reported that the teachers were instructed to work more like coaches than as traditional teachers. It was also reported that throughout the intervention participants could influence the methods, time schedule, as well as topics to be emphasized based on individual or group needs [47]. Finally, one report did not include details concerning methods or assignments used during the intervention [45].

### 3.5. Outcome Measures

Table 2. presents a summary of the measures used to assess primary and secondary outcomes of this review.

**Table 2.** Measures Used by Studies to Assess Outcomes.

Outcomes	Measure	References	Studies
<i>Primary Outcomes</i>			
Learning	One self-reported question, 4-point scale <sup>a</sup> (0 = very well; 4 = very poorly)	Measure developed for the study. No information concerning reliability	Nukari et al. (2020)
Disadvantage	Two self-reported questions, numerical scale from 0 to 10	Measure developed for the study. No information concerning reliability	Nukari et al. (2020)
Organization	Performance rating on a 10-point scale <sup>b</sup> (1 = poor; 10 = excellent)	Measure developed for the study. No information concerning reliability	Doyle and McDowall (2015)
Time Management	Performance rating on a 10-point scale <sup>b</sup> (1 = poor; 10 = excellent)	Measure developed for the study. No information concerning reliability	Doyle and McDowall (2015)
Stress Management	Performance rating on a 10-point scale <sup>b</sup> (1 = poor; 10 = excellent)	Measure developed for the study. No information concerning reliability	Doyle and McDowall (2015)
Self-Awareness	Not reported	Not reported	Beetham and Okhai (2017)
Confidence	Not reported	Not reported	Beetham and Okhai (2017)
Organization	Not reported	Not reported	Beetham and Okhai (2017)
Self-Confidence	Number of items and response-scale not reported	Modified version of “I think that I am ...”; [49]. No information concerning reliability	Jensen et al. (2000)
Empathy, including assessment of Perspective Taking	Number of items and response-scale not reported	Modified version of the interpersonal Reactivity Index [IRI]; [50,51]. No information concerning reliability	Jensen et al. (2000)
<i>Secondary Outcomes</i>			
Work	Registered data about experimental participants’ work	Not available	Jensen et al. (2000)

Notes. <sup>a</sup> Even though the report describes answers to be provided on a 4-point scale, the anchors described refer to a 5-point scale. <sup>b</sup> Exact number of items not reported.

Regarding primary outcomes, studies investigated the role of interventions in relation to one's confidence in learning new information and perceived disadvantages related to dyslexia [29]; organization [45,46], time and stress management [46], self-awareness [45,47], and empathy, including perspective-taking [47]. Yet, as it can be seen in Table 2, the majority of the reports included in the review used scales developed ad hoc for the specific study rather than scales that have been already largely tested and validated. In addition, none of the studies included in the review reported detailed information concerning scale development and reliability. For what concerns secondary outcomes, only one report provided data regarding participants' work status using registered data [47].

### 3.6. Effects of the Interventions

Concerning primary outcomes, results from the only study that reported random allocation of participants to the different conditions showed that there were no significant interactions between the intervention groups (i.e., individual and group) and the control group in self-evaluations concerning one's perceived ability to learn new information. In addition, analyses showed that none of the two intervention formats (i.e., individual and group) led to lower self-evaluated disadvantages caused by dyslexia when compared to the control group over time [29]. However, results also showed that perceived disadvantage diminished significantly within both interventions from baseline to first follow-up at five months, while the control group remained stable in the same time-frame [29].

In another study involving a control group, results showed that participants in the intervention reported higher self-confidence in their reading and writing ability compared to the control group over time [47]. Other dimensions considered regarding self-confidence referred to one's talents, family relations, and relations outside the family. Yet, none of these significantly changed in comparison to the control group over time [47]. In addition, the same report provided evidence regarding the effects of the intervention on empathy-related constructs, i.e., perspective taking as the active cognitive process of envisioning the world from others' viewpoints [52,53], which involves attempts to mentally represent how others see the perspective taker and her/his behaviour [54,55]. Here, findings showed that participants in the intervention group reported lower social distress compared to the control group over time [47].

Organization, time, and stress-management showed an improvement in one observational study where participants in a coaching intervention reported pre/post self-reports concerning such dimensions [46]. In addition, concerning time and stress-management, such improvements were consistent with managers' evaluations. Finally, one report provided descriptive data only, therefore not allowing to draw any conclusion about the role of the intervention on the measured outcomes [45].

Regarding secondary outcomes, i.e., any quantitative measure of work status (e.g., employed/unemployed), the only report that assessed participants' work status after the intervention reported descriptive facts (i.e., 26% of the 60 participants who started the program succeeded in obtaining work) and no data were available for the control group [47].

## 4. Discussion

This paper provides a systematic review of empirical evidence on the characteristics and effectiveness of interventions to support dyslexic adults' personal resources. Self-regulatory skills, self-efficacy, and the ability to employ self-control strategies when distressed or challenged are key to high employability [56]. Yet, dyslexic adults may score lower on such personal resources compared to other employees because of cognitive impairment and negative self-perceptions related to it [57,58]. This review aimed to map evidence on initiatives devised to support dyslexic adults' psychological resources and to deepen understanding of their overall effectiveness. We searched for intervention studies published in peer-reviewed journals, eventually including four reports that presented results from any intervention strategy with any format and theoretical background aiming to target dyslexic adults' personal resources, i.e., positive self-evaluations commonly linked to resiliency

and an individual's sense of ability to control and impact the environment in a successful manner, including coping strategies and self-management.

We included four studies with 278 participants (first endpoint after intervention) from three different countries. Among these, two studies were specifically focused on initiatives targeting dyslexic adults' psychological resources, while the other two included such a topic as a part of broader neuropsychological interventions that targeted several cognitive aspects of dyslexia. The types of initiatives developed to enhance psychological resources were highly heterogeneous, spanning from coaching sessions to group training. Likely, the topics included varied, mainly based on a common criterion of high flexibility to accommodate particular individual or group needs [42].

From a methodological point of view, while several validated and reliable measures exist in the literature to assess a wide range of psychological resources [59], the majority of the studies included in this review developed ad-hoc measures to test the effects of the interventions, and none of them reported information regarding the reliability and validity of such scales. Such an aspect limits the chances to gain a reliable understanding of whether the different interventions served to enhance or support participants' psychological resources. However, while acknowledging such methodological limitations, results from the studies included show that different types of interventions can lead to significant changes in some psychological resources, i.e., participants' self-confidence regarding their reading and writing ability and personal distress compared to the control group [47], and organization, time, and stress-management in one observational study [46].

Accordingly, this review shows that there is initial evidence suggesting that initiatives can be effective to support a set of personal resources important to allow dyslexic adults' positive adjustment in the workplace. This finding has relevant implications for practitioners and policy-makers alike as it highlights the value of devising initiatives leveraging on people development, rather than only literacy skills, to unfold dyslexics' work potential and career opportunities. To date, researchers suggested that successful dyslexics develop ways of controlling, coping and compensating for their deficits [60], and that low levels of psychological resources such as confidence and self-efficacy represent strong barriers preventing dyslexics from considering a broader set of career options [61]. Results from this review provide initial ground showing that such personal resources can be improved through specific interventions, therefore offering evidence to assist practitioners and organizations in the design of inclusion initiatives to unleash dyslexic adults' potential throughout their careers. Moreover, the fact that interventions focusing on the development of personal resources can be promoted at large in organizations without being necessarily targeted at dyslexic adults allows for addressing the problems of identification and self-disclosure, the latter being associated with misunderstanding and discrimination [62]. That is, by devising interventions aiming at strengthening employees' personal resources and effective coping strategies, organizations can provide resources to dyslexic employees who can benefit from the support they need to realize their potential [63] when they choose not to communicate their hidden disability or are not aware of it.

#### *Limitations and Directions for Future Research*

This review has some limitations that can inspire future research. First, our search resulted in a small number of relevant studies. This can be explained both because the current literature on adults with learning disabilities is limited [64,65], and as a result of the definition and perspective of dyslexia that we adopted, i.e., an inefficiency in the working memory and the information processing system. Concerning the latter, a large amount of literature builds upon the idea of neurodiversity, according to which the information processing of people on the autism spectrum, or with ADHD and, among other things, dyslexia, differs from the majority [66]. From this viewpoint, differences in the brain cause differences in thinking, communicating and learning, rather than deficits [67,68]. While in this review our focus was narrowed to dyslexic adults without comorbidity of other developmental, psychiatric or neurological conditions, future research could consider adopting a neurodiversity perspective to investigate whether and how results may differ in terms of the number of studies and effectiveness of

interventions for people with diverse neuro-functioning. Moreover, such research could be important to reinforce a perspective that leverages on dyslexic adults as other-minded instead of individuals with deficits, not only regarding verbal and written communication [69] but also concerning organization, time management, planning and adaptation to change. (This point stems from an anonymous reviewer who we want to thank for the insightful observation).

Second, together with the limited evidence available suggesting publication bias, high heterogeneity in methods and unclear methodological rigour speak to the need for more rigorous studies to determine the effectiveness of psychosocial interventions to support dyslexic adults' psychological resources. While the effectiveness and limitations of interventions for stress management, mental health promotion and well-being in organizations are well-documented [70], results from this review highlight the significant gap in empirical evidence on targeted support to facilitate career success and well-being among dyslexic adults [3]. Accordingly, while the studies in this review provide initial evidence suggesting that interventions may be effective to sustain psychological resources among dyslexic adults, more intervention studies adopting quasi-experimental designs are needed to understand better how different intervention initiatives may impact different sets of resources. Such an understanding is crucial if evidence-based recommendations and guidelines aiding policy-making and intervention strategies are to be developed [4]. Moreover, deepening knowledge on the role of intervention initiatives to enhance not only cognitive and executive functions but also psychosocial factors is essential to inform career-support services and programs to unleash the potential of people with dyslexia in the work environment and fostering their inclusion.

Third, while in this review we attempted to shed light on whether psychosocial interventions can be effective to improve employment rates, the number of studies ( $n = 1$ ) focused on such an outcome was too low, and the heterogeneity of the two groups compared was too high. Accordingly, research is needed to investigate whether such initiatives can have an indirect effect on employment through improved resources. Besides, this review included two studies from the United Kingdom and two studies conducted in Northern Europe. Such evidence highlights that research is needed to understand how initiatives to support dyslexic adults' psychological resources and employability can be effective in different language contexts, in order to improve confidence in the strength of interventions in cross-cultural contexts.

## 5. Conclusions

This paper presents a systematic review of psychosocial interventions to improve personal resources among dyslexic adults. Enabling dyslexic adults' participation in the work environment is key to unleash their potential and essential to make the workplace more inclusive [71]. This can be supported through psychosocial interventions that target a set of positive self-evaluations commonly linked to resiliency and an individual's sense of ability to control and impact the environment in a successful manner, including coping strategies and self-management [72]. Our study provides a first effort to map and integrate the understanding of interventions in this field. Specifically, while it reveals that interventions can be effective in enhancing psychological resources among dyslexic adults, it also highlights an important gap in the literature. Thus, knowledge in this field remains largely based on common sense rather than on evidence from research. Given the high incidence of dyslexia, its health consequences and high financial costs [73], this is particularly problematic and emphasizes the need for research designs to evaluate interventions' effectiveness on the improvement of psychological resources and employment opportunities. Accordingly, we argue for the need for intervention studies to understand the effects of initiatives on dyslexic adults' psychological resources and well-being, employing validated and reliable scales for outcome assessment.

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