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A Critical Realist Analysis of Coaching as a Disability Accommodation: Socio-legal Context, Psychological Mechanisms, Intervention Evaluation and Personalised Outcomes.

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[1] *Please note that the table titles are presented at the top of the table, not at the bottom throughout the document. Though this is contrary to City University of London's guidance on thesis formatting, I determined that the length of many tables presented herein meant that tables would be difficult to follow if the title came at the end. For consistency I applied this rule to all.*

List of Illustrations

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Declaration

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Abstract

Although dyslexia affects 5-8% of the workforce, this developmental disorder is insufficiently researched in adult populations from a psychological perspective. Dyslexia confers legal protections and employers must provide 'reasonable adjustments', accommodations that protect employment and improve work performance. Using Critical Realist Evaluation principles, I conducted a multi-disciplinary literature review of the biopsychosocial and macro-legislative context for dyslexia in adults which highlighted the need for intervention evaluation. The following expansive research question was formed:

Given a legislative context in which the dyslexic adult is considered disabled, and a social context which confers increased vulnerability to occupational and social exclusion, (1) what types of intervention exist to mediate such risk, (2) on which psychological mechanisms do they aim to operate, (3) and to what extent do interventions achieve a successful outcome?

Original survey data (N = 271) supported practitioner assertions that coaching is a widely adopted accommodation intervention and that the focus therein for adults is developing cognitive, behavioural and emotional skills, rather than solely literacy. A narrative systematic review was conducted to extract relevant psychological mechanisms and intervention protocols. The synthesis suggested 'Working Memory' and 'Self-Efficacy' as viable psychological mechanisms that can be successfully targeted by coaching. Intervention protocols compliant with Social Cognitive Learning Theory (SCLT) and Goal Setting Theory (GST) produced consistently effective results.

Two quasi-experimental field studies using double-blind controls tested these propositions: (study 1) SCLT and GST compliant coaching would improve Working Memory and Self-Efficacy for dyslexic adults, which would be correlated with improvements in work performance (N=67) and; (study 2) coachees' metacognitive development and / or emotion management were intervening variables (N=52) mediating this impact. Between-groups comparisons reported some improvements to these measures, including the maintenance after the coaching was complete, though correlations between measures were rarely significant. A consistent improvement from the control groups indicated a potentially active element to the testing process and weakened the between-groups findings. As such, a novel data analytic technique was created which elicited overall improvement value (Meta-Impact) and separated smaller, potential practice effects, resulting in a significant difference between the intervention and control groups.

Coaching was, theoretically and when applied, able to improve the experience of dyslexic adults upon cognitive, behavioural psycho-social and emotional domains of experience, though in likelihood the experience will be personalised and limited to one or two domains, rather than all. In conclusion, I challenge the medical model approach to dyslexia, and specifically the targeting of working memory deficit as a proxy for broader, contextual outcomes. I suggest that a multi-domain based intervention might produce outcomes that are more ecologically valid. This thesis potentially supports the premise of coaching as a disability accommodation, though further research is required to evaluate the longer term effects of coaching on contextual outcomes such as job sustainability and career progression outcomes. I further argue that any disability accommodation, including coaching, must mediate between the meso and individual level in order to be ethically and legislatively compliant and to increase occupational inclusion for this heretofore marginalised group.

Chapter One

Introduction

Dyslexia is common in the workplace, having a worldwide prevalence of approximately 10% of the population (IDA, 2002; Rose, 2009; Snowling, Adams, Bowyer-Crane, & Tobin, 2000) including around 8% of working adults (Rice & Brooks, 2004). In the UK, dyslexia confers disability protection under the Equality Act (United Kingdom Parliament, 2010) which means that employers are legally obliged to provide 'reasonable adjustments' to recruitment, work flow and environment (Telwatte, Anglim, Wynton, & Moulding, 2017). Adjustments are accommodation activities pertaining to the provision of equipment, environmental adaptations and/or processes that facilitate a person with disabilities to perform on an 'equal level' to colleagues (Jackson, Furnham, & Willen, 2000). Approximately 3000 dyslexic people per annum access support from statutory services such as 'Access to Work' (Melvill, Stevens, & Vaid, 2015) a service funded by the United Kingdom Department for Work and Pensions (DWP, Gifford 2011). Similar legislation is in place across developed nations (de Beer, Engels, Heerkens, & van der Klink, 2014; Florey & Harrison, 2000; Gerber, Batalo, & Achola, 2012; IDA, 2002) though services for employment are less comprehensive compared with educational support (Rice & Brooks, 2004; Rose, 2009). In addition to the well-known impact upon literacy difficulties, dyslexia also affects cognitive functions such as memory, attention and impulse control (Baker & Ireland, 2007; Swanson & Siegel, 2001; Varvara, Varuzza, Sorrentino, Vicari, & Menghini, 2014) but this is less understood by lay people, posing problems for the interpretation of valid reasonable adjustments (Colella, DeNisi, & Varma, 1998; Florey & Harrison, 2000). Dyslexic adults are subject to significant social exclusion, such as disproportionately high rates of incarceration (Fazel, Xenitidis, & Powell, 2008; Jensen, Lindgren, Andersson, Ingvar, & Levander, 2000) and unemployment (Snowling et al., 2000) as well as discrimination in the workplace (Achieve Ability, 2016; Colella et al., 1998; Cooper et al., 2018; de Beer et al., 2014) and failure to achieve career potential (Holliday, Koller, & Thomas, 1999; Logan, 2009; Richardson & Wydell, 2003).

Despite the significant population prevalence and a need for clarity into practical application of legislation, research into improving occupational inclusion and achievement through disability accommodation is lacking, specifically longitudinal evaluation of interventions to support dyslexic adults (Gerber, 2012; Kirby, Edwards, & Sugden, 2011; Rice & Brooks, 2004). Rice and Brooks (2004, p.12) stated the following in the conclusion

of their adult dyslexia review: "*good practice in this field rests almost entirely on professional judgment and common sense, rather than on evidence from evaluation studies".*

In over a decade since Rice and Brooks' review, my preliminary literature reviews reveal a dearth of adult-specific studies, with only 41 investigating the occupational experience (since 1995, see tables 1.3, 1.4, 2.1, below) indicating that sufficient evaluation studies have failed to materialise, despite repeated calls for further research from both researchers and practitioners alike (de Beer, Engels, Heerkens, & van der Klink, 2014; Gerber, Batalo, & Achola, 2012; Leather, Hogh, Seiss, & Everatt, 2011; McLoughlin & Leather, 2013; Siegel & Smythe, 2006). Practice is therefore divorced from evidence and in particular, psychological research has not addressed the occupational, social or educational needs of dyslexic adults. The small amount of research is fragmented across a wide range of disciplines (see tables 1.5, 2.2). Psychology, education, neuroscience, disability, occupational health, management and social inclusion researchers provide respective expertise, though neither a comprehensive review of adult, occupational symptomatology nor evidence-based principles (Briner & Rousseau, 2011) in occupational dyslexia management practice have emerged.

The potential contribution of my research is in providing a direct response to the calls from adult dyslexia researchers and practitioners mentioned above; an opening of the 'black box' in coaching utilised for disability accommodation. I aim to synthesise and critically analyse existing knowledge from a wide variety of contributing scientific disciplines, in order to develop a conceptual, psychological framework for adult dyslexia coaching interventions that elucidates macro and meso-level context as well as the 'active ingredients' in the intervention protocol and the psychological mechanisms employed. My thesis further proceeds with quasi-experimental longitudinal studies to evaluate the inducted, hypothesised pathway and quantify the outcomes for an appropriate sample of working dyslexic adults. Within, I have contrived a novel data analytic strategy for deriving overall impact from numerous variables, which supports the nuances of field work. My studies aim to provide a starting point of foundational knowledge regarding the occupational psychology of disability accommodation for dyslexia and are intended to stimulate further research from which a more robust body of evidence can emerge.

Thesis Outline

This thesis builds on the assertion that one function of academic research is to be relevant and advisory to practice (Briner & Rousseau, 2011). Working within a Pragmatic Paradigm (Simpson, 2018), I will combine a Critical Realist conceptual analysis (Houston, 2014) and Realist Evaluation methodology (Houston, 2014; Pawson, 2013). I use the Context, Intervention, Mechanism and Outcome (CIMO, Denyer et al. 2008) framework both as a tool for individual studies and as a guiding structure for the thesis as a whole. Table 1.1 summarises each chapter using the CIMO framework to illustrate how I combined the need for iterative conceptual, theoretical development with interdependent evaluative, experimental research. Rather than single chapters for methods, results and discussion I have written each study as a complete piece in separate chapters. The limitations and implications are numerous and some are specific to each study, I determined it would be difficult to read if each study's story was split into different chapters. Overall limitations and implications for the field of research will be presented in the concluding chapters. Following the summary table I will outline in more detail the content of the following chapters.

Table 1.1:

Chapter outline against CIMO framework

CIMO	Chapter Location	Output
Context (wider)	Chapter one	(Chapter) 1 Socio-legal perspectives
		1 Traditional narrative literature review of developmental disability (neurodiversity) in the workplace
		1 Epistemological contextualisation for the thesis
Context (specific to thesis)	Chapters two and three	2 Critical narrative review of dyslexia-specific research
		2 The ontology of dyslexia
		2 Coaching psychology definitions and relevance
		3 The development of a taxonomy of current, UK dyslexia adjustment provision
Intervention	Chapters three and four	3 Intervention activity distribution and perceived value
		4 Intervention protocols and principles

Mechanisms	Chapters four, five, six and seven	4 Salient psychological mechanisms to target 5 and 6 Exploration of relevant psychological intervening and outcome mechanisms
Outcomes (specific to this thesis)	Chapters five, six and seven	5 and 6 Evaluation of the impact of coaching upon individual dependent variables 7 Analysis of a meta-level, expansive impact of coaching upon the psychological experience of dyslexic adults
Outcomes (wider)	Chapters eight and nine	8 Summary of findings and limitations 9 Implications for theory, research and practice

In chapter one I firstly present a discussion of the neurodiversity movement, within which dyslexia fits as a 'hidden' disability, as an explanatory frame for the macro social, empirical and legislative forces that are active within the complex adaptive system of education and work. I then present a detailed analysis of the dearth of neurodiversity research within current psychological knowledge, justifying the inclusion of cross-disciplinary journals and dyslexia comparable populations in a search for transferable evidence to demonstrate that I am not replicating a study that has been thoroughly completed in an analogous field (Briner & Rousseau, 2011). Thirdly, I summarise what can be currently inferred regarding the nature and effectiveness of occupational adjustments for neurodiverse adults within the limited extant literature. Lastly in this chapter, I provide more detail regarding my chosen methodology, the Realist Evaluation approach (Pawson, 2006, 2013; Pawson & Tilley, 1997; Rousseau, Manning, & Denyer, 2008; Triana, 2008). The chapter closes with my expansive research question.

In chapter two I will delve more specifically into the extant educational and neuropsychological research specific to dyslexia, in order to define the population in question and explore the better-developed medico-normative literature in search of applicable interventions that might be replicable in adults. A data-led justification for selecting coaching as the intervention of focus in this thesis will be reported inductively through the research activities outlined in chapters three and four; however I will outline the pedagogical principles of coaching in chapter two. Though this may seem premature, it is necessary to the evolving epistemological narrative being created through this chapter and requires definition as a key term. Coaching psychology is discussed in relation to its ability to mediate between individual and meso-level boundaries of occupational outcomes.

Chapter three will identify and classify patterns in the potentially highly individualised accommodation intervention activities currently in operation for dyslexic adults in the UK; this is obtained through survey data (*N*=271). The survey confirms the presence of coaching in dyslexia accommodation practice and provides basic descriptive detail on the nature of the coaching and assistive technology adjustments, as well as exploring naturally present environmental adjustments. Chapter three closes with a proposed taxonomy of relevant dyslexia accommodation activities.

In chapter four, the narrative systematic review protocol advocated by Realist researchers (Denyer & Tranfield, 2009; Denyer et al., 2008; Pawson, 2006) is used as a specific tool to develop conceptual understanding of occupational dyslexic symptomatology and research priorities. The review contains extracted studies where such relevant psychological mechanisms have been successfully improved, synthesizing the successful elements of interventions, facilitating the construction of a hypothetical intervention protocol, which will then be replicated and tested empirically with samples of dyslexic adults.

Grounded in these emergent, inducted theoretical pathways, the intervention protocol is subsequently evaluated in chapters five (*N*=67), six (*N*=52) and seven (aggregating results from five and six), through quasi-experimental design according to a series of specific research questions regarding mechanisms and outcomes. These studies seek not to exclude extraneous variables and produce a sanitised, empirical test of hypothetical intervening variables against a predetermined fixed outcome, but to embrace the complexity of field research and attempt to assess whether, and at what level, coaching interventions might 'work' for dyslexic employees. Following the lead of the Realist researchers, any intervention evaluation cannot take place 'in a vacuum' but this should not deter us from trying (Pawson, 2013). The most stringent empirical methods possible in field settings can be applied, synthesizing any extraneous intervening factors as part of the discussion, according to the hierarchy of evidence principles (Rousseau et al., 2008). I posit that all complex intervening influences involved in field research are equally present in practice and, therefore, employing the concept of ecological validity (meaning transferable to the 'real world': Gouvier et al. 2010) I seek to ensure that the presented evaluations of psychological variables are transferrable to practice.

The output and success of my approach will be reviewed, with a summary of findings and limitations discussed, in chapter eight. Chapter nine will provide implications for theory and research with a summary series of testable hypotheses and make

recommendations for practice. I aim to investigate whether the adjustments recommended and practised by applied psychologists (and similar professionals) can be either empirically supported, or indeed improved, to increase reliability and begin developing evidence-based practice.

Current Conceptual Frameworks

Dyslexia is one condition within a category that was collectively known as developmental disabilities, or Specific Learning Disabilities, ('SpLD', Rose, 2009) but is increasingly referred to as 'neurodiversity' (Armstrong, 2010; Cooper et al., 2018; DWP, 2014) indicating that a fundamental reframing is in progress of how we conceptualise conditions, and support individuals who are affected. However in academic research, the psychological and occupational presentation of individual conditions (for example dyslexia but also Attention Deficit Hyperactivity Disorder (ADHD) and autism) does not reflect the 'neurodiversity' phenomenon and is dominated by pseudo-medical deficit diagnosis and neuropsychological imaging of individual conditions (Davis & Deponio, 2013; Riddick, 2001). Current definitions of dyslexia are limited to educational and literacy-based concepts,; they do not incorporate adults, neuroscience or social models of dyslexia (BPS, 2005; IDA, 2002). A dynamic tension is created between the educo/medico normative status afforded by educational and clinical researchers / practitioners and the critical deconstruction argued by contemporary authors, stakeholders and activists (Armstrong, 2010; Davis & Deponio, 2013; Eide & Eide, 2011; Mcgee, 2012; Riddick, 2001; Shelley-Tremblay & Rosen, 1996). Irrespective of this emergent, transitory discourse and lack of empirical research, applied occupational interventions are dispensed with regularity, and there is broad acceptance amongst practitioners that making reasonable adjustments (for example, the provision of specialist coaching and assistive technology) remediates workplace difficulty (Bewley & George, 2016; Doyle, Cleaver, & Rossiter, 2016; DWP, 2015; Melvill, Stevens, & Vaid, 2015; TUC, 2011). Dyslexia alone represents 12% of the 'Access to Work' budget (Melvill et al., 2015). Before bringing the focus to dyslexia and intervention activities, I now outline the wider, socio-historical context of the neurodiversity movement, as necessary background to the premise of this research.

Neurodiversity

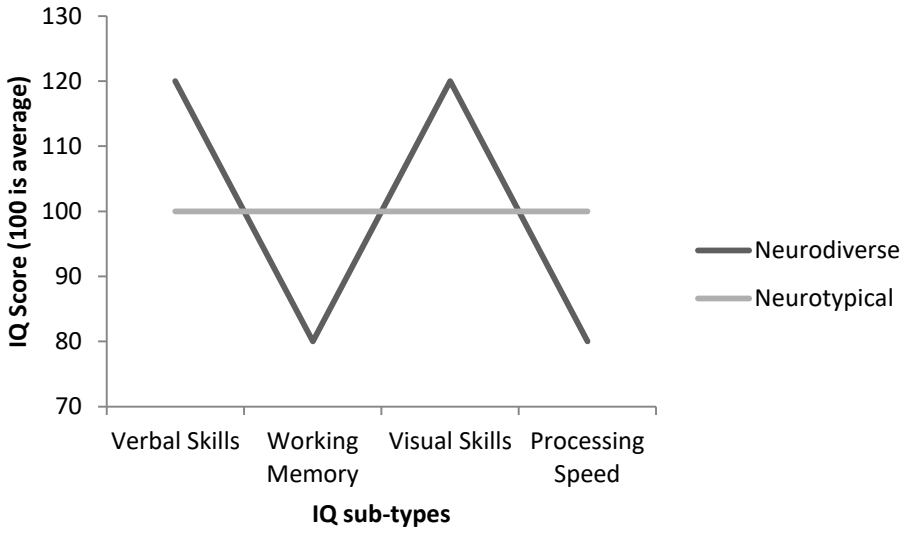
A movement for change. The contemporary term 'Neurodiversity' arose from disability rights activism over the past decade (Armstrong, 2010; Mcgee, 2012). The intention of activists was to move away from the medical model, where conditions are seen as a diagnosis of ill health or faulty neurology, towards a more socially inclusive recognition that divergence in thinking ability is normal, much like personality differences or overall intelligence level (Mcgee, 2012). The neurodiversity movement highlights the positive aspects of cognitive 'differences', rather than the sole focus on 'deficits', and normalises the presence of such differences (Armstrong, 2010; Bewley & George, 2016; Grant, 2009;

Jurecic, 2017; Kapp, Gillespie-Lynch, Sherman, & Hutman, 2012). The term is increasingly recognised in disability guidance for employers and policy makers (Bewley & George, 2016; Cooper et al., 2018; TUC, 2011). Given the high prevalence of the neurodiverse conditions reported in advanced economies (see table 1.2, below), the critical view is that neurodiversity has evolved within a typical spectrum of human experience (Blank, Peters, Pickvance, Wilford, & MacDonald, 2008; Boycott, Schneider, & Osborne, 2014; Shelley-Tremblay & Rosen, 1996) and, as such, people may wish to use neutral terminology that does not insinuate ill health. Within this emerging discourse of socially-constructed exclusion, it is argued that people with disabilities have the right to self-determination, to create and contribute to the narrative concerning their experience (Riddick, 2001; Wilton, 2006).

Individual Neurodiversity. 'Neurodiversity' has both a between- and within-person definition. As well as the 'between-groups' comparison to others who are 'neurotypical' (i.e. they do not have a neurodiverse condition), neurodiversity also refers to 'within-person' variations between an individual's neurocognitive abilities. For example, some dyslexic people are naturally strong visual thinkers but have poor memory (Bacon & Handley, 2010; Eide & Eide, 2011; von Karolyi, Winner, Gray, & Sherman, 2003). People with autism tend to have outstanding long-term memory but find processing speed difficult (Armstrong, 2010; Meilleur, Jelenic, & Mottron, 2015). Whilst everyone has strengths and weaknesses in their cognitive profile, for neurodiverse people, the difference between them is statistically significant (Grant, 2009; McLoughlin & Doyle, 2013). An average person will score at a reasonably similar level for each of the four intelligence quotients indexes that comprise the overall score (IQ: such as verbal, visual, memory and processing skills) on a cognitive ability test, such as the Weschler Adult Intelligence Scale (see figure 1.1: WAIS-IV, Weschler, 2008). A neurodiverse person is likely to have large disparities between scores; some may be below average and some far above. The WAIS IV provides guidance on the expected level of difference for adults; those falling outside those boundaries are considered neurodiverse. The neurodiversity critique argues that such differences represent specialism as much as they represent deficits, and are therefore simply representative of human diversity, as opposed to oddities against a neurotypical norm (Armstrong, 2010; Jurecic, 2007; Mcgee, 2012). It is possible for a neurodiverse person to have all index scores above average, or for the scores to incorporate average and below average scores. The critical distinction is the magnitude of difference, rather than the level of overall ability.

Figure 1.1

A 'Spiky Profile' showing example neurodiverse and average IQ scores



IQ testing using the WAIS-IV (Weschler, 2008) is commonly used to support a diagnosis of dyslexia or Developmental Coordination Disorder (DCD) in adults (McLoughlin & Leather 2013; Grant 2009; McLoughlin & Doyle 2013; Kirby et al. 2008) and to understand the cognitive ability of an employee following injury or illness (Tyerman, & Meehan, 2004). The use of the IQ differential model has received specific criticism as a diagnostic process for dyslexia in children (Seigel, 1989) yet, in adult populations, it is still used extensively because sole use of alternative diagnostic methods (for example age-normed spelling tests) bear less relevance post-education, particularly if remedial education has achieved success in establishing a reasonable level of literacy (Grant, 2009; McLoughlin & Doyle, 2013; McLoughlin & Leather, 2013). A disproportionately low verbal working memory score is now widely used as a diagnostic determinant of a range of neurodiverse conditions; this can be obtained via IQ testing (Elliott, Gathercole, Alloway, Holmes, & Kirkwood, 2010; Jeffries & Everatt, 2003; Jeffries & Everatt, 2004; Smith-Spark, Fisk, Fawcett, & Nicolson, 2003; Swanson & Siegel, 2001). However, consistent with neurodiversity discourse, IQ testing itself has been challenged as a tool through which psychology co-opts the barometer of normality, and is used at an individual level to maintain the socio-historically contextualised status quo (Gould, 2006). The idea of modular task specificity in testing and how this relates to biological development and generalised performance is increasingly questioned in the psychological literature (Chaytor, Schmitter-Edgecombe, & Burr, 2006; D'Souza & Karmiloff-Smith, 2017; Pennequin, Sorel, &

Mainguy, 2010; Sehgal Cuthbert, 2015; Söderqvist & Nutley, 2017). Psychologists in clinical, educational and occupational practice must navigate between this constructivist, critical argument and the need for reliable tools through which they can support an individual presenting with a practical need for help.

Neurodiverse conditions. Neurodiversity, as an umbrella term, typically encompasses: ADHD, Autism, Dyslexia, Dyspraxia/Developmental Coordination Disorder (DCD) Tourette Syndrome (TS), Dyscalculia and Dysgraphia (Doyle, 2017). These conditions are thought to be developmental as they emerge in childhood and adolescence and not as a specific response to trauma or ill health. There are two types of developmental neurodiverse conditions (Doyle, 2017):

(1) Clinical conditions, which are linked to behaviour and in the UK are typically diagnosed through Psychology, Neuropsychology and Psychiatry Clinicians working in the National Health Service, such as:
    a. TS
    b. Autism
    c. ADHD
(2) Applied conditions, which are linked to educational or practical occupational difficulties and typically diagnosed by Psychologists, Educationalists and Occupational Therapists in applied settings such as education and work, such as:
    a. Dyslexia,
    b. DCD,
    c. Dyscalculia
    d. Dysgraphia

Neurodiversity has also been known to refer to mild-to-moderate mental health needs: acquired brain injuries, including stroke and traumatic brain injury and neurological conditions, such as Multiple Sclerosis (Bewley & George, 2016; DWP, 2014) which is plausible since such acquired conditions also confer a 'spiky profile'. Memory difficulty, for example, could be a common *symptom* of a health-related condition, such as Multiple Sclerosis (MS: Thornton & Raz, 1997) or anxiety (Otto et al., 2016) compared with a potential *cause* of developmental problems with reading (Gathercole & Pickering, 2000). A person with mental health needs is likely to experience neurodiversity (e.g. compromised executive functions, but unaffected verbal articulation or visual skills: Solé et al. 2011) during an episode of anxiety for example, however may then become 'neurotypical' again

when their mental health is restored (Otto et al., 2016). Similarly, an individual with MS may develop memory difficulties during relapses (Thornton & Raz, 1997) but recover, in contrast to a neurodiverse person with a life-long diagnosis' or 'label' of dyslexia or ADHD (Miranda, Presentación, Siegenthaler, & Jara, 2013).

Occupational impact. Neurodiverse people are vulnerable to 'occupational exclusion'(Carter, Austin, & Trainor, 2012; Holliday et al., 1999; Logan, 2009; NAS, 2016; Taylor & Walter, 2003), which I am defining as reduced workplace participation and disproportionately low career advancement. Specific prejudicial action by employers according to stereotypes of their condition has been reported (Colella et al., 1998; NAS, 2016). Neurodiversity may not be immediately observable to colleagues and people do not readily disclose the condition themselves (Cook, Burke-Miller, & Grey, 2015; Madaus, 2008) often because they fear discrimination and also because they feel 'unworthy' of support compared to those with visible disabilities (Gerber, Price, Mulligan, & Williams, 2005; Wilton, 2006). This can delay the implementation of disability adjustments in education and in the workplace, and may contribute to reports of decreased job security (Wilton, 2006). All neurodiverse people are also more likely to be unemployed and incarcerated, both of which affect their life-long career success and occupational inclusion (Fazel, Xenitidis, & Powell, 2008; Halmøy, Fasmer, Gillberg, & Haavik, 2009; Hechtman et al., 2016). Table 1.2 below is reproduced, with permission, from a chapter written for the British Psychological Society (Doyle, 2017) and shows the various occupationally relevant strengths and weaknesses associated with neurodiverse conditions. As shown, although there is proportionally more written about difficulties, there is a persistent message regarding the presence of some strengths or unaffected areas; I contend that the disparity in volume may reflect our pseudo-medical normative research objectives and exclusive social structure rather than the inherent nature of the conditions, as per the neurodiversity critique (Ozbilgin, Beauregard, Tatli, & Bell, 2011). Of note is a consistent difficulty in working memory across all the conditions but autism, reflecting potential comorbidity but also the importance which current education and workplaces attach to working memory. This striking similarity has direct practical relevance to how we might construct occupational interventions to assist neurodiverse employees in bridging the conflict between their individual profiles and the skills required by their employer. Working memory research is a far more developed field than disability adjustments per se (Weicker & Thöne-Otto, 2015) and I draw on this research directly in chapter four.

Table 1.2

Neurodiverse conditions & prevalence, reported occupational difficulties and strengths

Condition	Difficulty	Strength
Dyslexia **Prevalence up to 10%** (Rice, 2004; Snowling, 2010)	Literacy, memory, organisation, communication and self-esteem (Bartlett, Moody, & Kindersley, 2010; McLoughlin & Leather, 2013) Memory, organisational skills, time management, stress management, literacy (Doyle & McDowall, 2015) Workplace participation in terms of mental functions and social interactions (de Beer et al., 2014) Cognitive functioning and social self-esteem (Baker & Ireland, 2007; Leather et al., 2011) Higher incidence of worklessness and incarceration (Baker & Ireland, 2007; Snowling et al., 2000) Working memory and self-efficacy (Gerber, 2012; Leather et al., 2011)	Entrepreneurialism (Logan, 2009) Creativity and cognitive control (Leather et al., 2011) Visual reasoning (von Karolyi et al., 2003) Practical skills, visual-spatial skills and story-telling ability (Eide & Eide, 2011)
DCD **prevalence 2%** (Kirby, Sugden, Beveridge, Edwards, & Edwards, 2008)	Difficulties with driving, self-care, organisation, communication and self-esteem (Kirby et al., 2011; Todd, 2011) Processing Speed and Working Memory (Grant, 2009) Persistence of motor difficulties (Losse et al., 1991).	High verbal comprehension ability (Grant, 2009)
ADHD **Prevalence up to 4%** (Edwin, 2014)	Time Management (Adamou et al., 2013) Concentration, attention and self-regulation difficulties (Prevatt & Yelland, 2013) Insomnia, depression, injury and absence (Kessler, Lane, Stang, & van Brunt, 2009) Working Memory (Miranda et al., 2013) Maintaining employment (Halmøy et al., 2009)	Creative thinking (White & Shah, 2006) Visual spatial reasoning ability (Grant, 2009) Hyper-focus, passion and courage (Armstrong, 2010)

Condition	Difficulty	Strength
	Difficulty with team work (Coetze & Gibbison, 2013)	
Autism **Prevalence up to 1.5%** (Wehman et al., 2016)	Time management (Wehman et al., 2016) Concentration and coping with more than one task (Howlin, Alcock, & Burkin, 2005) Social and communication difficulties (Katz, Dejak, & Gal, 2015) Need for routine (Katz et al., 2015)	Memory ability, and other 'specialist individual skills' including reading, drawing, music and computation (Meilleur et al., 2015) Innovative thinking and detail observation (Armstrong, 2010)
Tourette Syndrome **Prevalence 1%** (Robertson, 2006)	Hyper-arousal, social functioning, sleep disturbances (Shady, Broder, Staley, & Furer, 1995) Large overlap with ADHD including concentration, attention and memory difficulties (Robertson, 2006)	Ability to 'hyper-focus' (Averns, Jakubec, Thomas, & Link, 2012) Verbal ability (Dye, 2016)
Mental Health needs **Prevalence 16%** (NatCen Social Research, 2016)	'Executive Functions', which includes memory, attention, planning, inhibitory control and decision making (Solé et al., 2011) Stigma around disclosure and low expectations (Rinaldi, Miller, & Perkins, 2010) Demands of work leading to unmanageable stress (Sapani, 2015)	Creativity (Kyaga et al., 2013; Power et al., 2015) Ability to ruminate and think deeply (Armstrong, 2010)
Acquired Neurodiversity **up to 5% of the working age population** (Tyerman & Meehan, 2004)	Memory (Thornton & Raz, 1997; Tyerman, 2012) Concentration, attention and fatigue (Donker-Cools, Daams, Wind, & Frings-Dresen, 2015; Sweetland, Howse, & Playford, 2012) Recognising new limitations (Tyerman & Meehan, 2004)	Strengths are cognitive areas that are not affected by the injury or condition. These might include long term memory, verbal skills, visual skills and many more, but are determined on a case-by-case basis.

Narrative literature review of psychological evidence concerning neurodiversity

This thesis is intended to be grounded in occupational psychology and related fields, rather than (for example) education or neuroscience research. Occupational psychology, as s broad discipline founded on the principles of applying "systematic research to workplace issues" (Briner & Rousseau 2011, p. 3) incorporates an understanding of individual differences, organisational context, intervention evaluation and psychological theory,

applying multi-paradigmatic theory and research (Briner & Walshe, 2013; Chimiel, Fraccaroli, & Sverke, 2017; Grant, Passmore, Cavanagh, & Parker, 2010; Landy, 1997). Parallel to occupational psychology, bodies of application-specific research such workplace coaching psychology and workplace wellbeing psychology provide guidance on how to navigate between individual level experience and organisation factors (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Randall, Griffiths, & Cox, 2005; Theeboom, Beersma, & van Vianen, 2014), incorporating a combination research and practice (Briner & Rousseau, 2011) and raising concerns that some marginalised groups such as disability are heretofore overlooked (Ozbilgin et al., 2011). From an applied perspective, Occupational Psychologists in practice are involved in diagnosis, assessment and intervention delivery (Freeborn, in press), consulting across micro, meso and macro-levels, congruent to the systemic approach favoured in a Critical Realist analysis. Occupational psychology is an appropriate discipline for further dyslexia studies following this thesis, in which a wider range of interventions (other than coaching) will hopefully investigated in relation to work performance and career outcomes for individuals and employers. I therefore began a general narrative literature review with a search for key conditions within the most relevant journal to the applied profession, the *Journal of Occupational and Organizational Psychology* (JOOP). Results are shown in table 1.3.

Table 1.3

Representation of neurodiverse conditions in UK-published Occupational Psychology research

Condition	**No hits**	**pre-1995**	**1995-2005**	**2005+**
Dyslexia	2	1	0	1
Autism	2	0	0	2
Dyspraxia / DCD	0	0	0	0
ADHD	1	0	0	1
Mental health	413	-[2]	-	-
Tourette Syndrome	0	-	-	
Anxiety	311	-	-	
Depression	218			

I observed that the two dyslexia returns within JOOP pertain to (1) the use of handwriting as a recruitment technique (Klimoski & Rafaeli, 1983) and (2) a broader article

[2] *I did not categorise these returns by date since they were excessively numerous and the point is made without doing so.*

about employer responses to disability inclusion (Jackson et al., 2000). Similarly, the other conditions listed above are mentioned in references related to a broader theme, rather than examined as to how they relate to occupational psychology per se (for example both ADHD and autism are within the reference list for the coaching review conducted by Jones et al. 2016). Before eventually proceeding to a multi-disciplinary search for papers within the Elton B. Stephens Company (EBSCO) hosted academic databases, I explored the *psychological* evidence in particular. I therefore secondly targeted all journals published by the British Psychological Society (BPS). The results shown in table 1.4 include the British Journal of Educational Psychology, the British Journal of Psychology and the British Journal of Clinical Psychology, which one might reasonably assume to be reliable sources of knowledge regarding neurodiverse conditions given the extent of psychologists' involvement in conducting diagnoses (Freeborn, in press; McLoughlin & Doyle, 2013; SASC, 2017).

Table 1.4

Coverage of neurodiverse conditions in UK-based, multi-disciplinary psychological publications

Condition	**Hits**	**pre-1995**	**1995-2005**	**2005+**	**Population prevalence**	**Proportion of Neuro diversity**	**Proportion of research**
Dyslexia	448	278	79	91	10%	29%	9%
Autism	496	173	80	243	2%	4%	10%
Dyspraxia / DCD	95	46	11	38	2%	6%	2%
ADHD	110	3	17	90	4%	12%	2%
TS	10	3	3	4	1%	3%	0%
Mental Health	4040				16%	46%	78%

The UK-based psychology journal search revealed an increasingly disproportionate body of research focusing on mental health needs and autism, relative to their prevalence. Closer inspection revealed consistent cross-disciplinary research between mental health and occupational psychology: 1686 studies referenced 'work' in the British Journal of Clinical Psychology and 413 studies on mental health were published in the JOOP, which I interpret as a mature research field concerning the impact of mental health in the workplace. However, this mature research field did not extend to developmental neurodiversity, where the studies published appear to be decreasing in number and mainly focused on the diagnosis of children to the exclusion of occupational contexts. As such, I observed that psychological research provided insufficient assistance in (a) the investigation of neurodiversity as a

psychosocial concept (b) the exploration of psychological mechanisms of interest upon which to base intervention evaluations, let alone (c) the intervention evaluations themselves. I consider this to be more paramount than a simple paucity of research and, considering the prevalence rates and risk to psychological wellbeing, more of a research 'blind spot' (Ozbilgin et al., 2011). Psychologists are, in our undergraduate education, granted knowledge of developmental neurodiversity as well as mental health conditions. We are subsequently bestowed with authority, through registration with the Health and Care Professional Council, to independently assess and recommend adjustments for dyslexic, dyspraxic and ADHD adults (Freeborn, in press.; McLoughlin & Doyle, 2013; SASC, 2017). Yet academic psychological publications have not kept pace with this trend and do not support professional delivery (Bartlett et al., 2010; McLoughlin & Doyle, 2013; McLoughlin & Leather, 2013). As such, we cannot claim that our practice as psychologists is evidence-based (Briner & Rousseau, 2011) and thus I reiterate the justification for my expansive aim within this thesis to begin extrapolating theoretical and evaluative evidence, which will one day contribute to a more mature body of research.

As these preliminary searches demonstrate, the dearth of robust, psychological research into adult dyslexia and indeed adult developmental neurodiversity in general, necessitated the consideration of cross-disciplinary research. I conducted a wider review of the literature pertaining to neurodiversity outside psychology, across international borders, to ascertain if there was a tranche of evidence in any alternative professional field that might guide my research. Table 1.5, below, shows the sources (judged by Journal title) of the papers included in Table 1.2 and the review I will present in the following section, both of which contributed to my aforementioned practitioner report chapter entitled 'Neurodiversity at Work', as published by the British Psychological Society (Doyle, 2017).

Table 1.5

Disciplinary location of published research concerning Neurodiversity

Discipline	psychology	psychiatry	child development	condition specific	Occ Health/ Therapy/ Voc Rehab	disability	social work	career/ employment/work /management	other
No. of papers	9	6	4	10	15	5	1	5	5
% of papers	15%	10%	6%	16%	24%	8%	2%	8%	8%

These papers show the range of disciplines involved in neurodiversity and disability employment research, which must therefore be included in this thesis. Psychological principles need to be extracted and synthesised from intervention descriptions, as opposed to summarised and built upon existing psychological work, forming an interpretative narrative review rather than an aggregation of existing knowledge (Denyer et al., 2008). The next section will examine findings from the narrow band of neurodiversity research and practitioner reports, to ascertain any portable principles or studies that could inform my research questions and guide a more in-depth, systematic narrative review.

Disability accommodation for Neurodiversity

Choosing reasonable adjustments for neurodiverse people is intangible; where access ramps make sense for people using wheelchairs, someone with a memory, communication or concentration difficulty requires more detailed, personal and context-specific accommodations (Doyle et al., 2016). Practical problems are exacerbated when conditions are undiagnosed or badly explained during diagnosis, meaning that individuals are unaware of what to ask for as adjustments and what their strengths might be (Armstrong, 2010; Eide & Eide, 2011; McLoughlin & Leather, 2013; Quinn, 2005). Many employers perceive accommodation for dyslexia negatively (Jackson et al., 2000) unless they are strictly tied to literacy (Colella et al., 1998), reflecting the educational ontological bias and potentially limiting access to more general cognitive support. To illustrate, noise management in open plan offices is reported to be a key issue for dyslexic people (McLoughlin & Leather 2013), and indeed many people with a hidden disability (Dong 2013; Corbière et al. 2014), yet a compromise between the need for quiet and the demands of the job must be negotiated and could include ear plugs, head phones, moving desks or having a private room when writing

difficult reports or reading detailed documents, working-from-home days and more (McLoughlin & Leather, 2013). To satisfy the 'reasonable' element of the legislatively-required ‘reasonable adjustment’ (United Kingdom Parliament, 2010), a compromise needs be negotiated between employer and employee, balancing needs of the team and needs of the individual across a wide variety in personal experience of difficulty, job type and environmental constraints (Florey & Harrison, 2000; Jackson et al., 2000). ‘Access to Work’, the DWP funded body, provides such assessments, though they are also sometimes provided in-house or through Occupational Health services, leading to variation in their comprehensiveness and timeliness (Doyle et al., 2016). The heterogeneity in accommodation requirement also poses a problem for this research – since there are so many individual cases of what is applied in practice, consistently evaluating upon which psychological principles they are based, and whether adjustments ‘work’ becomes fraught with the complexity typically associated with social policy research (Pawson, 2013), not psychological enquiry.

Nevertheless, there is knowledge that can be extracted from the wider disciplinary literature review, which I have summarised below to provide basic information about the contextual factors involved in disability accommodation for neurodiversity and as an indication of the interventions that might form a protocol for my evaluative chapters. Much of the content of these paragraphs is reproduced with permission from the British Psychological Society and are reported in more detail in the ‘Psychology at Work’ report (Doyle, 2017).

Applied Developmental Neurodiversity. As above, this group comprises dyslexia, as well as those with DCD, dysgraphia, dyscalculia (meaning difficulty with movement, handwriting and numbers respectively). Accommodation activity is reported in practitioner literature to include coaching and provision of assistive technology (Bewley & George, 2016; Grant, 2009; McLoughlin & Doyle, 2013; McLoughlin & Leather, 2013; Bartlett et al., 2010; TUC, 2011). There are no studies in this broadened search academically examining the nature or effectiveness of reasonable adjustments for addressing DCD, Dysgraphia or Dyscalculia, though published studies have voiced an imperative to do so (Butterworth, Varma, & Laurillard, 2011; Kirby et al., 2011, 2008). My own primary, uncontrolled practitioner study (Doyle & McDowall, 2015) investigated coaching success using dyads of dyslexic coachee and supervisor. The study found that coaching was perceived as a useful intervention by both stakeholders, improving memory and memory-related skills such as time management; this was assessed by comparing dyad ratings of performance before and

after coaching. There are no controlled or dyad evaluations of assistive technology effectiveness, though two cross-sectional studies report that it is well-regarded by recipients (Draffan et al., 2007; Draffan, James, Wilkinson, & Viney, 2013). There are no investigations into alternative employer-led accommodations for this group. At the policy level, one report estimated that a typical programme of applied neurodiversity adjustments includes assistive technology and/or coaching and costs £727 per person (Melvill et al., 2015) which is considerably less than the cost of turnover per employee, estimated for the UK at £4,333 in 2007 (CIPD, 2007); this report is currently the only knowledge upon which we can assess the value to employers and employees of making adjustments for dyslexia.

Clinical Developmental Neurodiversity. Like the applied developmental neurodiverse conditions, individuals with ADHD, Autistic Spectrum Condition and Tourette Syndrome, experience lower rates of employment (Halmøy et al., 2009; NAS, 2016; Palmer & Stern, 2015). The research evidence is more developed for childhood considerations than for adult experience, and occupationally relevant studies are particularly sparse for TS and ADHD which mainly comprise primary studies, with autism research featuring systematic reviews of adult interventions. Intervention evaluations for ADHD of any age group, for example, are by far weighted towards pharmacology (Seidman, 2006), though there is a persistent suggestion that some sort of psychosocial intervention to support day-to-day performance is effective (Miranda et al., 2013; Parker & Boutelle, 2009; Richman, Rademacher, & Maitland, 2001; Weiss et al., 2012; Zylowska, Ackerman, Yang, Futrell, Horton, Pataki, & Smalley, 2008). A detailed, replicable intervention protocol is absent from these reports. Comparatively more is written about autism accommodations; these are reported to be primarily based on mentoring and coaching support (Lounds-Taylor et al., 2012; Strickland, Coles, & Southern, 2013), though assistive technology is also presented as a possible adjustment for this group (Burke et al., 2013; Hayes et al., 2015). More intensive vocational rehabilitation for severe cases is reported, including activities in preparation for employment as well as one-to-one support following job start (Lawer, Brusilovskiy, Salzer, & Mandell, 2009).

Both interpersonal and technological accommodations are reported in the literature as creating successful outcomes, however there is very little psychological or theoretical explanation as to how and why interpersonal and technology outcomes "work". Again, from a policy perspective, cost benefit analysis research has been attempted for intensive interventions with ADHD and autism (Howlin et al., 2005; Jacob, Scott, Falkmer, & Falkmer, 2015; Matza, Paramore, & Prasad, 2005). Tentative support is reported for the

viability of government spending on interventions to mitigate the costs of lifelong employment difficulties and economic underperformance. Cost effectiveness is predicated on a wide range of costs to government services and is not justified against the simpler turnover costs of human resource management, thereby lacking generalisability for dyslexia employment. There is no sufficiently longitudinal or cost benefit research into less intensive provision. No research has been conducted specifically exploring reasonable adjustments for TS, though again the papers reviewed mention this as a future research direction (Averns et al., 2012; Palmer & Stern, 2015; Shady & Broder, 1995; Touron & Hertzog, 2004).

Mental Health. Mild-to-moderate mental health needs account for 37% of sickness absence in the UK (HSE, 2016) and affect around 16% of the UK population at any one time (NatCen Social Research, 2016) and, as shown in table 1.4, have a more developed research field than developmental neurodiversity. Employers are expected to provide reasonable adjustments for this client group, which could include supervisor and peer support, a job coach or schedule flexibility (Corbière et al., 2014). The 'Access to Work' scheme facilitates specific coaching and mentoring as an accommodation for people with mental health needs in employment (DWP, 2015), at an average cost of £1121 per person per intervention (Melvill et al., 2015). High success rate of job retention at one year post support is self-reported by the intervention contractor (97%; Remploy, 2017), which provides a useful longitudinal marker of effectiveness, but lacks the rigour of objective observation and/or controlled experimental design. Additionally, and similarly to ADHD research, no indication is provided as to the content of coaching and mentoring intervention protocols in this programme.

Individual Placement Support (IPS) is an intensive mentoring programme widely reported as a successful adjustment for more severe mental health needs, clinician-led rather than 'Access to Work' funded. Reports on effectiveness are far more developed, with a robust research field including systematic review (Boycott et al., 2014; Rinaldi et al., 2010; Swanson, Courtney, Meyer, & Reeder, 2014). IPS research predominantly describes the active management of emotion, such as anxiety and paranoia insofar as they relate to an individual's ability to maintain their presence in a social environment and communicate effectively with colleagues. Unfortunately, this is less relevant to my target population and the studies reviewed do not address work performance specifically or overlapping cognitive issues such as memory and therefore offer little that can be refined for application in this thesis. Additionally, IPS models are labour-intensive, and cost much more to deliver than current budgets for dyslexia adjustments; indeed policy research can only justify the cost

when incorporating offsets from combined health, social care and unemployment budgets (Knapp et al., 2013).

Acquired Neurodiversity (neurological conditions and brain injury). Acquired brain injury in its broadest definition can affect up to 5% of the working age population (Tyerman & Meehan, 2004) and neurological conditions are also prevalent, including: Multiple sclerosis, which affects up to 0.2% (Mackenzie, Morant, Bloomfield, MacDonald, & O'Riordan, 2014); Parkinson's disease, which affects up to 0.05% (Parkinson's UK, 2009) and Chronic Fatigue Syndrome, affecting up to 4% of the general population (NHS, 2015). This list is not exhaustive. Vocational rehabilitation is a general support service for those recovering from brain injury and includes activity when individuals are employed that could therefore be considered an accommodation. Services are highly inconsistent across the UK, with some areas lacking an NHS referral service (Playford et al., 2011) and others providing relatively well-evidenced examples of best practice (Tyerman, 2012). Activity can start at diagnosis or following trauma and includes one-to-one mentoring support followed by gradual, phased reintegration to the workplace in which the mentor maintains one-to-one interaction in person, later by phone. Strong results and cost-effectiveness analysis are described in the literature (Sweetland et al. 2012; Tyerman & Meehan 2004a; Playford et al. 2011; BritSocRehabMed 2010). As with the IPS literature, very little is written about the content of such interventions that would allow the discernment of the psychological variables at work and their application to other conditions.

Summary of findings for adjustments for neurodiversity. An extensive search within a wide variety of disciplines, covering a range of neurodiverse conditions, has led to limited guidance that can be applied to dyslexic adults, reinforcing the need for more research. Rudimentary intervention descriptions of coaching, mentoring and assistive technology are offered as potential accommodations, implemented through statutory services such as 'Access to Work' for developmental applied conditions and the Health services, using occupational Health and Vocational Rehabilitation for clinical and acquired conditions, with varying degrees of intensity and cost. The specifics of *how* coaching and mentoring programmes lead to improved occupational outcomes is not sufficiently explained; the interventions are presented as a 'black box' (Nielsen & Randall, 2013). Clear definitions of coaching, mentoring and assistive technology are lacking, all of which are subject to much heterogeneity in practice (Doyle et al., 2016; Work and Pensions Committee, 2018). From a macro, 'programme effectiveness' perspective, 'Access to Work' and health-funded interventions in general have been subject to a few summative evaluations of cost-

effectiveness and are viewed favourably as providing clear return on investment for neurodiverse individuals in general (Gifford, 2011; Knapp et al., 2013; Lounds-Taylor et al., 2012; Melvill et al., 2015; Remploy, 2017). However, the provision of services for dyslexia has not been evaluated specifically, nor has any 'Access to Work' intervention been subjected to controlled studies (Doyle et al., 2016; Doyle & McDowall, 2015; Gerber et al., 2012; Siegel & Smythe, 2006). We remain unenlightened as to how such perceived success is operationalised and unable to comment on best practice principles for psychological interventions. Having now exhausted evidence from other disciplines regarding similar conditions, in the hope of avoiding the need to reinvent the wheel (Briner & Rousseau, 2011), I conclude that there is need for a data-led description of dyslexia accommodation practice, followed by iterative development of theory and evaluation activities, whilst acknowledging the frame of the wider transition from medical to social model of disability. Below, I explain my chosen epistemology for this task, concluding with my expansive research question for the thesis, which indicates how my work potentially fulfils the doctoral obligation to contribute original research.

Epistemology

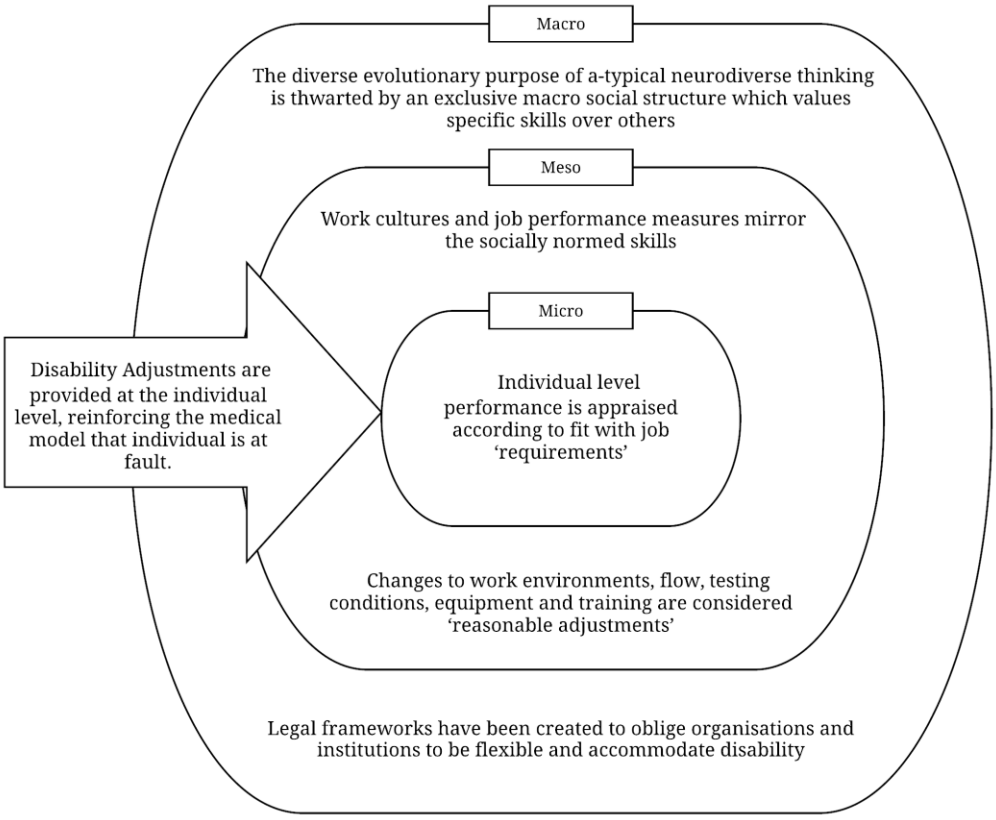
The complexity of overlapping research fields, heterogeneity in interventions and need for pragmatic advice for policy makers and practitioners would, at face value, insinuate the need for a social policy research framework and a positivist determination of impact magnitude. Disability and employment statistics are very clear: all people with disabilities are less likely to be gainfully employed, less likely to fulfil their potential and more likely to be discriminated against (Mcdaid, Knapp, Medeiros, & MHEEN Group, 2007) and I have shown that neurodiverse people, specifically dyslexics, are not immune to this. Yet, given the current lack of sound theoretical underpinnings for existing practice, I find macro policy evaluation to be premature and the individual, psychological experience of stakeholders a preferable starting point. Nevertheless, the social and organisational levels of analysis are critical here in understanding the antecedents of individual psychological experience (Blackman, Moscardo, & Gray, 2016; Nielsen & Randall, 2013) and Realist Evaluation (Pawson, 2006, 2013; Pawson & Tilley, 1997) was chosen as a methodology within the comprehensive epistemology of Critical Realism (Houston, 2014) to incorporate the multiple levels and mixed methods required.

Interdependent levels of analysis. Employment is essentially a social interaction and accommodations cannot operate in a vacuum. "*Employment is a fundamental component of quality of life, the main source of income for most people, commonly a major influence on someone's social network, and a defining feature of social status*" (Mcdaid et al., 2007, p. 1). Social Identity Theory (Tajfel & Turner, 1979) suggests that we define a large part of our sense of self by the groups we belong to; for example, our family role, our employment status or indeed our neurodiverse condition. The social relationships we form within society at large drive behaviour and self-perception (Reis, Collins, & Berscheid, 2000). The overwhelming use of the medical, problem-focused model to diagnose conditions results in people feeling defined by their weaknesses and not playing to their strengths in education and employment (Painter & Welles, 2008). Dyslexia, often labelled during childhood, can determine someone's sense of self from a very early age and define their goals and their career success (Holliday et al., 1999; Price, Gerber, & Mulligan, 2003; Richardson & Wydell, 2003). The purpose of a disability accommodation within a social model of hidden disability must be to facilitate occupational success for individuals such that they have a voice; i.e. we need to increase the dyslexic's capacity for career agency through occupational accommodations, which serves to improve perceptions of the social currency of their strengths (Erbentraut, 2015; Philipson, 2014; Wollaston, 2016). Most adjustments are

delivered at the individual level rather than the organisational level (ACAS, 2016; Melvill et al., 2015; TUC, 2011); this is somewhat paradoxical in that the need for occupational accommodations itself is created by the socially-constructed occupational environment, rather than individual actions (Beauregard, Basile, & Thompson, 2018). Yet pragmatically, this must be my starting point since I acknowledge that changes to the macro social structure are beyond the capability of one thesis and, while we wait for more systemically inclusive environments to emerge, there remain a significant number of people at risk of occupational exclusion due to dyslexia. We have a vehicle for change through legislative frameworks, including 'Access to Work', (Melvill et al., 2015) which can be co-opted as a lever for micro / meso-level change within the exclusive macro system, though it does not currently challenge the status quo. Figure 1.2 shows the macro- and meso- contextual factors influencing the perceptions of performance for neurodiverse individuals at work.

Figure 1.2

Macro and meso context for considering the work performance of neurodiverse individuals



Critical Realism facilitates our understanding of macro forces and relationships, a questioning appraisal of agency and structure (Denyer et al., 2008; Johnson, Buehring, Cassell, & Symon, 2006; Ozbilgin et al., 2011; Pawson, 2006, 2013; Triana, 2008). I have accordingly approached this research by recording contextual influences, and questioning the ontological nature of hidden disability. Realist enquiry, though arguably distinct from Critical Realism (Bhaskar, 1978) highlights the importance of understanding the practical relevance of interventions, synthesising mechanisms and evaluating outcomes (Denyer & Tranfield, 2009; Denyer et al., 2008) and this guides my empirical work. I caution that evaluation of what 'works' is entirely dependent on the current frame of what success 'looks like', and is therefore subject to change over time as our work patterns develop, true to the concept of 'Morphogenesis' or the permanent state of self-transformation (Archer, 1995) present in wider systems. The Pragmatic Paradigm is defined as *"a celebration of pluralism that offers a multiplicity of enticing options for researchers seeking more dynamic and processual ways of engaging with their research contexts and questions"* (Simpson 2018, p. 55). The Pragmatic Paradigm permits the blending of a Critical Realist epistemology and Realist Evaluation methodology (Pawson & Tilley, 1997), to iteratively employ inductive, hypothetico-deductive and abductive reasoning (Gioia, Corley, & Hamilton, 2013; Ralph, Birks, & Chapman, 2015; Van Maanen, Sørensen, & Mitchell, 2007) and draw conclusions of academic and practical relevance.

Chapter Summary

In this chapter I have contrasted aspects of the social, legal, historical, empirical and occupational context of neurodiversity in adult populations to provide an analysis of the wider research context in which this thesis sits. I have shown that that relevant research is limited and more specifically, I have highlighted a blind spot within psychological research. Dyslexia accommodation interventions are reported at the policy, system level to be prevalent in practice (Gifford, 2011; Melvill et al., 2015) but remain unsubstantiated by empirical evidence (Gerber et al., 2012; Rice & Brooks, 2004); moreover they are devoid of theoretical conceptualisation or psychological explanation (Siegel & Smythe, 2006). My contribution to the advancement of psychology within this thesis is to begin expanding our knowledge of dyslexia in adults. Specifically, I consider how a coaching programme might be employed as an accommodation intended to increase occupational inclusion, which I define as appropriate levels of sustainable employment and career advancement relative to the prevalence of the condition within the general population.

Research question. Using the Realist 'CIMO' framework, I propose the following three clause question to frame my thesis:

Given a legislative context in which the dyslexic adult is considered disabled, and a social context which confers increased vulnerability to occupational and social exclusion, (1) what types of intervention exist to mediate such risk, (2) on which psychological mechanisms do they aim to operate, (3) and to what extent do interventions achieve a successful outcome?

I aim to contribute to a foundation for the development of academic psychological knowledge (Blackman et al., 2016; Passmore & Fillery-Travis, 2011) regarding disability adjustments for adult dyslexics and provide guidance for applied practitioners.

Chapter Two

Operational definitions

In this chapter I review the ontological nature of dyslexia, specifically referencing the competing normative and constructivist narratives described in chapter one. I conclude my review with a working conceptualisation of dyslexia in adults that can be taken forward in my research protocol. I will also begin to explore general pedagogical principles within coaching psychology that contribute to the ontological and epistemological premise of the thesis. Working definitions of coaching for use in the later empirical chapters will be iteratively, inductively reviewed in response to observed quantitative, narrative and qualitative data presented in chapters three and four.

Dyslexia

Dyslexia is not managed by health professionals and receives no state funding post-education in the UK other than the small investment made via 'Access to Work' recommendations (typically £727 per person, Melvill et al. 2015). Dyslexia is associated with an increased vulnerability to criminal activity (Fazel et al., 2008; Snowling, 2010); higher unemployment (Jensen et al., 2000); failure to achieve potential post-education (Holliday et al., 1999); and impaired workplace participation (defined by de Beer et al., 2014, p. 4, as "work content, work circumstances, terms of employment and relationships at work"; World Health Organization [WHO], 2001). To illustrate: only 1% of corporate managers are dyslexic (Logan, 2009) compared with a population norm of 10% (IDA, 2002; Snowling, 2010), demonstrating an unequal pattern in career achievement. Lack of socially-valued success leads to low socio-cognitive beliefs about one's own abilities, which in turn can affect the general well-being of adult dyslexics (Nalavany, Logan, & Carawan, 2017; Nalavany & Carawan, 2013; Tanner, 2009). Indeed, some preliminary research published in conference proceedings has correlated adult dyslexia with increased insomnia and decreased general health scores compared to the general population (Doyle & Cleaver, 2015). The critical nature of disability accommodations for social inclusion and equality (Kim, Sally, & Joseph, 2002; Price et al., 2003; von Schrader, Malzer, & Bruyère, 2014) creates a moral imperative to ensure adjustments are well-researched, yet thorough enquiry has not yet materialised for dyslexic adults (Gerber et al., 2012; Siegel & Smythe, 2006). In narrowing the population context of this thesis from neurodiversity and disability inclusion in general to dyslexia in particular, I initially undertook a broad pilot literature search of the EBSCO-hosted databases in July 2014 (published in Doyle & McDowall 2015) with the objective to

identify how many publications there are specifically for adult dyslexia populations, as well as to identify any transferable knowledge from child-based studies to adult populations. The search produced the returns shown in table 2.1.

Table 2.1

Pilot search returns (Doyle & McDowall, 2015)

Step 1 Dyslexi* or reading disabilit* or learning disabilit*	**Step 2** Adult or Adults or 19+ added to search parameters	**Step 3** Excl. HE, child, student or education	**Step 4** Interven*; improv*; remedial; remediation; support; treatment; achievement; success	**Step 5** Additional terms: Employment; career; work; occupation
11,117 (9,600 research papers)	2010 (1,814 research papers)	802	463 (377 research papers)	41 (22 research papers)

Of the final 41 papers that directly related to the adult occupational experience, a variety of disciplines were represented (as judged by the journal / publication type; see table 2.2), none of which were psychology-based. The 41 studies were mainly cross-sectional, qualitative studies or practice reports presenting experience related to the specific difficulties faced by dyslexic adults, with one notable exception that considered dyslexic strengths in entrepreneurship (Logan, 2009).

Table 2.2

Pilot search journal type for adult dyslexia papers

Journal Type	*N* papers
Education / Dyslexia	18
Human Resources	9
Occupational Health	6
Management	4
Other (e.g. Social Work)	4

The difference in volume when age limiters were applied to the initial search revealed a publication bias towards childhood samples. As stated in chapter one, the lack of scientific attention to the post-education experience of up to 10% of the population (IDA, 2002; Snowling, 2010) impedes the ability of practitioners to provide effective learning

interventions and restricts the occupational success of our dyslexic colleagues, thus contributing to social exclusion from the workforce (Jensen et al., 2000). This bias is reflected in, or potentially created by, conventional definitions. The British Psychological Society (BPS, 2005) defines dyslexia as follows:

"Dyslexia is evident when accurate and fluent word reading and/or spelling develops very incompletely or with great difficulty. This focuses on literacy learning at the 'word level' and implies that the problem is severe and persistent despite appropriate learning opportunities. It provides the basis for a staged process of assessment through teaching".

Such a definition is entirely education- and deficit-based, with neither an indication of adulthood symptomatology, nor clarification of any the causal neurological or psychological mechanisms of the symptom. Yet dyslexia is widely considered a life-long condition (Davis & Deponio, 2013; de Beer et al., 2014) and is argued by researchers and practitioners to persist even when literacy difficulties have been 'compensated' through special education (McLoughlin & Leather, 2013; Shaywitz, 1996, 1998; Tanner, 2009), indicating an underlying psychological experience not limited to literacy. There is a need to update our definition of dyslexia per se, as well as our specific understanding of occupational dyslexic difficulty, which I will provide in this chapter, following my analysis.

The micro, neurocognitive contextualisation of dyslexia. A sample of 100 of the pilot search papers in Table 2.1 was checked for journal type, to assess the paradigm of scientific enquiry in operation for the child-based studies. Titles that included the terms 'neuro' and 'brain' were judged to be neuroscience-based and this comprised 61 papers, suggesting that a majority of research is concerned with neurological presentation of dyslexia, specifically of that of children. However, despite such widespread investigation over several decades, neurocognitive research has produced conflicting accounts of aetiology.

From a cognitive perspective, dyslexia was historically thought to be a visual processing disorder ("word blindness"; Orton, 1937) and this persisted into the 1970s as the dominant theory. Phonological deficit theory emerged later, positing that dyslexic people are less able than peers to phonologically discriminate between (segment) phonemes, and is currently predominant in developmental and educational research (Bishop, Snowling & Blakemore, 2007; Leather et al., 2011; Shaywitz, 1998; Vellutino, Fletcher, Snowling & Scanlon, 2004). However, rapid-naming (visual recognition of words at speed; an

augmentation of 'word blindness'), which was originally proposed by Denckla and Rudel (1976) and augmented by magnocellar deficit theory (Galaburda & Livingstone, 1993) is still routinely tested in diagnosis (McLoughlin & Doyle, 2013). Therefore in practice, the double-deficit hypothesis (Wolf & Bowers, 1999 – meaning both difficulties in rapid naming and the accurate decoding of sounds) is still used to define and determine individual cases. Further to phonological deficit theory, modern neuropsychological researchers have highlighted the phonological short-term component of working memory (defined as a capacity to hold verbal, visual and spatial information over a short term and manipulate it; Baddeley, 2000) as a primary neural mechanism causing phonological processing difficulties, which in turn then results in delayed literacy acquisition (Jeffries & Everatt, 2004; Smith-Spark et al., 2003; Swanson & Siegel, 2001; Torgesen, 2001). Other lines of research include exploring different long-term memory-based hypotheses, such as the cerebellar deficit theory, which implicates a lack of automatisation and issues with balance/motor control (Nicolson, Fawcett & Dean, 2001).

A study comparing the neural images of Chinese-speaking dyslexics to English speaking dyslexics (Siok et al. 2009) found them to be distinctly divergent between cultures, indicating that dyslexia occurs when the structure of the language one speaks is incompatible with individual strengths and weaknesses in the neural structure, i.e. dyslexia occurs in response to language style (e.g. orthographic or phonological) rather than a congenital neurological deficit that applies to all affected humans consistently. Indeed, some researchers remain unconvinced that there are any specific neurocognitive elements that are sufficiently distinct to differentiate dyslexia from general poor reading skills (Davis & Deponio, 2013; Elliot & Grigorenko, 2014).

Dyslexia symptoms appear to be without clear, reductive, cognitive or neuropsychological cause; presentation of literacy difficulties in childhood is not always continued into adulthood where, instead, difficulties may involve memory itself or other skills related to working memory such as time management (Doyle & McDowall, 2015; Mantyla & Carelli, 2006). Furthermore, studies aimed at discerning the quintessential nature of dyslexia are conceptually problematic, given that literacy acquisition is a complex process based on (1) a variety of micro neurophysiological structures, (2) meso-level teaching techniques interacting with (3) a sensory mode of processing language specific to the language itself, and (4) the values of our macro culture. It is possible that we are unlikely to ever find a single unifying theory (Bishop, Snowling, & Blakemore, 2007), and that all the evidence collected thus far is potentially relevant at the individual level, since there are many

paths by which an individual can develop the symptom of 'dyslexia', arguably as numerous as the different neurocognitive processes required for processing the written word. Each such individual neurocognitive pathway involved in reading or spelling (phonological processing, rapid naming, memory etc.) also undertakes the duties for which it initially evolved, such as retaining a sequence of auditory stimulus or concentrating, and thus the dyslexic's difficulties are highly unlikely to be limited to literacy. This critique has been developed within the educational psychology literature and is termed 'neuroconstructivism', rejecting the modular task specificity of neuroanatomical structures and arguing for a more nuanced, interlinked relationship between development of the brain and emergent educational performance (D'Souza & Karmiloff-Smith, 2017; Karmiloff-Smith, 2009; Trautmann, 2014). A search for a consistent occupational experience of dyslexia, and resulting best practice intervention protocol, may be fruitless. Instead, it may be more practically meaningful to develop an understanding of a set of flexible best practice principles, with narrative understanding of the range of interventions required.

Meso-level education/occupational symptomatology. The adult dyslexic reports a higher incidence of memory difficulties than literacy difficulties (92% and 67% of dyslexic employees, respectively; Doyle & McDowall, 2015) and the underlying, potentially causal, neural processes detailed above are unaddressed in correctional educational interventions which prioritise the symptom of literacy acquisition (Rice & Brooks, 2004; Rose, 2009), without considering the myriad of other symptoms that a memory or phonological deficit might initiate. Though the effectiveness of interventions has been better researched in education, these interventions are unquestioning of the medicalised status quo, and are also generally limited to educational remediation of delayed literacy acquisition only (e.g., Mortimer and Crozier, 2006), essay writing and study skills (Rose, 2009). They are therefore deeply unhelpful in discerning psychological mechanisms that may be influential for adults in a workplace context.

The small number of papers applying a non-medical research lens to adult dyslexia have, so far, been limited to extrapolating stakeholder experience rather than experimental work. For example, the work of Blace Nalavany and colleagues (Nalavany et al., 2017; Nalavany & Carawan, 2013) explores the emotional impact of dyslexia and how lowered self-esteem and self-efficacy correlate to lowered acquisition of support both from family and employer sources. Paul Gerber and colleagues' qualitative work (Gerber, 2012; Gerber, Price, Mulligan, & Shessel, 2004; Gerber et al., 2005; Price et al., 2003) outlines the experience of dyslexic adults in the macro legal context of 'disability', and the impact of

self-perception of career potential, accessing support and disclosure. Two papers regarding successful dyslexic adults (Leather et al., 2011; Logan, 2009) indicate the importance of self-efficacy highlighting the potential intervening role of autogenic development of personal 'strategies'. Neither study explored the possibility that such strategies could be developed into a testable intervention protocol. De Beer et al.'s systematic review of the factors affecting work participation (de Beer et al., 2014) disseminated a range of individual level cognitive, behavioural, emotional and also social issues that are relevant to occupational inclusion for dyslexic people. It is noteworthy that even these de-medicalised papers address mainly the individual level of experience, albeit within a social context, as opposed to, say, either a meso-organisational level approach to dyslexia inclusion (for example, such as those used to treat occupational stress at work) or a proposal of a macro systemic departure from literacy reliance as a measure of success.

A macro, evolutionary psychology critique of dyslexia. Despite persistent inconsistencies within the extant literature so far regarding a neuropsychological basis for dyslexia and the neurodiversity critique explored in chapter one, the extant literature remains dominated by medico-educational normative models. Yet education is subjective, and the "knowledge content of education is whatever forms of knowledge a society thinks is worth upholding and transmitting to the next generation" (Sehgal Cuthbert 2015, p. 51). Research looking for aetiological deficits and dyslexia specific difficulties serves to reinforce a rarely questioned assumption that all humans must possess an innate capacity for the written word, and that to fail in this is a medical disability similar to visual impairment or the loss of a limb. Literacy is a modern phenomenon and, unlike spoken language, is relatively new in evolutionary terms. Given the worldwide reported dyslexia prevalence of around 10% (IDA, 2002; Snowling, 2010), a critical view counters that it must be within the normal range of human experience, and that the 'disability' has arisen due to an exclusive social structure in which literacy is the sole route to educational success (Armstrong, 2010; Nalavany et al., 2017; Nalavany & Carawan, 2013; Tanner, 2009). Educational disablement is then compounded in adulthood via a workplace which increasingly requires generalist skills. Indeed, our modern educational context and economy is currently predicated on literacy prowess, more so than other periods in human history. To illustrate: if we compare the modern workplace to that which existed before mainstream education, we note that two hundred years ago careers within metalwork, construction, barbery, fashion, trading, hospitality and entrepreneurship were accessible with rudimentary literacy. However, in modern times, one can approach very few careers without this specialist cognitive skill. For

example, in order to complete a Modern Apprenticeship in Hairdressing, Plumbing or Bricklaying, one must simultaneously acquire GCSE standard literacy (SFA, 2016).

A human community is typically comprised of diverse people with evolutionary advantageous individual differences and so we could anticipate differences in cognitive ability and talent just as we observe variation in personality, physical dexterity or strength; a balance of specialists and generalists rather than homogenous thinking styles (Armstrong, 2010; Shelley-Tremblay & Rosen, 1996). Individual differences psychology provides precedent for this assertion, occupational psychology itself was founded on the application of individual differences in the workplace (Baddeley, 2007; Cattell, 1943; Landy, 1997). In support of a social model of disability perspective preferred by neurodiversity authors (Armstrong, 2010; Jurecic, 2007; Mcgee, 2012) dyslexia may confer reduced literacy skills but bestows the presence of other skills (see table 1.2, for example visual reasoning: Von Károlyi, Winner, Gray, & Sherman, 2003). Using this macro, historical perspective, I concur that the changes to our occupational norms through education and post-industrialisation may represent the *creation* of a disability rather than the conventional view that dyslexia was *discovered* in 1884 by Rudolf Berlin (Berlin, 1884). It is through this evolutionary critique that the neurodiversity movement refutes the idea of disability in favour of difference, this can be applied to dyslexia specifically (Nalavany & Carawan, 2013; Riddick, 2001).

However, the present thesis is seeking to understand the psychological, interactional basis of how and why accommodation interventions might "work" (Pawson, 2006) for an adult dyslexic population, and so inherently assumes that something is 'not working'. To resolve this conflict, my emergent conceptual framework will include socially relevant mechanisms and multiple levels of operation, in line with the macro social dynamics relevant to the proposed ontology of the condition (Beauregard et al., 2018), as shown in figure 1.2, in order to position the element that is 'not working' at the interaction between micro, meso and macro, rather than at the individual level.

A definition of dyslexia. I now clarify my working definition of dyslexia, within the context of broad, biopsychosocial influences. Bearing in mind the caveats I have outlined concerning about the validity of current aetiological and ontological research, the following statement should be viewed as a summary of how dyslexia currently operates within a complex, adaptive modern world, as opposed to a summative, biological definition that will not change in response to developments in our education, technology and industry.

Dyslexia represents a 'spiky' neurocognitive profile, where differerences between strengths and weaknesses are more extreme than the average person. Dyslexic difficulties typically include poor verbal working memory, determined using both within and between person comparisons of ability according to standardised psychometric testing. Neurocognitive difficulties often lead to delayed acquisition of literacy in childhood, and more amorphous performance impediments in the workplace such as time management and organisational skills. Verbal and visual abilities are known to be either unaffected, or indeed represent strengths. The juxtaposition of strengths and weaknesses is currently poorly accommodated in modern education and workplaces which are predicated on a more evenly-balanced presentation of ability.

Legislative obligations under the Equality Act in the UK, and the macro, meso and micro model presented in figure 1.2, imply that accommodations for dyslexia act as mediators of 'person-environment fit', meaning the degree to which the individual performs given their personal characteristics and enviromental context and requirements (Lewin, 1936).

Coaching

Defining coaching. Coaching has been defined as "a Socratic-based, future-focused dialogue between a facilitator (coach) and a participant (coachee/client) where the facilitator uses open questions, active listening, summaries and reflections which are aimed at stimulating the self awareness and personal responsibility of the participant" (Passmore & Fillery-Travis 2011, p. 74). Applications of coaching are broad, incorporating interventions within business (Blackman et al., 2016), sports performance (Turnnidge & Côté, 2018) and management of personal health (Boehmer et al., 2016). I have chosen to base my working definitions and literature sources upon coaching in the workplace, in order to simplify the research process and because workplace coaching is the closest contextual match, however there may be overlap into personal health issues due to the medicalisation of dyslexia outlined above. Workplace coaching "attends to the triadic nature of this developmental intervention (coach, coachee, organisation) and reflects the outcomes of coaching in an organisational context" (Bozer & Jones 2018, p. 2). Workplace coaching thus incorporates the initial development of both coachee and organisationally-defined goals and provides guidance on the ethical considerations of placing responsibility for improvement on both coachee and organisationally supportive Human Resource Development (Diochon & Nizet, 2015; Law, 2010; Welman & Bachkirova, 2010).

Power dynamics in coaching. Through the traditional paradigms of research and legislation presented thus far appears a consistent message that we need to "help" neurodiverse people, and that the impact of either their biology or social norms has left the majority "helpless", though I have challenged the usefulness of this status quo. Coaching as a 'helping profession' is clearly articulated within the workplace coaching psychology literature (O'Broin & Palmer, 2010) and further, the notion of the helpless client is specifically addressed. Coaching is described as a counteractive activity to empower and facilitate the self-efficacy of coachees (Baron, Morin, & Morin, 2011; Moen & Allgood, 2009) rather than create dependence or further need for expertise. Workplace coaching psychology thus has the potential to address the power dynamic between 'helped' and 'helper' (Welman & Bachkirova, 2010) and operate distinctively to other helping professions such as counselling (O'Broin & Palmer, 2010). This is consistent with the proposed multi-level framework for neurodiversity accommodation (figure 1.2) and provides a vehicle that can simultaneously help and challenge the disempowerment posed by disablement. Workplace coaching is reported to be orientated towards positive outcomes, the facilitation of contextualised success and engagement of strengths, as opposed to addressing

weaknesses (Grant et al., 2010; Palmer & McDowall, 2010), which serves to reinforce the use of coaching as an alternative to a 'remedial education' style intervention, or a punitive (and therefore potentially discriminatory) human resources style approach to performance management. Based on these relational as opposed to authoritarian attributes (Jones et al., 2016; Law, 2010; Palmer & McDowall, 2010), coaching can be considered a viable disability accommodation activity.

Disability coaching. To further establish the feasibility of coaching, I note precedent in the wider disability literature for coaching interventions as a mediator of improved work performance for people with both physical and mental health issues (Spencer, 2008). Coaching style interventions have previously been used to address occupational difficulties resulting from a variety of disabling conditions, including: chronic illness (McGonagle, Beatty, & Joffe, 2014); neurological trauma (Donker-Cools et al., 2015; Tyerman, 2012); autism (Katz et al., 2015; Lawer et al., 2009); ADHD (Deal et al., 2015; Quinn, 2005); mental health needs (Corbière et al. 2014; Fabian et al. 1993); stress (Hahn, Binnewies, Sonnentag, & Mojza, 2011; Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010) and dyslexia itself (Doyle & Mcdowall, 2015). Jones et al., (2016) performed a meta-analysis of seventeen coaching studies and found that coaching operated through cognitive and behavioural domain mechanisms, as well as improving the regulation of emotion in the workplace. Theeboom et al., (2014) also performed a meta-analysis (k=18) and demonstrated medium to large effect sizes for a range of outcomes including again cognitive and behavioural domains, also well-being, coping, attitudes and self-regulation. These examples span Europe, Canada and the USA and indicate a broad acceptance in developed nations that coaching is a viable, effective intervention, accommodating a wide range of health and disabling conditions to improve performance, able to act via a variety of intermediate psychological mechanisms.

A maturing research base. Workplace coaching psychology knowledge has developed significantly since the year 2000, addressing the need for: (1) cataloguing activities (Bono, Purvanova, Towler, & Peterson, 2009) and providing definitions (Passmore & Fillery-Travis, 2011); (2) theoretical framing such as the Coaching Alliance (Baron & Morin, 2009) hypothetical improvement pathways (Franklin, 2009); (3) experimental work (Mcdowall, Freeman, & Marshall, 2014; Moen & Allgood, 2009; Mühlberger & Traut-Mattausch, 2015) and now moving on to; (4) systematic reviews of outcomes and the predicates of effectiveness (Blackman et al., 2016; Bozer & Jones, 2018; Theeboom et al., 2014). Systematic reviews are reported to be a hallmark of evidence-based practice in

management (Briner, Denyer, & Rousseau, 2009) and, as such, the coaching psychology literature provides a more mature research base upon which to draw. Using the above four steps as a guide relevant to the development of analogous psychological knowledge (Blackman et al., 2016; Passmore & Fillery-Travis, 2011), the present thesis hopes to build on coaching psychology research to extrapolate principles and undertake some preliminary work in cataloguing, defining, developing theory and evaluating interventions.

Particularly relevant to the present thesis is the reported prominence of the 'Coaching Alliance' as the active ingredient most likely to influence positive outcomes (Baron & Morin, 2009; Gessnitzer & Kauffeld, 2015; O'Broin & Palmer, 2007). Coaching Alliance theory prioritises an interpersonal exchange between two professionals, as opposed to a power dynamic of expert versus novice; it presupposes that both parties are agent and active in the relationship, not passive recipients of units of knowledge, and that this joint working leading to coaching effectiveness (de Haan & Duckworth, 2012; O'Broin & Palmer, 2010). Coaching Alliance literature suggests coaching as a forum for the negotiation (rather than telling) of which tasks constitute the socially constructed work performance criteria. The coaching psychology literature warns of the potential to falsely attribute performance outcomes to the individual level rather than to accommodate organisational responsibility (Kemp, 2008) and an active Coaching Alliance can help frame and reframe coachee-led self-appraisal. Such pedagogical premises are divergent from didactic teaching and reductive skill development as is more common in education interventions, and are more aligned to the operational definition of dyslexia above.

Coaching for dyslexia. From an applied practice perspective, there is no specific training, supervision or quality control for coaches of dyslexic adults facilitated within the current system of 'Access to Work' provision in the UK (Doyle et al., 2016). The only specific dyslexia training available is aimed at literacy instruction tutors (BDA, 2018). This leaves coachees in a vulnerable position; they are not necessarily able to discern best practice and, should they receive a poor service, they may simply consider that *they* have failed to improve rather than the coaching failing to deliver. Coaching, without clear dependent outcomes, evaluation and quality benchmarking, creates an ethical dilemma for practitioner psychologists. Knowing who to recommend, how many coaching sessions and what should be contained within the programme, are features currently based solely on anecdotal experience, nepotistic relationships and industry knowledge. It is hard to objectively advise and impossible to predict reliable outcomes given the scant information that is currently available regarding coaching as an accommodation activity for dyslexia.

Chapter Summary

In this chapter I have explained the lack of reliable and ecologically valid research on the nature of adult dyslexia specifically and how this poses problems for psychological enquiry, from which I base my assertion of the need for preliminary conceptual and evaluative work. Despite the ontological opacity of the condition, I conclude that the design of effective solutions is urgent in order to address priorities of discrimination and social / occupational exclusion. I have highlighted the need for solutions to be socially contextualised and I propose that moral and legal organisational-level obligations to adjust do not negate the practical need for activities targeted at individual level. In other words, the very real problems experienced by individuals deserve well-researched interventions from the scientific discipline of psychology, to mitigate the risk of practitioners applying unsubstantiated advice to a vulnerable population that cannot easily self-advocate against a dominant status quo.

Coaching is delivered at the individual level and it may be able to operationalise the mediation of person-environment fit between the individual and organisation (meso-level). Workplace coaching psychology provides an appropriate lens for developing potential intervention protocols, congruent to the ontological, operational definition of dyslexia and the epistemological position outlined thus far. Coaching psychology overlaps with occupational psychology, enabling me to retain scientific alignment and potentially find portable principles to apply. A more detailed, context-specific definition of coaching will be developed inductively through this thesis, as an emergent property of the preliminary conceptual work in subsequent chapters. I iteratively align the dialectic pedagogy of workplace coaching psychology with stakeholder descriptions of disability coaching protocols for dyslexic adults to arrive at a working definition of coaching for use in the experimental chapters. In the next chapter, I will present survey data to further illustrate the data-led rationale for selecting coaching as the accommodation intervention of choice within this thesis.

Chapter Three

Identifying and classifying adjustments for dyslexia in the workplace

This chapter aims to support the development of primary studies by exploring the variety and prevalence of workplace adjustments that are currently operational in the UK for dyslexic adults. Unfortunately, the reliance on practitioner literature for adults and dominance of education in academic literature is such that we do not even have a reasonable record of what activities are in operation as disability adjustments from which we could try to elicit the psychological mechanisms upon which positive occupational outcomes may be predicated. As such, a necessary first step in this thesis is to capture and classify the practice that I seek to investigate through a widely-distributed survey (N=271) of employed adults with dyslexia in the UK. This exercise is similar to early coaching psychology development where Bono et al.'s (2009) pump priming survey is now widely referenced in relation to defining how workplace coaching materialises in practice (Blackman et al., 2016; Bozer & Jones, 2018).

In this chapter I initially aimed to (1a) adapt a disability accommodation scale to a dyslexic population and (1b) ensure the construct validity (i.e., internal consistency and factor analysis) of the adapted scale, as a requirement of due diligence before drawing conclusions and also to contribute a resource for further dyslexia studies (Passmore & Fillery-Travis, 2011). The chapter's aim pertinent to the overall thesis is to ascertain the variety and distribution of (2a) organisational-level accommodation as well as (2b) individual-level adjustments, for a sample of dyslexic adults in the UK, and to subsequently (2c) derive perceptions of adjustment effectiveness. Ethics approval for this research was granted by City, University of London. Rather than determine a working hypothesis a priori for the survey, in this section I apply the 'methodologically dynamic' principles of Grounded Theory (Ralph et al., 2015) and inductive reasoning (Gioia et al., 2013) to catalogue the activity and qualitative experience of disability accommodation from the perspective of dyslexic stakeholders.

Practitioner knowledge. Practice and policy documents refer consistently to the use of coaching, assistive technology (for example software which converts text-to-speech and speech-to-text software) and employer adjustments (for example additional training and environmental flexibility) (Work and Pensions Committee 2018; Melvill et al. 2015; Bewley & George 2016; Doyle 2017; TUC 2011) yet it is unknown to what extent each of these distinct activities is applied. Prevalence of intervention activities and their value to

stakeholders is important in determining research priorities, since one aim of this thesis is to be immediately useful to practice. For example, if assistive technology is the most prevalent adjustment and perceived as the most helpful, this might suggest that indeed literacy is the predominant barrier to occupational success for adults and I should devote further research to adult literacy issues. Conversely, if employer adjustments are popular, this might suggest that the psychosocial adaptation to environment is more pertinent. The variety in accommodation activities and their value is also, in and of itself, a finding of interest to current practitioners wanting to make recommendations when performing workplace needs assessment (Freeborn, n.d.). I therefore determined early in the research process, that such a scoping exercise was required to check my assumptions and catalogue experience before I devoted further resource to exploring coaching.

Survey development. Given that no previously validated and work-appropriate measure exists for identifying and classifying accommodations for dyslexia specifically, the 'Work Accommodations and Natural Support Scale' (WANSS, Corbière et al., 2014), was identified as an potential scale for adaptation to the specific context of adult dyslexics. The WANSS was originally designed to explore accommodation activities for employees with mental health needs. The WANSS survey items contain 55 activities, natural supports, accommodations and flexible working practices that could potentially constitute 'reasonable adjustments' (United Kingdom Parliament, 2010) for employees with hidden disabilities, which were derived through literature review (e.g., Bond & Meyer, 1999; Fabian et al., 1993; MacDonald-Wilson et al., 2002). The original scale (Corbière et al., 2014) is rated by the participant with a categorical yes/no indication to elicit the presence of each potential adjustment, as well as a yes/no indication of whether this adjustment is useful to the individual; a suitable simple structure for the purpose of cataloguing activity. WANSS items have, through Confirmatory Factor Analysis, been grouped into a taxonomy of six accommodation categories: (1) Support from different stakeholders; (2) Presence of a job-coach in the work environment; (3) Supervisor and co-worker supports; (4) Training; (5) Schedule flexibility and; (6) Support from the work environment. In this introductory section, I first clarify the justification for using the WANSS as a starting point and the adaptations that I made by reiterating and clarifying the overlap in symptomatology alluded to in chapter one. The aims of the survey collection are then clearly stated before I proceed to outline the method of adaption and collection.

The applicability of the WANSS to dyslexia research. Analogous to some mental health conditions, dyslexia is referred to as a hidden disability and infrequently disclosed in

employment (Corbière, Villotti, Toth, & Waghorn, 2014; Gerber, Price, Mulligan, & Shessel, 2004; Madaus, Foley, McGuire, & Ruban, 2002; Madaus, 2008; von Schrader, Malzer, & Bruyère, 2014) for fear of stigmatisation (Riddick, 2001). Dyslexia is known to impact on self-efficacy (meaning belief in one's own ability; Bandura, 1986; Holliday, Koller, & Thomas, 1999) social communication (de Beer et al., 2014) and confidence (Leather et al., 2011), as are mental health needs (Andersson, Moore, Hensing, Krantz, & Staland-Nyman, 2014; Capone, 2016; Fu, Koutstaal, Fu, Poon, & Cleare, 2005). Additionally, similar cognitive difficulties in memory, concentration and time management are observed in both populations (Solé et al., 2011; Varvara et al., 2014). Thus, any adjustments are more likely to overlap with those for people with mental health needs than with, for example, for physical injury causing reduced mobility. A person-focused approach, centred on dedicated and facilitative support for individuals through one-to-one or group activities is being pursued in parallel across mental health and dyslexia research and practice (Doyle & McDowall, 2015; Sapani, 2015). Researchers in mental health have explored job mentoring as an accommodation for clients with mental health needs (Corbière et al., 2014); dyslexia practitioners espouse a similar approach of job coaching (Bartlett et al., 2010; McLoughlin & Leather, 2013). The volume of studies pertaining to mental health is far larger and therefore the existing scale is based on more developed primary conceptual and evaluative work. The WANSS mainly refers to informal, naturally- occurring organisational means of support because mental health field researchers suggest good outcomes are not contingent on disclosure of disability and may simply represent a 'good fit' between employee and a supportive environment (Dalgin & Gilbride, 2003; MacDonald-Wilson et al., 2011).

The inclusion of what the WANSS terms 'naturally occurring' organisational accommodation is vital to the present thesis as it is congruent to the multiple layered Critical Realist approach. From a research perspective, the survey elicits features of the wider organisational context, in order to capture some of the complexity and variability in the dyslexic adults' environment, which is known in coaching and well-being occupational psychology to affect the success of any intervention (Blackman et al., 2016; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Nielsen & Randall, 2013). Secondly, these factors, once objectively documented and valued by stakeholders, can be applied to practice, meeting the obligation for accommodation recommendations directed at the organisational level. My starting point for the present study was therefore the previously validated WANSS, seeking to adopt principles from a mature field rather than assume that there is no transferable knowledge (Briner & Rousseau, 2011).

Formal and informal adjustments. Dyslexia practitioner literature describes the use of individual level adjustments more frequently than organisational support. Specifically, assistive technology (McLoughlin & Leather, 2013; Work and Pensions Committee, 2018) and the use of coaching to target specific skills such as time management (Doyle & Mcdowall, 2015; McLoughlin & Leather, 2013; Bartlett et al., 2010) is reported, rather than general, affective inter-personal support as featured in the WANSS. It was therefore necessary to supplement the WANSS with some dyslexia-specific items. I expanded on the provision of coaching and added assistive technology items, both of which are formally recommended via a workplace assessment for dyslexia (Doyle, Cleaver, & Rossiter, 2016; Doyle & McDowall, 2015; TUC, 2011) and require the purchase of external consultants or products rather than being naturally present in a supportive environment. These additions constitute what I am terming 'formal adjustments' as opposed to the informal supports that form the majority of WANSS items. Formal adjustments are therefore defined as those requiring specific expertise, usually acquired through commissioning of consultants external to the organisation; informal adjustments are those that are naturally occurring within the organisation. In the following methodology section, I will describe the process of item and categories adaption as well as the preliminary reliability analysis of the measure when applied to dyslexia.

Method

Procedure

An iterative approach to adaptation was taken to ensure content validity and user relevance (Golombok et al., 2008). First, the WANSS items were reviewed by three dyslexia practitioners from a professional reference group (the Neurodiversity and Employment Working Group convened within the British Psychological Society) and collaboration between the WANSS authors and my primary supervisor. All contributors agreed high levels of applicability of the original scale to adults with dyslexia and made recommendations for adaptation. 39 items of the original scale were kept (e.g., "Are you provided with feedback from your employer and/or coworkers"?), 7 items were modified/adapted to provide clarity (e.g., "Are you able to make changes in the arrangement of your workplace, *such as the direction your chair faces to decrease distraction*?"), 9 items were removed because they were not relevant (e.g., "Are you compelled to attend social activities (such as lunches and nights out?"). Following the review of existing items, I conducted a mapping exercise between practitioner guidance of what is likely to be recommended in dyslexia assessment reports (Grant, 2009; McLoughlin & Leather, 2013; TUC, 2011) and previous research (de Beer et al., 2014; Doyle & McDowall, 2015; Draffan, James, Wilkinson, & Viney, 2013). Sixteen dyslexia-specific items were created such as, "Have you been provided with text-to-speech software"? The WANSS single coaching item is termed "the presence of a job coach", however the term frequently used in employment practice is 'Strategy Coaching' (Bewley & George, 2016; Doyle et al., 2016; McLoughlin & Leather, 2013; Bartlett et al., 2010) and includes specific topics directed by the assessor (Bartlett et al., 2010) or collaboratively agreed with consultation between coachee and supervisor (Doyle & McDowall, 2015). The items created reflected common dyslexia-specific practice such as "have you received 'strategy coaching' for memory / organisational skills / stress management / spelling"? The full list of original WANSS items is in appendix 3.1 and the current lists of both new and edited items are presented in tables 3.3/3.4 and 3.5 respectively, in the results section.

The original WANSS items, the modified items, and the newly-developed items were grouped into seven major conceptual categories, relying on the original WANSS factor structure, the only difference being the expanded Coaching Support items and the addition of Assistive Technology and Tools items. Table 3.1, below, shows both the original WANSS and the new or edited categories.

Table 3.1

Original WANSS categories and dyslexia adapted categories

WANSS for Dyslexia	**Original WANSS**
Coaching Support (8 items)	Presence of a job coach (1 item), previously part of 'different stakeholders support
Assistive Technology and Tools	No equivalent, but one item moved from the original to this category
Supervisor and coworker support	Supervisor and coworker support
Different stakeholders Support	Different stakeholders Support
Schedule flexibility	Schedule flexibility
Environment flexibility	Work environment
Training	Training

The yes/no response format for each item and its perceived helpfulness was retained, as per the original scales, once alternative options, such as an agreement scale, had been discounted as not appropriate for the actual experience of adjustments, or their absence. Individuals scored 1 for 'yes, I have this adjustment' and 2 for 'no, I do not have this adjustment'. The helpfulness question was voluntary, which I considered a necessary concession to increase completion rates in what was already a long questionnaire, particularly for this client group, though I acknowledge that this precipitated a far lower response rate for stakeholder ratings of items. The helpfulness question was left as open, qualitative data to allow for comments and feedback.

Participants and survey distribution

The 62 item-scale and a range of other measures including demographics (age, gender, whether or not people had disclosed dyslexia to their current employer, source of adjustments and tenure - see table 3.2, below) was distributed to a purposive opportunity sample through social media, in conjunction with a U.K. dyslexia charity and the social enterprise run by the researcher. The sample was predominantly female (66%) with an average age of 42 years. Just over 80% had disclosed their dyslexia to the employer at varying stages, including at initial recruitment, when the employee felt comfortable and when the employee began to have difficulties. This disclosure rate is much higher than previous studies of dyslexic adults in the UK (Cooper et al., 2018) and internationally (Gerber, Price, Mulligan, & Williams, 2005; Madaus, 2008). One plausible explanation is

that the title of the advert, which expressly stated the survey was regarding 'reasonable adjustments for dyslexia' attracted participants who already had adjustments, thus creating a sampling error limiting generalisability to dyslexic employees at large. However, I have proceeded with the analysis on the basis that the relative distribution of different adjustments activities within the pool of people receiving them is of interest to my central aim of mapping the variety of adjustments and in deriving perceptions of helpfulness; i.e. when adjustments *are* in situ, of what do they comprise and are they valued?

A total of 302 participants in total provided informed consent, though not all these individuals answered each question, therefore the number of participants in each data point fluctuates. The response rate to the presence of each item varied, with consent questions receiving 100% response rate, some questions skipped and dropping to 78% for items placed at the end; 56 individuals did not complete the survey. However, the dropouts began in earnest at the first reasonable adjustment questions, which received 253 complete responses compared to 235 for the last question, suggesting that only 18 participants dropped out because the questionnaire was too long or too onerous. The attrition after the biographical data section was possibly due to respondents' awareness of the number of reasonable adjustment questions still to come, as was indicated in two emails sent to the researcher. The additional, voluntary 'is it helpful' question, which was attached to each item predictably received a much lower response rate: the maximum number of responses for an item was 60 responses, minimum 9, mean 28.45 responses per item.

Table 3.2

Participants' characteristics and employment/disclosure status

Variable	***N* (%)**
Gender	*N* =271
Female	173 (63.8%)
Male	98 (36.2%)
Age Range	20-65 years
Average (*SD*)	42.2 (10.73)
Length of job	*N* =270
< 6 months	37 (13.7%)
6-12 months	20 (6.6%)
1-2 years	39 (14.4%)
2-3 years	34 (12.5 %)
3-4 years	26 (9.6%)
4-5 years	14 (5.2%)
=/>6 years	93 (34.4.7 %)

Variable	*N* (%)
Disclosure	*N* =270
Disclosed when joined company	104 (38.5%)
When started to have trouble	84 (31.1%)
When I felt comfortable	40 (14.8%)
I haven't told my employer	42 (15.6%)
Origin of adjustments	*N* =270
I asked my employer for changes	37 (13.7%)
I contacted Access to Work	91 (33.7%)
My employer offered support	57 (21.2%)
I haven't got any formal adjustments (naturally occurring supports only)	85 (31.5%)
How long did you wait for your formal adjustments once you had asked?	*N* =62[3]
Less than a month	12 (20.97%
1-2 months	16 (25.81%)
2-3 months	7 (11.29%)
3-4 months	6 (9.68%)
4-5 months	2 (3.23%)
5-6 months	2 (4.84%)
>6 months	15 (24.19%)
How confident do you feel that your formal adjustments will provide the support that you need to work at your best?	*N* =62
Very confident	11 (17.74%)
Somewhat confident	26 (41.94%)
Not sure	18 (29.03%)
Not confident at all	7 (11.29%)

Data analysis

SPSS v 24, Microsoft Excel 2007 and MPlus v8 were used to analyse the data. Initial screening for internal consistency was calculated for the 62 reasonable adjustment items using Guttman's split Lambda 2 coefficient, which is appropriate for categorical (yes/no) data (Osburn, 2000) indicating a reliability coefficient of λ-2=.875. Inter-item correlations were performed, which revealed lower than expected results for the original WANSS items. The average correlation for the whole table was r=.113 ; thus raising alarms about the internal consistency and reliability of the scale (Clark & Watson, 1995; Cortina, 1993). A specific item had been included near the end (the question order was not randomised in this survey), a repeat of the previous question worded differently, which only achieved a correlation of r=.69, which we would expect to be over r=.9 since it is essentially the same question: 'Can your job tasks be adapted (such as varying the tasks to keep you

[3] *The last 3 questions in Table 3.2 received significantly lower responses, potentially due to confusion as to whether formal adjustments were in place, or indeed what they were. With hindsight, these questions should have been presented at the end of the questionnaire.*

interested, decreasing excessive workloads, changing assignments)' vs 'Can your job tasks be modified (such as varying the tasks to keep you interested, decreasing excessive workloads, changing assignments)'. Additionally, the space for qualitative feedback (the 'helpfulness' sub-item) towards the end of the questionnaire was increasingly annotated with comments such as "I'm not sure about this" and "it depends", indicating that some people were confused as to the meaning of the items. While some inconsistency may be expected due to irregularity in organisational practices and management style, comments indicated inconsistent answers due to fatigue or difficulty interpreting the meaning of the item. This finding called the suitability of the WANSS for dyslexic adults into question in its present form.

However, the items at the beginning of the questionnaire had much stronger inter-item correlation (r=.260) and made more practical sense in terms of their relatedness. For example, the items related to coaching included an item asking if the participant had received coaching for memory, which was correlated with receiving coaching for time (r=.65), organisational (r=.74) and stress (r=.63); similarly the coaching items related to literacy were correlated: coaching for reading and spelling achieving r= .70. The inter-item correlations suggested a number of factors within these new items and were thus subjected to Exploratory Factory Analysis, using MPlus for tetrachoric correlations, as opposed to factorial analysis in SPSS, due to the essentially categorical nature of the data.

Each accommodation category, both original and new, then had a compound, scaled score calculated for prevalence, achieved through creating an average score from the items contained within the categories: 'yes' was coded a 1 and 'no' was coded as 2, therefore a high score indicated less prevalence. The new continuous score enabled me to observe which categories of adjustments were more or less common in practice, and, for the new items, whether or not any particular type of adjustment was correlated with disclosure. The data from the original WANSS items are presented below as only tenuous indications of distribution and were not subjected to inferential statistics, due the low inter-item correlations. The helpfulness feedback remains of interest, since comments indicated an understanding of the items. Though the computed scores from the new are both reliable and continuous (not categorical) data, they did not meet parametric assumptions and therefore were subjected to inferential statistics using non-parametric measures.

Results

In this section I firstly present the exploratory factor analysis (EFA) of new items conducted with MPlus, followed by descriptive statistics for all items, grouped into their respective, original factors. I then outline findings from regression and correlationary analysis.

An EFA with Geomin (oblique, to allow overlapping items) was conducted comparing 1-5 factor models. Model fit was analysed using the following parameters: Root Square Mean Error of Approximation (RSMEA) <.05; Comparative Fit Index (CFI) >.95 and; Tucker Lewis Index (TLI) >.95 (Hu & Bentler, 1998). A three, four and five factor model achieved good fit according to these parameters, though the five factor model was discounted as one of the factors had only one item. Both a three and four factor model were also numerically viable, however the four factor model was accepted after a construct validity review of the items, as shown in Table 3.3. The four factor model fit was sufficient (RMSEA=.027, CFI=.996, TLI=.994) with a strong Chi Square for the baseline model ($X^2(153)=4777.065$, $p<.001$). The factors were named as follows: (1) assistive technology and tools; (2) coaching for 'executive functions' (defined here as functions related to higher-order cognitive skills associated with time management, organisation, memory and stress management: Garner, 2009); (3) coaching for literacy skills and (4) workstation adaptations.

Table 3.3

Factor loadings from the Exploratory Factor Analysis with Geomin rotation, performed in MPlus

Four Factor Model					**Three Factor Model**		
1	2	3	4		1	2	3
0.749	-0.03	0.381	0.072	Have you been provided with text-to-speech software?	0.737	0.007	0.413
0.736	0.255	-0.035	0.013	Have you been provided with speech-to-text software?	0.719	0.285	-0.018
0.546	0.153	-0.045	0.02	Have you been provided with mindmapping software?	0.537	0.171	-0.028
0.543	0.044	0.328	0.023	Have you been provided with a specialist spell checker?	0.528	0.084	0.333
0.765	0.338	0.087	-0.075	Have you been provided with specialist training to use any of the above technological adjustments?	0.729	0.387	0.07
0.773	0.113	-0.111	0.142	Have you been provided with a digital voice recorder for use in meetings and interviews?	0.773	0.112	-0.029
0.157	0.037	0.073	**0.458**	Have you been provided with a dual screen or reading stand?	0.223	-0.038	0.26
0.638	-0.103	0.401	-0.046	Have you been provided with coloured overlays, coloured paper or similar to help reading?	0.611	-0.051	0.393
0.319	-0.022	-0.009	**0.49**	Are you able to change the font or size of the reading material electronically?	0.377	-0.092	0.2
0.019	-0.012	0.193	**0.63**	Have you been provided with a whiteboard, pin board, coloured post it notes or anything similar?	0.12	-0.071	0.379
-0.007	**0.88**	0.147	-0.114	Have you had specialist strategy coaching to support you with memory issues?	-0.039	0.924	0.064
0.05	**0.904**	0.069	0.011	Have you had specialist strategy coaching to support you with organisational issues?	0.027	0.959	0.008
0.034	**0.993**	-0.11	0.071	Have you had specialist strategy coaching to support you with time management issues?	0.024	1.031	-0.15
0.12	0.072	**0.892**	-0.162	Have you had specialist strategy coaching to support you with spelling difficulties?	0.08	0.171	0.767
-0.004	-0.016	**0.999**	0.088	Have you had specialist strategy coaching to support you with reading?	-0.015	0.001	1.036
-0.266	0.141	**0.700**	0.247	Have you had specialist strategy coaching to support you with writing style?	0.229	0.167	0.700
-0.04	**0.837**	0.029	0.097	Have you had specialist strategy coaching to support you with stress management?	-0.042	0.863	0.007

Four Factor Model					Three Factor Model		
0.018	**0.437**	0.22	-0.112	Are there meetings with your coach, your supervisor and yourself?	-0.014	0.490	0.141

Tables 3.4-3.6 show the percentages/number of people reporting the presence of individual items in each accommodation category, as well as the percentage/number of responses to the voluntary helpfulness question, followed by the percentages/number of people reporting the items as 'helpful'. The mean scores for each adjustment factor are also shown at the top of each section.

Table 3.4

Prevalence and perceived helpfulness, per new item 'Technology and Tools'

New Items	(A) Do you have, or have you had this adjustment? % answering Yes	N answering Yes	(B) It is helpful? Response % of those answering Yes to 'A'	% of those answering Yes to 'A'	(C) It is helpful? % of those answering Yes to helpful	n of those answering Yes to helpful
Assistive Tech&Tools average	**39.36%**	**98.29**	**43.09%**	**42.14**	**67.81%**	**28.57**
Have you been provided with text-to-speech software?	46.0%	115	52.2%	60	75.0%	45
Have you been provided with speech-to-text software?	44.8%	112	41.1%	46	47.8%	22
Have you been provided with mind-mapping software?	31.2%	78	48.7%	38	65.8%	25
Have you been provided with a specialist spell checker?	35.6%	89	31.5%	28	78.6%	22
Have you been provided with specialist training to use any of the above technological adjustments?	48.0%	120	35.0%	42	73.8%	31
Have you been provided with coloured overlays, coloured paper or similar to help reading?	35.3%	88	48.9%	43	83.7%	36
Have you been provided with a digital voice recorder for use in meetings and interviews?	34.6%	86	44.2%	38	50.0%	19
Workstation adaptation average	**43.20%**	**107.67**	**34.53%**	**33.67**	**90.80%**	**30.67**
Have you been provided with a dual screen or reading stand?	27.6%	69	40.6%	28	78.6%	22
Have you been provided with a whiteboard, pin board, coloured post it notes or anything similar?	26.9%	67	37.3%	25	100.0%	25

New Items	(A) Do you have, or have you had this adjustment? % answering Yes	N answering Yes	(B) It is helpful? Response % of those answering Yes to 'A'	% of those answering Yes to 'A'	(C) It is helpful? % of those answering Yes to helpful	n of those answering Yes to helpful
Are you able to change the font or size of the reading material electronically?	75.1%	187	25.7%	48	93.8%	45

Table 3.5

Prevalence and perceived helpfulness, per new item 'Coaching Support'

New Items	(A) Do you have, or have you had this adjustment? % answering Yes	N answering Yes	(B) It is helpful? Response % of those answering Yes to 'A'	% of those answering Yes to 'A'	(C) It is helpful? % of those answering Yes to helpful	n of those answering Yes to helpful
Executive functions coaching average	**38.68%**	**94.2**	**33.88%**	**32.6**	**85.16%**	**27.8**
Have you had specialist strategy coaching to support you with memory issues?	45.9%	111	40.5%	45	82.2%	37
Have you had specialist strategy coaching to support you with organisational issues?	43.4%	105	37.1%	39	89.7%	35
Have you had specialist strategy coaching to support you with stress management?	38.0%	95	31.6%	30	86.7%	26
Have you had specialist strategy coaching to support you with time management issues?	38.4%	93	33.3%	31	83.9%	26
Are there meetings between your coach, your manager and yourself?	27.7%	67	26.9%	18	83.3%	15
Literacy Coaching Average	**19.00%**	**46.00**	**35.60%**	**16.33**	**82.20%**	**13.33**
Have you had specialist strategy coaching to support you with spelling difficulties?	24.4%	59	35.6%	21	81.0%	17
Have you had specialist strategy coaching to support you with reading?	16.9%	41	31.7%	13	92.3%	12
Have you had specialist strategy	15.7%	38	39.5%	15	73.3%	11

New Items	(A) Do you have, or have you had this adjustment? % answering Yes	N answering Yes	(B) It is helpful? Response % of those answering Yes to 'A'	% of those answering Yes to 'A'	(C) It is helpful? % of those answering Yes to helpful	n of those answering Yes to helpful
coaching to support you with writing style?						
Average for All Formal adjustments	**32.19%**	**79.40**	**37.34%**	**29.58**	**81.93%**	**23.81**

Table 3.6

Prevalence and perceived helpfulness per original or adapted WANSS item and category

WANSS Item	(A) Do you have, or have you had this adjustment? % answering Yes	N answering Yes	(B) It is helpful? Response % of those answering Yes to 'A'	% of those answering Yes to 'A'	(C) It is helpful? % of those answering Yes to helpful	n of those answering Yes to helpful
Schedule Flexibility average	**47.17%**	**119.33**	**25.87%**	**28.67**	**79.43%**	**22.67**
Are you able to have flexible hours (e.g. permission to start or finish earlier or later)?	59.3%	150	14.7%	22	81.8%	18
Are you able to do part of your work at home ?	45.8%	116	25.9%	30	80.0%	24
Are you able to take longer or more frequent work breaks?	36.4%	92	37.0%	34	76.5%	26
Supervisor and Co Worker Support Average	**43.60%**	**104.59**	**29.90%**	**27.35**	**85.59%**	**23.65**
Are you provided with feedback from your employer and/or coworkers?	70.6%	166	20.5%	34	91.2%	31
Does your workplace encourage interactions between coworkers?	70.0%	166	21.1%	35	85.7%	30
Is your workplace naturally supportive if you need help?	62.1%	146	29.5%	43	90.7%	39
Do your coworkers or supervisor take time in order to assist / guide you?	48.6%	123	19.5%	24	70.8%	17
Can your jobs be adapted (such as varying tasks to keep you interested, decreasing excessive workloads, changing assignments)?	44.4%	110	22.7%	25	80.0%	20
Are you able to share your tasks with a co-worker?	37.9%	96	30.2%	29	96.6%	28
Do you receive rewards and/or recognition from your supervisor and/or coworkers?	40.4%	95	42.1%	40	87.5%	35
Is your job description clearly defined to you (an effort was put in to reduce role conflict and ambiguity)?	37.0%	91	28.6%	26	88.5%	23

WANSS Item	(A) Do you have, or have you had this adjustment? % answering Yes	N answering Yes	(B) It is helpful? Response % of those answering Yes to 'A'	% of those answering Yes to 'A'	(C) It is helpful? % of those answering Yes to helpful	n of those answering Yes to helpful
Does your employer change his/her expectations of your performance, for example lengthening the learning period or allowing for more errors)?	32.5%	80	40.0%	32	93.8%	30
Are you able to exchange work tasks with others?	24.1%	60	46.7%	28	92.9%	26
Are you provided with a co-worker buddy ?	16.0%	38	55.3%	21	85.7%	18
Different stakeholders Support Average	**42.93%**	**101.17**	**25.35%**	**21.33**	**81.95%**	**17.50**
Do you receive support from your family?	71.5%	168	11.9%	20	65.0%	13
Do you receive support from your friends?	66.0%	155	20.0%	31	90.3%	28
Do your coworkers/supervisor provide you with emotional support (such as offering you time to talk)?	49.4%	117	17.9%	21	81.0%	17
Do you receive support from your peers (other dyslexic people)?	28.9%	68	38.2%	26	80.8%	21
Are you provided with a mentor?	23.2%	55	16.4%	9	88.9%	8
Is there a dyslexia support professional in your workplace?	18.6%	44	47.7%	21	85.7%	18
Training Average	**32.53%**	**78.71**	**26.43%**	**19.29**	**84.14%**	**16.57**
Do you have access to written as well as verbal instructions?	55.3%	136	17.6%	24	100.0%	24
Do you have access to extra job training in order to learn new or specialist job skills?	37.7%	90	25.6%	23	73.9%	17
Was training adjusted to your learning pace?	32.6%	78	29.5%	23	100.0%	23
Were tasks introduced gradually to allow you to become accustomed to your job?	28.9%	72	22.2%	16	87.5%	14
At work, are you provided with training in communication skills?	29.3%	70	28.6%	20	80.0%	16
Are you trained in your job in the use of self-management tools (e.g. time management and task planning)?	28.0%	67	19.4%	13	53.8%	7

WANSS Item	(A) Do you have, or have you had this adjustment? % answering Yes	N answering Yes	(B) It is helpful? Response % of those answering Yes to 'A'	% of those answering Yes to 'A'	(C) It is helpful? % of those answering Yes to helpful	n of those answering Yes to helpful
Do your co-workers receive training in dyslexia awareness?	15.9%	38	42.1%	16	93.8%	15
Environmental Flexibility Average	**49.61%**	**120.43**	**12.60%**	**14.00**	**85.33%**	**12.00**
Is it possible to adapt work rules, policies or procedures to accommodate your needs (e.g. hot-desking or providing notes in advance of meetings)?	43.9%	108	13.0%	14	92.9%	13
Do you have access to the internet or your personal emails for support during your working hours?	78.2%	190	10.5%	20	85.0%	17
Do you have access to a laptop and agenda to help you organise your tasks?	65.9%	162	9.3%	15	66.7%	10
Are you able to change the noise levels (including wearing headphones)?	55.4%	134	12.7%	17	100.0%	17
Are you able to make changes in the arrangement of your workplace (e.g. the direction your chair faces to decrease distractions)?	45.5%	110	10.0%	11	100.0%	11
Do you have a private office or space enclosure to work in when required?	37.0%	87	11.5%	10	80.0%	8
Are you able to change the intensity of the lighting?	21.4%	52	21.2%	11	72.7%	8
Average for all informal adjustments	**43.17%**	**104.85**	**24.03%**	**22.13**	**83.29%**	**18.48**

Table 3.7 shows the descriptive statistics for the factors; these indicate the relative prevalence of each accommodation category, where a lower score indicates a higher volume of 'yes' indicators. These scores did not meet parametric assumptions.

Table 3.7

Average prevalence scores for the adjustment factors in order of most prevalent (top)

	N	Mean	Std. Deviation
Work Environment flexibility	234	1.4994	0.27517
Schedule Flexibility	253	1.5283	0.35226
Supervisor or Co-Worker Support	234	1.5614	0.26041
Support from Different Stakeholders	235	1.5709	0.22840
Executive Functions Coaching	242	1.6132	0.38281
Training	239	1.6742	0.24363
WorkStation adjustments	249	1.7289	0.35041
Assistive Technology and Tools	249	1.8328	0.51537
Literacy Coaching	242	1.8099	0.32797

The prevalence scores of the new, reliable factors (Assistive Technology and Tools, Work Station Adaptations, Executive Functions Coaching and Literacy Coaching) were regressed against the following dependent variables from the opening section of the survey: both 'perceived confidence of adjustment effectiveness' and 'length of wait for adjustments' using multiple regression with bootstrapping to adjust for non-parametric interval data; no significant relationships were found. No other regressions or correlations were performed due to the unreliability of the WANSS items within this sample.

Discussion

The objective of this survey was to adapt a validated scale for assessing the prevalence of workplace accommodation activities from mental health to dyslexia, using exploratory factor and internal consistency analysis to consider content and construct validity, and then to use the scale to explore the variety and distribution of adjustments for adults with dyslexia in UK workplaces, creating a taxonomy of dyslexia adjustments. Interestingly, the inter-item correlationary data provided on the original items did not indicate reliability sufficient for further, inferential analysis and thus we could not replicate the findings from the WANSS study. This may be particular to the client group because, as dyslexic people, they are more likely to find long, wordy questionnaires burdensome. The new items, devised from practitioner panel consultation and reviewing practitioner guidance on adjustments were found to be more reliable using Lambda and inter-item correlation coefficients and, when subjected to EFA using M-Plus, were found to contain four distinct factors: Assistive Technology and Tools, Work Station Adaptations, Executive Functions Coaching and Literacy Coaching. The item 'are there meetings between you, your coach and your supervisor' was loaded on the 'executive functions coaching' factor; this suggests that these meetings are more prevalent when the coaching adjustments are executive function (EF) based rather than literacy-based. One plausible explanation for this is that EF coaching presents less face validity to supervisors, whereas literacy coaching and assistive technology provide a better fit to the stereotypes of dyslexic difficulty (Colella et al., 1998). Secondly, EF coaching presents a more nuanced issue in terms of performance management. Supervisors may seek support in understanding the boundary between typical employee productivity issues such as failing to meet deadlines and dyslexic specific needs around planning and prioritising time. Figure 3.1 shows the new categories of accommodation and the adjustment items within each.

Figure 3.1

A taxonomy of formal adjustments for adults with dyslexia

Executive Functions Coaching • Memory issues • Organisational issues • Stress management • Time management Associated with supervisor engagement in coaching	**Literacy coaching** • Spelling • Reading • Writing style
Assistive Technology and Tools • text-to-speech software • speech-to-text software • mind mapping software • specialist spell checker • coloured overlays, coloured paper or similar to help reading • a digital voice recorder for use in meetings and interviews Associated with formal training in technology use	**Workstation adaptations** • dual screen or reading stand • whiteboard, pin board, coloured post it notes or similar • ability to change the font or size of the reading material electronically

Findings from introductory section, basic data

Disclosure rates and origin of adjustments. As shown in Table 3.2, the high disclosure rates indicated by our sample are very different from those indicated in previous research. Gerber et al. (2004) found that in a small sample of 49 dyslexic adults, 20% of employees in the USA had disclosed to employers; 37.5% in Canada. This low level of disclosure is similar to the 30.4% reported by Madaus et al. (2002) and 55% (2008), also with North American samples. Reasons provided by the aforementioned studies for non-disclosure included fear of job loss, embarrassment and a perceived lack of relevance of dyslexia in the workplace context. In the present sample, the most frequent response indicated disclosure upon hire of 40%, leading to an eventual 79.6% of respondents disclosing. At face value this suggests that it is possible that attitudes and support in the UK are different, or have progressed since these earlier studies. However, I exercise caution on this interpretation, since it is divergent from a similar-sized UK-based study completed in 2017 (Cooper et al., 2018) and, as stated in the introduction, may reflect a sampling error. Instead, I would recommend investigating the adjustment prevalence rates for those who are aware of 'Access to Work', versus those who are not. In this sample, the 'disclosure upon hire' prevalence is more in line with previous research (Cooper et al., 2018; Madaus, 2008).

One third of respondents stated that they had disclosed upon experiencing difficulties and reported contacting 'Access to Work', suggesting that the UK's statutory programme of support is successful in providing a vehicle to facilitate the execution of adjustments in the workplace. Indeed, contacting 'Access to Work' directly was more popular than asking for support and being offered support proactively by the employer, suggesting a reasonable level of public awareness about 'Access to Work'. One individual reported receiving 'Access to Work' support despite not disclosing to their employer at all.

Length of wait for formal adjustments. The distribution of wait times was bimodal, with some people receiving adjustments within a short period of up to 2 months (46.78%), and some waiting over 6 months (24.19%). There was no relationship between the length of wait and the type of formal adjustment.

Confidence in formal adjustments. A slim majority of 59.68% respondents indicated that they were generally confident in their formal adjustments, yet 29.03% were 'not sure' and 11.29% indicated no confidence. I note that this result is divergent from the helpfulness rating for formal adjustments provided by the item by item analysis, which shows that for the average of 29.58 people responding to the helpfulness questions, 81.93% of people found them helpful. I conclude from this that the placement of the initial confidence question may have resulted in the 'not sure' responses and, following clarity about what is meant by a formal adjustment, respondents were better equipped to answer the question.

Findings from informal adjustment responses

Informal supports for dyslexia included the original WANSS categories of: (1) environmental flexibility; (2) schedule flexibility; (3) supervisor and coworker support; (4) peer and family support; and lastly (5) adjustments to organisational training. Environmental flexibility and Supervisor/co-worker supports were the most popular adjustments, though all informal adjustments received a high helpfulness rating (minimum 79.43% for schedule flexibility). Overall, 43.17% of people reported having informal adjustments in place and, of the average 22.13 people per item answering 'does it help?', 83.29% of these reported informal adjustments to be helpful. Informal supports may present as common practice at an organisational level, but can also be selectively implemented 'per person' following recommendation for disability adjustments for organisations where they do not naturally occur.

These tentative results are convergent with Gerber's (2004) qualitative interview data, which indicated that frequent use of informal support buffers a lack of formal workplace adjustments. Additionally, data from a cross-sectional questionnaire (*N*=203) presented in BPS conference proceedings by Doyle & Cleaver (2015) suggested that perceptions of organisational support moderates the impact of dyslexia on workplace well-being. The popularity of informal adjustments indicates a need for their wide recognition and recommendation by psychologists and assessors when composing workplace needs assessment reports, in addition to the formal adjustment recommendations often provided (McLoughlin & Leather, 2013). I note however, that these findings are simply consistent with general research on organisational support, showing strong links between perceptions of organisational support (including organisational climate and organisational justice) and employee well-being and performance (Daniels, Watson, & Gedikli, 2017). As such, the conclusions drawn from a qualitative interpretation of the WANSS items are simply that (1) dyslexic employees are similar to non-dyslexic employees in finding organisationally supportive practices helpful and (2) these practices vary across organisations. Further meso-level studies are required to elucidate which organisational, informal adjustments make the most difference for which types of dyslexic employees in which type of job role.

Findings from formal disability adjustment responses

Formal adjustments for dyslexia in operation in the UK are indeed as discussed in practitioner literature and comprise (in order of distribution prevalence within this sample): assistive technology and tools; workstation adaptations; executive functions strategy coaching support; and literacy coaching support. Uptake of formal adjustments remains lower than informal support (32.19% versus 43.17% respectively), despite higher than anticipated rates of disclosure in this sample. The most frequent formal adjustment is assistive technology (43.88%) and the least frequent is coaching for literacy skills (19%). Speech to text, text to speech and mind-mapping software, had helpfulness ratings of 47.8%, 75% and 65.8% respectively, which are comparatively low considering that EF coaching support received average helpfulness ratings of 85.16%, a finding consistent with the only known (at time of writing) study directly evaluating coaching impact (Doyle & McDowall, 2015). On closer inspection of the individual data points, 42% of people receiving technology adjustments did not receive training on how to use the technology and, of those who did receive training, only 37% of those rated the training as helpful. This may have contributed to the comparatively lower helpfulness ratings of technology overall, which I note is divergent from a previous evaluation of assistive technology with dyslexic students,

where training to use the software was more consistently dispensed and the sample younger (Draffan et al., 2007, 2013). Again, this demonstrates a need for systematic evaluation of interventions to determine the cost effectiveness of reasonable adjustment investment.

Limitations

The construction of the WANSS questionnaire was observed to be unsuitable for this sample, leaving me unable to conduct inferential statistics on informal measures. Length of questionnaire and wording of items may have presented barriers for dyslexic adults. In retrospect, it may have been preferable to limit the items to no more than 40 and to have started from scratch, based on practitioner guidance, rather than adapt the tool. The adapted items certainly provided more insight and seemed more relevant to participants. However, this process allowed me to gain useful qualitative feedback and an understanding of the need to explicitly consider dyslexic needs in formulating questionnaires. I also note that the initial questions asking about timing, provision of and confidence in formal adjustments would have been easy to understand at the end, after introducing the participant to what is meant by a formal adjustment and therefore received more responses of higher quality.

The main limit of the study is the lack of predictive power regarding the effectiveness of the adjustments; cross-sectional regression analysis is limited in general and in this case failed to find any significant relationships between perceptions of confidence in the adjustments, timing of delivery and the nature of the adjustments themselves. I was unable to assess the impact of one variable against another over time, as the survey did not establish the dates of the disclosure or the implementation of adjustments in any way that enabled a longitudinal interpretation of the data. Additionally, data regarding educational level and type of employment were not collected, therefore I cannot say for certain that my sample reflects common practice in the U.K. However, the identification, classification and distribution of adjustment activities provide a mapping of practice contributing to the direction of this thesis. The context for longitudinal work is better defined and will be addressed in chapters five, six and seven.

Implications for practice

Informal adjustments. The widespread reported utility of the informal adjustments is helpful to practitioners; I am able to make recommendations that can be immediately applied to clients, with some rudimentary indication that these will be found valuable by end-users. Empowering assessors, employers and indeed dyslexic adults themselves to implement informal adjustments would contribute to systemically inclusive practice;

informal adjustments can be trialled and effectiveness judged by the supervisor / employee dyad concerned, during regular reviews. In reality, the face validity of adjustments is important (Colella et al., 1998) and whether employers understand the link between schedule flexibility, the need to move a desk to minimise noise and dyslexia is not clear. Many employers will hold completely understandable stereotypes that dyslexia affects children and literacy alone and is not relevant in call centre work, for example, or managing attention in meetings. Practitioners can use the items in the scale to raise awareness of a more inclusive work design and contribute to the prevention of performance difficulties at the meso-level, rather than retrospectively applying fixes at the micro-level once problems have arisen.

Other fields such as research into organisational stress initiatives may provide portable guidance, particularly around attitude, familiarity, access and employer initiation (Randall et al., 2005) or applying existing frameworks from occupational psychology such as the 'Job Demands / Resource Model' (Demerouti et al., 2001; Karasek, 1979), which directly employs meso-level interaction factors as the determinants of outcomes. These considerations also apply to the provision or formal technology and tools provision, as below.

Formal adjustments. The data presented here indicate that assistive technology provision, though clear in face validity as a literacy compensator, can be problematic in implementation and its effectiveness may rely on complex factors. For example, individual IT skills and attitudes, type of job, employer support/initiation, the provision of training to use new equipment, proportion of time spent on IT use, awareness of tool are all areas requiring further calibration. In order for practitioners to make useful recommendations on a day-to-day basis, these influences could currently only be considered qualitatively.

Coaching was broadly rated as helpful by survey respondents and the inclusion of the supervisor meetings item on the executive functions factor indicated where this adjustment is most useful, supporting the transfer of triadic coaching principles (Bozer & Jones, 2018; O'Broin & Palmer, 2007) from coaching psychology to dyslexia populations. This raises interesting questions as to the psychological 'active ingredients' in a coaching programme, and whether they are operant at the micro individual and/or meso-level. Based on the survey results presented here, practitioners should feel more confident in recommending coaching as a formal adjustment but exercise caution in recommending technology.

Implications for my further studies

The inclusion of this survey in my thesis was primarily as a response to the complete absence of academic studies reporting the variety and distributive prevalence of disability adjustments for dyslexia. Following the acquisition of data-led descriptions of formal adjustments provided and experienced in UK workplaces, with some general descriptive feedback as to the perceived utility of informal and formal adjustments, my future research design could have taken many directions. However, I chose to prioritise coaching, in part due to the popularity of coaching within this survey and in previous research (Doyle & McDowall, 2015). The perceived high value is a preliminary step, validating stakeholder engagement, but providing no insight as to the details of the intervention or the psychological mechanisms at work. As such, the development of this line of enquiry must incorporate an investigation of the 'active ingredients' in a coaching intervention for dyslexic adults.

Executive functions coaching. Executive functions coaching is proposed as the intervention of analysis for the remainder of this thesis. EF coaching is herein found to be distinct to literacy coaching, which will not be further explored since it is (a) less prevalent in workplace contexts and (b) already addressed in reviews of protocol effectiveness through educational reviews (Rice & Brooks, 2004; Rose, 2009). There exists supporting evidence that workplace coaching is effective at facilitating cognitive outcomes (Blackman et al., 2016; Goudreau & Knight, 2015; Theeboom et al., 2014) but these studies lack specific detail as to how this might include the different executive functions and their related behaviours. To illustrate: coaching might not act solely on individual thinking ability but also act as an extended needs assessment process, in which coach and coachee work at an individual level to devise further informal, workflow and environmental adjustments such as the use of the whiteboard to aid planning. These activities could support executive functions difficulties, and they can also be accommodated actively by an organisation to fulfil their legislative obligations (Jackson et al., 2000). The conceptual detail of EF coaching will be further developed in the next chapter, through narrative systematic review of analogous interventions.

Chapter Summary

This chapter has contributed a basic taxonomy of accommodations to the field of adult dyslexia research and finds evidence of formal and naturally-occurring adjustments being implemented in practice, delivered through interpersonal contact and communication as well as via technology and the work environment. All adjustments are broadly perceived as valuable to the individual, with technology perceived as the least helpful, possibly due to lack of adequate training. Further research is required to understand how, when and for whom different adjustments contribute to the primary aim of mitigating risk to employment, coaching is selected as the intervention for analysis in this research. I propose to research the effectiveness of EF coaching for adults with dyslexia, deepening our understanding of the potential cognitive, behavioural and emotional mechanisms at work when addressing EF-related performance issues such as time management, organisational skills, memory and stress. The next chapter comprises a narrative systematic review, using principles drawn from the Realist evaluation literature (Denyer & Tranfield, 2009) to identify active psychological and delivery pathways within a coaching protocol. Once a theoretical pathway has been extrapolated, intervention analyses based on the hypothetico-deductive paradigm can be constructed and will be detailed in chapters five, six and seven.

Chapter Four

Narrative Systematic Review

Using a Realist evaluation frame, following the mapping of occupational dyslexia adjustments, I now proceed to developing my understanding of the psychological mechanisms underpinning coaching adjustments that might effect change for dyslexic adults. Given the epistemological choice to inductively develop theoretical underpinnings before forming any a priori research hypotheses, the most appropriate technique for this systematic review is a 'Realist Synthesis' (Pawson, 2006). Unlike a Cochrane review of medical evidence (The Cochrane Collaboration, 2008), the purpose of a Realist synthesis is to develop a theoretical explanation of "how and why programmes work" (Pawson, 2006, p. 74). Rather than simply produce a summative result of intervention impact, or aggregate effect size, I build on current theory and empirical evidence to extrapolate a viable intervention protocol. In a systematic narrative synthesis, the development of the research question must be detailed and carefully planned in order to ensure that the primary study extraction of studies is sufficient in scope and targeted in sample (Denyer & Tranfield, 2009), this was achieved through expert panel consultation. Since the immaturity of the adult dyslexia research field impeded my ability to review papers regarding the target group directly, the aim of the present review protocol was to establish a Realist synthesis of context, intervention, mechanism and outcome (Denyer et al., 2008) that may permit us to identify the portable principles upon which coaching may act as a catalyst for improving. Inference to the target population is thus considered separately. The chapter will close with an inductive hypothetical pathway of intervention and mechanism features for testing within a dyslexia specific sample.

Scoping the research question

Lead by advice from Rojon, McDowall, & Saunders (2011), I began interviews in 2014 with research and practitioner expert stakeholders, known for their work with dyslexia, as a scoping exercise. Expert consultation also served to corroborate findings from the previous chapter which highlighted the use of coaching to address executive function related difficulties. I outline this process in detail before presenting the extraction protocol, synthesis approach and findings.

Expert panel consultation. I convened a virtual panel of nine nationally and internationally recognised experts in both research and practice, as well as five stakeholders.

An invitation letter explained the reasons for the study and briefed the panel participants. Table 4.1 shows the individuals who responded positively to the invitation. Those who consented to take part responded in writing to arrange a time to be interviewed. A verbal invitation to ask questions or make clarifications was extended before the interview took place. The interviews were conducted by telephone during October 2014, by means of a semi-structured discussion. I questioned (1) their understanding of relevant psychological mechanisms for adults with dyslexia; (2) potentially under-researched but urgent topics, as well as; (3) direct questions about pertinent literature. I then conducted thematic mapping of their responses.

Table 4.1

Participating contributors in the advisory panel

Academic contributors	A Professor from Sheffield University, part of the 'positive dyslexia movement'.
	A Researcher from Southampton University, in the area of Assistive Technology
	A Professor from Durham University
	A post-doctoral Researcher from the Cognition and Brain Unit at Cambridge University
Practitioner contributors	A Registered Psychologist (Clinical)
	A Registered Psychologist (Occupational)
	A Registered Psychologist (Educational)
Stakeholder groups	The CEO of the British Dyslexia Association
	A Registered Occupational Psychologist and 'Access to Work' programme leader
Dyslexic adults	Three individuals, two employed and one unemployed, aged between 22 and 39
Employers of dyslexic people	Two individuals, one owner/supervisor of a small business and one middle manager in a national corporate organisation

I asked the following questions:

1. How are people identifying and diagnosing dyslexia in the literature?
2. What definitions of dyslexia are used in practice?
3. How do you define dyslexia?
4. Is it different in adults [to children]?
5. What do we need to learn about the nature of dyslexia in adults?
6. Which outcome variables are explored in the literature?
7. What should the research be telling us?
8. What occupational issues exist for dyslexic people?

9. What key research areas should I be exploring and examining in this review?

Some questions were not relevant to all groups (e.g. those regarding the existing literature were not asked of non-researchers) and some questions resulting in a higher volume of responses than others. The interviewees' responses were recorded in note form, retaining verbatim answers where possible. Guided by advice on applying methodological rigour or to qualitative, inductive analysis (Gioia et al., 2013), the interview notes were printed and reviewed, creating a first tier analysis by grouping them together according to themes in the answers to identify patterns and commonalities. This process revealed that interviewees' answers coalesced around three main areas: (a) nature of dyslexia in adults; (b) specific issues pertaining to adult populations and; (c) the type of research they would like to see conducted. With these specific areas in mind, the interview notes were then reviewed specifically for excerpts and phrases related to a second tier analysis using to the following questions:

1. How do people define adult dyslexia?
2. What occupational issues exist for adults with dyslexia?
3. What gaps are there in our knowledge?

The reorganised responses were then subjected to a thematic content analysis, catalogued by similarity and counted, to form a weight of opinion response; raw data are shown in Appendices 4.1-4.3. The individual conversations sometimes produced more than one response to each question in some cases, and in other cases the question was not directly answered. The numbers reported for each question in the Appendices are therefore the number of responses pertaining to each question, rather than the number of individuals reporting that answer. The themes emerging under each question were created and revised iteratively, as later notes often clarified an idea which was then related back to previous notes to check if the same themes were present, albeit less obviously.

Defining Dyslexia. Dyslexia was regarded mainly as a neurocognitive condition, and 52.9% of responses indicated some sort of brain-based difference, including three responses specifically highlighting Working Memory (WM) as a definitive factor. WM is a sub-function within the broader dimension of executive functions (Garner, 2009; Hofmann, Schmeichel, & Baddeley, 2012; Miranda et al., 2013) and relates to the EF items highlighted in the taxonomy of formal adjustments (Figure 3.1). Whilst this might be due to the sample of stakeholders convened, it does suggest some divergence from institutional definitions of dyslexia, which tend to address literacy symptoms rather than neurological causes (BPS,

2005; IDA, 2002) and converges with more contemporary research (Swanson & Siegel, 2001). Only one response indicated the neurodiverse perspective of person-environment fit rather than congenital, biological disability.

Occupational Impact. Direct references to WM deficits or indicators of WM-related behaviours were present in 56.8% of responses related to occupational difficulty. WM-related behaviours were judged against a scale created by WM researchers in education (Alloway et al., 2008). Psychosocial difficulty was the second most frequent response (36.4%) and, specifically, the need for Self-Efficacy (SE) was highlighted directly in this question but also in the following question regarding knowledge gaps. This builds on the individual level definition and implies a more nuanced psychosocial interaction in adult dyslexia symptomatology consistent with the definition in chapter two. Both mechanisms will be explained further in the next section.

Gaps in Knowledge. The panel primarily stressed the need for evaluations of current interventions, specifically those focused on memory and self-efficacy. Also highlighted was a need for further research on careers, including analysis of the strengths of dyslexic thinking. Triangulating their opinion with the preliminary literature reviews reported in chapters one and two the panel supported my proposal that intervention evaluation should be the primary empirical aim of this thesis, in order to address gaps in our knowledge as practitioners and researchers.

Summary of panel findings. The panel did not highlight any significant bodies of work from their respective disciplines that I had not included, though some specific studies were referred. The nature of dyslexia in adults was reported as divergent from childhood experience and both neurocognitive and psychosocial in experience, referring to working memory and self-efficacy as potential mechanisms of interest. The executive functions focus identified in chapter three was supported by the panel feedback. WM (as a cognitive skill) and SE are both psychological variables that have been reported as susceptible to improvement via general workplace coaching literature (Theeboom et al., 2014). I now define both emergent mechanisms in relation to work performance, followed by a consideration of how their conceptualisation influences the definition of coaching as a psychological intervention.

Key terminology

Working Memory and Work Performance. Working Memory is defined by its co-creator as "assumed to be a temporary storage system under attentional control that underpins our capacity for complex thought" (Baddeley 2007, p.1). The link to complex cognitive reasoning is well-established (Ariës, Groot, & van den Brink, 2014; Baddeley, 2007; Barrouillet & Camos, 2015; Conway, et al., 2005; Hock, 2012; Hofmann et al., 2012; Klingberg, 2009; Swanson & Siegel, 2001) and is implicated in a range of effective work-related behaviours, such as self-regulation (Wolf & Kaplan, 2008), time management (Mantyla & Carelli, 2006) and management of complex environments (Thorell, Lindqvist, Nutley, Bohlin, & Klingberg, 2009). The clear association between WM and work performance, supports its relevance to disability accommodation activities; yet leaving the question of *how* WM could be improved via coaching unanswered. I note at this stage the more developed and growing body of literature on improving WM through adaptive computerised training and the dissonant results therein between successful 'near transfer' of WM skills and less successful 'far transfer' of higher cognitive reasoning skills akin to a contextualised work performance. Systematic reviews of computerised interventions demonstrate that when WM is targeted specifically it improves, but these improvements often fail to translate to wider, contextual-based successes across a wide range of client groups (children with reading disabilties: Dunning, Holmes, & Gathercole, 2013; clinical neuropsychological rehabilitation and healthly populations: Melby-Lervåg, Redick, & Hulme, 2016; Weicker & Thöne-Otto, 2015). For this reason, higher cognitive skills, contextualised skills and specific work performance related skills were specifically extracted and analyzed in the synthesis as a secondary outcome. I then consider if coaching interventions experienced the same comparatively weaker effect with contextual measures as a computerised training protocol or whether higher fidelity to context interventions increase contextualised effects.

Self-Efficacy and Work Performance. Self-efficacy refers to one's belief in one's own ability and is distinct from self-esteem or confidence (Bandura, 1986, 1997). Self-efficacy develops naturally given exposure to social learning and mastery experiences (Bandura, 1986). Functioning and performance in the employment context are contingent such supportive interactions with others and on positive self-belief (de Beer et al., 2014; WHO, 2001). A seminal meta-analysis by Stajkovic and Luthans (1988) showed that SE, similarly to WM, has a strong relationship with work performance in the general population and, in particular, high SE has been shown to mediate the impact of poor workplace

outcomes in people with dyslexia (Gerber et al., 2012; Leather et al., 2011; Werner, 1993). To explore the viability of coaching as a disability accommodation for dyslexia, coaching interventions targeting SE in the workplace were thus justified as the second focus of my review.

Coaching for dyslexia. Following the scoping phase, I reviewed the definition and nature of coaching used in this very specific context. Chapter three implies that coaching used in disability accommodation (Bewley & George, 2016; Doyle, Cleaver, & Rossiter, 2016) is not a straightforward continuation of the various better-researched coaching/tuition interventions provided in education (Mortimer & Crozier, 2006; Rice & Brooks, 2004). Coaching to support people with dyslexia in the workplace focuses less on literacy attainment, rather on outcomes more commonly associated with general workplace coaching such as time management and organisational skills (Doyle & Mcdowall, 2015; McLoughlin & Leather, 2013). Specifically, McLoughlin and Leather (2013, p.43) describe workplace dyslexia coaching as an "androgogical approach" that relies on the metacognitive experience of dyslexic adults (Leather et al., 2011), but they highlight that deviations from this style are common in practice. Some 'coaches' resort to literacy tuition, training and knowledge transfer, very similar to educational interventions (BDA, 2018; Doyle & McDowall, 2015; Doyle et al., 2016) (Doyle & Mcdowall, 2015). The extent to which interventions adhered to dialectic, rather than didactic, principles was thus explicitly considered in the sampling and synthesis of primary studies. Using this pedagogical stance, I note the divergence in learner experience between coaching psychology interventions and computerised working memory training; a self-directed, yet conversational and social learning protocol compared to a solitary, technology-based exercise, practising similar tasks repetitively.

Summary of the review aims

The purpose of this review is to identify and analyse the socio-cognitive mechanisms and coaching intervention activities that could be effective for improving dyslexic difficulty in the workplace. I synthesised relevant primary studies to further my understanding of whether, in principle, coaching could improve salient psychological mechanisms of WM and SE which were determined through extensive scoping. I specifically drew out the WM results and compared these to adaptive, computerised training of WM which has received considerably more research interest to date (Melby-Lervåg et al., 2016; Weicker & Thöne-Otto, 2015). The results of this review provide a hypothetical intervention pathway for designing primary, longitudinal evaluations, as outlined in further chapters of this thesis.

Review Protocol

Narrative Synthesis Using the CIMO Framework. Table 4.2 shows my approach to applying the context, intervention, mechanisms and outcomes (CIMO) framework (building on Denyer et al., 2008).

Table 4.2

Interpretation of the CIMO framework for the current Realist synthesis

Realist synthesis component	**Explanation (Denyer & Tranfield, 2009)**	**Relevance to the present review**
Context	Individuals of interest. Interpersonal relationships of interest. Institutional setting of interest. Aspects of wider infrastructure of interest.	Include adults and children. Include both men and women. Include all nationalities. Consider educational, health and occupational contexts.
Interventions	The intervention of interest.	Exclude medical- or technology-based interventions such as memory training. Include interventions described as 'learning' or 'coaching'. Include interventions delivered via face-to-face dialectic pedagogy. Exclude didactic-type interventions.
Mechanism	Mechanisms of interest. Explanation of how the interventions act within the context to lead to the outcome. Understanding of how mechanisms are activated or not activated in different contexts.	Unusual to the CIMO structure, WM and SE were both considered mechanisms and outcomes in the search for studies, provided that the study included a standardised measure of either mechanism as a dependent variable.
Outcome	Relevant outcomes. Measurement of outcome. Primary and secondary outcomes.	Additional mechanisms (contributing to WM/SE improvement) and work-related outcomes were also considered in the extraction and synthesis.

Context and Intervention

The extraction protocol was designed to enable flexibility with the sample, environment and premise of the intervention to generate sufficient returns. Adult samples were prioritised, but child- and education-based studies were included in strongly matched intervention protocols; a concession to the general dearth of primary studies. As WM

remains an issue for a wide range of physical and mental health conditions, including dyslexia but also multiple sclerosis (Thornton & Raz, 1997), mild cognitive impairment (Moro et al., 2012), attention-deficit and hyperactivity disorder (ADHD; Parker and Boutelle, 2009) and bipolar disorder (Sole et al., 2011), all adult populations (healthy or not, education- or work-based) were included with the exception of (1) samples with serious age-related cognitive impairment (e.g., dementia) and (2) child-based studies in which the interventions focused on the actions of the parents or teachers rather than the children themselves. To improve the rate of returns, I initially broadened the search to include all face-to-face learning interventions, as defined by the absence of technology rather than the inclusion of coaching in particular. The resulting extracted studies were then analyzed specifically regarding the extent of fidelity to a dialectic, recognised coaching definition, such as the one described above by Mcloughlin and Leather (2013) and reported to be successful in a related field such as ADHD (Parker & Boutelle, 2009; Richman et al., 2001).

Mechanisms and Outcomes

Working memory. WM-focused studies were identified by the use of recognised standardised testing instrument to collect WM scores as a dependent variable. Because WM has already been established as a contributing factor in my primary dependent variable of improved occupational success/work performance in dyslexic adults (Leather et al., 2011), I incorporated studies that included WM as both a mechanism (process or intervening variable) and an outcome (dependent variable) as long as the first criterion was met.

Self-efficacy. SE-based studies were identified through the explicit use of the term, through reference to the SCLT, and/or use of a validated SE scale. As with WM, the pre-existing correlations between SE and work performance place SE acting as an intervening variable in our framework; studies using SE as a sole dependent variable were included.

Work-related outcomes. I reiterate that though the causal relationship between WM and work performance highlighted in the introduction is considered well-established conceptually (Baddeley, 2007; Colom, Martínez-molina, Shih, & Santacreu, 2010; Conway et al., 2005), computer training-based studies have report weaker results in translating WM improvements into contextualised work performance (Melby-Lervåg et al., 2016; Weicker & Thöne-Otto, 2015). This has led to some criticism of the conceptual assumptions (Chaytor et al., 2006; Söderqvist & Nutley, 2017) and therefore where available, other ‘higher order’ cognitive skills were extracted and compared by effect size for both WM and SE studies.

Research question

Based on the above considerations, my aim was to derive relevant psychological principles tending towards the effectiveness of coaching activities which can be extrapolated from extant research. The primary, two-part question guiding my review was as follows: to what extent, and under what conditions, can face-to-face (C) learning interventions (I) improve WM (MO_1) and SE (MO_2)?

Search criteria

I mapped my search terms against the CIMO framework (Table 4.2) and depicted below in table 4.3. The terms used were as broad as possible and were cross-referenced with the expert panel to ensure that the terminology reflected the phrases commonly used in the numerous disciplines contributing to the review.

Table 4.3

Search criteria against CIMO framework

CIMO stage	**Search terms**	**Search location or stage**
Context	Coaching OR training OR classroom OR professional development OR intervention OR activity OR learning OR face-to-face OR tuition OR education	All Text
Primary context of interest	Dyslexia OR adults OR 19+	Filtering term applied after the initial search to identify high relevance studies
Interventions	Learning OR metacognitive OR self-awareness OR self-development OR synesthe* OR synaesthe* OR instruct* Or knowledge OR personal development	All Text
Mechanism / outcome 1	Working memory OR executive function* OR attention OR short-term memory OR cognition OR metacogniti* OR time management OR self-regulation OR synesthe* OR synaesthe* OR mental function*	Title / subject / abstract / keywords
Mechanism / outcome 2	OR self-efficacy OR perceived self-efficacy OR work efficacy OR self-efficacy belief OR social cognitive learning theory OR social learning theory OR self-esteem OR self-confidence OR participation OR social interaction OR agency OR career agency	Title / subject / abstract / keywords

I did not initially limit from 1995 onwards, since a lot of the original literature around working memory (Baddeley, 1974) and self-efficacy (Bandura, 1989) predates, and it may be that some early work bears relevance to my search. This search was conducted in June 2015, using the EBSCO hosted databases. The search was repeated in October 2016, along with an invitation to the stakeholder expert panel to review the references of the extraction; one paper was added at this time. The included databases were:

- Academic Search Complete
- Applied Science and Technology Source
- British Education Index
- Business Source Complete
- Child Development & Adolescent Studies
- CINAHL Plus with Full Text
- Communication Source
- Criminal justice Abstracts with Full Text
- Education Abstracts (H.W. Wilson)
- Educational Administration Abstracts
- Education Resource Information Center (ERIC)
- Health and Psychosocial Instruments
- Health Policy Reference Center
- Medline Complete
- PsycArticles
- PsycINFO
- SocINDEX with full text
- Teacher Reference Center

The search results were exported from the EBSCO host platform, via Refworks, as a .txt file and opened using Microsoft Excel in data extraction form, with individual columns for author, dates, abstract etc; identifying 609 studies for WM and 414 for SE. The abstracts were reviewed for relevance. Each study was given a relevance score of '2', indicating highly relevant; '1' indicating possible relevance; and '0' indicating not relevant. Studies were excluded on the following basis:

- Studies which relied on Transcranial Magnetic Stimulation (rTMS) interventions
- Studies which relied on computerised training only
- Non-intervention studies (such as correlationary designs)
- Studies that could not be downloaded in the English Language
- Different types of memory (not working memory)
- Self-esteem or confidence instead of self-efficacy
- Not a face-to-face intervention
- Target variables as independent, rather than dependent variables

Figure 4.1, at the end of the quality check section, shows the sifting process and the number of studies included at each stage. Some book abstracts were included in the first sift if the topic was of high relevance and reviewed for primary sources which had not appeared in the EBSCO search. This process returned 15 papers for working memory, of which 4 were included as relevant and none for self-efficacy. A final list of 22 working memory studies and 28 self-efficacy studies were retained following abstract sifting and went forward for a relevance and quality review of the full paper, cross-referenced between myself and my primary supervisor.

Relevance check

As recommended by the Denyer and Tranfield's (2009) CIMO design, relevance criteria were prioritised for Intervention and Mechanism. The main obstacle to assessing relevance was the persistent lack of detail in the papers regarding the nature of the intervention. For instance, in education research, the term 'training' was used interchangeably to refer to computer-guided adaptive practice and face-to-face learning. In ADHD research, many interventions considered themselves 'psycho-social' or 'coaching' but upon close inspection were actually interventions that targeted teachers' or parents' behaviour rather than coaching of the individual. Several authors were contacted to provide more information, but no responses were received. Criteria and scoring values, shown in table 4.4, were developed for each section.

Table 4.4

Relevance criteria

	Descriptions for indicators and value assigned, use respective value if:
Context	3 - Adult, dyslexic, working population 2 - Dyslexic or working 1 - Adult only or child-based and dyslexic 0 - Child, non-specified dyslexia
Intervention	3 - Coaching intervention specified, method of coaching clearly described and pedagogically dialectic 2 – Face-to-face learning, methods clearly described 1 – Face-to-face learning, not well described in terms of methods 0 - Intervention not based on face-to-face learning – e.g. rTMS, asynchronous e-learning or self-study

	Descriptions for indicators and value assigned, use respective value if:	
Mechanism	3 – Working memory targeted, a reliable testing method clearly described 2 – Working memory tested method for analysis inadequately described or blended with other measures 1 – Other forms of memory targeted 0 – Working memory not addressed in this study	3 – Self-efficacy targeted, a reliable testing method clearly described 2 – Self-efficacy tested method for analysis inadequately described or blended with other measures 1 – Other forms of efficacy, esteem, confidence or agency targeted 0 – Self-efficacy not addressed in this study
Outcome	3 – Work-related performance addressed and measures robust 2 – Work-related, measures self-report alone 1 – Adult-related success measures, not necessarily work (e.g. HE study; desistance etc) 0 – Unrelated to work or adult measures of success (e.g. word recognition or mental arithmetic)	
Overall Score	I/M = 4 – 9, plus C/O 4-6 Highly relevant, must include I/M = 4-9 Good relevance for Realist synthesis, include C/O = 4-6 Good relevance for narrative review of the field, include but separate I/M = 2-3 Consider inclusion based on C/O score and quality of paper (must be raised with co-reviewer) I/M = 0-1 do not include	

Working memory relevance check. Ten papers scored five or above for intervention / mechanism and, of these, nine also score three or above for context and outcome. Five papers were rejected outright at this stage and seven were subjected to further evaluation. Of the seven that were checked further, one remained included, resulting in a total of eleven studies to proceed to quality assessment. During the relevance assessment, I reviewed several studies that had been extracted due to the inclusion of the term 'meta-cognition' which, whilst related to the training of working memory and highlighted in the dyslexia literature as a variable of interest (Leather et al., 2011), could not at this stage be used as a proxy for working memory. Therefore, studies that did not also include working memory as a clear mechanism or outcome were rejected. Other reasons for rejection included: (1) Highly specialised intervention targeting a context too far removed from target populations; for example, working memory in samples of children with severe learning disability or mental health needs; (2) Intervention, though face-to-face, purely knowledge transfer, rather than interactive and dialectic; (3) working memory not a target variable, but included as an independent co-variable.

Self-efficacy relevance check. Self-efficacy relevance check resulted in fourteen studies scoring four or higher for intervention / mechanism. Of these, ten also scored four or above for context and outcome. The remaining eighteen were reviewed in depth and debated between supervising research and primary researcher. The reasons for rejection were as follows: (1) highly specialised intervention targeting a context too far removed from target populations; for example self-efficacy in nutrition of breast-feeding mothers in under developed countries; (2) intervention, though face-to-face, knowledge transfer education-based, rather than interactive and dialectic; (3) self-efficacy not a target variable, but included as a potential independent variable. Sixteen studies proceeded to quality check.

Quality criteria

The quality criteria were based on that used by Rojon et al. (2011) and adapted by adding an additional criterion of active bias management. I conducted the scoring initially and the primary supervisor scored independently to cross check. All intermediate scoring studies were discussed by both researchers. The completed quality analysis is shown in Appendices 4.3-4.6.

For the working memory extraction, the intermediate studies scored poorly due to their data analysis techniques and this was noted for consideration in synthesis. The following issues were present in the quality assessment: (1) reporting non-significant results against a data set that did not achieve sufficient statistical power for the analysis used (e.g. using MANOVA with samples of 25 and four variables) and; (2) using several separate analysis of variance tests (ANOVA) or *t*-tests to explore the impact on a range of dependent variables when a multiple analysis of variance (MANOVA) should have been used or Bonferroni correction applied. One study (Toll & Van Luit, 2013) was excluded for failing to include an appropriate WM measure post-intervention. The final extraction included seven studies of high quality (Alloway & Warner, 2008; Ariës et al., 2014; Chambers, Lo, & Allen, 2008; Craik et al., 2007; Miranda, Presentación, Siegenthaler, & Jara, 2013; Zeidan, Johnson, Diamond, David, & Goolkasian, 2010; Zylowska, Ackerman, Yang, Futrell, Horton, Hale, Pataki, & Smalley, 2008) and three of intermediate quality (Jha et al., 2010; Moro et al., 2012, 2015). A high-quality paper (Ariës et al., 2014) was analysed as two studies, as it included two data sets that measured the same outcomes but using separate samples and interventions.

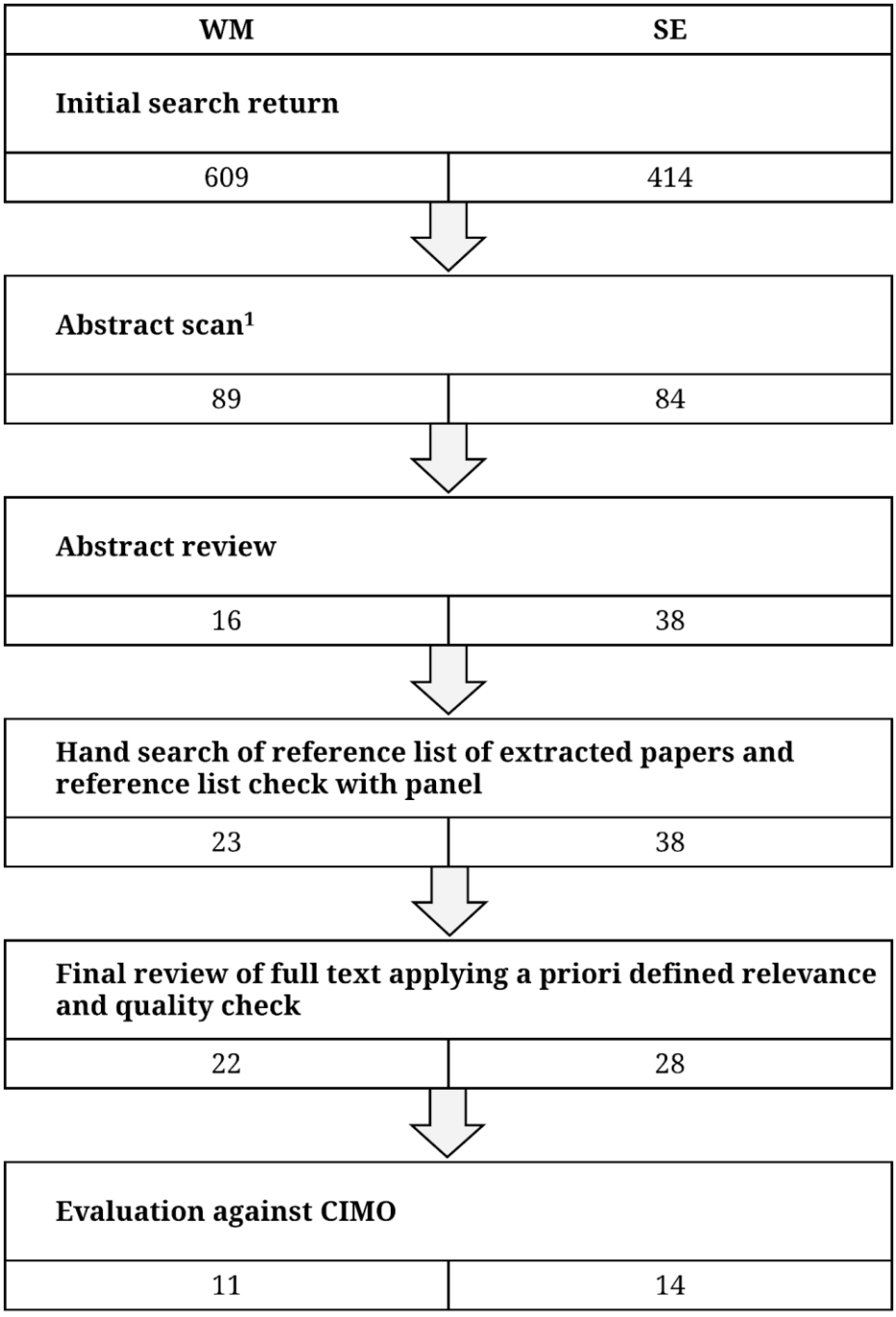
For self-efficacy, reasons for the intermediate scores were as follows: (1) design did not include a control group, but a before and after comparison only; (2) *t*-tests presented

without Bonferroni correction for multiple comparison of means; (3) failure to use an appropriate method of analysis, for example large data sets comparing multiple dependent variables relying on *t*-tests without Bonferroni correction instead of MANOVA. One study (Ogan-Bekiroglu & Aydeniz, 2013), was excluded for failing to establish at what point the post-intervention data were collected and not presenting sufficient detail on baseline measures. A second study (Platt, 2011) was excluded for not including self-efficacy as a dependent variable, but instead only recording pre-intervention scores as an independent co-variable. I retained fourteen studies, including eight studies of high quality (Franklin & Doran, 2009; McDowall & Butterworth, 2014; Mcdowall et al., 2014; McGonagle et al., 2014; Reif, De Vries, Petermann, & Görres, 2013; Tschannen-Moran & McMaster, 2009; Watt, Murphy, Pascoe, Scanlon, & Gan, 2011; Zwerver, Schellart, Anema, & Van Der Beek, 2013); and six of intermediate quality (Bell, Raczynski, & Horne, 2010; Engin & Cam, 2009; Reed, Kennett, Lewis, & Lund-Lucas, 2011; Stensrud, Gulbrandsen, Mjaaland, Skretting, & Finset, 2014; Style & Boniwell, 2010; Tsai et al., 2011).

Figure 4.1 shows the number of studies included at each stage of the sifting, relevance and quality check.

Figure 4.1

Sifting process and the number included at each stage



[1]At each stage coding was 2 = relevant; 1 = potential, inclusion resolved through discussion in research team, 0 = not relevant

Data Extraction

Tables 4.5-4.7 show the extracted data for both mechanisms.

Table 4.5

Data extracted from working memory studies

Author	Context			Interventions		Mechanism	Outcomes			
	Nationality, sample size, % female	Health / work / education / experimental group	Neurodeficit or identified WM deficit	Teaching / learning methods used	Time spent in intervention	Learning / psychological theories applied	Effect size of WM measure	WM test used		WM test Published by
Alloway and Warner (2008)	UK, 20, 45%	Education	100% DCD	Physical, group-based coaching to perform fine and gross motor tasks	65 x 1 hour	WM impact on learning	*d* = 0.97	Large	Verbal & visuo-spatial	(Alloway, 2007)
Ariës et al. (2014) study 1	Holland, 92, 62%	Education	n/k	Computerised n-back practice and IMPROVE with group peer coaching to learn Metacognition (MC)	50 mins x 5 weeks	WM impact on learning, metacognition	*r* = .65	Large	n back & odd one out	(Holmes, Gathercole, & Dunning, 2009) (Jaeggi, Buschkuehl, Jonides, & Perrig, 2008)

Author	Context			Interventions		Mechanism	Outcomes			
	Nationality, sample size, % female	Health / work / education / experimental group	Neurodeficit or identified WM deficit	Teaching / learning methods used	Time spent in intervention	Learning / psychological theories applied	Effect size of WM measure	WM test used		WM test Published by
Ariës et al. (2014) study 2	Holland, 63, 54%	Education	n/k	Peer coaching to learn MC (no WM practice)	50 mins x 5 weeks	WM impact on learning, metacognition	**d*= 0.89[4]	Large	n back & odd one out	(Holmes et al., 2009) (Jaeggi et al., 2008)
Chambers, Lo and Allen (2008)	Australia, 20, 45%	Experimental	n/k	Mindfulness workshops	10-day course	EF, attentional control spotlight theory	**d*= 0.52	medium	Digit span backwards only	(Weschler, 1997)
Craik et al. (2007)	Canada, 49, 55%	Health	Age-related WM deficit	Group training knowledge transfer with practice and de-briefing	4 sessions	WM impact on learning	**d*=0.1	<small	Alpha span test	(Craik, 1986)
Jha, Stanley, Kiyonaga, Wong	US, 60, n/k	Work	Experimental group likely to be	Mindfulness workshops plus	24 hr total over 8	Cognitive control	Cannot calculate		Ospan	(Unsworth, Heitz,

[4] *Where effect sizes are noted with * they have been calculated by the author, not present in the original paper*

Author	Context			Interventions		Mechanism	Outcomes			
	Nationality, sample size, % female	Health / work / education / experimental group	Neurodeficit or identified WM deficit	Teaching / learning methods used	Time spent in intervention	Learning / psychological theories applied	Effect size of WM measure	WM test used	WM test Published by	
and Gelfand (2010)			high ND % due to military role +stress	coaching	weeks					Schrock, & Engle, 2005)
Miranda, Presentacion, Siegenthaler and Jara (2013)	Spain, 42, 14.8%	Education	ADHD	Small group dialectic workshops, in addition to parent/teacher interventions	16 sessions of 45 mins	WM impact on learning, self-regulation	η^2=.125	Medium	WM sentences	(Seigel & Ryan, 2013)
									Digit span	(Weschler, 1993)
Moro et al. (2012)	Italy, 30, n/k	Health	Mild cognitive impairment (MCI) age-related	Cognitive training with personalised follow-up to coach strategies	6 months - 2 month intensive 4 months weekly + practice	Metacognition	*d=0.8	Large	Listening span test	(De Beni & Borella, 2008)
Moro et al. (2015)	Italian, 30, n/k	Health	(MCI) age-related	Cognitive training with personalised follow-up to coach strategies	6 months - 1 month intensive 5 months weekly +	Metacognition	*d=1.28	Large	Listening span test	(De Beni & Borella, 2008)

Author	Context			Interventions		Mechanism	Outcomes			
	Nationality, sample size, % female	Health / work / education / experimental group	Neurodeficit or identified WM deficit	Teaching / learning methods used	Time spent in intervention	Learning / psychological theories applied	Effect size of WM measure	WM test used	WM test Published by	
					practice					
Zeidan, Johnson, Diamond, David and Goolkasian (2010)	US, 63, 60%	Education	n/k	Facilitation meditation workshop	4 sessions	stress management	Cannot calculate	N/A	Digit span backwards only	(Weschler, 1981)
Zylowska et al. (2008)	US, 32, 62.5%	Experimental	ADHD	Small group mindfulness workshop	8 sessions of 2.5 hours	WM impact on learning, self-regulation	**d*=0.1	<small	Digit span	(Weschler, 1981)

Table 4.6.

Comparison of WM specific and contextually-related dependent variables

Author	Research design	Significance level of WM measure	Effect size of WM measure 0 =<small 1=small 2=medium 3=large		Most workplace relevant contextual outcome selected and reported here	Effect size of contextual measure 0 =<small 1=small 2=medium 3=large	
Alloway & Warner, 2008	Within contrasts repeated measures ANOVA	$F(1,18) = 6.08$, $p = .02$	$d = 0.97$	3	Reading and numerical test scores	Cannot calculate	
Ariës et al. 2014 study 1	Within/Between ANOVA at each interval, group comparisons from final test presented here	$F(1,89) = 31.759$, $p = <.001$	$r = .65$	3	Reasoning abilities test scores (second interval)	$r = .13$	1
Ariës et al., 2014 study 2	Within/between ANCOVA, metacognitive training versus control at final test presented here	*NS* due to Bonferroni corrected *p* value	*d= 0.89[5]	3	Reasoning abilities test scores within-groups comparison	r=.38	2
Chambers et al. 2008	Within /between repeated measures ANOVA; Interval 2 control and intervention comparisons presented here	$F(1, 39) = 7.81$, p=.01	*d= 0.52	2	Mindfulness Awareness	*d= 0.25	1
Craik et al., 2007	Between-groups ANCOVA	*NS* Means and SDs reported	*d=0.1	0	Secondary Memory (Logical Stories)	*d=0.66	2

[5] *Where effect sizes are noted with * they have been calculated by the author, not presented in the original paper*

Author	Research design	Significance level of WM measure	Effect size of WM measure 0 =<small 1=small 2=medium 3=large		Most workplace relevant contextual outcome selected and reported here	Effect size of contextual measure 0 =<small 1=small 2=medium 3=large	
Jha et al, 2010	Within-groups (military trained) comparison paired samples *t*-test	Significant only with those reporting high practice, correlation between practice level and WM increase was *r*=.37, *p*=<.05	Cannot calculate for high practice groups only as M and SDs reported for all training groups		Positive and Negative Affect respectively– NB only Intervention group Means and SDs provided	**d*=0.5	2
						**d*=0.5	2
Miranda et al., 2011	Between-groups ANCOVA (baseline scores as control variable) post intervention scores comparison reported here	$F(1, 41) = 5.558$, p=.024	η^2=.125	2	Attention Vigilance test	η^2=.288	3
Moro et al., 2012	Within pre-post (T1-T3) *t*-test reported as significant for intervention group A, effect size calculated from between-groups comparison at T2 for consistency, where group B act as a control group	$t(14) = 2.48$, p =.027	**d*=0.8	3	Attention – verbal span test selected as best work- related measure, again T2 between-groups comparison selected	**d*=.84	3
Moro et al., 2015	Within pre-post (T1-T2) *t*-test reported as significant for intervention group A, effect size calculated from between-groups comparison at T2 for consistency, where	$t(14) = 2.3$, p =.037	**d*=1.28	3	Montreal Overall Cognitive Assessment was selected as best work-related measure, again T2 between-groups	**d*=1.08	3

Author	Research design	Significance level of WM measure	Effect size of WM measure 0 =<small 1=small 2=medium 3=large		Most workplace relevant contextual outcome selected and reported here	Effect size of contextual measure 0 =<small 1=small 2=medium 3=large	
	group B act as a control group				comparison selected		
Zeidan, et al., 2010	Within/between ANOVA, session x group reported here	$F(1, 47) = 1.26$, $p=.27$	Cannot calculate		Fatigue	*d=0.7	3
Zylowska et al. 2008	Within-groups comparison only	$t(24) =0.45$, $p =.66$	*d=0.1	0	ADHD symptoms	*d=0. 7	2
Average effect size				**2.1**			**2.7**

Table 4.7.

Data extracted from self-efficacy studies

Author	Context			Interventions			Mechanisms	Outcomes	
	Nationality, sample size, % female	Health / work / education / experimental group	Neurodeficit or identified WM deficit	Teaching / learning methods used	Time spent in intervention	Reliability of SE measure, α	Learning / psychological theories applied	Effect size of SE measure	
Bell, Raczynski and Horne (2010)	US, 50, NK	Working in education	NK	Group-based knowledge transfer and discussion	7 sessions	.94	SCLT - teacher efficacy	d = 0.5148	Medium
Engin and Cam (2009)	Turkey, 22, 100%	Working in health	NK - but nursing up to 10% (Sanderson-Mann & McCandless, 2006)	Group-based knowledge transfer and discussion	5 sessions	.81	SCLT – SE, autonomy	r = 0.88	Large
Franklin and Doran (2009)	Australia, 52, 59%	Education	NK	2 workshops followed by 4 paired peer coaching sessions	9 hours	.86 Cited in Grant & Franklin (2007)	PAAL; SCLT - SE; incremental implicit person theory	PAAL group d = -1.21; Self-reg group - d=.1.08	Large
McDowall and	UK, 32, 75	Education	NK	Group coaching -	1 session	.78	Strengths-based		

Author	Context			Interventions			Mechanisms	Outcomes	
	Nationality, sample size, % female	Health / work / education / experimental group	Neurodeficit or identified WM deficit	Teaching / learning methods used	Time spent in intervention	Reliability of SE measure, α	Learning / psychological theories applied	Effect size of SE measure	
Butterworth (2014)		transition to work		facilitated discussion			coaching		
McGonagle et al. (2014)	USA, 59, 86%	Work	Chronic health conditions	1:1 phone coaching	6 sessions of 1 hour	GSES:.80-.89 cited in Judge, Erez, Bono, & Thoresen (2003) Job SE .77-.83 cited in Chen, Goddard, & Casper, (2004)	SCLT – SE, also transactional and conservation of resources models of stress	GSES: Partial *η2* .18; Job SE: Partial *η2* .09	Large Medium
McDowall, Freemann and Marshall (2014)	UK, 54, 65	Work	NK	1:1 coaching, two intervention conditions	1 session	0.83	Appreciative enquiry; feedback intervention theory	*η2* = .24	Large

Author	Context			Interventions			Mechanisms	Outcomes	
	Nationality, sample size, % female	Health / work / education / experimental group	Neurodeficit or identified WM deficit	Teaching / learning methods used	Time spent in intervention	Reliability of SE measure, α	Learning / psychological theories applied	Effect size of SE measure	
Reed, Kennett, Lewis and Lund-Lucas (2011)	Canada, 41, NK	Education	20%	Seminar group with mixed info transfer and group discussion	NK - > 6	.89 Cited in Kennett & Reed (2009)	Learned resourcefulness	*d* = .81	Large
Reif, de Vries, Petermann and Gorres (2013)	Germany, 234, 80	Health	n/k	Seminar group with mixed info transfer and group discussion	8 x 90 mins	.76-.9	'Psycho-education'	*η2* = .10	Medium
Stensrud, Gulbrandsen, Mjaaland, Skretting and Finset (2014)	Norway, 21, 29	GPs at work	n/k	Role-play and debrief	5 x 4 hours	0.94	SE	n/a	N/A
Style and Boniwell (2010)	UK, 93, NK	Experimental	n/k	Group discussion 1/3; peer coaching 1/3; self-reflection 1/3	6 sessions	.76-.9	Positive psychology	*d* = .55	Medium
Tsai et al. (2011)	Taiwan, 395, 98	Working in health	NK - but nursing up to 10% (Sanderson-Mann & McCandless, 2006)	Group training	1.5 hours	0.94	Not stated at all	*r* = .26	Small

Author	Context			Interventions			Mechanisms	Outcomes	
	Nationality, sample size, % female	Health / work / education / experimental group	Neurodeficit or identified WM deficit	Teaching / learning methods used	Time spent in intervention	Reliability of SE measure, α	Learning / psychological theories applied	Effect size of SE measure	
Tschannen-Moran and McMaster (2009)	US, 93, NK	Working in education	n/k	Small group coaching; 1:1 coaching; observational 'live' coaching	5.75 hours	0.9	SCLT	*r* = .24	Small
Watt, Murphy, Pascoe, Scanlon, and Gan (2011)	Australian, 118, 89	Studying nursing	NK - but nursing up to 10% (Sanderson-Mann & McCandless, 2006)	"Structured learning program"	3 days	0.69	Weak but SCLT related	*d* = *.87*	Large
Zwerver, Schellart, Anema and van der Beek (2013)	Holland, 40, 50	Working as doctors	n/k	Info transfer, role play, feedback	n/k	.75-.86	Theory of planned behavior, attitude, social norms and SE model	*r* = .33	Medium

Data Synthesis

I synthesised the primary studies separately for WM and SE comparing by (a) reviewing the effect sizes reported in each study; (b) grouping the studies according to outcome and; (c) examining contexts and interactions to identify any common themes as presented in the table above. In some cases (denoted by asterisk in the above tables) effect size had not been reported in the original paper and I computed the effect size from the means and standard deviations or *t*-test statistic and degrees of freedom as appropriate. This allowed for consistent comparisons whether methodology limited significance.

In the WM studies, the mean population ages ranged from 7.3 to 75 years; the statistical methods used were ANOVAs, ANCOVAs and t-tests. The studies used a variety of WM measures, all standardised and previously validated.

In the SE studies where the mean population ages ranged from 18 to 50 years; the statistical methods used were ANOVAs and t-tests, and two studies included non-parametric analyses, using Wilcoxon and Mann-Whitney tests. Many SE studies used a published General SE Scale (GSES, *n*-6), others used Teacher SE (*n*-2), specifically-constructed scales (*n*-2), Academic SE (*n*-1) and Study Skills SE (*n*-1). One study did not specify the scales used (*n*-1, Tsai et al., 2011) but clarified that it was created with reference to the SCLT. One study included a GSES measure as well as a Job SE measure (McGonagle, Beatty & Joffe, 2014).

Whilst I outline the study findings for WM and SE separately, as the nature of these studies differed in terms of theoretical framing as well as the methods used, I employed a common analytic strategy focusing on a direct comparison between 'successful' (i.e., an observed effect in the expected direction) and 'unsuccessful' interventions to isolate effective treatment mechanisms across studies. This approach led me to observe the methodological short-comings and lack of detail in the primary studies, which I discuss further in each synthesis as appropriate, followed by an overall discussion in the final section of the paper.

WM synthesis

Results for WM improvement. The effect sizes of the successful studies ranged from medium to large, with only one statistically-significant study (Chambers et al., 2008) falling short of medium effect size correlation (r=.25). When mean data were presented,

many successful studies indicated a standard score improvement of between one and two, which represents a half and a whole standard deviation (Ariës et al., 2014; Chambers et al., 2008; Jha et al., 2010; Miranda, Presentacion, Siegenthaler & Jara, 2013). Moro et al. (2012, 2015) reported less than half a standard deviation improvement, but their samples experienced age-related cognitive decline and therefore have additional barriers when compared with dyslexia or working adults. Four studies reported non-significant results and the two effect sizes that were calculable for these were below the small range. Table 4.6 denotes a crudely-computed average of medium effect size for the WM measure (2.1), indicating the bottom of the medium range; these calculations lack sophistication such as sample size weighting but allow for ease of comparison across the studies. The effect sizes for successful studies were similar to meta-analytic moderate aggregate effect sizes achieved for standard verbal WM through adaptive computerised WM training (g= .31: Melby-Lervåg & Hulme, 2012; g=.36, Weicker & Thöne-Otto, 2015). I cannot discount that a sampling bias is present, I position the effect size interpretation as a trend indicating an avenue for further investigation. I do, however, propose that the WM intervention effect is comparable for coaching interventions and computerised training, which is of interest considering the differentiation in learner experience.

Intervention analysis. The interventions were typically a series of sessions that were conducted by either a professional in education/health or a trained meditation facilitator, although some studies additionally utilised peer learning. The number of sessions varied, with as many as 65 sessions delivered over one year (Alloway & Warner, 2008) yet as few as four sessions for two of the studies (Craik et al., 2007; Zeidan et al., 2010), who both notably reported no impact of their intervention on WM.

Comparing the quality of the studies was challenging, as the descriptions of the interventions varied considerably; researchers tended to very briefly describe the content of the intervention, leaving little opportunity for replication or analysis of the delivery. The theoretical components of the extracted studies were devoted to the WM-dependent aspects of learning, as opposed to the learning processes used during the intervention. My initial review revealed a consistent picture in the successful studies: the activities described in the methods could be interpreted to represent the four critical elements of Social Cognitive Learning Theory (SCLT: Bandura, 1986): (1) verbal persuasion (an introductory knowledge transfer in most cases); (2) role-modelling (either current/past case study discussion or active role play); (3) vicarious learning (group discussion) and (4) mastery (the opportunity to practice or rehearse in context, with recognition of success). In studies by Aries (2015, study

2, metacognition group only), Craik et al. (2007) and Zeidan et al. (2010), a lack of fidelity to SCLT resulted from an insufficient amount of time available to develop mastery and/or engage socially and these studies showed no improvement; however, Zylowska et al. (2008) provided sufficient time and discussion yet no improvement was noted in their study either. In analysing this fourth study to identify the missing factor, I noted that WM was not a stated outcome of the intervention in Zylowska et al. (2008), and that specific practice of metacognition or stress management were not mandated, indicating the potential salience of these mechanisms.

'Metacognition', or the development of self-awareness in thinking (Flavell, 1979), was mentioned explicitly in four studies (Ariës et al., 2014 study 1 & 2; Moro et al., 2012, 2015) and by association with similar terms in two others ('attentional control', Chambers et al., 2008; 'cognitive control', Jha et al., 2010). Becoming aware of and deliberately manipulating thoughts to improve memory has some support in the literature on dyslexia (Gerber, 2012; Leather et al., 2011). The 'Gerber-Leather model' (de Beer et al., 2014) proposes (1) the self-regulation of memory (WM) and (2) positive reframing of the individual's personal dyslexic experience as mediators of an improved sense of control, thereby influencing success in the workplace. Additional support is found in clinical dementia, educational and memory-specific research, in which 'meta-memory' (the ability to consciously be aware of and control mental memory tasks, such as visualizing a shopping list; Dixon & Hultsch, 1984) is improved through developing mental strategies and focusing on memory-related SE (Barrouillet & Camos, 2015; Billing, 2007; Dunlosky, Bailey, & Hertzog, 2011; Jopp & Hertzog, 2007; Unsworth, Brewer, & Spillers, 2011; Van der Elst, Van Boxtel, Van Breukelen, & Jolles, 2008). The extracted studies support metacognition as a viable psychological pathway for increasing WM capacity.

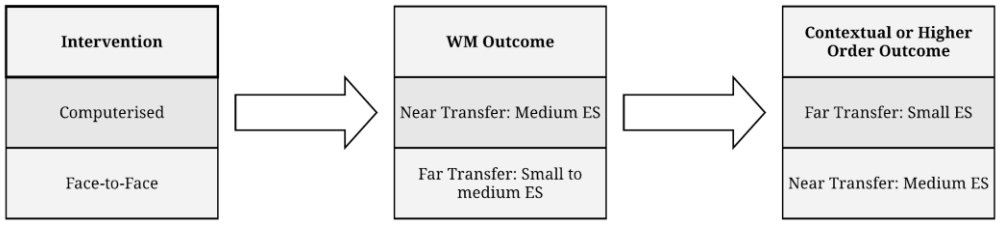
Two studies developed a similar metacognitive experience in general through mindfulness and meditation protocols (Chambers et al., 2008; Jha et al., 2010), demonstrating an increase in WM concurrent with a decrease in negative emotions (negative affect and stress, respectively). Since *increases* in anxiety and stress are known to reduce WM capacity (Johnson, 2015; Otto et al., 2016), my synthesis indicates an argument for *reductions* of stress as a moderating variable; this again is further supported by dementia research (Kaszniak, 2011) and connects with my target population, since research indicates stress management as problematic for dyslexic employees (Doyle & McDowall, 2015). General mindfulness, unlike the targeted development of meta-memory, might not mediate improved WM but potentially acts via the moderating effect of reduced stress.

To summarise, I observed that in addition to the general relevance of SE for dyslexic learners and employees presented in the introduction and expert panel contribution, interventions conducive to the development of memory-specific SE (through SCLT compliant activities) resulted in the improvement of WM. This finding has some support in the clinical literature (Valentijn et al., 2006). The synthesised successful intervention protocols are in contrast to interventions involving the passive engagement of recipients in lessons involving knowledge transfer of memory strategies only (didactic teaching) or practice divorced from context (WM training games). This contrast highlights the importance of high- fidelity training environments, as predicted by extant literature on training transfer in general (Grossman & Salas, 2011). The metacognitive and emotional experience of participants provided mechanisms of interest for further evaluation.

Contextually-based outcome measures. The extracted context-based, or functionaloutcomes (Table 4.6) were heterogeneous in nature but consistent in reporting improvements with medium effect sizes on average and appropriately significant *p* values for all studies, unlike the WM scores which included four unsuccessful interventions. The crude computation aggregate effect size was 2.7, towards the top of the medium range and representative of a stronger intervention effect than the WM measure. These results are divergent from contextual outcomes reported in adaptive computerised WM training research, where smaller effect sizes are noted for 'far transfer' measures such as verbal abilities or everyday life measures (respectively: *g*= .24: Melby-Lervåg & Hulme, 2012; *g*=.29, Weicker & Thöne-Otto, 2015). Published systematic reviews of computerised training (Dunning et al., 2013; Melby-Lervåg & Hulme, 2012; Weicker & Thöne-Otto, 2015) report consistently stronger WM scores compared to weaker and, in some cases, unsuccessful effects for contextual measures. In the brain-training paradigm, contextualised measures are termed 'far transfer', since they are further from the trained tasks, whereas in contextual, discursive coaching the WM measure itself represents the far transfer. I observe that the two divergent learning environments produce an opposite effect. Where WM tasks are trained explicitly (as in computerised training) there is a medium effect size for highly-related WM outcomes and consistently smaller effect for more contextually-based outcomes; where training is contextual (as presented here) the effect sizes for the contextual outcomes are more compelling, with marginally smaller, inconsistent yet also on average medium effect sizes for the WM outcome. This relationship is shown in figure 4.2.

Figure 4.2

Comparison of near and far transfer effect sizes for computerised and face-to-face interventions



Some contextual training appears to improve core WM without direct practice of WM tasks, as observed in Chambers (2008); Moro et al, (2012); Moro et al. (2015); Alloway & Warner (2008) and Jha et al. (2010); equally some WM computerised training improves contextual measures without explicit training (Holmes et al., 2009). Of particular note from this extraction is the second study by Aries et al. (2014), where the contextual-based intervention resulted in contextualised improvements, but did not overlap with targeted WM improvements. WM and contextual outcomes may be related, but the causal direction and transfer pathways between them appear to be neither clear nor reliable in either body of research. Of more relevance may be the notion of contextual specificity, first developed by Tulving & Thomson ('encoding specificity', 1973) noting that short-term recall is dependent on environmental context matches. For example, if one learns a Digit-Span sequence of numbers under water, one recalls more accurately underwater compared to when dry (Baddeley, Cuccaro, Egstrom, Weltman, & Willes, 1975). So it may follow that if one needs to improve WM capacity in an applied context, one must learn and practice capacity-enhancing strategies in a similar context (Coveney, Switzer, Corrigan, & Redmond, 2013; Song & Bédard, 2015; Stark, Reagh, Yassa, & Stark, 2017; Unsworth, Spillers, & Brewer, 2012). The proposals support the potential of coaching to improve WM, particularly specific to functional skills.

SE synthesis

Results. Three studies reported small effect sizes, and the remainder (eleven studies) reported medium to large effects. These effect sizes compare favourably to those measuring the ability of online training to improve SE, for example, which has generally shown smaller effects (see systematic review: Mccutcheon, Lohan, Traynor, & Martin,

2015). The studies tended to include other measures of mood and affect, and eight studies included measures of academic or work-related performance, mainly adherence to a new tool, skill or process, all of which were significantly improved as a result of the intervention. Coaching is observed to be a reliable intervention for both improving SE and contextual workplace abilities in this extraction.

Intervention analysis. The participants in the SE studies were typically adults who were engaged in learning related to their studies or work. The interventions tended to be delivered by a mix of professional educators and facilitators trained in a specific, work-related process (e.g., Franklin & Doran, 2009; McDowall et al., 2014), although some studies additionally utilised peer-to-peer coaching without providing adequate descriptions of the training provided to peer coaches (Franklin & Doran, 2009; McDowall & Butterworth, 2014; Style & Boniwell, 2010). As with the WM studies, and as expected for developing SE, the successful interventions involved all four elements of SCLT, either overtly within the intervention structure or by allowing time for development of mastery before reassessment. In most cases, the participants' SE was developed in relation to a clear and measurable learning outcome or goal related to their work or life, rather than directly targeting SE; this approach is congruent with Bandura's (1986) original proposition. I thus observed a common trend to deliver interventions consistently with Goal Setting Theory (GST; Locke & Latham, 2002) in addition to SCLT. GST predicts that 'goal clarity' (GS1) focuses attention and inspires effort and persistence to achieve while creating the conditions for metacognition around the target behavior; this element was clearly adhered to in the extracted studies through the verbal persuasion element. However, GST further proposes two other moderators for improvements in work performance: (GS2) SE for achieving the goals and (GS3) the commitments made to others in relation to the goals. The extracted studies' methodologies reported sufficient attention to GS2 through mastery and rehearsal, but the results varied considerably regarding GS3. It was possible to infer fidelity to GS3 through the common occupational or educational contexts of each sample, with the exception of the study by Style and Boniwell (2010), yet this connection is tenuous. I nevertheless propose that SE may not be an isolated psychological construct and develops with positive, well contextualised and internalised goals.

In contrast to the results of the WM studies, where practice time was a key determinant of success, the time spent in interventions did not affect the level of significance or effect size of the SE studies; even those with a single intervention session reported a significant impact on SE (McDowall & Butterworth, 2014; McDowall et al., 2014). The

interventions were typically shorter than those in the WM papers, with the longest being five sessions of four hours; however, poor descriptions were common again, one paper not reporting the intervention length at all (Zwerver et al., 2013). Neither time nor the use of trained vs. peer coaches could be identified as a determinant of effect size range. The use of general vs. context-specific scales did not result in any significant patterns.

The single extracted study in which no improvement was found at all (Stensrud, 2014) reassessed SE at the immediate end of the program, before the participants could practice skills in their own setting (i.e., to develop mastery), and thus the results may have reflected a methodological artefact caused by testing before mastery had been attained. Indeed, Tsai et al. (2011) observed that SE decreased in the period immediately after the intervention before recovering to an increase from baseline after three months, indicating again that time to practice was needed to obtain mastery. In the single session interventions, mastery was incorporated by asking the participants to recall and explore incidences of previous mastery (McDowall & Butterworth, 2014; McDowall et al., 2014). Therefore, as with the WM studies, the practice/rehearsal/mastery element is highlighted as key in successful interventions. The cohesion between learning goals and socially interactive development of SE facilitated consistently successful outcomes.

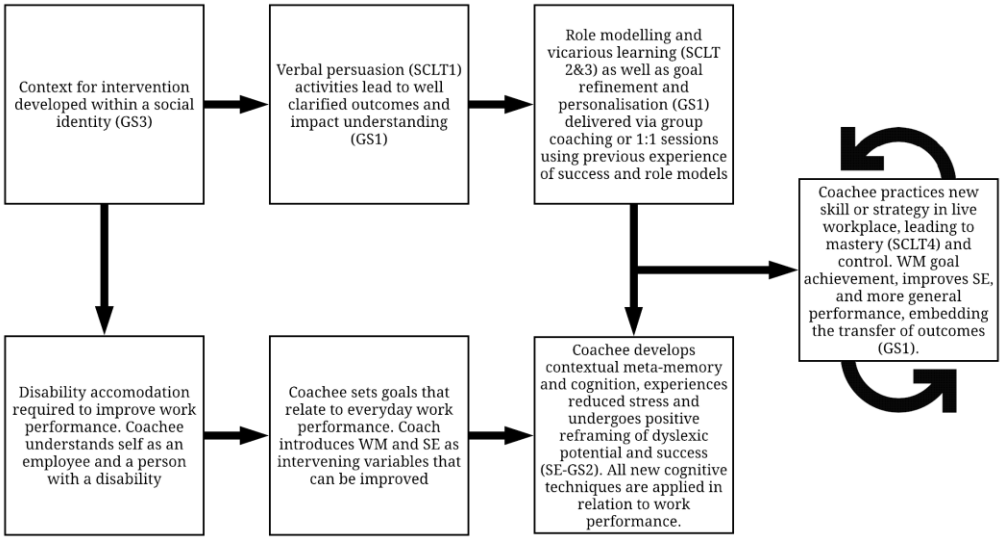
Discussion

The results of my narrative systematic review reinforce the view that an insufficient number of studies have evaluated learning or coaching activities for dyslexia, or any other relevant context/population with robust and appropriate study designs. Given the relatively small number of studies reviewed overall, the implications for research and practice outlined below are limited and are interpreted with caution. My propositions are thus viewed as inductively derived tentative hypotheses for further testing in studies with an appropriately sampled, longitudinal design as intended within this thesis.

I now outline my findings regarding my primary research question: 'to what extent, and under what conditions, can face-to-face (C) learning interventions (I) improve WM (MO_1) and SE (MO_2)'. Fidelity to SCLT and GST protocols provided consistent evidence of the effectiveness of coaching to improve SE, supporting coaching practice. Evidence that coaching improves WM was less consistent and also apparently contingent on fidelity to SCLT (in particular mastery experiences) combined with development of self-awareness and/or stress management through metacognitive practice. The salient mechanisms are described in Figure 4.3: which depicts a proposed intervention protocol. I note with caution that an active goal-setting component was inferred through the intervention description rather than through explicit statements in the studies with the exception of McDowall et al. (2014). The lack of detail in intervention protocols and reliance on my interpretation of key phrases such as 'discussion' and 'reflection' to infer dialectic principles was a limitation of the synthesis. Grey literature was not included in this extraction and, though this was a deliberate attempt to isolate research-based evidence regarding psychological variables to refute or vindicate contemporary practitioner guidance (Bartlett et al., 2010; McLoughlin & Leather, 2013), systematic review of practitioner evidence may yet strengthen the findings.

Figure 4.3

Proposed pathway for development of WM and SE in coaching



The consistency between the WM and SE studies regarding the application of the SCLT was surprising and clearly showed that any new skill, including development and management of cognitive function such as WM, needs to be facilitated while considering the individual learner's social and metacognitive experience; additionally, particular attention should be devoted to practice opportunities when developing a new skill. WM skills, which are reported to be of highest concern to our target population, cannot simply be 'taught'; learners must develop them for themselves, with support and reflection on mastery opportunities (this has some support in clinical literature, see Valentijn et al., 2006).

Relevance to dyslexia coaching

I now address the heterogeneity in samples and lack of dyslexia-specific studies by directly analysing any differences in population or intervention protocols that would inhibit transfer to dyslexia adjustment coaching, in order to assess whether, in principle, the findings of the synthesis could be applied to such a specific context.

Population. The search protocol included a broad age range (from 7 to 75 years); however, the target population was working adults. Successful studies included all age ranges and when combined, the results demonstrated that in principle, improvement in WM was possible regardless of age. All SE studies were based on working age adults and were

therefore directly comparable but, in particular, I note McGonagle et al. (2014), who provided coaching as a disability adjustment to a sample of working adults. The samples of individuals with dyslexia were not extracted directly, but when dyslexia or other developmental learning difficulties were included in the samples, improvements did occur (Alloway & Warn, 2008; Ariës et al., 2014; Miranda et al., 2013). Gender was well-balanced between the studies and did not affect the results. The population comparison did not clearly support applicability to adults with dyslexia, but I conclude that there is potential for generalisability, thereby providing the required premise for further direct evaluation research as outlined in chapters five and six.

Intervention protocol. The current practice in dyslexia coaching is to provide an average of 4-5 sessions delivered on a one-to-one basis (Doyle & McDowall, 2015). The extracted studies that matched this structure were broadly successful, indicating that typical dyslexia coaching protocols may potentially meet the requirements of facilitating WM and SE improvement; however, the quality of coaching and adherence to SCLT and GST may be as important as sufficient intervention time. Indeed time spent in coaching has not yet been found to be a significant determinant of outcome in more general workplace populations (Jones et al., 2016; Theeboom et al., 2014).

One major difference between the extracted studies and the current models of dyslexia coaching is the use of group versus one-to-one training. Some studies included one-to-one elements (McDowall & Butterworth, 2014; McDowall et al., 2014; McGonagle et al., 2014), yet all intervention protocols except one (McGonagle et al., 2014) reported some element of group discussion, peer coaching or coaching triads. The one-to-one intervention achieved a positive result; however, a greater understanding of the group dynamics in WM and SE outcomes is needed. It is possible that a dyslexic population might benefit further from group coaching, but no studies have compared the impact of group coaching with one-to-one protocols.

Chapter Summary

In summary, though my extracted studies did not match my target population, I addressed the fundamental challenge of reviewing diverse research to provide a narrative, conceptual framework to support further, primary studies. Whilst I noted the small number and variable quality of primary studies, the results from the WM synthesis appeared to question the effectiveness of current research interventions, insofar as the evidence for real world outcomes appears limited; an observation echoed by some contemporary authors (Chaytor et al., 2006; Söderqvist & Nutley, 2017). In relation to dyslexia interventions in the workplace, I argue for greater contextualisation of any interventions, which should pragmatically combine neuropsychological, behavioural and social variables into a biopsychosocial model of dyslexia to build on the existing, comparatively robust evidence regarding effective literacy support and the development of SE. I conclude that there is sufficient demonstration of principle to warrant further dyslexia-specific research using the coaching protocol in figure 4.3.

Chapter Five

Does it 'Work'?

A Quasi-Experimental Evaluation of the Impact of Dyslexia Coaching upon Working Memory, Self-Efficacy and Work Performance.

The focus of this chapter is a coaching intervention evaluation. I aim to continue developing the theoretical understanding of how and why coaching may act as an intervention for dyslexia by measuring mechanisms/outcomes of working memory, self-efficacy and work performance, within a quasi-experimental field study of mid-career dyslexic professionals in the UK. To introduce, I build on the knowledge extrapolated so far from related research documented in chapters one and two, the survey results from chapter three and the narrative synthesis presented in chapter four, by outlining in more detail (1) a conceptual definition of coaching to be applied in the study and (2) interpretation of the mechanisms of interest. I then (3) describe a protocol designed according to the framework proposed in the previous chapter. This study received approval from the Ethics Committee at the University of Surrey.

Conceptual framework: the intervention

An operational model of coaching for dyslexia. The following terms are used in dyslexia practitioner literature to describe dyslexia-specific coaching (as opposed to the workplace coaching outlined in chapter two): strategy training, dyslexia tuition, support work, coaching (Bartlett et al., 2010; European Dyslexia Association, 2016; McLoughlin & Leather, 2013). These terms hint at nuances in the pedagogy that affect the learner experience, varying from a predefined list of techniques that must be learned, which is more appropriate to the development of spelling, for example; to the development of new skills and abilities in partnership with a facilitator, which is appropriate to developing good time management or organisational skills (Hock, 2012; Swanson, 2012). Analogous to workplace coaching, the dyslexia coach need not hold expertise in the coachee's specific occupational practice (Jones et al., 2016) but can instead facilitate the "optimis[ation] of a person's work-related functioning" (Theeboom et al., 2014, p3), negotiating the manner in which their dyslexia affects performance of their role, and the meso-level interaction of the organisation in supporting the role. An operational definition of coaching, specific to the current delivery of UK dyslexia adjustments, congruent with definitions of workplace coaching outlined in chapter two and the hypothetical pathway synthesised in chapter four, is presented in Mcloughlin and Leather's practitioner manual (2013, p.43):

> "Coaching: this is a partnership and more androgogical approach, in which the learner ultimately takes control of their own learning and progression. The aim is to help and increase the individuals' awareness of what they need to do to improve their performance or develop a particular skill."

Carol Leather's work has further recommended the notion of developing self-awareness, congruent to chapter four's synthesis, indicating that successful people with dyslexia are metacognitively aware of their thought processes, which supports memory difficulties and enhances their self-efficacy (Leather et al., 2011). The coaching model applied in this study operationalises McLoughlin and Leather's conceptual definition of a coaching intervention in order to evaluate the outcomes for those at work. This definition is consistent with the intervention principles extracted from chapter three and the Coaching Alliance principles mentioned in chapter two (Baron & Morin, 2009; Gessnitzer & Kauffeld, 2015; de Haan & Duckworth, 2012).

Coaching as a disability accommodation. Three problems need to be addressed in considering the application of the above coaching definition to disability accommodation: lack of detail regarding intervention activities and exercises; the balance of power between coachee, employer and coach; as well as the use of groups versus one-to-one. Below I outline each issue and how they will be addressed within my intervention protocol.

Firstly, chapter four highlights that research papers tend to (1a) give scant descriptions of coaching pedagogy and intervention protocols, which limits replicability and practice guidance and that they are (1b) lacking theoretical framing regarding *how* coaching impacts on work performance for these different types of conditions and disabilities. The lofty aims of McLoughlin and Leather's definition are disconnected from appropriate intervention activities; I aim to address this with more detailed description of SCLT compliant activities and measurement of the potential intervening variables of WM and SE.

Secondly, the legal premise of disability accommodation is to prevent unemployment that happens as a cause of the disability, to create the conditions for the employee to be able to "carry out the tasks and demands of the role" (ACAS, 2016). For employment to sustain, workplace performance must reach (or remain at) an acceptable level for the employer; these judgments are subject to inaccurate perceptions of capability by supervisors (Colella & Varma, 2001) and bias in the allocation of performance responsibility between employee and organisation (Kemp, 2008). A supervisor, who must act protectively towards both the individual and the organisation, influences the sustainability of

employment. Additionally the input required to achieve performance must be at an acceptable level for the employee, who may already feel that they are working harder than their peers (Doyle & Cleaver, 2015). This instigates a power dynamic and potential imbalance between the coach (employer-sanctioned provider) and coachee (fearing unemployment or overwork), which could adversely affect the relational nature of the intervention (Welman & Bachkirova, 2010). Though inclusion of the employer as a stakeholder is well-recognised in coaching psychology and stress management research (Nielsen & Randall, 2013; O'Broin & Palmer, 2010), the disability-specific studies cited in chapter two include few employer ratings of performance and instead rely on tenuous proxy-dependent variables such as job satisfaction (McGonagle et al., 2014). For these reasons, I have included supervisor reported feedback on work-related performance; a positive perception on the supervisor's part being likely to reflect positive outcomes in job retention. I also provided a workshop for supervisors to explain the nature of dyslexia and work and provided a forum for discussion of the intervention aims.

Thirdly, and contrary to the current dyslexia coaching practice in the UK that I am evaluating, many of the WM intervention studies in chapter four involved peer-based coaching workshops, rather than one-to-one coaching alone (Ariës et al., 2014; Chambers et al., 2008; Miranda, Presentacion, & Soriano, 2002; Moro et al., 2015). In the context of our specific client group, Gerber (2012, p. 44) asserts that for dyslexia, "social supports are important for successful adjustment in the variety of adult domains", which supports the inclusion of a group condition in addition to the practice norm of one-to-one. SE-focused interventions are also often delivered in a group setting with peers (Lloyd, Bond, & Flaxman, 2017; McDowall & Butterworth, 2014); though there is much more variety than observed with WM studies as per the previous chapter. Group coaching more naturally mirrors the development of self-efficacy according to Bandura's (1986) original SCL Theory through the natural inclusion of vicarious learning opportunities via the peers in the group. Group coaching may therefore result in greater improvements than one-to-one coaching, both a group coaching protocol and a one-to-one protocol were therefore included, in order to compare outcomes.

Conceptual framework: the mechanisms and outcomes

While there are a significant number of potential output variables documented in the coaching literature, the focus for the current chapter was to consider *if* coaching is working for dyslexic people (i.e. does work performance improve) and *at what level* it is working (i.e. are improvements within a cognitive, behavioural, psychosocial or emotional domain).

Following the limitations of the WANSS structure reported in chapter three, care was taken not to over burden participants with lengthy questionnaires, selecting minimal measures in each domain. I acknowledge that this action limits the scope of the study to answer such a broad research question; further research will yield the accumulation of evidence and this primary study merely begins the process.

The overlapping, interactive importance of domains is reported in the dyslexia literature. De Beer et al (2014) used a predetermined taxonomy of workplace participation, originally developed for considering the impact of a range of disabilities on employment (WHO, 2001), to map which categories were salient for dyslexic adults. The review articulated a breadth of relevant research related to the category of 'mental functions', alluding specifically to memory and indeed executive functions more broadly, as well as a range of psycho-social impacts to self-esteem, communication and social identity. Gerber's (2012) review highlighted the need for the development of 'mental control over memory and concentration', and noted that employment and economic success for adults with dyslexia was predicated on SE. These dyslexia-specific reviews, triangulated with the data gathered through chapters three and four, suggest a preliminary theoretical foundation where cognitive domain capacity in working memory (WM) is strengthened through activities targeted at equipping individuals to improve their memory. The reviews presented so far also indicate that these should be paired with equally important, socially-contextualised activities to boost self-efficacy (SE, psycho-social domain). I now describe the developing knowledge regarding each mechanism and make a grounded prediction as to how each will behave as a result of a coaching programme intervention.

Working Memory. Though WM tests measure the cognitive domain, the question of at what level WM improvements become manifest is potentially more complex. The literature is not clear as to whether WM improvement occurs at (1) the cognitive domain level, i.e. changing the internal thought processes of an individual such that they are better able to remember or develop increased capacity, as is the case in computerised training and some coaching interventions (Ariës et al., 2014); (2) an emotional level, i.e. decreased stress create more WM capacity (Chambers et al., 2008; Jha et al., 2010) or whether; (3) behaviour around WM changes so that people are simply placing fewer demands on themselves and learning to cope with their (stable) WM capacity (Moro et al., 2012, 2015).

Data were therefore collected measuring cognitive working memory capacity, an emotional domain item and behavioural domain aspects of managing working memory at work. Based on the analysis in chapter four, it is likely that all domains will result in

improvement following coaching, though it is not clear whether they are related and if so, how.

H1a: Participation in one-to-one and group coaching will positively affect the WM cognitive capacity, emotional management and working memory-related behaviour of adults with dyslexia when compared to a control group.

H1b: The group coaching condition will experience an improvement equal to or greater than that of the one-to-one condition for all measures related to WM and emotional management.

Self-efficacy. Coaching as an intervention has been shown to develop SE in a variety of contexts, including task-specific learning (Tsai et al., 2011; Watt et al., 2011), leadership (Moen & Allgood, 2009) and indeed disability support (McGonagle et al., 2014), as well as self-efficacy for its own sake (McDowall & Butterworth, 2014). Furthermore, there is a strong correlation between SE, a psychosocial domain mechanism and the emotional domain (De Caroli & Sagone, 2014; Judge, Thoresen, Bono, & Patton, 2001) and so the limited emotional domain measure for WM (as above) could be augmented by the inclusion of SE. For this study, general SE was prioritised; specific SE and expanded emotional management measures are further explored in chapter six.

H2a: Participation in one-to-one and group coaching will positively affect the general self-efficacy of adults with dyslexia when compared to a control group.

H2b: The group coaching condition will perform better than the one-to-one condition for general self-efficacy.

Work-related Performance Measures. The evidence presented so far suggests that coaching activities are capable of improving dyslexic difficulty at work in tandem with improved WM and SE, though this can be inconsistent as shown in chapter four. Though SE and WM remain the *intervening* mechanisms of interest, in order to assess whether coaching is a 'reasonable' disability adjustment, it is necessary to collect contextual measures (namely work performance) as a more definitive outcome. The present study was time-limited and I was therefore unable to follow up further than three months to assess rates of job sustainability and promotion, so a dyslexia-specific work-related performance scale was constructed, drawn from preliminary work from a pilot study (Doyle & Mcdowall, 2015) and guidance provided by UK-based practitioners involved in the delivery of coaching support

(Doyle, Cleaver, & Rossiter, 2016; McLoughlin & Leather, 2013; Bartlett et al., 2010) (Table 5.3).

H3a: Participation group coaching will improve the work-related performance of adults with dyslexia, equal to or greater than one-to-one coaching, as rated by the coachee; both groups will be significantly improved compared to a control group.

As well as the power dynamic and legislative considerations outlined in chapters one and two, measuring work performance from the perspective of self-reported data versus organisational level outcomes is known to be unreliable (Jones et al., 2016) and therefore supervisor ratings were collected. In previous research, supervisors reported a significant improvement in work-related performance following coaching (before and after within-group comparison, Doyle & McDowall, 2015). I aim to replicate this finding using both a working memory behavioural measure and the work performance items, using a more conservative, between controlled groups design.

H3b: Participation in one-to-one and group coaching will improve the work-related performance of adults with dyslexia as rated by their supervisor, when compared to a control group.

In chapter four, I proposed that WM cognitive capacity may develop independently from more contextual measures, yet more closely to SE, and therefore in this study I propose to assess the extent to which the various output domains are correlated, eliciting any potential relationship between cognitive, behavioural and psycho-social domains. Again, based on the findings from chapter three, I suggest that WM gains will not be significantly correlated with behavioural (contextual) gains but will be correlated with improvements in SE.

H4a: Cognitive WM improvement will not be significantly correlated with behavioural measure of improvement in work-related performance or behavioural management of working memory symptoms.

H4b: Cognitive WM will be significantly correlated with SE improvement.

Summary of study aim

The aim of the present study was primarily to begin addressing the significant gap in dyslexia research regarding interventions to support adults in occupational settings, using a control group comparison and longitudinal design. Coaching was selected as an intervention due to its popularity and application as a disability adjustment in the UK (see chapter three, as well as its theoretical plausibility described in chapter four. Coaching in this context is specifically defined as workplace coaching: a 'person-centred and androgogical approach' (McLoughlin & Leather, 2013) that focuses on positive improvement of workplace ability, able to act via cognitive, emotional and behavioural domains (Bozer & Jones, 2018; Theeboom et al., 2014). One-to-one coaching protocols were conducted in order to provide the much-needed evaluation of current practice, and a group coaching protocol was included in response to the extant literature concerning the development of SE and WM. Supervisor ratings were included as these are important from the perspective of protecting employment. Through fidelity to the protocol principles synthesised from the narrative systematic review, followed by evaluation of potential mechanism and outcome variables, including SE and WM work performance-related, contextual measures, this study aims to further our knowledge of the impact of coaching upon adults with dyslexia.

Method

Organisational setting and participants

I advertised the study with several large councils across the UK, on the premise that these organisations have sufficiently large numbers of employees from which to recruit a cohort of dyslexic adults. I conducted the study with a UK county council (local government) working with the human services department, which often have higher than average prevalence rates of dyslexia (Taylor & Walter, 2003). Volunteers were recruited from staff in the adult services department, comprising predominantly of social workers, their supervisors and administrative staff, forming a mature sample of mid-career adults.

The volunteers were self-identified as dyslexic and many had not received a formal diagnosis through psychological testing; rather screening tools applied through charities or in education. A basic assessment of core cognitive abilities (Weschler, 2008) was therefore used to provide a benchmark for all participants and to provide a minimum validation for those who did not have a formal diagnosis. I drew on the advice of the British Psychological Society (McLoughlin & Doyle, 2013) and included participants who had a significant difference between working memory and perceptual reasoning and/or verbal comprehension (Grant, 2009). This was a crude but pragmatic method which would identify those most likely to benefit from the intervention, i.e. address comparatively low working memory ability. Table 5.1 shows the baseline normative data.

Table 5.1.

Baseline demographic data for the three conditions

	Condition 1 (1:1 coaching): *N = 22*		**Condition 2 (control) *N = 22***		**Condition 3 (group coaching) *N = 23***		**1 way ANOVA or equivalent**
	M	*SD*	*M*	*SD*	*M*	*SD*	
Age (yrs)	39.5	9.34	39.4	10.17	42.6	9.46	F (2,61) = 0.751, p = .476
Gender	1.72:1		1.9:1		1.6:1		Ratio of women to men weighted towards women
Age left education (yrs)	20.6	5.2	18.9	3.6	19.4	3.6	K (2,63) = 1.421, p = .491
Tenure	2.9	1.5	3.9	1.66	3.8	1.75	K (2,64) = 4.530, p = .104
VCIQ*	102.0	10.96	96.95	8.94	104.63	11.06	F (2,62) = 3.024, p = .056**
WMIQ*	91.45	10.55	91.90	10.49	91.68	10.96	F (2,62) = 0.010, p = .990
PRIQ*	109.2	12.06	105.57	11.57	105.59	9.96	F (2,62) = 1.284, p = .284
PSIQ*	92.68	11.54	90.95	15.04	91.27	10.71	F (2,62) = 0.117, p = .890

**These relate to the four indexes of the Weschler Adult Intelligence Scale IV (WAIS IV; Weschler, 2008) respectively Verbal Comprehension, Working Memory, Perceptual Reasoning and Processing Speed.*

***although this variable shows a near significant difference between the groups, bi-variate correlation analysis indicated no significant relationship between VCI and the dependent variables at any interval.*

I employed a quasi-experimental field design to evaluate the effectiveness of one-to-one and group coaching compared to a waiting list control group. The approach mirrors the 'pragmatic, randomised control trial' method employed by McGonagle et al. (2014) in that employees were initially randomly assigned to one of three conditions: one-to-one coaching, group coaching and wait-list control. However, volunteers were allowed to state a preference for a condition due to any pressing logistical or personal circumstances. The groups were adjusted to accommodate the seven requests we received. Biographical data were collected to ensure that the groups were balanced in extraneous variables as shown in Table 5.1. Four participants were moved from one-to-one coaching to control in order to balance the groups before the research commenced. Attrition, a common issue in longitudinal field research (Zahrly, 1990), was a problem for all three cohorts and while I commenced the study with 67 participants, by T3 some data sets had fewer than 20 results.

Nine from the wait-list control group left the study because their need for coaching and other adjustments became pressing and they felt their employment to be at risk if they continued to wait; we had advised at consent stage that they should consider their job security paramount and even provided guidance as to how to move forward with 'Access to Work' should they feel concerned. Other individuals simply failed to present for testing or failed to return questionnaires, despite prompting.

Design and Intervention Protocol

The intervention was delivered over a six month period, with the six coaching sessions delivered at two week intervals, followed by a three month break between the data collection immediately after the intervention and the follow-up collection. To reduce absence from the organisation and therefore minimise disruption, the participants were split into three cohorts, each one receiving the same coaching and data collection process but sequentially rather than in tandem. The entire intervention and data collection period spanned eighteen months with three cohorts. As a control of the influence of organisational context upon intervention success, a measure of job satisfaction (Greenhaus, Parasuraman & Wormley 1990: see Appendix 5.3) was taken at all three intervals for each cohort. A total of six sessions were provided for the group condition and four sessions for the one-to-one coachees. Although this creates variance between the two cohorts, it mirrors existing practice in the UK, where the average one-to-one coaching programme is four sessions (Doyle & McDowall, 2015) yet (relying on evidence from my own, non-profit, practitioner organisation where 2000 individuals per annum receive support) group interventions typically receive six sessions. Each participant underwent testing at three intervals: before (T1); upon completion (T2) and three months after completion (T3) and all tests were conducted by a psychologist on the British Psychological Society's Register of Qualified Test Users with an MSc in Occupational Psychology. To reduce bias, blind controls were applied such that the testing psychologist was unaware of the condition to which each individual belonged. The first test session typically lasted 60-90 minutes covering control variables of IQ, de-briefing of the results and the collection of the first questionnaire; the subsequent tests immediately after and three months afterwards took between 10 and 20 minutes as only a measure of WM collection was repeated. Questionnaire collection at T2 and T3 was conducted electronically. Table 5.2 summarises the measures taken at each time interval. A summary of all means and standard deviations for the three intervals is presented in the results section, see table 5.4.

Table 5.2.

Summary of the context, intervention and dependent variables for the study

Context	**Intervention**	**Intervals**	**Dependent Variables**	**Measure used**
Adults with dyslexia in a UK local government workplace	1) One-to-one coaching 2) Group coaching 3) Control group (wait-list)	T1 – before intervention T2 – immediately after intervention T3 – three months after intervention	(1) Working memory (2) Self-efficacy (3) Work-Performance	1a) Digit-Span (cognitive domain) 1b) WMRS (behavioural domain)* 2) GSES (psycho-social domain) 3a) WM-related items (behavioural domain)* 3b) Stress item (emotional domain)* 3b) SE-related items* (behavioural domain)

** Ratings were collected from both coachees and supervisors for these measures.*

Content of the coaching intervention. In order to achieve acceptable consistency between the various one-to-one and group coaching protocols, the same coach delivered all interventions and was briefed in advance regarding the (1) theory, (2) delivery and (3) content of the coaching. These were aspects that could be held constant across condition and cohort, though there is dynamic tension between this and the need for flexibility to respond to individual needs and, as such, the coach was instructed to prioritise coachee and employer requirements before those of the research (Diochon & Nizet, 2015). To manage the conflict, the coach was briefed as to what was essential and where flexibility could be incorporated. Firstly, from a theoretical perspective, SCLT was used as the guiding protocol for the programme of sessions. This involves:

1. initially verbally exploring a subject and ascertaining objectives (‘verbal persuasion’, also Goal Setting);

2. considering past experiences of success and difficulties in each subject (both personally, representing 'mastery' and considering others who are exemplars of the desired skills, representing 'role-modelling');
3. inviting discussions of best practice in the coachees immediate environment ('vicarious learning' and 'role-modelling') and;
4. devising of new, autogenic strategies or behaviour with follow up reflection in the subsequent session ('mastery').

SCLT mirrors other accounts of best practice in workplace coaching, which describe multi-source feedback and cycles of practice and reflection (Jones et al., 2016). The coach facilitator was employed in the delivery of coaching for adults with dyslexia and was specifically trained to Level 5 in Professional Workplace Coaching (ILM, 2011). The coach was additionally trained in the use of 'Clean Language'; a conversational coaching tool which reduces the influence of the facilitator in the coachee's meta-cognitive experience (Tosey, Lawley, & Meese, 2014). This technique is used to nurture self-guided thought which is known to improve coaching outcomes (Gessnitzer & Kauffeld, 2015), including specifically for dyslexia (Doyle & McDowall, 2015; Hock, 2012). Clean Language has the added advantage of being deliverable at the group and individual level (Doyle, Tosey, & Walker, 2010; Walker, 2014) and therefore allowed for consistency across the intervention conditions whilst accommodating key skills reported as essential within workplace coaching psychology research such as listening (Hawkins & Schwenk, 2010; Lai & McDowall, 2016; O'Broin & Palmer, 2007). Aside from these stylistic parameters, the coach was given free rein to adapt the coaching content, examples and pace to suit the needs of the individual and group, as would be appropriate in dialectic, reflexive practice. At the same time, the coach ensured that, as a minimum, the following topics were covered in all programmes: memory, stress management, organisational skills, time management and spelling (Doyle & McDowall, 2015).

Delivery consistency was calibrated through reflection with the coach following the study, which indicated that the following activities were covered with all participants: (1) development of metacognitive awareness through silence, observation and discussion (Coutinho & Neuman, 2008); (2) Metacognitive exercises such as 'Kim's Game' to work on memory and spelling exercises (Fisher, 2006), de-briefed in groups, pairs or individually with Clean Questions (Tosey et al., 2014); (3) time management and organisational approaches using 'Clean Space': a metacognitive exercise for resolving conflicts between desired outcomes and practical realities (Lawley & Manea, 2017); (4) emotional

development ‘Triune Brain’ and ‘Drama Triangle’, two models for understanding how our emotional states are affected by, and can be improved via, physiology (Palmer, 2013) and relationships at work (Burgess, 2005) and; (5) Goal Setting using the ‘GROW’ model (Whitmore, 1992). These activities are faithful to SCLT. Three SCLT elements (verbal persuasion, role-modelling and vicarious learning) were reported to have been achieved during the group coaching discussion sessions, whereas mastery opportunities were provided between sessions as the coachees tried out new ideas at work, and then reflected upon them during subsequent sessions. For the one-to-one conditions, the coach confirmed that coachees overcame the reduced opportunity for role modelling and vicarious learning by identifying role models amongst their colleagues and friends, with whom they discussed different topics such as memory strategies with them between sessions.

Outcome measures

Working Memory. Cognitive Working Memory ability was assessed at T1 using the Digit-Span task from Weschler Adult Intelligence Scale version four (WAIS IV; Weschler, 2008). At T2 and T3 the Digit-Span equivalents from the Wide Range Assessment of Memory and Learning (WRAML: Sheslow & Adams, 2003) and the Test of Memory and Learning (TOMAL: Reynolds & Voress, 2007) were used interchangeably, which avoided practice effects as the structure of the Digit-Spans tasks are slightly different in each test. The two subsequent tests are significantly correlated with Weschler measures and to each other (r=.6 - .69; Reynolds & Voress, 2007; Sheslow & Adams, 2003); ANOVA analysis confirmed that the test use was not a significant predictor of WM results. All WM tests produce age-normed, standardised scores which range from 1-19, the average being 8-12.

Working Memory-related behaviour was analysed using the Working Memory Rating Scale (WMRS; Alloway et al., 2008). The items (which operate on a four point scale: not typical (0); occasionally (1); fairly typical (2); very typical (3)) were adapted to be relevant to adults through consultation with the British Psychological Society’s working group on Neurodiversity and Employment, whose membership is predicated on practitioner expertise and pedigree. An example item is “does not remember spoken instructions accurately and fully. May remember and act on some, but omits others.” There were insufficient returns for a principle components analysis of the adapted scales, though Cronbach’s alpha indicated high internal consistency when the updated item responses were analysed at T1 by coachees (α=.901) and supervisors (α=.938) and with reasonable inter-item correlations (Cortina, 1993; mean for all items was α=.35). I took the decision that the

adapted items were sufficiently reliable, and with high face validity, to accept the scale as a tool. Both the original and adapted scale is in Appendix 5.1.

Self-efficacy. Generalised self-efficacy (GSES), a sub scale from the Core Self Evaluations Scale (Judge, Locke, Durham, & Kluger, 1998), was selected as a robust and well-evaluated measure of SE, due to its high correlation with work performance (behavioural domain) and well-being at work (emotional domain) (Andersson et al., 2014; Grossman & Salas, 2011; Judge et al., 2001; Stajkovic & Luthans, 1988) and was repeated at all three intervals. The items were measured using a five point Likert scale indicating agreement / disagreement with statements, for example "I usually feel that I can handle the typical problems that come up in life". The full scale is in Appendix 5.2.

Work performance. Work performance was measured again using a simple five point Likert scale rating of self-reported confidence in ability across 13 items, drawn from advice given by practitioners as most likely to be affected by dyslexia (Doyle et al., 2016; McLoughlin & Leather, 2013; Bartlett et al., 2010). Items were selected to match the coaching priorities highlighted in chapter three and previous pilot research (Doyle & McDowall, 2015). While again my total sample of 67 did not allow for principle components analysis, alpha co-efficients were conducted to explore the internal consistency of this scale. The items returned good co-efficients for coachee (α=.77) and supervisor ratings (α=.87). Further analysis of construct validity was conducted by correlating the items with other measures at all time intervals. Seven items in the work performance were found to be significantly correlated with the WMRS at T1-T3 (r=.480 – r=.731, all p<.001) and five items were found to be significantly correlated with SE at T1-T3 (r=.217 – r=.495, all p<.001). One item, managing stress, did not correlate well with either subscale and was therefore analysed separately as a single item pertaining to the emotional domain. Though this does not represent a thorough analysis of stress, there is some justification in grey literature for such an action (Houdmont & Randall, 2018) and it is less burdensome than including a longer, empirically-validated stress scale. Inter-item correlations at T1 for coachees were α=.310 for the WM related items and α=.421 for the SE items which I deemed as sufficient to proceed (Cortina, 1993). Table 5.3 shows the items in the scale and their relationship to the other measures. Following these analyses, I determined to analyse the work performance items as three separate subscales: WM related work performance, SE-related work performance and a single item of managing stress.

Table 5.3

Items on the work performance scale correlated with WM and SE

	Item- how confident do you feel about…	***Correlation coefficient***
WM related work performance	Remembering verbal instructions	*r*=.480** - .731**, with WMRS
	Remembering verbal information (e.g. codes, numbers, names)	
	Concentrating in an open plan office	
	Planning and prioritising your time	
	Keeping track in meetings	
	Finding and organising your belongings and kit	
	Keeping track of what you have to do	
	Managing stress	*Not correlated; analysed separately*
SE related work performance	Knowing your strengths	*r*=.217* - .495,** with self-efficacy
	Sharing ideas at work	
	Disclosing your dyslexia at work	
	Asking for practical support at work for your dyslexia	
	Asking for emotional support at work for your dyslexia	

Data analyses

Analyses were conducted using *g*-power 3.1, SPSS v24 and Microsoft Excel 2007. I screened the data to assess parametric assumptions and proceeded to remove one outlier with elevated working memory scores across all intervals; his three interval scores were consistent with the overall pattern of his cohort and condition, however the exceptionally high numbers skewed the data unnecessarily. I analysed the data with ANOVA and post-hoc *t*-tests and adjusted the stringency of the ANOVA model as far as observed power in the model would allow. To reduce the chances of family-wise Type-1 error in the questionnaire analysis, Bonferroni Corrections (Field, 2013) were made to the *p* value, for both cohorts of respondents: the coachees and the supervisors. There were 3 comparisons (group, one-to-one and control) at 3 intervals (before, immediately after and 3 months after) across three

tests (work performance, WMRS and GSES) for the coachees and two measures (work performance and WMRS) for the supervisors, resulting in respective adjusted values as follows: coachees p=.05/9 (.0056); supervisors p=.05/6 (.0083). Having split the work performance Scale into three separate means for analysis, it could be argued that the Bonferroni correction to the alpha value should be reduced further, resulting in 3 (groups) + 3 (intervals) + 5 measures, resulting in k=11, for the coachees and 3 + 3 + 4, resulting in k=10 for the supervisors. However, it has been suggested that applying these corrections is too stringent, and results in a risk of a Type II error. Dividing k by 1.5 and rounding to the nearest integer is recommended when the number of tests is greater than 3 (Perrett & Mundfrom, 2010). This resulted in a correction of 7 for both coachees and supervisors and a consequent adjusted alpha of p=.007.

Due to the overall statistical power in the model resulting from attrition, effect sizes were calculated on some comparisons, despite a technically non-significant result. Effect size partial eta squared was calculated within the ANOVA models in SPSS for multiple group comparisons. For comparisons between two means I calculated Cohen's d , using the means and standard deviations (SD – these were taken from the control group or the T1score as appropriate; Durlak, 2009).

The WM standard score data were subjected to further analysis, since observation of the raw data indicated a clear subset within the intervention groups: those who experience no improvement at all and those who experience improvement. This variation within the sample was explored using k-means cluster analysis.

Improvement scores were computed for each dependent variable by subtracting the T1 score from the T3 score; these were then subjected to correlation analysis to compare the magnitude of effect and direction of travel between the variables.

Management of bias

As well as the pragmatic randomisation of condition allocation and blind testing of WM, two further methodological precautions were implemented to reduce any influence of research bias. Firstly, the delivery of the coaching and the group coaching was conducted by an experienced practitioner, who did not know the participants' baseline scores. Secondly, the data were sent to the primary researcher with codes for condition, rather than names, and the initial data analyses were performed blind. All analyses were checked by the primary supervisor, also under blind controls.

Results

The control variable of job satisfaction found no differences between intervention groups at any interval (F=0.185-2.353, p=.104-.831). There was a significant difference between cohorts at T1 (F=4.166, p=.021); this was revealed with post hoc testing to refer to one difference where the last cohort scored significantly lower than the first cohort (mean difference -.493, SE .173, p=.019). At the third interval there was a near significant difference (F=3.305, p=.051), again with the last cohort scoring less than the first (mean difference -.675, SE .267, p=.019). However, the second interval was reasonably homogenous (F=0.848, p=.453). Bi-variate correlations at T3 indicated that job satisfaction at T3 was moderately significantly correlated with SE (r=-.431, p=.014) and the stress item (r=.399, p =.024).

Table 5.4 shows the means and standard deviations for all outcome variables. The number of participants is included for each variable at each interval as there was some inconsistency and considerable attrition.

Table 5.4

Number of participants, means and standard deviations for all outcome variables, by condition and interval.

Measure	**1:1**			**Group**			**Control**		
	T1 ***N*=** ***M* (*SD*)**	**T2** ***N*=** ***M* (*SD*)**	**T3** ***N*=** ***M* (*SD*)**	**T1** ***N*=** ***M* (*SD*)**	**T2** ***N*=** ***M* (*SD*)**	**T3** ***N*=** ***M* (*SD*)**	**T1** ***N*=** ***M* (*SD*)**	**T2** ***N*=** ***M* (*SD*)**	**T3** ***N*=** ***M* (*SD*)**
Verbal working memory	*N*=22 7.95 (1.53)	*N*=15 8.03 (2.29)	*N*=14 8.93 (1.6)	*N*=23 7.96 (2.03)	*N*=19 8.74 (3.40)	*N*=19 9.34 (2.10)	*N*=22 8.31 (1.76)	*N*=16 9.41 (2.43)	*N*=13 8.15 (1.92)
WMRS (coachee)	*N*=21 1.38 (0.67)	*N*=16 1.06 (0.46)	*N*=11 0.81 (0.31)	*N*=22 1.39 (0.48)	*N*=16 1.00 (0.45)	*N*=13 0.96 (0.45)	*N*=19 1.28 (0.47)	*N*=16 1.22 (0.40)	*N*=9 1.35 (0.40)
GSES	*N*=21 2.26 (0.43)	*N*=16 2.11 (0.63)	*N*=11 1.73 (0.45)	*N*=22 2.62 (0.63)	*N*=16 2.24 (0.62)	*N*=15 2.39 (0.71)	*N*=19 2.46 (0.52)	*N*=15 2.38 (0.72)	*N*=8 2.52 (0.57)
Job Perf. (WM)	*N*=21 2.88 (.65)	*N*=16 3.53 (.51)	*N*=10 3.71 (.49)	*N*=20 2.79 (.62)	*N*=16 3.55 (.55)	*N*=15 3.51 (.42)	*N*=18 2.99 (.43)	*N*=16 3.09 (.52)	*N*=9 3.07 (.35)
Job Perf (SE)	*N*=21 2.98 (.78)	*N*=16 3.49 (.88)	*N*=11 4.00 (.38)	*N*=22 2.99 (.69)	*N*=16 3.88 (.77)	*N*=15 3.65 (.81)	*N*=19 2.86 (.70)	*N*=16 3.19 (.80)	*N*=9 2.91 (.54)

Stress Management (coachee)	*N*=18 2.86 (1.01)	*N*=11 3.25 (0.93)	*N*=8 3.55 (0.82)	*N*=22 2.63 (1.36)	*N*=16 3.5 (1.32)	*N*=15 3.1 (0.99)	*N*=19 3.32 (1.00)	*N*=16 3.13 (1.02)	*N*=9 3.00 (1.22)
WMRS (super-visor)	*N*=18 0.73 (0.56)	*N*=12 0.52 (0.43)	*N*=8 0.63 (0.39)	*N*=18 1.02 (0.62)	*N*=10 0.86 (0.75)	*N*=5 0.74 (0.56)	*N*=19 0.88 (0.49)	*N*=12 0.66 (0.46)	*N*=8 0.59 (0.42)
Stress Management (supervisor)	*N*=19 3.26 (1.05)	*N*=12 3.92 (0.51)	*N*=8 3.36 (1.19)	*N*=18 3.2 (1.29)	*N*=10 3.7 (1.32)	*N*=5 4.2 (0.44)	*N*=19 2.95 (1.17)	*N*=12 3.0 (1.28)	*N*=8 4.00 (.93)
Job Perf. (WM, super-visor)	*N*=18 3.64 (.67)	*N*=11 4.10 (.68)	*N*=8 3.55 (1.10)	*N*=17 3.29 (.94)	*N*=10 3.86 (.64)	*N*=5 4.00 (.78)	*N*=19 3.63 (.81)	*N*=12 3.71 (.85)	*N*=8 4.09 (.52)
Job Perf. (SE, super-visor)	*N*=17 3.33 (.79)	*N*=12 3.55 (.81)	*N*=8 3.58 (1.08)	*N*=18 3.26 (.89)	*N*=10 3.72 (.67)	*N*=5 3.84 (.90)	*N*=19 3.24 (.70)	*N*=12 3.72 (.84)	*N*=8 3.55 (1.03)

No significant differences for the outcome variables were found at any interval using 'cohort' as the independent variable, indicating that neither wider changes in the organisation across the 18 month delivery window, nor changes in the flow of the coaching delivery, significantly affected results though the correlations for stress and SE are noted.

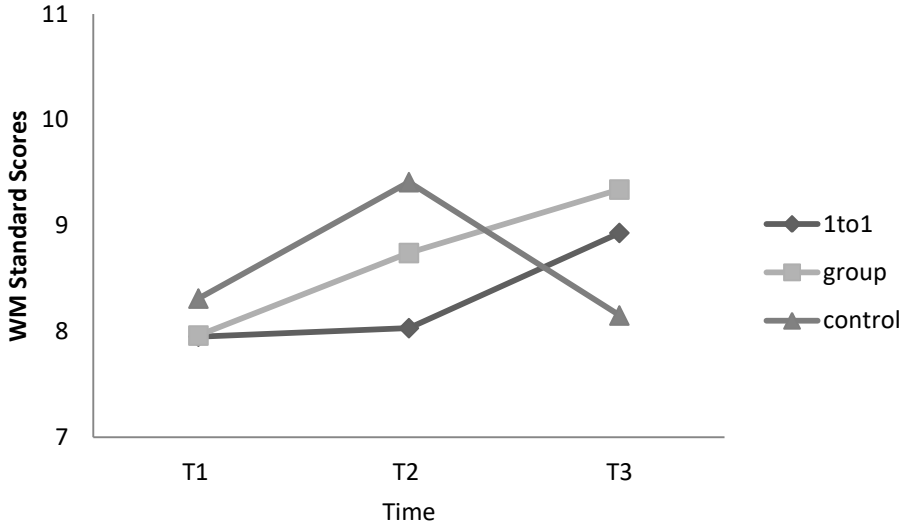
All graphs are shown with truncated scales to illustrate the effect and compare variables with similar ranges where there was a observable effect versus no effect. WM uses a range of scores between 1 and 19, 8-12 is the average range and 7-11 is depicted in both graphs using this measure (5.1 and 5.2). The remaining scales use either 1-5 or 0-4 and a range of 2 is used for all, to allow visual comparison between the measures.

Hypotheses 1a and 1b: Working Memory improvement

The working memory scores were subjected to repeated measures ANOVA and showed no significant differences for time (F(1.88,71.76)=4.482, p=.231, η^2=.038, β=.301) or group (F(1.88,71.76)= .815, p= .514, η^2=.041, β=.242) with Huynh-Feldt correction applied accordingly following significant Mauchley's Test of Sphericity (X^2(2)=6.578, p=.037) due to the Greenhouse-Geisser epsilon being over .75 (Field, 2013)). The null result is in part due to an apparent Hawthorne effect (where participants change their behaviour during intervention observation, but this does not sustain; Salkind 2010) experienced by the control group at T2 (see graph 5.1). The small effect size is obscured within the stringent ANOVA model, significant results were further hindered by low statistical power. I therefore conducted post-hoc paired samples *t*-test comparisons for each condition, revealing a significant improvement and medium effect size for the group work condition between T1 and T3 (t(18)=-3.517, p=.002, d=.68); the one-to-one condition and the control group did not significantly improve.

Graph 5.1

Mean WM scores per interval by condition



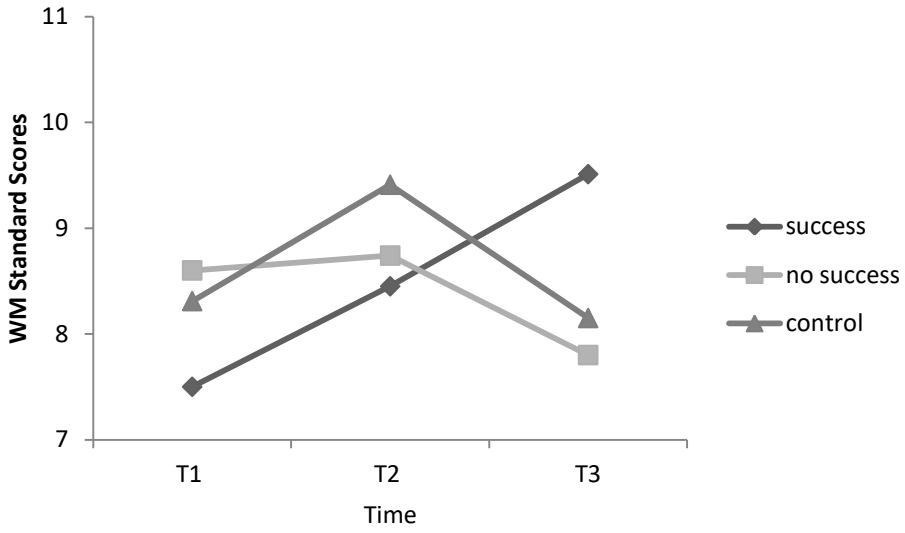
Further analysis of the raw data was prompted by large standard deviations in both the intervention group means. A *k*-means Cluster Analysis of improvement magnitude (T3 Verbal Working Memory minus T1 Digit-Span), revealed two independent groups: those who did not improve (mean scaled score improvement -.88) versus those who did improve (mean scaled score improvement + 2.28); this was significant (F(1,44)=85.78, p<.001). I

separated those from both intervention conditions who had an increased score (n=18) from those failing to improve (n=12) to compare those who were successful with those who were not, and the control group, see graph 5.2.

I analysed the difference between these new groups with repeated measure ANOVA with significant main effect of group ($F(4,74)=6.001$, $p<.001$, $\eta^2=.245$) and a non- significant effect of time with Huynh-Feldt correction applied ($F(3.36,63.91)=3.66$, $p < .016$, $\eta^2=.162$). Graph 5.2 illustrates that some intervention participants followed the same pattern as the control group, while others experienced a clear improvement that maintained and increased after the intervention was complete.

Graph 5.2

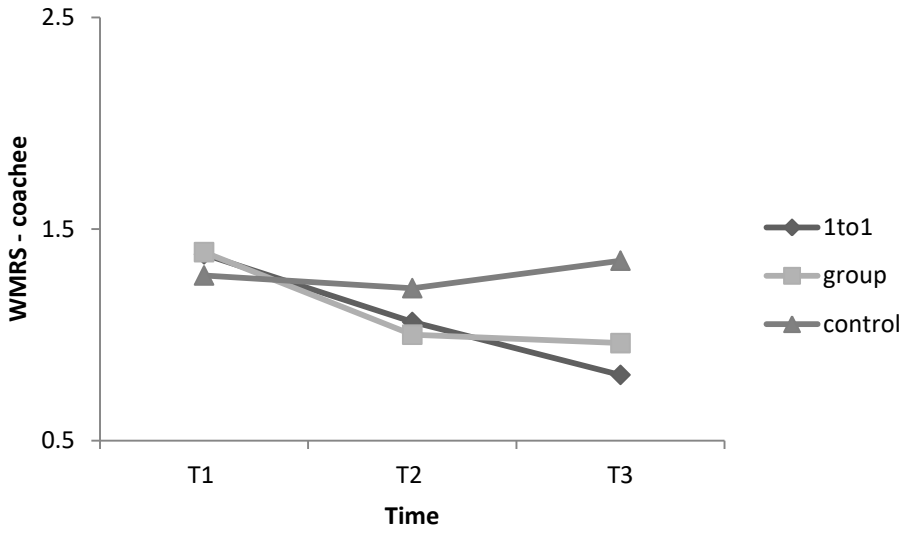
Mean WM scores per interval by control vs success/no success condition



Working memory-related behavioural difficulties (participant rated) were analysed using a computed average WMRS score in which a lower number represents fewer difficulties and is therefore an improvement, see Graph 5.3 for group mean x interval. I conducted an ANCOVA (with T1 scores as the co-variable), which provided a significant result and a large effect of group ($F(2,29)= .48$, $p= 003$, $\eta^2=.365$); see graph 5.3. Post hoc independent groups *t*-tests were conducted to test between-group differences at T3, revealing a significant difference between the one-to-one and control ($t(17)=-3.309$, $p=.004$, $d=1.34$) in the expected direction but not achieving significance for group and control ($t(19)=-2$, $p=.06$, $d=.98$) despite a large effect size. To further explore, I conducted paired samples *t*-tests for both intervention groups, which revealed marginally non-significant (i.e. when Bonferroni correction applied) differences between T1 and T3 for the one-to-one group ($t(10)=2.668$, $p=.024$, $d=.85$) but significant results for the group coaching condition ($t(11)=3.354$, $p=.006$, $d=.9$). Both comparisons report large effect sizes and the disparity between alpha levels is likely to be power related.

Graph 5.3

Mean WMRS scores per interval by condition (lower score indicates improvement)

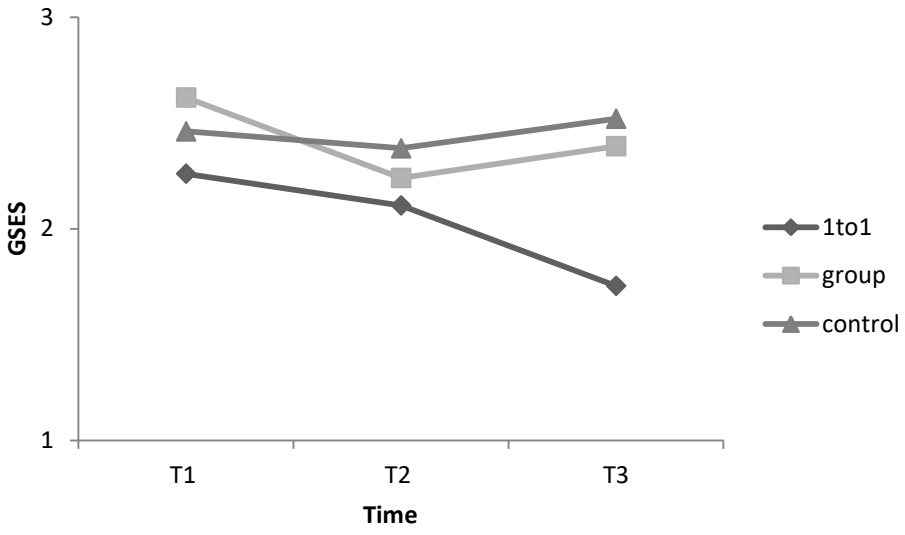


Hypotheses 2a and 2b: GSES improvement

The GSES results indicated a decrease in self-efficacy for the intervention condition between T1 and T2, followed by improvement and partial recovery at T3 for the group condition, but a further decrease for the one-to-one condition, as depicted in graph 5.4. The control group did not vary in their results. Main effects were tested with a one-way between-groups ANOVA at T3 ($F(2,32)= 5.495$, $p=.009$) which was non-significant, however post-hoc *g*-power analysis indicated a low beta-value ($\beta=.21$) and so further analyses were undertaken to avoid a Type II error. A post hoc *t*-test indicated that the one-to-one condition had significantly decreased GSES scores at T3 when compared to T1 ($t(10)=4.194$, $p=.002$, $d=1.26$). No other paired comparisons were significant or sufficiently large in effect size to warrant further analysis.

Graph 5.4

Mean GSES scores per interval by condition



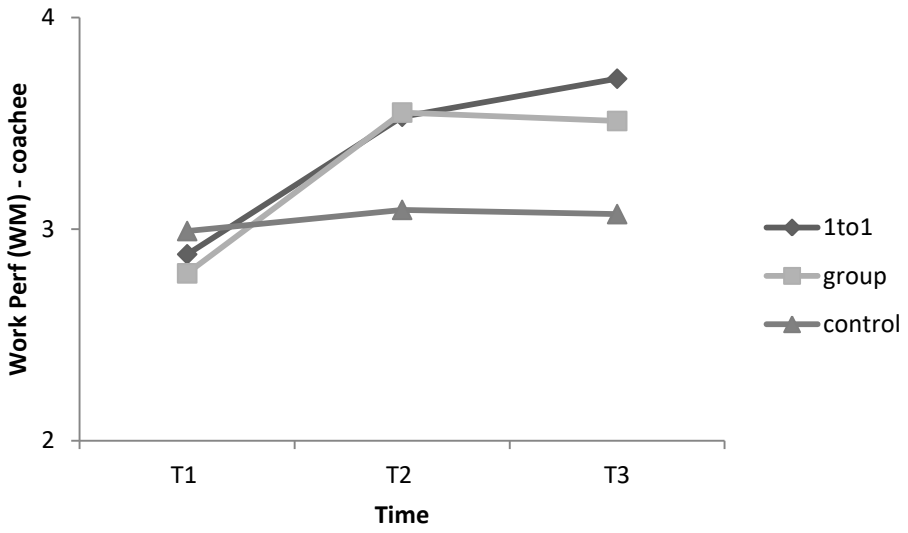
Hypothesis 3a:self-rated work-related performance improvement

As per the correlationary analysis in table 5.3, the workplace performance questionnaire was analysed as two subscales, and a single stress item analysed separately.

Work performance (WM). A computed average score for WM-related work performance scale were subjected to a repeated measures ANOVA (see Graph 5.5), revealing a main effect of time ($F(2, 50)=11.295$, $p<.001$, $\eta^2=0.311$) and significant effect of time*groups ($F(4,50)=4.842$, $p=.002$, $\eta^2=0.279$), both with large effect sizes.

Graph 5.5

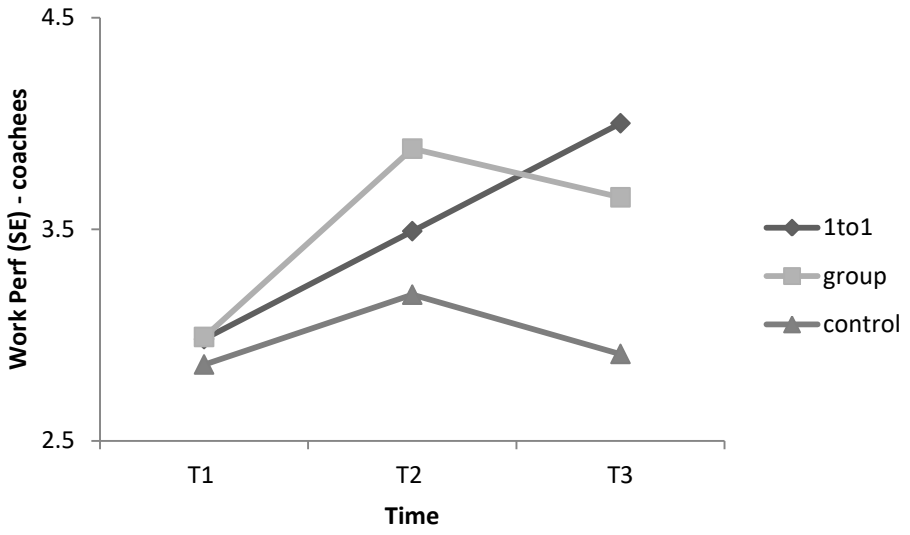
Mean self-rated work performance scores (WM) per interval by condition



Work performance (SE). I conducted a repeated measures ANOVA test of within-subject effects upon the mean scores for SE-related work performance items (see Graph 5.6); this revealed a significant effect of Time ($F(2,52)=15.789$, $p<.001$, $\eta^2=0.378$) and a non-significant result of Time*Groups ($F(4,52)=2.887$, $p=.031$, $\eta^2=0.182$); and Groups ($F(2,26)=3.592$, $p<.042$, $\eta^2=0.217$). Though the Bonferroni corrected *p*-values indicated a non-significant result, the large partial eta squared effect sizes (Durlak, 2009) warranted further analysis. Independent samples *t*-tests comparing both intervention groups to control at T3 indicated a significant result for the one-to-one condition ($t(18)=5.658$, $p<.001$, $d=.2.04$) and a marginally non-significant result for the group condition ($t(22)=-2.483$, $p=.021$, $d=1.39$); though the direction of result and large effect size here again points to low power affecting significance rather than a straightforward null effect.

Graph 5.6

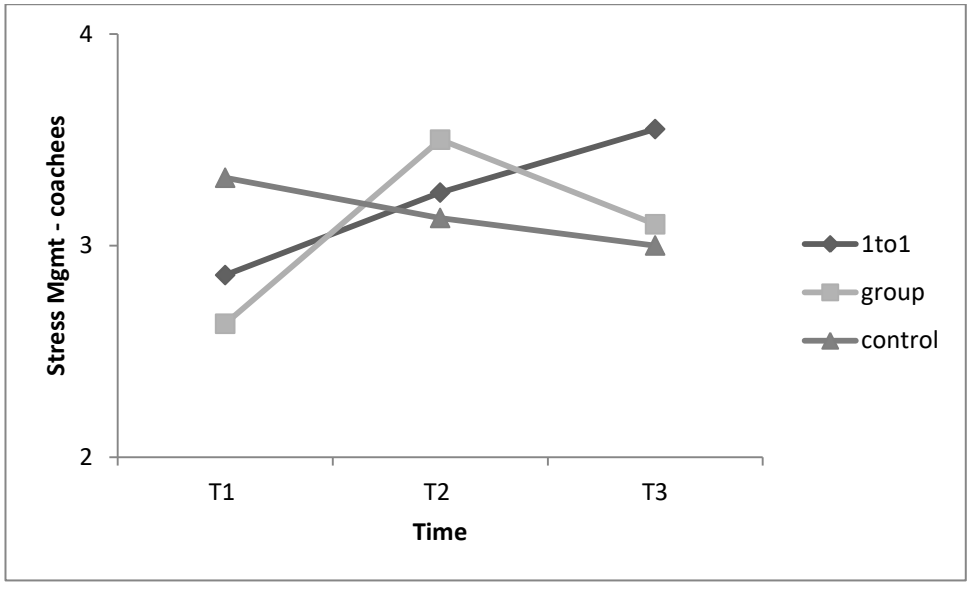
Mean self-rated work performance scores (SE) per interval by condition



Work performance (stress management). The individual item of stress management was subjected to repeated measures ANOVA (see Graph 5.7), indicating a significant main effect of time ($F(4,54)=10.459$, $p<.001$, $\eta^2=.279$) and a marginal effect of time*groups ($F(4,54)=2.770$, $p=.036$, $\eta^2=.17$). Graph 5.7 shows that initial improvements made by both interventions groups slightly weakened after the intervention was completed. Though there are no significant differences between the groups at T3, the improvement effect is masked by baseline differences. ANCOVA was not sufficiently powered with the small sample at T3, and the effect size was too small to sustain these constraints. However, I conducted paired samples *t*-tests, which revealed one significant comparison for the one-to-one condition between T1 and T3, and two significant comparisons for the group condition when comparing between the intervals as follows: one-to-one, T1-T2 ($t(15)=-2.99$, $p=.009$, $d= .38$) and T1-T3 ($t(10)=-3.698$, $p=.004$, $d=.68$); group condition, T1-T2 ($t(13)=-4.984$, $p<.001$, $d=.64$) and T1-T3 ($t(12)=-3.953$, $p=.002$, $d=.36$).

Graph 5.7

Self-rated stress management item per interval by condition

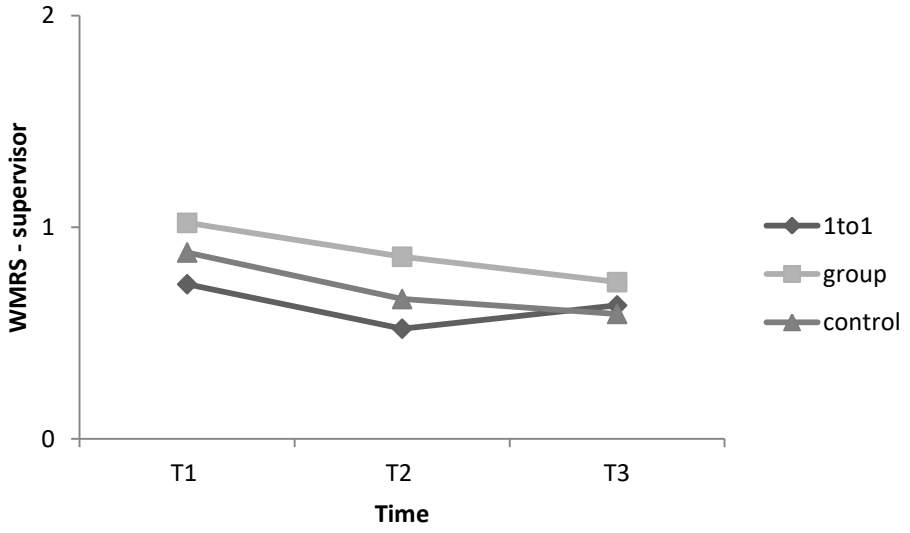


Hypothesis 3b: supervisor-rated work-related performance improvement

Both the WMRS and the work-related performance scales were subjected to Repeated Measure ANOVA. No significant main effects of time for supervisor ratings were found for WMRS ($F(2,30)=.301$, $p=.742$); perceptions of WM related work performance ($F(2,30)=.073$, $p=.930$); perceptions of SE related work performance ($F(2,28)=.1.949$, $p=.161$) and line supervisor observations of stress management ($F(2,30)=.288$, $p=.752$). Although observed power was very low due to small sample sizes (range $\beta=.091$-$.451$), the partial eta squared calculations were also very low (<.02) in all cases and, therefore, further analyses were not performed. Graphs 5.8-5.11 inclusive show the means at all time intervals, per condition; this output is from the SPSS general linear model and therefore only includes results from participants who submitted data at all 3 intervals. There were only 2 supervisors participating in all three intervals for the stress management item, hence why the graph is divergent from the overall means reported in table 5.4, which include people who completed a questionnaire at T3 but not at T2 and vice versa.

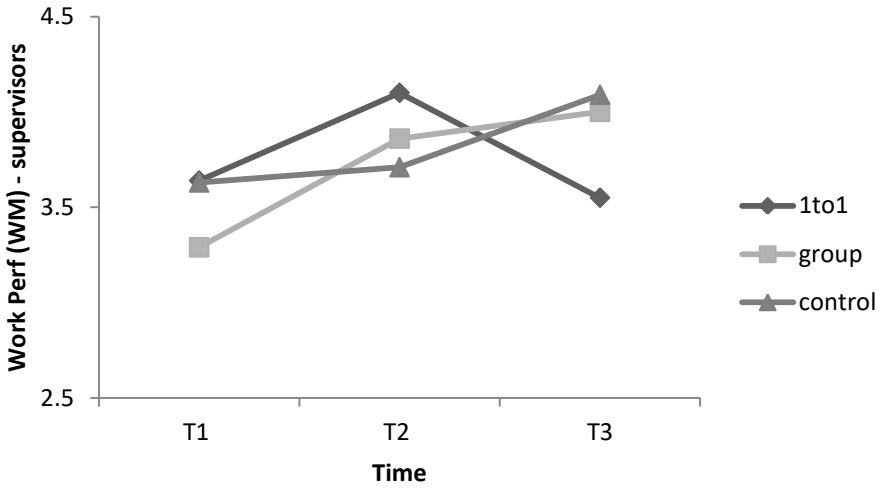
Graph 5.8

Mean Supervisor-rated WMRS, per interval by condition (lower score indicates improvement)



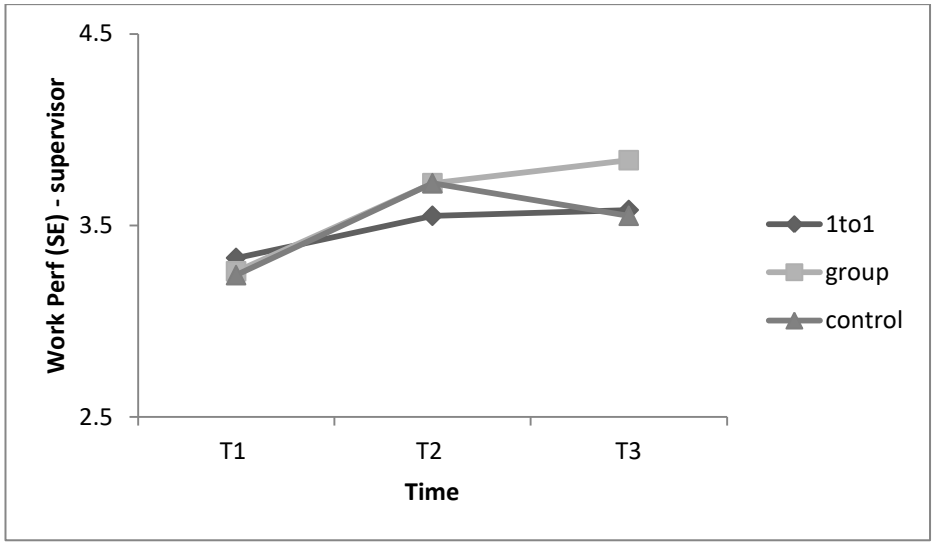
Graph 5.9

Mean supervisor-rated work performance (WM), per interval by condition



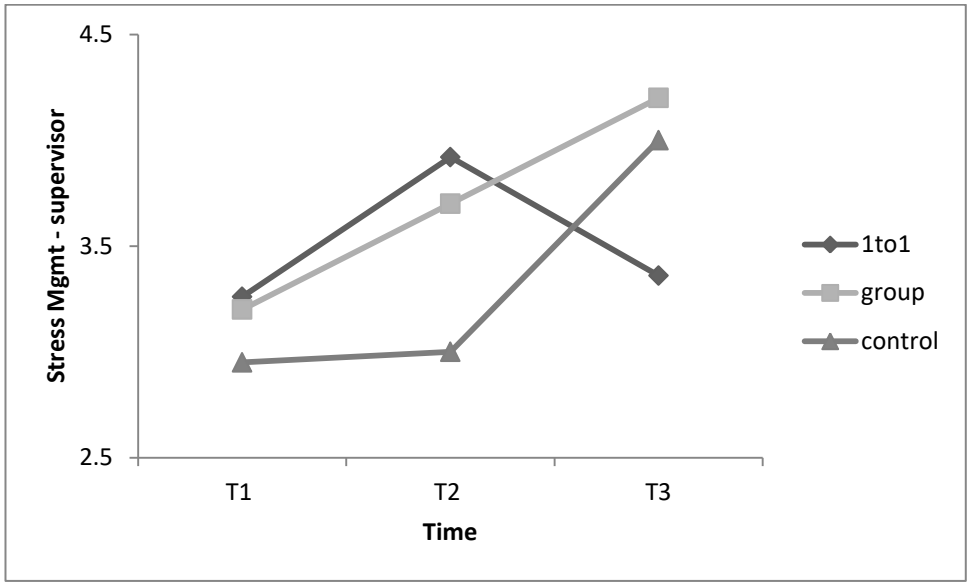
Graph 5.10

Mean supervisor-rated work performance (SE), per interval by condition



Graph 5.11

Supervisor-rated stress management, per interval by condition



Hypothesis 4a and 4b: Correlations between variables

Bonferroni corrections of alpha significance were not applied to correlation tables (Field, 2013). Table 5.5 shows the correlation analysis of the improvement in scores achieved between T1-T3 (or indeed decrease). Improvement in cognitive WM (verbal working memory, or VWM) was not correlated with SE, stress or any behavioural measure. Improvements between behavioural domain measures were significantly correlated as follows: WMRS with work performance, both WM related (r=.619, p=.001) and SE related (r=.445, p=.014); stress with work performance, again both WM related (r=.556, p=.002), and SE related (r=.367, p=.036) and WMRS (r=.378, p=.039). SE was correlated with WMRS only (r=.584, p<.001).

Table 5.5

Correlation co-efficients for T1-T3 improvement

		SE Improve	**WMRS Improve**	**Work Perf SE Improve**	**Work Perf WM Improve**	**Stress Improve**	**VWM improve**
SE Improve	Pearson Corr.	1					
	Sig. (2-tailed)						
	N	33					
WMRS Improve	Pearson Corr.	**-.584****	1				
	Sig. (2-tailed)	**0.001**					
	N	**30**	30				
Work Perf SE Improve	Pearson Corr.	-0.175	**.445***	1			
	Sig. (2-tailed)	0.330	**0.014**				
	N	33	**30**	33			
Work Perf WM Improve	Pearson Corr.	-0.348	**.619****	**.696****	1		
	Sig. (2-tailed)	0.065	**0.001**	**0.000**			
	N	29	**26**	**29**	29		
Stress Improve	Pearson Corr.	0.119	**.378***	**.367***	**.556****	1	
	Sig. (2-tailed)	0.509	**0.039**	**0.036**	**0.002**		
	N	33	**30**	**33**	**29**	33	
VWM Improve	Pearson Corr.	-0.032	0.157	0.239	0.321	0.042	1
	Sig. (2-tailed)	0.867	0.425	0.203	0.102	0.824	
	N	30	28	30	27	30	46

****. Correlation is significant at the 0.01 level (2-tailed) / *. Correlation is significant at the 0.05 level (2-tailed).**

Discussion

My primary aim in this study was to evaluate the impact of coaching when used as an intervention to support the work performance of dyslexic adults, building on previous action research samples with dyad data only (Doyle & McDowall, 2015). The data has provided some promising and some confusing results. The results tentatively supported hypothesis H1a that a coaching intervention based on SCLT would improve working memory cognitive ability and working memory-related behavioural difficulties. The data did not, however, support hypothesis H2a, that coaching would lead to an improvement in general self-efficacy for adults with dyslexia, when compared to a control group. The group condition outperformed the one-to-one condition in WM improvements, supporting H1b. That the group condition would out-perform the one-to-one condition on measures of self-efficacy (H2b) was supported when rated with the GSES, however the performance differential was due to under-performance by participants within the one-to-one condition, who significantly decreased in GSE, rather than an improved performance from the group condition who plateaued. Improvements in work-related performance when rated by coachees (H3a) were found in the intervention groups, but not when rated by their supervisors (H3b). Support was found for the lack of correlation between improvements in cognitive measures of WM (H4a) and work related, contextual measures but cognitive WM was not found to be related to SE improvement (H4b).

Whilst the value of this study resides in the attempt to conduct a controlled comparison in a field setting, the comparison was nevertheless hampered by small samples in each group and therefore low statistical power to detect significant effects. All results must therefore be considered tentative, though I note that many of the effect sizes reported are large, and indeed are higher than meta-analytic reported practice effects from coaching (small to medium, Hausknecht et al. 2007). The results are instead frequently comparable to meta-analytic reported effect sizes for individual level effects of coaching interventions (δ=1.28, Jones et al. 2016). I now explore the results in more detail according to the psychological domains of influence.

Cognitive improvement

The working memory cognitive improvement was inconsistent, with 60% of intervention participants experiencing an improvement, yet 40% failing to do so at all, the cluster analysis revealed an ‘either /or’ response rather than a sliding scale. Two-thirds of improvers originated from the group coaching condition. The normal range for working

memory scores is between 8 and 12, with 6 and 14 being within one standard deviation (Weschler, 2008) and, as such, our successful participants experienced an improvement that took them across a standard deviation barrier in standardised scaled scores (from 7.5 to 9.6;) and represented half a standard deviation improvement, which is consistent with the research reported in chapter four. Since no other variables were significantly correlated with WM, there appears to be an as yet unidentified factor that accounts for the improvement (or lack), though these data suggest that this factor is more prevalent in group settings than one-to-one.

Behavioural improvement

The impact of the coaching was more consistent for the behavioural domain variables than the cognitive testing. Both WMRS and WM work-related performance items experienced significant improvement for coachees in both one-to-one and group conditions, despite the less definitive improvement in WM cognitive capacity. These results point to the coaching having a greater impact on a conscious behavioural management of symptoms, rather than an increased neuro-cognitive capacity. No behavioural measures correlated with cognitive WM, further suggesting that the purported links between these variables is questionable.

Emotional improvement

Whilst the data indicated marginal improvement on the one item measure of confidence in managing stress, this should be interpreted with caution, and findings replicated with a more extensive and robust measure. Stress improvement was not significantly correlated with WM improvement but instead to behavioural, work performance measures. Any causal direction of influence is not possible in this analysis and further exploration of the emotional domain is required.

Psychosocial improvement

That the interventions would improve SE (H2a) was not observed in this sample. As general SE did not *decrease* for the groups to the same extent as the one-to-one participants, partial support for H2b, which proposed that the groups would do better, was found. Upon reflection of this apparent null result, I suggest that a different measure of self-efficacy, one more closely related to work performance, could be more sensitive to the effects of coaching. The GSES was originally included due to its reported reliability and link to emotional measures (Andersson et al., 2014; Judge et al., 2001), however GSE's ability to detect impact from coaching interventions has been mixed in previous studies. Within a potentially

comparable context, a study by McGonagle et al (2014) found that GSE was improved by coaching, but not job-specific self-efficacy. However there are examples within coaching studies where GSE *is not* improved via a targeted intervention, yet job-specific self-efficacy *is* improved (Bell et al., 2010; Reif et al., 2013). A possible explanation of the result, therefore, is that the development of SE is not immune to context (like WM) and that in the case of McGonagle et al. (2014) the clients, who were recruited for support with general health conditions, may have found the coaching less targeted towards job-specific behaviours and more general in approach. Within the present sample, with the intervention focus very much upon targeted areas of work performance, stress management and memory, an improvement in GSE was not found.

A further plausible explanation is that the one-to-one condition experienced dependency on their coach or difficulties in the Coaching Alliance (Gessnitzer & Kauffeld, 2015), which is known to affect self-efficacy (Baron et al., 2011). This may have been avoided by the enhanced relational experience of the groups, who independently maintained positive peer relationships after the intervention, through informal use of the organisation's intranet. However, any proposition is tenuous given the low number of participants overall, and I conclude that this mechanism should be explored further in adult dyslexic populations, using more targeted SE measures such as the Occupational Self-efficacy Scale (Schyns & Collani, 2002).

Supervisor ratings

There were no significant improvements noted by the supervisors, refuting hypothesis 3b that improvements would be observable by a third party. I am firstly reluctant to accept this finding as reliable with so few participants at T2 and T3 and I secondly also propose that this could be a research design flaw in lack of supervisor engagement, leading to lower motivation to take part and assess performance (Bozer & Jones, 2018). To illustrate: the volunteer participants did not identify a performance difficulty a priori to the intervention, thus indicating that their job security wasn't 'critical'. This creates a different context to the study conducted by Doyle and McDowall (2015) which comprised individuals referred via 'Access to Work', the DWP service predicated upon employment vulnerability resulting from work performance issues. A less pressing need may have resulted in less engagement and a genuine perception on behalf of the supervisors that performance was adequate and did not change.

Furthermore, many people with dyslexia work harder to overcome perceptions of difficulty in the workplace and are motivated to appear as productive as their non-dyslexic counterparts (Gerber, Price, Mulligan, & Shessel, 2004). It is possible that their efforts mimic the metaphor of the swan gliding across the pond seemingly effortlessly, whereas in reality, there is a lot of work under the surface to produce this effect. There would have been less concealment of the effort/performance ratio in the sample reported by Doyle and McDowall (2015) since in their cohort supervisors were invited into the first coaching session to share the development of the coaching goals and remained engaged through sharing of 'coaching session reports'; supervisors also attended the last session to reflect on progress. In the present opportunistic sample, training was organised for the supervisors in groups, but only half were able to attend. These methodological differences may have affected the supervisors' ability to make accurate initial and subsequent perceptions of performance. Consistent with the 2015 study, however, supervisors consistently rated coachee performance higher than coachees' self-ratings at T1. In this sample supervisor ratings did not indicate any performance difficulties, providing some numerical support for the above proposition that the supervisors did not perceive the need for the intervention. Given the critical nature of supervisor perceptions on sustainability of employment, further research is required to understand the dynamics involved with the supervisor relationship, particularly the differential between coachee and supervisor in initial perceptions of performance and also the effect of inclusion in the coaching process. In executive coaching, supervisor support is known to affect coaching effectiveness (Bozer & Jones, 2018) and this factor may be increasingly critical when job security is dependent on coaching success.

Correlation Analysis Summary

The correlation analysis indicated significant, reasonable correlations between all behavioural / contextual measures, yet no relationship in improvement between any variable from this domain and cognitive WM memory gains. This supports the proposition from chapter four that these variables may not be inter-dependent and that, for some coachees, it is possible to improve in cognitive WM and *not* work-related performance measures, or vice versa. The lack of correlation between SE improvement and WM was potentially affected by the unusual SE result and therefore requires further exploration. In general, the low *r*-values across all variables were surprising, indicating a potential for individuals to improve in some areas but not others; a very personal learning experience for all, irrespective of intervention conditions. This is of interest and will be explored again in the following chapters.

Limitations

The study was methodologically limited through (1) attrition, (2) coaching protocol consistency, (3) intervention length inconsistency (4) the number of outcome variables assessed at each interval and (5) the apparent decline in job satisfaction between the cohorts. Firstly, attrition is a common difficulty in action research (Zahrly, 1990), though steps were taken to minimise the impact on data analysis and avoid Type II errors; namely, statistical power was calculated and effect sizes scrutinised in order to ensure that non-significant results were not overlooked through low sample numbers. I note that attrition was not a problem in the intervention phase, only in testing, particularly at T3 and conclude that the coaching was well-received and valued by participants, who were not obliged to attend. Secondly, fidelity to the SCLT, Clean Language and specified content protocol was assumed through previous experience of the coach and de-brief with the primary researcher, but not objectively measured. Thirdly, in comparing the two coaching intervention conditions, it is possible that my commitment to evaluate current common practice, which required different numbers of sessions for groups versus one-to-one is responsible for a more favourable group coaching result for working memory (cognitive domain) since they had more practice opportunities. Fourthly, the inclusion of a wide range of potential outcome variables, though appropriate for preliminary, exploratory research, limited the impact through stringent Bonferroni corrections. I note this would have been less critical had attrition been less severe. It is possible that the questionnaires were still too large and burdensome for the client group and indeed may have contributed to the attrition. Lastly, the significant differences between cohorts on self-reports of Job Satisfaction (Greenhaus et al., 1990) suggest that the apparently declining conditions within the organisation produced some significant effects upon self-reported SE and stress management. Organisational context is known to impact upon ratings of stress in particular (Randall et al., 2005; Randall, Nielsen, & Houdmont, 2018) and grey literature reports perceived organisational support as influential for dyslexic employees (Doyle & Cleaver, 2015); the results of this control variable will require further analysis in subsequent research.

The study was additionally limited in explaining the nature of WM improvement. Methodologically the use of three different measures of WM may, in hindsight, have been problematic. Though there were no significant differences found between the test use protocol, which randomly switched between TOMAL and WRAML at T2 and T3, the nature of the tests is slightly different. The execution of the Digit-Span is different for the WAIS – one must recall each digit in correct order with no replacements omissions or additions

(Weschler, 2008), yet in the WRAML a point is scored for each digit in the right place (Sheslow & Adams, 2003). Publisher reported correlations between the two subsequent tests and the WAIS Digit-Span score are significant, but not high. It is therefore arguable that the scores represent easier tests at T2 and T3, though risk of practice effects has been minimised. Nevertheless, the significant increases in WM cognitive capacity for 60% of intervention cases warrant further conceptual investigation. Since behavioural domain improvements are occurring, but do not seem to be correlated to cognitive improvements, I propose deeper analysis of the potentially intervening mechanisms facilitating the cognitive WM improvement. Research presented in chapter four points towards (1) metacognition and (2) stress management. Firstly, metacognition as an intervening variable has some success in clinical populations (Dunlosky et al., 2011; Miranda et al., 2013), in the workplace (Jha et al., 2010) and is supported in theory within the dyslexia literature (Leather et al., 2011). This mechanism was built into the intervention but not measured as a dependent variable specifically, which is in itself a limitation of the present study. In the next chapter I will therefore focus on metacognition as a potential mediating variable. Secondly, stress management is also supported in the literature as a contributory factor in improving WM cognitive scores (Chambers et al., 2008; Jha et al., 2010). In the present study, stress management was measured by a single item (Houdmont & Randall, 2018), which significantly improved by the coaching intervention yet was not correlated with WM improvement and also therefore warrants further exploration using a more comprehensive measure within the emotional domain.

Sustainability of coaching impact

In order for coaching with dyslexic employees to result in employment retention, and thus be a valid accommodation for disability, the results must sustain after the coaching intervention has passed; independence is paramount. I note with interest, therefore, that the improvement after T2, for WM, WMRS and self-rated work performance, is not only sustained following the cessation of coaching interventions but further improved. According to SCLT, the development of mastery, with repeated learning cycles involving further role modelling and vicarious learning, would make this a natural consequence of creating independent, self-efficacious learners. However, with the self-efficacy results inconsistent, further work is needed to elucidate the process by which the coachees have independently improved their working memory ability / behavioural difficulties and their self-rated work performance.

Chapter Summary

I report tentative support for the use of coaching as a disability accommodation for adults with dyslexia. A quasi-experimental design, with pragmatic randomisation and triple-blind controls has revealed a significant improvement in working memory for many, as well as a robust decrease in working memory-related behaviour difficulties and improved reports of work performance. These cognitive and behavioural measures may support sustained employment, a vital feature in disability adjustment and both intervention conditions experienced significant improvements when compared to the wait-list control group.

I now introduce two further lines of enquiry for this thesis. Firstly, from a conceptual, psychological point of view of particular interest is the lack of inter-dependence between WM and behavioural, contextual measures, particularly since WM has such strong support in the extant literature as a key determinant of workplace performance (Baddeley, 2007; Bailey, 2007; Baker & Ireland, 2007; Conway et al., 2005; Leather et al., 2011; Parker & Boutelle, 2009). WM improvement is also the subject of a disproportionately large amount of research for dyslexia (indeed all neurodiversity) when compared to contextual workplace measures across the behavioural domain (de Beer et al., 2014). Having established that it is possible for coaching to significantly improve WM capacity specifically for adults with dyslexia, I now ask *how* indeed improvement could be occurring, if not correlated with general SE or behavioural changes, and propose a further study to explore both the metacognitive experience of working memory development and the impact of well-being/stress management (emotional domain) on WM scores congruent with the synthesis from chapter four. Secondly, I also seek to address the SE result with the use of a more targeted measure; in doing so, I hope to achieve an evaluation of the individual level process through which coachees are able to achieve improved WM and work performance.

The behavioural domain measures provided the clearest result in the present chapter, I conclude that both one-to-one and group coaching are able to improve the behavioural management of a WM deficit (shown in the WMRS) and self-reported work performance. In order to maintain a limit on the number of variables measured in a study to protect both statistical sensitivity and the good will of participants, I choose not to repeat the behavioural domain measures in the next study. WM and SE will be retested, measures of each will be selected with circumspect attention to the limitations described above. Table 5.6 shows the mechanisms of interest and, while supervisor data will not be collected in this study, I note that for future research this element is still vital for supporting the practice of coaching dyslexia in the workplace. Emboldened are the elements that are comparatively more

conclusive within the present chapter and therefore not repeated, italicised are the areas of specific interest for the next chapter.

Table 5.6

Summary of mechanisms analysed so far

Independent Variables	**Dependent Variables**
Group and one-to-one coaching *vs control* group	*WM*
	SE
Coaching to include SCLT methodology and inclusion of GST, *Metacognition* and *Emotional Management*	**Contextualised work performance**

Chapter Six

How does it "Work"?
Exploration of Potential Antecedents of WM Improvement.

As the final experimental chapter of this thesis, I am using a similar design to the study outlined in chapter five (coaching study 1, or CS1), building on the implications of CS1 and addressing some of the methodological weaknesses, as well as providing more detailed analysis of intervening mechanisms. The mechanisms of interest in coaching interventions for dyslexia synthesised from the systematic review are summarised in table 6.1.

Table 6.1

Summary of mechanisms for evaluation in this study

Independent Variables	**Mediating Dependent Variables**	**Output Dependent Variables**
Intervention* vs control group	Metacognition	WM
	Well-being/stress	Workplace Self-Efficacy

**Coaching to again include intervention principles founded on SCLT with inclusion of GST and Stress Management techniques.*

The present study (Coaching Study 2, CS2) received approval from the Ethics Committee at City, University of London. In order to refine the analysis following Coaching Study 1 (CS1), a more circumspect selection of measurements for each of the variables was conducted, these are described in the methodology section. I aimed to initially replicate the improved WM score and then additionally learn more about *how* scores are improving, since the data did not support a relationship between behavioural domain / SE changes and WM. A more detailed questionnaire was employed to understand the various components of metacognition and stress related to WM. A more specific, workplace-related self-efficacy questionnaire was employed to address the unexpected result in CS1 where general self-efficacy *decreased* for some participants and remained unchanged for others. I propose the following hypotheses:

H1: The WM improvement result from CS1 will be replicated in the new sample in that the intervention group will consistently improve their WM, the improvement continuing and sustaining after the intervention is complete;

the control group will experience a smaller practice effect but this will not sustain.

H2: Workplace self-efficacy (WSE) will be improved for the intervention group when compared to control.

H3: Measures of metacognition and emotional management related to WM will be improved for the intervention group when compared to control.

H4: WM improvement will be significantly, positively correlated with improvements in (i) metacognition, and/or (ii) WSE and/or (iii) decreases in stress.

Method

Participants. Recruitment was conducted via social media with support from the major UK dyslexia charity, the British Dyslexia Association. Participants were invited to join a coaching group beginning in late 2017 or early 2018 (the latter being a wait list control group). Following the high attrition rate in CS1, care was taken to ensure that the study was conducive to dyslexia-friendly procedures. This approach began at recruitment, where information was available as a blog post, a document download or a verbal podcast to increase access for this client group. 35 people were initially recruited in June and July 2017, for a September start; however the study was delayed to November to allow for further recruitment. An additional 35 people were recruited. A pragmatic randomisation of allocating individuals to a condition by order of application was employed, while allowing individuals to state a preference if they had one based on their diary commitments. I also allowed people to state if they felt the coaching was urgent; four people moved from wait-list control to intervention for this reason. 'Access to Work' details were provided in case participants felt that the study was insufficient and their job security was in danger, or for those in the wait list control who no longer felt able to wait and wanted to expedite support. No one left the study for these reasons. Eight people dropped out between September and November as the start change affected their availability, two people were then moved from intervention to control to balance the group sizes. As a further 10 dropped out due to time pressures, the final sample size was 52, which provided 26 participants in each condition at the last time interval and was much higher than CS1. The delivery and testing protocols were adjusted to contract the time from beginning to end, also to reduce attrition.

Table 6.2 shows the baseline biographical data for those in the sample who completed the study. There were 26 people in each final group (intervention and wait-list control); 35 were female (67%). There were three groups in each condition (six groups in total, three intervention and three control). 17 participants were seen in Brighton (33%) and 35 participants in London (67%).

Table 6.2

Baseline demographic data for all participants

Variable	Mean	Standard Deviation	Parametric assumptions	*t*-test or equivalent between conditions
Age	42.5	10	Yes	$t(50)=0.275$, $p=.785$
Highest level of education (1-6, 1 being pre-GCSE, 6 being post-graduate)	5.04	1.19	No – skewed towards higher education	$H(1)=.03$, $p=.863$
Digit-Span	7.9	1.88	Yes	$t(50)=.660$, $p=.512$
Block Design subtest	11.4	2.86	Yes	$t(50)=-2.16$, $p=.036$*
Similarities Sub test	11.97	3.08	Yes	$t(34)=-1.721$, $p=.094$
Processing Speed subtest	9.44	3.05	Yes	$t(50)=-.861$, $p=.393$

** No significant correlations were found between this baseline measure and any dependent variable.*

Baseline measures. Details of age and highest education level achieved were collected. Participants were assessed using a limited number of tests from Weschler Adult Intelligence Scale version IV (Weschler, 2008) and the pattern of strengths and weaknesses was checked against a typically dyslexic profile (Grant, 2009; McLoughlin & Doyle, 2013; McLoughlin & Leather, 2013) as in CS1, albeit more briefly. As shown in Table 6.2, the group was sufficiently homogenous in terms of age, highest level of education, baseline working memory (as shown in the Digit-Span test) and baseline processing speed. The participants' mean scores were in the predicted directions for this client group: below average for working memory, average for Processing Speed, whilst being high average for Block Design a sub-test of the Perceptual Reasoning index, and Similarities, a sub-test of the Verbal Reasoning Scale. The control group scored significantly higher than the intervention group for Block Design (control $M=10.58$, $SD=2.83$; intervention $M=12.23$, $SD=2.69$; difference -1.65, $r=.29$) and near significantly for Similarities (control $M=12.83$, $SD=2.76$; intervention $M=11.11$, $SD=3.22$; difference -1.72, $r=.28$). For this reason, bi-variate correlations were computed for both these variables with all dependent variables at Time 3; no significant correlations were found.

Dependent variables – Working Memory

In Coaching Study 1, three different measures of verbal working memory were taken, using three different tests (Reynolds & Voress, 2007; Sheslow & Adams, 2003; Weschler, 2008), with the intention of reducing practice effects. However, the variability within the intervention groups and the practice effect noted from the control group raised concerns that the administration of slightly different measurements had created extraneous 'noise' in the data. For this reason, and following the lead of the working memory papers reviewed in chapter four (Zeidan et al. 2010; Zylowska, Ackerman, Yang, Futrell, Horton, Hale 2008; Moro et al. 2012; Chambers et al. 2008), I choose to repeat the Digit-Span subtest from the Weschler Adult Intelligence Scale IV (Weschler, 2008) at three intervals on this occasion. While this approach risks practice effects, it mirrors existing research and therefore allows for comparison of effect sizes. Practice effects are reported via test-retest reliability analysis in the WAIS IV and the mean improvement is 0.6 of a standard score, which ranges from 1-19 and represents less than one quarter of a standard deviation (Weschler, 2008). As such, I will explicitly consider the magnitude of improvements and note where these are more than 0.6 of a standard score.

Dependent variables – questionnaire

Metacognition and emotion. Three pre-validated memory questionnaires were considered to explore the metacognitive experience of adults with dyslexia. These included the metacognition about symptom control scale (Fernie, Maher-Edwards, Murphy, Nik, & Spada, 2015) and the metacognitive awareness inventory (Schraw & Dennison, 1994); neither of which were suitable as they (respectively) related specifically to clinical symptoms or educational experience. A meta-memory questionnaire (Dixon & Hultsch, 1984), which was originally designed for supporting older people with cognitive decline, was selected for adaption to this client group due to high face validity of the questions and the inclusion of an anxiety scale, which allowed the emotional domain variable to be included easily rather than added on; a pragmatic measure to reduce the burden on participants.

The original questionnaire includes 109 items, which are comprised of the following seven subscales following Dixon and Hultsch's (1984) Principle Components Analysis: 1) memory strategy; 2) memory tasks; 3) memory capacity; 4) memory changes; 5) memory anxiety; 6) memory achievement and; 7) locus of memory control. Items were prioritised for the working population compared to those at risk for dementia; memory tasks (2) and memory change (4) were deemed not relevant for this study (for example: 'the older I get,

the harder it is to remember clearly'). An iterative approach to item reduction and inclusion was taken, initially marking each item with a one or zero to indicate relevance, with 0.5 for items which were questionable. All questionable items were discussed with my primary supervisor. Based on the difficulties that arose from questionnaire adaption reported in chapter three and attrition in chapter five, face validity and parsimonious sentence structure were prioritised, to ensure that the questionnaire would be clear to the dyslexic participants. The original and final questionnaire items are shown in Appendix 6.1 and Appendix 6.2 respectively; 43 items in total were retained, from the five most relevant subscales, including a sense of the importance of memory achievement which might affect motivation to learn (Stark et al., 2017) and the use of mental strategies which have support in related literature (Barrouillet & Camos, 2015; Moro et al., 2015). The following detail was added to H3, that the individual measures of meta-memory would be improved for the intervention group as follows:

H3a: Use of metacognitive memory strategies (Memory Strategies) will be improved for the intervention group, compared with the control group.

H3b: Self-reported memory capacity (Memory Capacity) will be improved for the intervention group, compared with the control group.

H3c: Levels of anxiety around using memory (Memory Anxiety) will be improved for the intervention group, compared with the control group.

H3d: Psychosocial beliefs about the relative importance of memory (Memory Achievement) will increase for the intervention group, compared with the control group.

H3e: A sense of control over one's memory (Memory Control) will increase for the intervention group, compared with the control group.

I note that the items related to Memory Control could be interpreted as memory self-efficacy; the terminology employed by the original researchers occurred during a time period where SE was an emerging concept and therefore they could conceivably have overlooked the consistency between their items and the SE theory (Bandura, 1986). For the purposes of this chapter I use the original terminology. However, I note that this variable relates to a psychological experience that encapsulates a sense of self-belief in one's own ability to manage memory; highly consistent with Bandura's description of SE, there is some support

for this from other researchers who also curated the original items and renamed them memory self-efficacy (Valentijn et al., 2006).

Self-efficacy. In order to test the hypothesis that the unusual result from CS1 had been due to an inappropriate measure of self-efficacy, I used the Workplace Self-Efficacy Scale (WSES; Pepe et al. 2010) having considered other scales, such as the Occupational Self-efficacy Scale (OSES; Schyns & Collani 2002). The WSES was selected for high practical relevance, unlike other scales which tended to rely quite heavily on general beliefs and general self-efficacy; for example, the WSES included items such as 'how well do you think you can concentrate at work', whereas the OSES included items such as 'I feel insecure about my professional abilities'. In this way, the WSE items are more practical, more tangible and relate to perceptions of effective workplace behaviour and productivity; a necessary change required from a coaching intervention that is intended to protect employment. To clarify, they are a closer transfer measure, lending high fidelity from the training context to work performance (Grossman & Salas, 2011). The WSES was originally devised for people looking for work rather than being in work, and, as such, the items were grammatically altered from 'how well you will be able to' to 'how well do you think you can'. Both original self-efficacy scales are shown in Appendix 6.3 with notes on the small adaptations made.

Reliability and analysis of the new, combined questionnaire. The adapted, combined version of 53 items from both original scales was anonymously distributed to 138 working adults via social media, of which 36 self-reported some form of additional learning support needs (ALS), including dyslexia, and 102 reported none. Reliability analysis showed high Cronbach's alpha co-efficients for all elements of the scale as shown in Table 6.3.

Table 6.3

Reliability of the new questionnaire

Sub measure	**Alpha co-efficient**
Memory Strategy (MemStrat) Use of behaviour and cognitive strategies to manage memory-related behaviour	α = .832, 15 items
Memory Capacity (MemCap) Self-reported ability in memory-related areas (such as remembering names)	α =.748, 8 items

Memory Anxiety (MemAnx)	α =.829,
How anxious one feels when asked to remember	6 items
Memory Achievement (MemAchieve)*	α =.764,
How important one feels memory is to achievement	10 items
Memory Locus of Control (MemCtrol)	α =.822,
Whether memory is within one's personal control	4 items
WSES	α =.916,
Self-efficacy related to workplace activity	10 items

I note the far higher number of people without ALS completing the questionnaire; these individuals are unlikely to find grammatical ambiguities and lengthy sentences difficult and therefore more likely to provide a reliable set of answers. Consequently, I decided to calculate inter-item correlations for each measure with the final data set, in order to ensure that these item groups are reliably correlated, therefore implying that they have been understood by the dyslexic participants in Coaching Study 2.

The MemStrat, MemCap, MemAnx and MemAchieve data were found to meet parametric assumptions and so I conducted inferential statistics to assess any differences in scores between the additional learning needs participants (ALS) and those reporting none (None), noting a Bonferroni corrected *p*-value of 0.008 to accommodate 6 subtests. Significant differences were found between the ALS and None groups for MemAnx, with the None group reporting unexpectedly higher levels of anxiety ($t(126)=-3.819$, $p<.001$, $r=.36$); for MemCap with the ALS group reporting lower capacity ($t(136)=3.679$, $p<.001$, $r=.33$) and near significance for use of MemStrat with the ALS group reporting higher use of strategies ($t(136)=2.372$, $p=.019$, $r=.2$). No significant differences were found for MemAchieve. Mann-Whitney U analysis was conducted on variables which did not meet parametric assumptions. The ALS group did report marginally lower workplace SE ($U=2003.5$, $z=2.252$, $p=.024$, $r=.2$), though this did not achieve significance when Bonferroni corrected. No differences of interest were found for MemCtrol, though I retained the items due to their relation to self-efficacy (Valentijn et al., 2006). In conclusion, from preliminary reliability and construct validity analysis, the questionnaire was found to be a reliable measure, with valid items potentially of relevance to adults with dyslexia.

Data collection protocol

The participants were seen by a Psychologist at three intervals for working memory assessment: before (T1); immediately after (T2) and 6 weeks after (T3). Unlike Coaching Study 1, in which T3 occurred 3 months after the coaching, the wait for T3 was reduced to only 6 weeks; a pragmatic change intended to reduce attrition and keep the control group active since they would be anticipating beginning their training. The coaching was delivered over six weeks, at weekly intervals; again a shorter period of time but designed to reduce the time span commitment on participants and maintain a larger sample size.

In response to the inconsistent pattern of results in CS1 at T2 and T3, with some variables increasing then returning to baseline (or vice versa), I evaluated participant experience more frequently to analyse the process of change from an individual perspective and to establish if there were any clear directions. The questionnaires were therefore delivered at 2 week intervals during the whole 12 week period. Despite frequent reminders from the researcher to complete, the final questionnaire was completed by 22 control group participants *after* the commencement of their coaching, and the final set of questionnaires were therefore excluded from the study. The labelling of each time interval indicates order as follows: Time 1 questionnaire items are labelled as 'A', before the intervention; Time 2 is labelled Nov1 as it was distributed in early November 2017; Time 3 is Nov2, late November; Time 4 is Dec1, mid-December; Time 5 is Jan1, early January 2018; Time 6 is Jan2, late January 2018.

The questionnaire analysis was intended to elicit trends, specifically to understand the control group increases at T2 that were present in CS1 and ascertain if these results represented a Hawthorne Effect or a random increase. Needing to ensure that the analytic model retained enough statistical power, all individual data points were not subjected to inferential statistics. The trend lines thus provided directional insight of the participant experiences that were contributing to the quantitative three interval analysis, rather than a seven interval quantitative analysis. Inferential statistics were conducted at three selected data points providing the closest match to the WM assessment (A, Dec1 and Jan2).

Control of bias

In addition to pragmatic randomisation of participants, the study was conducted with double blind controls. The working memory data were collected by two psychologists, again both on the British Psychological Society's Register of Qualified Test Users and both with an MSc in Occupational Psychology. One worked with the London groups and one worked

with the Brighton groups; analysis of baseline and dependent variables shows no significant differences between these groups either before or after Bonferroni correction. Neither psychologist was told to which group the participants had been allocated and participants were expressly reminded to keep this information confidential. On this occasion, the intervention was delivered by the researcher, due to lack of resources and time, and so to prevent my identifying the intervention and control groups during data analysis, an administrative assistant coded all participants, removing names and only indicating their number, location and whether they were control or intervention. The assistant was employed under contract to follow clear confidentiality and data protection guidelines. The coding was not divulged to the researcher until after the initial analysis had been conducted.

Intervention protocol

The intervention was designed to closely match that of CS1 and, though delivered by the researcher on this occasion, my experience and skill match that of the coach employed in CS1. The primary facilitation method was again Clean Language (Tosey et al., 2014), which has been used in other coaching programmes to enable participants to self-generate outcomes and develop metacognitive awareness (Lawley & Manea, 2017; Walker, 2014). Goal-setting theory was built into the opening session, through the development of well-formed, contextually-relevant and socially-relevant outcomes. Ability to achieve the outcomes (Goal- Setting Self-Efficacy) was directly discussed and de-briefed at the start of each session as the group reflected on experiences over the past week. Social Cognitive Learning Theory (SCLT) was employed via repeated cycles of verbal persuasion (introduce a topic, or model); role-modelling (members of the group practice the model or exercise); vicarious learning (members of the group share experiences of their ability or difficulty related to the topic) and mastery (developmental tasks to practice in the week, followed by reflection the following week). The weekly schedule was designed to match the topics reported by the coach in CS1 and is shown in Table 6.4.

Table 6.4

Coaching topics and methods used

Week and Topics covered (information from this column was presented as notes to participants)	**Coaching Methods**
Week 1: Why are we here? Overview of research and purpose Meeting each other Setting outcomes Thinking about thinking Remembering that we remember well! Notice your internal world – which senses you use to think in? Developmental task: Think of a time or an example of something you remember well	Visual and oral presentation group discussion. Development of metacognitive awareness through silence, observation and discussion (Coutinho & Neuman, 2008).
Week 2: Natural strategies for memory How do we remember when we remember well? What state do we need to be in to remember well? Memory for names Memory for space Memory for image Memory for sound Memory for numbers Developmental task: Practice a strategy at least 3 times.	Metacognitive exercises such as 'Kim's Game' (Fisher, 2006) de-briefed in groups and pairs with clean questions (Tosey et al., 2014).
Week 3: How do we think about time? Using Space and Time to remember Developmental Task: note your current time management tools such as diaries and electronic reminders, how to these fit with your models for time?	'Clean Space', metacognitive exercise for resolving conflicts between desired outcomes and practical realities (Lawley & Manea, 2017).
Week 4: Emotional resilience Strategies for concentration and paying attention (taking things in) Developmental Task: practice moving from 'drama' to 'calmer'	'Triune Brain' and 'Drama Triangle', two models for understanding how our emotional states are affected by, and can be improved via, physiology (Palmer, 2013) and relationships at work (Burgess, 2005).

Week and Topics covered (information from this column was presented as notes to participants)	Coaching Methods
Week 5: Strategies Time and organisation Putting into context Developmental task: put into practice your outcomes from today	Goal Setting (Whitmore, 1992) and Clean Space (Lawley & Manea, 2017).
Week 6: Any remaining issues! Reflecting on what we have learned and what we will do next	Pair and group de-briefing using Clean Questions (Doyle et al., 2010; Tosey et al., 2014; Walker, 2014) and Clean Feedback (Walsh, Nixon, Walker, & Doyle, 2015).

To assess the consistency of approach to all intervention groups, an independent MSc Occupational Psychology Graduate assisted in all three groups and provided feedback and inter-rater confirmation that the same material had been covered consistently for all participants. This was discussed each week, consistency and agreement between the researcher and observer was high. There was some variability in the pace and examples used, as would be expected for client-led delivery. I note that process analysis often contains measures of (1) wider context, (2) intervention exposure and qualitative feedback on (3) the value of exposure (Nielsen & Randall, 2013; Randall et al., 2005, 2018). In this study, I accommodated the second and third principles by recording attendance and allowing time for feedback at the start of each session by asking the group: "what is working well/not working well at work, and about the coaching" and "how are you using the coaching back in your workplaces". A total of seven individuals missed one session so the assistant spent the first 15 minutes of each subsequent session providing a 'catch up' from the preceding week; on two occasions this was delivered by telephone coaching. I acknowledge that the participants were recruited from a wide variety of organisations conferring heterogeneous organisational contexts, though I did not take a measure of organisational climate in this study. I argue that it was less likely to change substantially in a single cohort over a contracted time span and more relevant to the applied practice of diverse coachees from multiple organisations.

Data analysis

The data were analysed using *g*-power 3.1, SPSS v 24 and Excel 2007. Descriptive statistics including mean, standard deviation, skewness and kurtosis were computed for all variables. The relationship between statistical significance, effect size and power was considered and the most stringent inferential test applied where possible, with Bonferroni

corrections where necessary. There is some debate as to how this should be calculated (Perrett & Mundfrom, 2010). Following the strategy in CS1, this should be six variables (five Memory subscales plus WSE), plus three intervals, plus two independent groups for the questionnaire data and therefore an adjusted α value of p=.05/11 (.0045) (Field, 2013). This limit again risks an elevated Type II error and therefore again the k/1.5 corrections (Perrett & Mundfrom, 2010) is applied again and with a resulting k=7 alpha of p=.007. The working memory scores were collected separately and therefore Bonferroni correction was not added to the questionnaire data; merely an interval correction resulting in an adjusted α value of p=.05/3 (.016). Data analysis included RM ANOVA for within- and between-group comparisons and post hoc t-testing to explore further where needed. As with CS1, improvement scores were computed and correlation analysis performed to assess the relationship between the output variables. Reverse scored questions were adjusted to be in line with other questions in the same subscale and anxiety questions were also reversed so that in all cases, a higher number represented a more positive outcome.

Results

The results are presented in four sections: firstly the reliability analysis of the questionnaire; secondly the analysis of the WM scores; thirdly the questionnaire data and lastly the correlation analyses. As in CS1, graphs are approached to best show the trends in the data but also consistently between measures using the same range. WM is depicted in the standard score range of 7-11 to allow comparison between CS1 and CS2. Likert scales in this study use a 1.25 range to illustrate more subtle changes but this is applied consistently in all analyses.

Questionnaire reliability

Alpha co-efficients were conducted on the scale at all seven intervals; these ranged between α=.785 - .904. Inter-item correlations were computed for the six subscales; these are presented in Table 6.5, below.

Table 6.5

Overall alphas and inter-item correlations for the subscales within the adapted questionnaire

	Alpha	Mem Strat	Mem Cap	Mem Anx	Mem Achieve	Mem Ctrol	WSES
Pre	.785	.267	.289	.575	.307	.335	.358
Nov-01	.831	.286	.212	.398	.303	.157	.295
Nov-02	.845	.301	.205	.400	.332	.345	.366
Dec-01	.904	.370	.299	.440	.349	.391	.471
Jan-01	.873	.331	.262	.468	.401	.381	.384
Jan-02	.885	.295	.243	.439	.349	.476	.430

Since there is some debate in the literature as to whether a .6 correlation ought to be an acceptable reliability baseline for questionnaire items or whether .2-.4 is acceptable (Clark & Watson, 1995; Cortina, 1993), consideration was applied to the overall low inter-item correlations. It is conceivable that a dyslexic client group might have difficulty with

reverse scoring questions or difficult grammatical phrasing; they may also be uncertain what is meant by some of the memory strategy specific questions, since at the start, and as control group members, they won't have been 'inducted' into understanding different types of memory. As a result, they may answer questions erratically, being confused by the question and ticking a box to move on rather than considering their answer. In order to systematically approach understanding the reliability of the questionnaire by assessing the validity of the questions, I calculated the average inter-item correlation for each question (amongst its subscale rather than the total) at two time intervals, Nov 1 and Jan 1, since these were the lowest and highest overall scores, respectively. Any item scoring below .2 on either occasion was highlighted. I then re-considered the questions according to their grammatical accessibility (for example reverse scored items) and use of jargon. The following questions were numerically problematic:

1. I have no trouble keeping track of my appointments (low at both times)

2. I have no trouble remembering where I put things (low once)

3. I am usually able to remember exactly where I read or heard a specific thing (low once)

4. I have no trouble remembering the lyrics of songs (low once)

5. It bothers me when I forget an appointment (low once)

Question 1's average was so low at both intervals (0.011 and 0.09 respectively) that it was removed. Questions 2 and 4 both use the phrase 'no trouble', which might cause problems, since the 'no' could be missed easily. Question 3 is lengthy. Question 5 has no obvious issues. I took the decision to remove questions 1-4, which improved the inter-item correlation of MemCap to r=.451 (Nov1) and r=.406 (Jan1). While this improves the overall reliability and validity of the MemCap scale, MemCtrol at Nov1 contained the lowest score. On reflection, I decided to include, for two reasons, firstly because Nov 1 was not one of the three inferential data comparison intervals and secondly I suggest that most people may be genuinely confused by the idea that they could control their memories, haven't thought about it before and don't know how to answer. MemCtrol's Jan3 inter-item correlation jumped to .55, which is much stronger, and I interpret this as showing the understanding once of all participants had developed understanding of the concept.

Working Memory results

Descriptive statistics were calculated and parametric assumptions were met in all cases. Table 6.6 shows the number of cases, mean standard score and standard deviations for all time intervals, per group.

Table 6.6

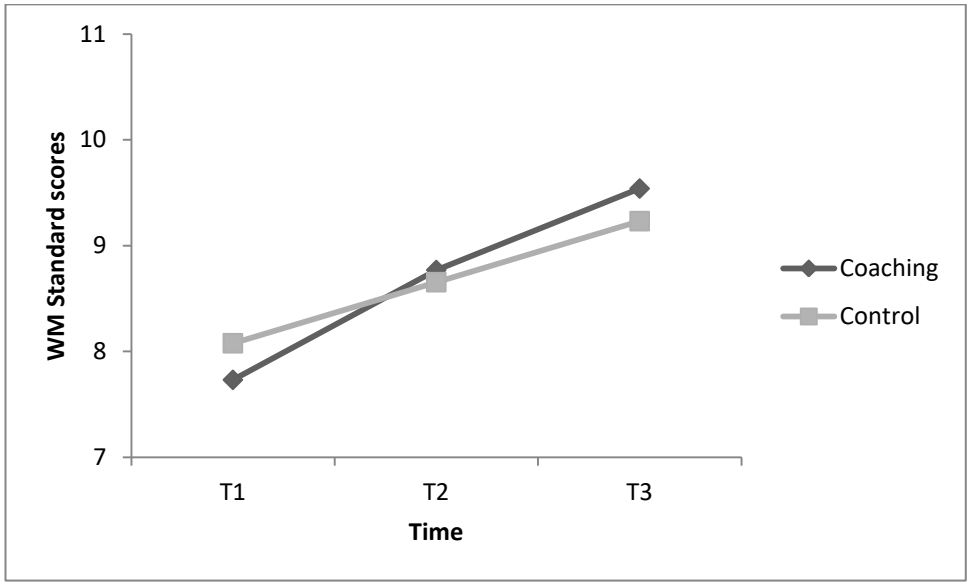
Means and standard deviation for WM per interval by condition

	Intervention			**Control**		
Time	*N*	*Mean*	*SD*	*N*	*M*	*SD*
T1	26	7.731	1.756	26	8.077	2.018
T2	26	8.769	1.986	26	8.654	2.449
T3	26	9.539	2.611	26	9.231	2.405
T3 score minus T1 score	26	1.808	1.877	26	1.154	1.488

A repeated measures ANOVA was conducted to explore the main effect of time and to assess the relationship of time by group. Mauchley's test of Sphericity was conducted and revealed a non-significant result $X^2(2)=1.789$, $p=.409$. The ANOVA revealed a highly significant effect of time ($F(2,100)=22.825$, $p<.001$, $\eta^2=.313$,$\beta=1.0$). However, time by group was not significant ($F(2,100)=1.172$, $p<.314$, $\eta^2=.023$,$\beta=.252$). Graph 6.1 shows the means at each interval, by condition. A Post Hoc independent Samples *t*-test indicated no significant differences before the intervention ($t(50)=-.354$, $p=.512$). The intervention group report a marginally larger improvement from baseline than the control, as demonstrated in slightly stronger paired samples *t*-test results comparing T1-T3 (intervention: $t(25)=-4.912$, $p<.001$,$d=1.03$; control: $t(25)=-3.953$, $p=.001$, $d=0.57$) revealing a difference in effect sizes. Paired samples tests at T2 are significantly different for intervention ($t(25)=-3.100$, $p=.005$, $d=0.39$) but not for control ($t(25)=-1.959$, $p=.061$, $d=0.24$).

Graph 6.1

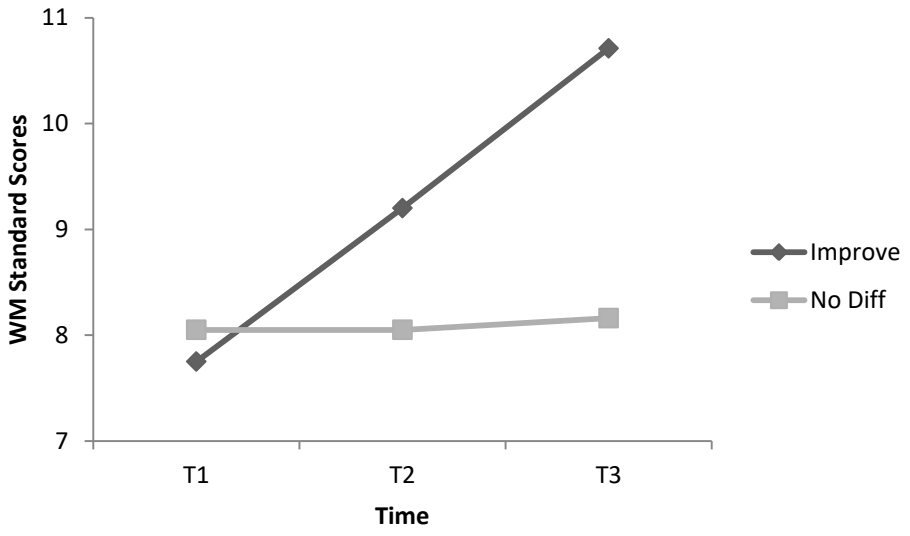
Mean WM scores per interval by condition



As in Coaching study 1, a *k*-means cluster analysis using computed, standardised improvement scores showed 2 distinct groups: those who did not improve (mean scaled score improvement +.11) and those who did improve (mean scaled score improvement +2.96). Analysis using these groups as the independent variable produced strong significant differences using repeated measures ANOVA for a main effect of time ($F(1.783,89.15)=40.972$, $p<.001$, $\eta^2=.45$,$\beta=1.0$) and time*group ($F(1.783,89.15)=35.531$, $p<.001$, $\eta^2=.415$,$\beta=1.0$) with Huynh-Feldt correction for a significant Mauchley's Test of Sphericity ($X^2(2)=9.731$, $p=.008$). However, in this study and unlike CS1, the two clusters were spread more evenly: 27 participants in the 'no difference' group and 25 in the 'improver' group; 14 improvers came from the intervention group yet 11 improvers came from the control group. Graph 6.2 shows the means per cluster at each time interval.

Graph 6.2

Mean WM scores per interval by cluster



Questionnaire results

Independent samples *t*-tests confirmed that there were no significant differences between the groups at the first time interval (t=0.13-0.785, p=.429-.990). Each questionnaire subscale, at each of the six time intervals, was computed into an average score for each individual at each time. The computed scores were subjected to analysis of kurtosis and skewness; all were found to meet parametric assumptions. Tables 6.7-6.12 show the Means and Standard deviations of all subscales, at all time intervals, split by condition.

Table 6.7

Time 1 'Before' descriptive questionnaire statistics

	Intervention			**Control**		
Subscale	*N*	*Mean*	*SD*	*N*	*M*	*SD*
MemStratA	26	3.743	0.650	23	3.865	0.422
MemCapA	26	3.102	0.782	24	3.090	0.496
MemAnxA	26	2.039	0.684	24	1.934	0.581
MemAchieveA	26	3.974	0.471	24	3.973	0.472
MemCtrolA	26	3.356	0.558	24	3.438	0.567
SEA	26	3.696	0.612	24	3.821	0.479

Table 6.8

Time 2 'Nov1' descriptive questionnaire statistics

	Intervention			**Control**		
Subscale	*N*	*Mean*	*SD*	*N*	*M*	*SD*
MemStrat*N*ov1	26	3.806	0.579	25	3.720	0.477
MemCap*N*ov1	26	3.179	0.700	25	3.113	0.537
MemAnx*N*ov1	26	2.148	0.580	25	2.112	0.567
MemAchieve*N*ov1	26	4.007	0.589	25	3.792	0.428
MemCtrol*N*ov1	26	3.635	0.420	25	3.370	0.403
SE*N*ov1	26	3.777	0.530	25	3.784	0.582

Table 6.9

Time 3 'Nov2' descriptive questionnaire statistics

	Intervention			**Control**		
Subscale	*N*	*Mean*	*SD*	*N*	*M*	*SD*
MemStrat*N*ov2	24	3.798	0.555	26	3.742	0.487
MemCap*N*ov2	24	3.090	0.663	26	3.038	0.524
MemAnx*N*ov2	24	2.173	0.559	26	2.141	0.674
MemAchieve*N*ov2	24	4.148	0.478	26	3.824	0.403
MemCtrol*N*ov2	24	3.833	0.514	26	3.510	0.492
SE*N*ov2	24	3.863	0.554	26	3.827	0.578

Table 6.10

Time 4 'Dec1' descriptive questionnaire statistics

	Intervention			**Control**		
Subscale	*N*	*Mean*	*SD*	*N*	*M*	*SD*
MemStratDec1	24	3.783	0.527	20	3.810	0.561
MemCapDec1	24	3.202	0.650	20	3.200	0.523
MemAnxDec1	24	2.138	0.654	20	1.925	0.621
MemAchieveDec1	24	4.066	0.467	20	3.729	0.481
MemCtrolDec1	24	3.979	0.541	20	3.500	0.556
SEDec1	24	3.846	0.638	20	3.740	0.674

Table 6.11

Time 5 'Jan1' descriptive questionnaire statistics

	Intervention			**Control**		
Subscale	*N*	*Mean*	*SD*	*N*	*M*	*SD*
MemStratJan1	26	3.889	0.468	25	3.866	0.518
MemCapJan1	26	3.192	0.580	25	3.206	0.460
MemAnxJan1	26	2.236	0.563	25	2.148	0.717
MemAchieveJan1	26	4.162	0.519	25	3.776	0.437
MemCtrolJan1	26	4.032	0.634	25	3.390	0.445
SEJan1	26	3.892	0.570	25	3.920	0.591

Table 6.12

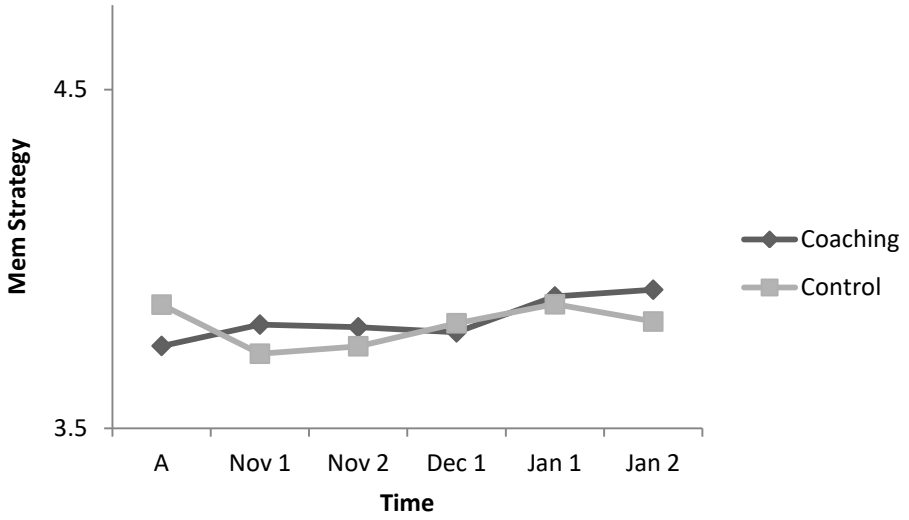
Time 6 'Jan2' descriptive questionnaire statistics

	Intervention			**Control**		
Subscale	*N*	*Mean*	*SD*	*N*	*M*	*SD*
MemStratJan2	25	3.909	0.483	23	3.815	0.447
MemCapJan2	25	3.133	0.599	23	3.015	0.510
MemAnxJan2	25	2.133	0.555	23	2.113	0.648
MemAchieveJan2	25	4.072	0.518	23	3.673	0.380
MemCtrolJan2	25	3.858	0.457	23	3.475	0.292
SEJan2	25	3.920	0.728	23	3.745	0.614

In order to evaluate trends and consider the viability of planned, multi-variate, repeated measures ANOVA, I produced the following graphs of means at each interval, using Excel 2007. Graphs 6.3-6.8 show the means and trend lines for each subscale, per interval and by group.

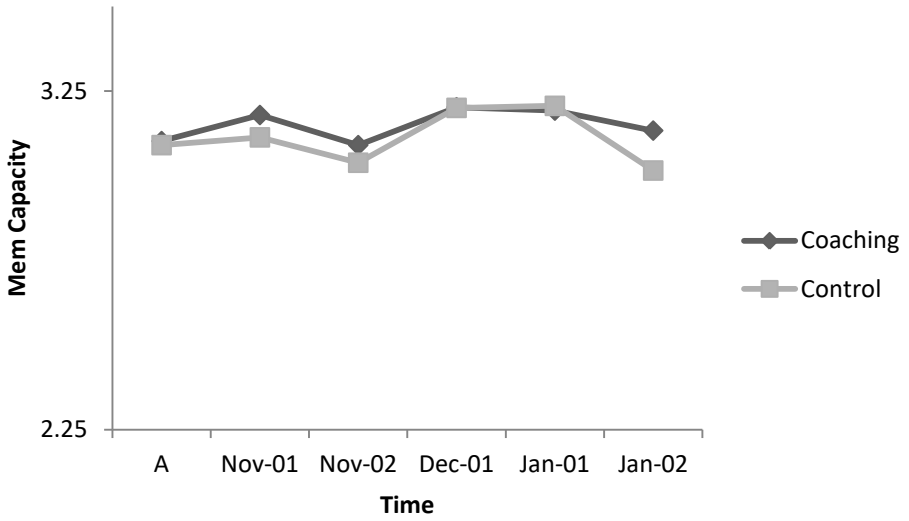
Graph 6.3

Mean Memory Strategy scores



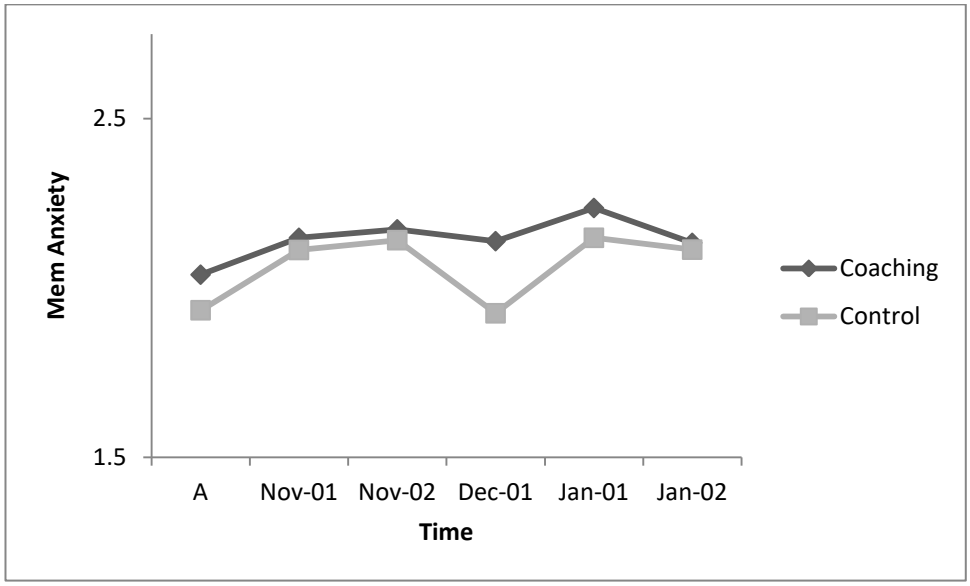
Graph 6.4

Mean Memory Capacity scores



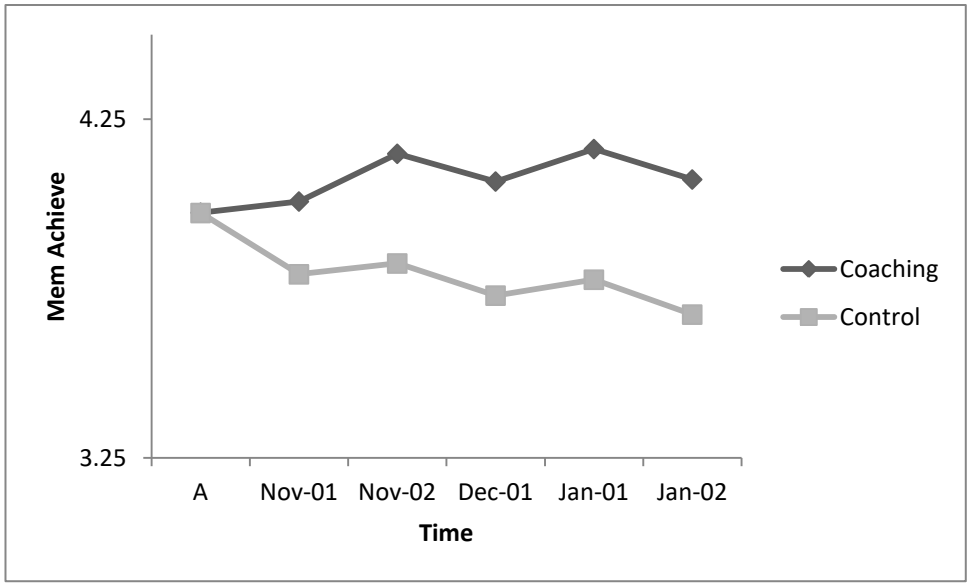
Graph 6.5

Mean Memory Anxiety scores



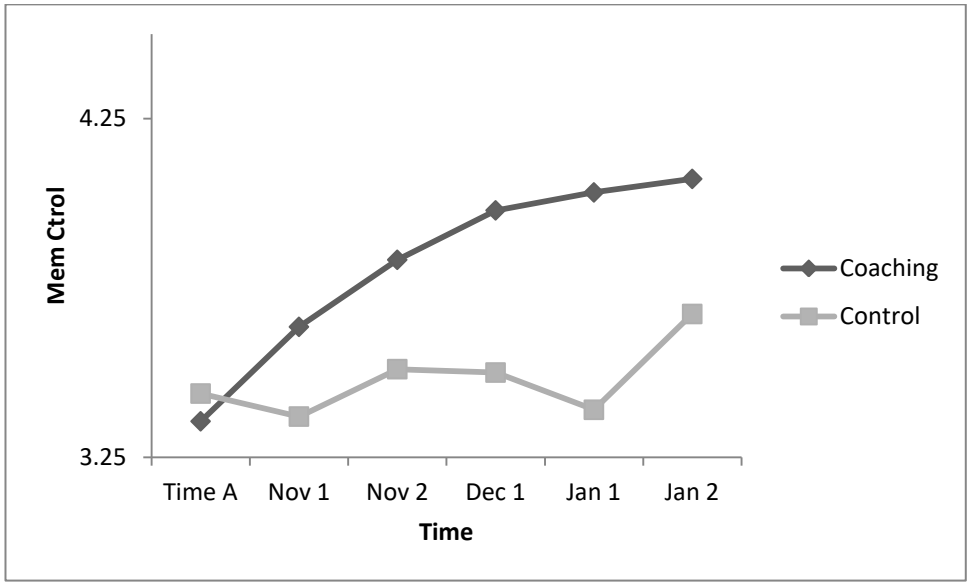
Graph 6.6

Mean Memory Achievement scores



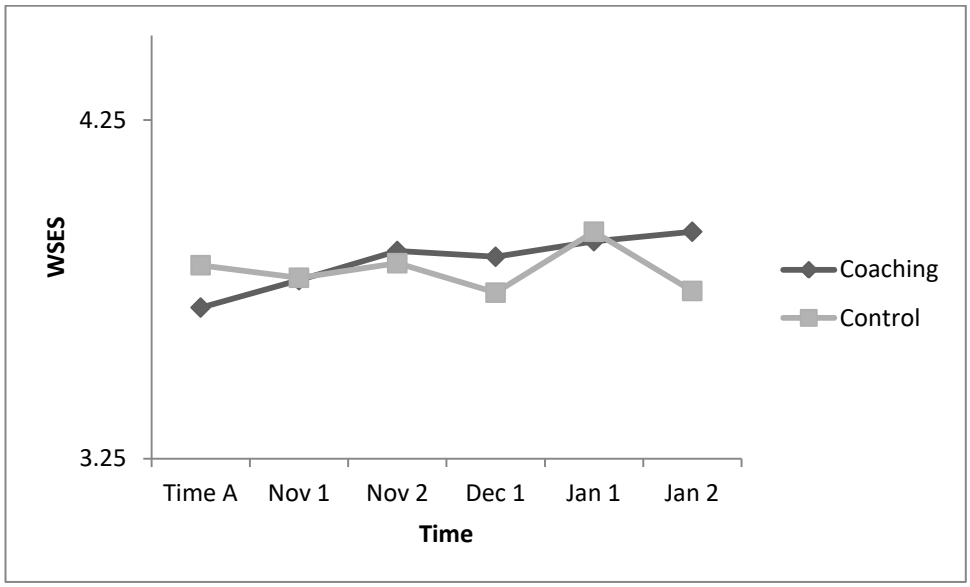
Graph 6.7

Mean Memory Control scores



Graph 6.8

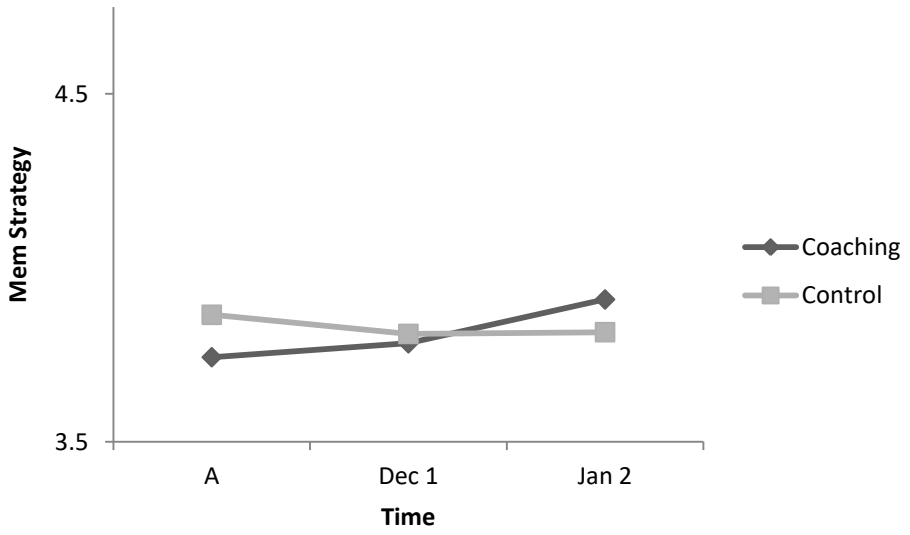
Mean WSES scores



The tables of means and the graphs depicted in Graphs 6.3-6.8 showed clear trend lines for Memory Achievement; (to remind, this measures how important a person feels their memory is to their everyday life) and Memory Control. The Memory Strategy and WSES scores show a trend, but it is less clear and subject to fluctuation between data points. The scores for Memory Capacity and Memory Anxiety show a matching but unexpected trend, which may have been affected by the time of year (the period covering Christmas potentially placing additional requirements on memory and increased anxiety), rather than indicative of participant experience in the intervention. Nov1, Nov2 and Jan1 were removed from further analysis, which reduced the noise of weekly fluctuation but did not affect the overall trend lines. The remaining time intervals are aligned with the points at which working memory data were collected (T1 September and October 2017, before the intervention commenced; T2 second week of December, after the intervention but before the Christmas break; T3 3rd week of January 2018, 5-6 weeks after the intervention but before the commencement of the wait-list control group's intervention). Graphs 6.9-6.14 show the data points for the new three time intervals by group (A=intervention, B=control).

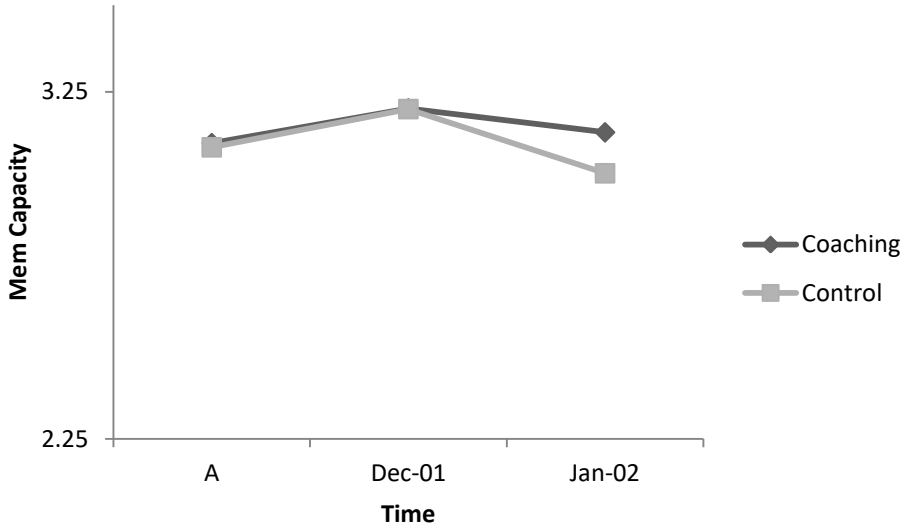
Graph 6.9

Mean Memory Strategy scores per interval by condition



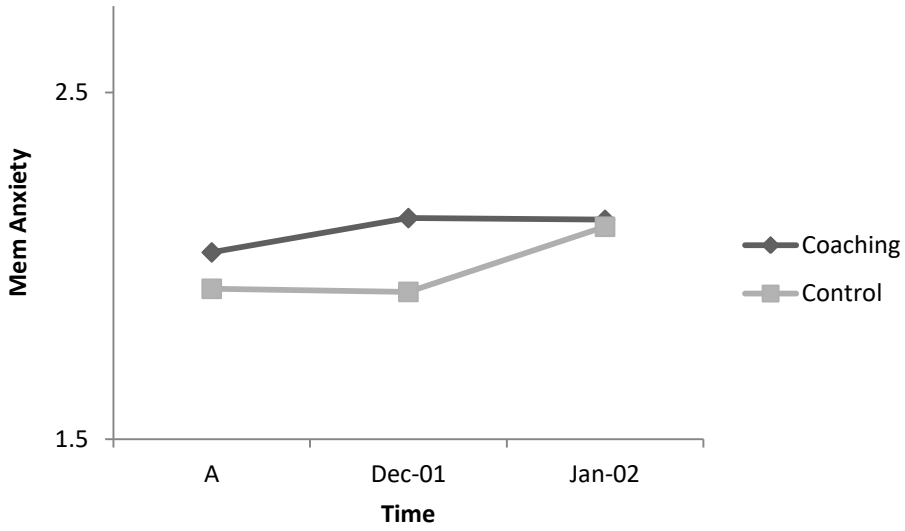
Graph 6.10

Mean Memory Capacity scores per interval by condition



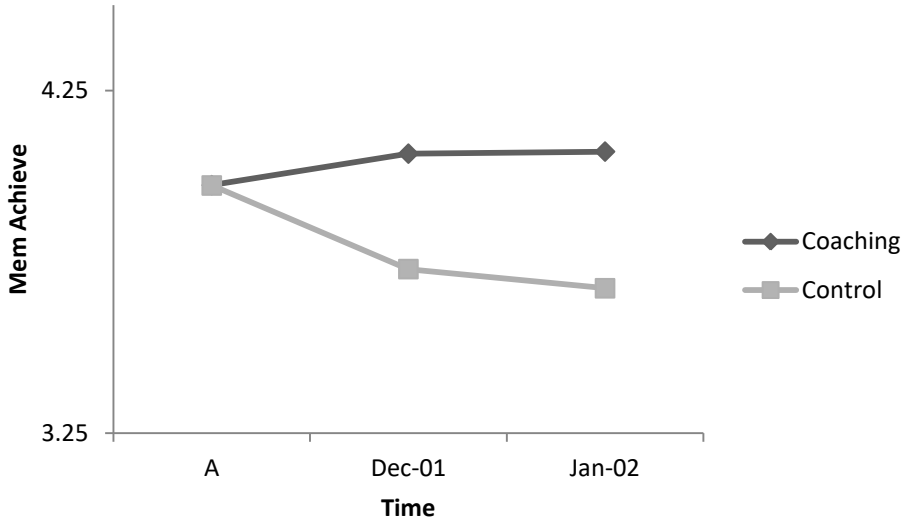
Graph 6.11

Mean Memory Anxiety scores per interval by condition



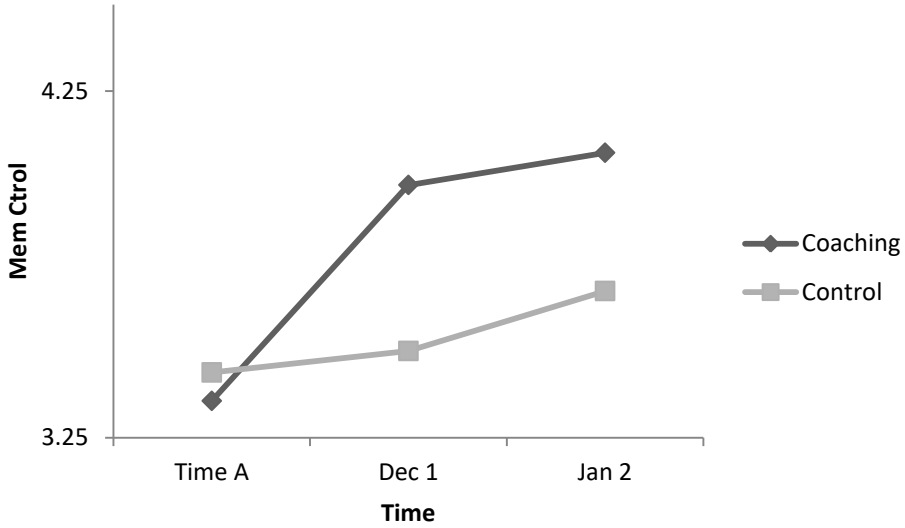
Graph 6.12

Mean Memory Achievement scores per interval by condition



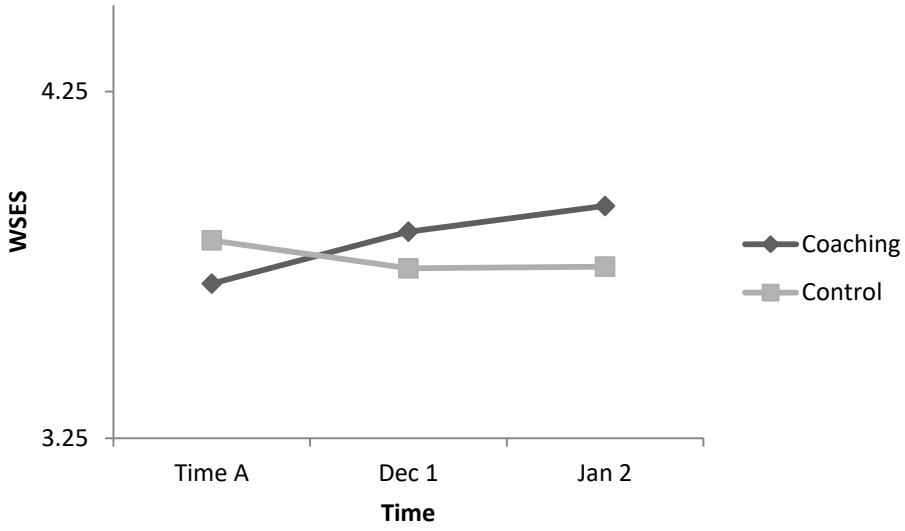
Graph 6.13

Mean Memory Control scores per interval by condition



Graph 6.14

Mean WSES scores per interval by condition



Repeated measures ANOVAs were conducted to explore the within- and between-group changes across the intervention (T1-T2) and the sustained effect after intervention (T2-T3). Mauchley's Test of Sphericity was conducted on all models with two significant results (MemCap and MemAnx). Huynh-Feldt correction was applied due to the Greenhouse-Geisser epsilon being over .75 (Field, 2013). The results of the ANOVAs are in Table 6.13, where results of further interest have been highlighted either due to significant *p* values or high partial eta squared effect sizes or both. The trend of a stronger result for time than for time*intervention group was consistent across all subscale measures of metacognition and WSE, though only one subscale achieved a significant difference with accompanying large effect size, memory control.

Table 6.13

Repeated Measures ANOVA for all questionnaire subscales

Variable	Mauchley's	Within-groups (Main effect of Time)	Between-groups (Time*Intervention)
MemStrat	$X^2(2)=5.605$, $p=.061$	$F(2,72)=1.523$, $p=.225$, $\boldsymbol{\eta^2=.041}$,$\beta=.341$	$F(2,72)=.796$, $p=.455$, $\eta^2=.022$, $\beta=.181$
MemCap	$X^2(2)=9.120$, $p=.010$	$F(1.74,62.65)=1.462$, $p=.24$, $\boldsymbol{\eta^2=.039}$, $\beta=.282$	$F(1.74,62.65)=.496$, $p=.573$, $\eta^2=.014$, $\beta=.123$
MemAnx	$X^2(2)=7.914$, $p=.019$	$F(1.783,64.174)=1.469$,$p=.238$, $\boldsymbol{\eta^2=.039}$, $\beta=.287$	$F(1.783,64.174)=.19$, $p=.803$, $\eta^2=.005$, $\beta=.077$
MemAchieve	$X^2(2)=5.728$, $p=.057$	$F(2,72)=1.268$, $p=.288$, $\boldsymbol{\eta^2=.034}$, $\beta=.267$	$F(2,72)=4.702$, $p=.012$, $\boldsymbol{\eta^2=.116}$, $\beta=.772$
MemCtrol	$X^2(2)=4.117$, $p=.128$	$\boldsymbol{F(2,72)=8.604, p<.001, \eta^2=.193, \beta=.962}$	$F(2,72)=4.526$, $p=.014$, $\boldsymbol{\eta^2=.112}$, $\beta=.755$
WSE	$X^2(2)=3.282$, $p=.194$	$F(2,72)=3.593$, $p=.033$, $\boldsymbol{\eta^2=.091}$, $\beta=.648$	$F(2,72)=1.187$, $p=.311$, $\boldsymbol{\eta^2=.032}$, $\beta=.252$

As observed in Table 6.13, many of the power calculations were low, and therefore risks of a Type-2 Error were high and, therefore, I reviewed effect sizes and *F* values to determine if I should conduct further analyses using the guide that an *F* value of less than one is unlikely to yield a distinct difference no matter the sample size (Field, 2013). Where *F* values were less than 1 and partial eta squared revealed a small or less (<.02) effect size (Durlak, 2009), the null hypothesis was retained. Where *F* values were greater than 1 and effect sizes were between small and medium (.01-.06), the result was further explored. Using this guide, some results in the repeated measures ANOVA (Table 6.13) indicated potential differences between the groups that were not achieving statistical significance despite small to medium effect sizes due to low power combined with the Bonferroni Corrections (MemAchieve, MemCtrol and WSE). I conducted post hoc Independent samples *t*-tests at T3 on these variables, revealing two significant differences between the intervention and control at this time, for Memory Achievement ($t(41.318)$[6]$=3.186$, $p=.003$, $d=1.05$) and Memory Control ($t(45)=3.448$, $p=.001$, $d=1.3$), but not for WSE ($t(45)=0.888$,

[6] *Levene's Test for Equality of Variances was significant F=6.266, p=.016 and corrected degrees of freedom reported accordingly.*

p=.304, d=0.28) which was also not significant with ANCOVA controlling for baseline differences (F(1,42)=2.019, p=.163, η^2=.046, β=.284).

Other results were clearly insignificant, such as the between-groups effects for MemStrat, MemCap and MemAnx. Additional reviews of the graphs produced by SPSS v. 24 RM ANOVA output indicated that baseline differences could be masking the effects of the intervention. I computed an 'improvement score' for each individual by subtracting the baseline score from the T3 score, with the intention of conducting MANOVA on the scores. *g*-power 3.1 analysis indicated that the sample size was still insufficient to detect a significant improvement with an effect size lower than η^2=.4 and this was confirmed with a MANOVA conducted on the improvement scores within questionnaire data, which led to a non-significant global result despite a medium to large partial eta-squared effect size (F(6,37)=1.028, p=.422, η^2.143, β=.353). Since there were only two intervention groups in this sample, I decided to run a series of paired samples *t*-tests to explore the results in more detail, to serve as a more detailed understanding of the effect of time, with less statistical power required for the model but with Bonferroni alpha corrections as appropriate. Table 6.14 shows the paired comparisons between T1 and T2 for all questionnaire subscales, split by intervention group. Table 6.15 shows the paired comparisons for T1-T3. In both tables, effect size Cohen's *d* was calculated using means and standard deviations (Durlak, 2009; Field, 2013), where *p* value was significant or near-significant, all achieving medium to large effect sizes; results of interest are emboldened.

Table 6.14

Paired samples comparison of improvement magnitude for all subscales, by condition, T1-T2

Variable	T1-T2 Intervention	T1-T2 Control
MemStrat	t(23)=-.745, p=.464	t(17)=-.242, p=.811
MemCap	t(23)=-1.410, p=.172	t(17)=-.807, p=.431
MemAnx	t(23)=-1.056, p=.306	t(17)=-.527, p=.605
MemAchieve	t(23)=-.871, p=.393	t(17)= 1.894, p=.075**, d=0.47**
MemCtrol	**t(23)=-4.872, p<.001, d=1.05**	t(17)=-.800, p=.435
WSE	t(23)= -2.271, p=.033**, d=0.26**	t(17)=-.707, p=.489

Table 6.15

Paired samples comparison of improvement magnitude for all subscales, by condition, T1-T3

Variable	T1-T3 Intervention	T1-T3 Control
MemStrat	*t*(24)=-2.193, *p*=.038, ***d*=0.28**	*t*(18)=--.390, *p*=.701
MemCap	*t*(24)=-.004, *p*=.997	*t*(19)=1.519, *p*=.145
MemAnx	*t*(24)=-.964, *p*=.356	*t*(19)=-1.522, *p*=.145
MemAchieve	*t*(24)=-1.125, *p*=.272	*t*(19)= 2.291, *p*=.034**, *d*=0.65**
MemCtrol	***t*(24)=-4.130, *p*<.001, *d*=0.95**	*t*(19)=-.586, *p*=.565
WSE	*t*(24)= -2.539, *p*=.018, ***d*=0.41**	*t*(19)=-.965, *p*=.347

On the basis that *both intervention and control groups* significantly improved their working memory, the possibility that the questionnaire itself facilitated an active ingredient was explored. The meta-memory subscales and WSE scores were re-analysed using paired samples comparisons between T1 and T3, with all participants included, to assess which, if any, variables were consistently improving for both groups, just as WM consistently improved for both groups. The following variables produced the strongest results but none were significant (Bonferroni corrected): SE (*t*(44)=-2.657, *p*=.011,*d*=.16); memory strategy use (*t*(43)=-1.897, *p*=.065, *d*= .11); memory anxiety (*t*(44)=-1.719, *p*=.093, *d*=.21, and indeed with notably small effect sizes. Regression analyses were not possible with the sample size less than the required 20-25 participants per variable (Field, 2013).

The meta-memory questionnaire was re-analysed at T3 using the WM clusters as the independent variable to determine if any of the subscales were significantly different between the two groups. Independent samples *t*-tests using cluster as the independent variable indicated three results with non-significant alphas but medium effect sizes between the clustered groups: MemAnx (*t*(45)=1.996, *p*=.052, *d*=.56); MemAchieve (*t*(45)=2.010, *p*=.05, *d*=.58); MemCtrol (*t*(45)=2.118, *p*=.04, *d*=.62) and lastly SE (*t*(45)=2.012, *p*=.05, *d*=.51). These relationships, whilst not showing a Bonferroni-corrected significant *p* value, indicated far more compelling medium effect sizes and raise the possibility that the two WM clusters represent different groups of people who may also be experiencing different results for metacognition and WSE.

Correlation Analyses Results

Bi-variate correlation analysis was conducted to assess whether WM improvement between T1 and T3 was associated with any of the metacognitive or WSE variables. Table 5.16 shows the correlation analysis for each variable. WM improvement was significantly correlated with Memory Achievement improvement (r=.429, p=.003) only. SE improvement was significantly correlated with improved Memory Control (r=.718, p<.001). Correlations between improvements on the meta-memory subscales were low and inconsistent; these are displayed in table 6.16.

Table 6.16.

Correlation co-efficients for T1-T3 improvement

		Mem Strat Impro	Mem Cap Impro	Mem Anx Impro	Mem Achie Impro	Mem Ctrl Impro	SE Impro	WM Impro
Mem Strat Impro.	Pearson Corr.	1						
	N	45						
Mem Cap Impro.	Pearson Corr.	-0.053	1					
	Sig. (2-tailed)	0.730						
	N	45	46					
Mem Anx Impro.	Pearson Corr.	**-.403****	**.431****	1				
	Sig. (2-tailed)	**0.006**	**0.003**					
	N	**45**	**46**	46				
Mem Achie Impro.	Pearson Corr.	**.422****	0.037	-0.227	1			
	Sig. (2-tailed)	**0.004**	0.809	0.130				
	N	**45**	46	46	46			
Mem Ctrl Impro.	Pearson Corre.	-0.030	**.429****	**.350***	0.054	1		
	Sig. (2-tailed)	0.844	**0.003**	**0.017**	0.723			
	N	45	**46**	**46**	46	46		
SE Impro.	Pearson Corr.	-0.145	**.307***	0.260	-0.026	**.718****	1	
	Sig. (2-tailed)	0.349	**0.040**	0.084	0.866	**0.000**		
	N	44	**45**	45	45	**45**	49	
WM Impro.	Pearson Corr.	0.171	0.052	-0.024	**.429****	0.154	-0.064	1
	Sig. (2-tailed)	0.262	0.731	0.872	**0.003**	0.308	0.664	
	N	45	46	46	**46**	46	49	52

****. Correlation is significant at the 0.01 level (2-tailed)./ *. Correlation is significant at the 0.05 level (2-tailed).**

Discussion

Summary of results

In relation to the working hypotheses for this study, I will report on each individually with the analysis of results, followed by a broader, in-depth consideration of the ability of coaching to improve WM, Metacognition and WSE.

H1: The working memory improvement result from Coaching Study 1 will be replicated in the new sample, in that the intervention group would consistently improve their WM, the improvement continuing and sustaining after the intervention is complete; the control group would experience a smaller practice effect but this would not sustain.

Partial support was found for this hypothesis, in that there was a statistically significant improvement for WM standardised scores when comparing 'before' and 'after'. This *is* a replication of CS1 in that the coaching intervention group has again improved its WM scores by approximately half a standard deviation yet, unlike CS1, the control group has also maintained its improvement on this occasion. There are several potential reasons for this result: (1) improvement is a practice effect in all cases, and the coaching has no impact on WM scores; (2) the use of the WAIS Digit-Span at all 3 time intervals in CS2 increased the practice effect for the control group, which was *less* of an issue in CS1 due to the use of different tests used to score WM; (3) the fortnightly questionnaire had an active effect on memory meta-cognition and this was sufficient to create improvement for the control group and lastly; (4) the reduced delay of the T3 testing interval, which was intended to reduce attrition, meant that the T3 return to baseline that was observed in CS1 did not have time to take effect in the present study. These possibilities will be considered in conjunction with the questionnaire results after the summary of results.

H2: Workplace Self-Efficacy would be improved for the intervention group when compared to control

Tentative support is found for this hypothesis, with a significant effect of time within the RM ANOVA and post hoc testing revealing a small effect size for the intervention group's pairwise comparison improvement (d=.41) despite this result not achieving the Bonferroni corrected p value of .008 (p=.018); whereas the control group did not even achieve a marginal result (this result is considered tentative given the low power analysis).

Graph 6.6 shows an upward improvement trend for the intervention group, and an upward but markedly inconsistent result for the control group, potentially indicating that participant experiences were more influenced by extraneous variables, and/or their approach to the questionnaire less engaged. Like the WM result, the improvement of the control group masked the effect at T3 and a significant difference between the groups was not found. Nevertheless, this result is at least more in line with expected direction than the SE effect from CS1, showing that SE can be improved through coaching for dyslexic adults, though the effect is not large in this study.

H3a: Use of memory strategies will be improved for the intervention group, compared with the control group.

A second tentative support result was considered for this variable with another small effect size (d=0.28), which failed to achieve Bonferroni corrected alpha (p=.038) whilst also suffering from low statistical power. However, graph 6.3 showed inconsistencies at each time interval, for both groups so the null hypothesis is retained, indicating that the coaching did not impact on the use of meta-cognitive memory strategies.

H3b: Self-reported memory capacity will be improved for the intervention group, compared with the control group.

Despite a marginal increase at T2 for the intervention group, this was not significant and the scores returned to baseline at T3. The null hypothesis was retained, indicating that the coaching did not impact on self-ratings of memory capacity.

H3c: Levels of anxiety around using memory will be improved for the intervention group, compared with the control group.

No significant results were found for this variable and the null hypothesis was retained, indicating that the coaching did not impact on memory anxiety for the intervention group. Variance within this variable, depicted in graph 6.5, may have been influenced by the time of year, with the Christmas period possibly influencing anxiety levels around memory.

H3d: Beliefs about the relative importance of memory will increase for the intervention group, compared with the control group.

This variable was influenced over time by a significant *decrease* on the part of the control group by comparison to the intervention group, who remained at the same levels. This may indicate that the control group, following repeated exposure to the questionnaire,

concluded that a good memory is less important than they thought during their initial response, or simply that they were paying less attention.

H3e: A sense of control over one's memory will increase for the intervention group, compared with the control group.

The null hypothesis is refuted in this sample and the coaching intervention was found to have significantly increased participants' sense of control over their memory, a strong and consistent result.

Metacognitive Memory Scale findings summary. The clearest between-group differences were in the MemCtrol and MemAchieve subscales. Memory control, being qualitatively very similar to a potential memory SE, seems to have been affected by the coaching, whereas the sense of how important Memory is seems to have been depleted by the repeated questionnaire; an impact moderated by the coaching. Memory anxiety, memory strategies and memory capacity produced no significant results. A small improvement in memory anxiety and an increase in strategy use did indicate minor changes in direction that were similar for both intervention and control, memory capacity results were highly inconsistent, no significant result was found. The adapted meta-memory scale provided highly inconsistent results across the subscales in general. Plausible explanations include the possibility that the metacognitive experiences of both control and intervention groups were affected by (1) the questionnaire itself, (2) the WM testing session and related interaction with a psychologist as well as (3) the seasonal variances of the Christmas period impacting on self-reported confidence in competence, activities, anxiety and control.

However, the purpose of the scale was to understand the psychological pathway by which WM is improved and, since this was improved for both groups the between-groups comparison is less relevant. In order to understand whether any of the other psychological variables from the meta-memory subscales or WSE are concurrent with the WM improvement, I next discuss the consistency of improvement direction and magnitude between the variables.

H4: WM improvement will be significantly, positively correlated with improvements in (i) metacognition, and/or (ii) WSE and/or (iii) decreases in stress.

Within-groups correlation analysis revealed that WM improvement magnitude and direction was neither linked to the meta-memory scale, WSE nor the Mem Anxiety subscale

specifically (represented stress in CS2); the null hypothesis is retained for H4. Though Memory Anxiety and WM mean scores were correlated at the different intervals, the magnitude of improvement between T1 and T3 is not. From this I suggest that, while anxiety is related to WM, it is less likely to be a mediating variable leading to improvements in WM, rather a reflection of participant self-awareness on memory capacity (i.e. I know I am weak on this therefore I am anxious, as opposed to I know I have improved and am therefore less anxious or I am less anxious therefore I improve). The significant difference between-groups for increased Memory Control/SE, juxtaposed with the similar increase in WM for both groups further suggests that Memory Control/SE is not a mediating variable for improved WM either. Interestingly, Memory Anxiety improvements seemed to be related to the increase in the use of Memory Strategies and increased perception of Memory Capacity, suggesting that anxiety is less related to pure cognitive capacity but instead related to day-to-day behaviour and performance.

The WM improvement had one significant correlationary relationship: with Memory Achievement improvement; a variable asking how important participants thought it was to achieve or retain and good memory, which might indicate motivation (Stark et al., 2017) and could be related to the Goal Setting element inferred from the systematic narrative review. From this I could interpret two potential causal directions: (1) that as their sense of ability improves, the level of importance they assign to memory also increases or (2) as memory becomes more important to them, they are motivated to 'try harder' and thus achieve higher scores. Neither of these options, nor the lack of concurrent improvement with any of the other variables, supports the proposition that reduced stress, increased metacognitive self-awareness or increased SE mediate improvements in cognitive WM. However, with the improvements still achieving over the standard improvement of 0.6 in standard score reported as the practice effect by Weschler (2008), we have to assume that some element of the research possessed an 'active ingredient' and that this variable may have been more present in the intervention group (1.8 average standard score improvement) than the control group (1.15), but not significantly so. It is possible that, rather than being one single element that we are unable to ascertain through bi-variate correlation, each individual has a different route to improvement: one reduces anxiety, another increases strategy use, a third develops self-belief. This will be explored further in chapter seven.

Is WM improved through coaching for dyslexic adults?

My results from CS1 and CS2 indicate that improvements to WM are possible through coaching with dyslexic adults, similar to the extracted studies in chapter four. The interpretation of the CS2 WM result is, however, problematic due to the interference of the control group. To reiterate, the sustained result may have resulted from the contracted time span between T2 and T3, similar to the CS1 Hawthorne Effect, yet a robust measure of WM should not be vulnerable to sustained Hawthorne Effect and therefore we must consider if the repeated testing and questionnaire was in and of itself an intervention. In this data set, the use of the same repeated tests (representing enhanced practice effects and/or mastery perhaps), may have been sufficiently active to improve the result of a second test when accompanied by the appropriate reassurance of other cognitive competence (e.g. block design and verbal skills). The third interval result may represent further improvement following the use of a questionnaire to prompt reflection on memory ability and importance. It is not clear how long this result would sustain without intervention; CS1 suggests that those who have received coaching will maintain or continue to improve without intervention, yet CS2 suggests that a non-coaching generated effect can be maintained with a short, a-synchronous prompt.

My conclusions are cautious from these results: yes, WM can be improved through coaching for dyslexic adults, but also through other means such as assessment with a psychologist facilitated de-brief (as suggested in CS1) and repeated prompting of questions concerning memory which may reduce anxiety or increase self-awareness; we cannot separate the active ingredients in the improvement through these data.

Is meta-memory improved through coaching?

The results of CS2 produced few significant differences between the coaching and control group; only the perceived importance of memory (MemAchieve) and perceptions of memory control (MemCtrol) appeared to show any clear differential effect. Reported use of metacognitive strategies, memory anxiety, and perceptions of capacity were not significantly affected by the coaching. Overall, the meta-memory questionnaire was a weak measure of the impact of the coaching intervention and/or the coaching did not impact meta-memory.

Is workplace SE improved through coaching?

The direction of WSE result in CS2 is in more line with predictions and consistent with extant literature around the development of SE. The intervention group reported a

consistent gradual improvement which sustained and increased following the intervention, though this result was statistically weak and hampered by interference from an inconsistent control group response. As with the WM results, though to lesser and non-significant impact, the control group also improved and therefore we have to consider that the repeated questionnaire also produced a small effect for control group participants. Improvement in WSE was strongly correlated with improvement in memory control, providing support for my suspicion that Dixon and Hultsch's term 'Memory Control' is conceptually Memory SE by another name, as suggested in some clinical research (Valentijn et al., 2006). Further, there was a weaker, but still significant, correlation between WSE and perceived Memory Capacity improvements. Again this may relate more to the behavioural and performance improvements noted in CS1; a specific study to examine these relationships should be conducted.

Limitations

This study produced few clear results and the impact of the use of multiple scales and required Bonferroni corrections make conclusions hard to draw. The memory anxiety subtest, included to attend to the emotional domain and build on the stress management finding from CS1 appears to have limited explanatory power when determining *how* WM is improved via coaching. In hindsight, an emotional domain measure specific to contextual stress management rather than memory anxiety may have been a better scale to include.

Attrition was minimised in this sample, yet the concession of a reduced post-study time interval may have obscured a decrease in WM scores similar to CS1. Erratic results across the time period when reading all six questionnaire analyses indicate that extraneous variables associated with Christmas affected the results; a risk with any field study. Yet the need for field studies is paramount, and indeed these interfering issues are, in and of themselves, a mirror of the issues faced by coaching programmes delivered in practice. Rather than seeking to eliminate them through sanitised laboratory studies, I propose that we continue to conduct field studies and address the need for clarity over time, by accumulating an extracted aggregated effect through meta-analytic technique, as well as a thorough understanding of the various wider contextual factors influencing successful outcomes so that we can moderate any detrimental impact. This aim is consistent with a Realist approach to evaluation (Pawson, 2006) and the concept of ecological validity, which is known to be an issue in working memory research (Chaytor et al., 2006; Söderqvist & Nutley, 2017) including for dyslexia specifically (Trautmann, 2014).

Implications for my research

I do not yet have an explanation as to why some people appear to make a WM improvement and others do not; these two 'types' within both control and intervention, CS1 and CS2 are distinct, yet their difference is not well explained by the additional variables contained within the meta-memory scale or WSE. A more important question is beginning to emerge. Rather than asking if WM can be improved through coaching, I am led to consider whether or not WM is a valid marker of success. My initial literature review and survey data converged with contemporary researchers' conviction that WM is a critical differential variable between success and struggles for dyslexic adults (Gerber, 2012; Leather et al., 2011; Swanson & Siegel, 2001). There is s vast base of research into improving WM (Dunning et al., 2013; Melby-Lervåg & Hulme, 2012; Melby-Lervåg et al., 2016; Weicker & Thöne-Otto, 2015) and its critical, foundational relationship to higher-order thinking skills is conceptually well reported (Baddeley, 2007; Conway et al., 2005) including for dyslexia specifically (Gathercole & Pickering, 2000; Hock, 2012; Smith-Spark et al., 2003). These factors convinced me to attempt to replicate the result in CS1 which showed improved WM for coaching intervention participants when compared to control, despite reservations that this was *not* significantly correlated with more contextual, behavioural outcomes in CS1. Behavioural and contextual variables appeared to develop independently of cognitive WM in CS1, and are arguably more relevant to retaining employment. A fundamental aim of this thesis is to understand the value of coaching interventions dispensed as a disability accommodation for adults with dyslexia. The failure of the meta-memory measure to provide insight into WM success provides further indication that coaching's value may lie outside the cognitive domain in this population.

Implications for practice

As the studies contained within this thesis iteratively build understanding and evaluate practice, I return to the question of practical relevance. The potential use of coaching as a disability accommodation is still viable, nothing so far has *refuted* its continued use, yet there are clear questions that remain unanswered. The indicators at this nascent stage from CS1 and CS2 are to focus the coaching on practical, contextual and behavioural outcomes rather than cognitive improvement itself, on the understanding that a basic intervention consisting of assessment with a psychologist with minimal post-intervention prompting may be sufficient to create and maintain an improvement in cognitive ability.

Chapter Summary

Coaching Study 2 has provided a perplexing lack of correlation between improvements in the variables, despite similar, modest increases in some group means between intervals. Since mean scores are mainly increasing in a similar direction, I would expect the correlations to be stronger; since it is not I can only conclude that there is divergence as to which individuals are improving within each variable. As explored through cluster analysis of the WM results, there may be distinct groups of 'improvers' and 'non-improvers' for all variables, this needs further exploration. If the 'improvers' for each variable are different individuals, i.e. that some participants are improving in WM, some in SE, but not both; this would explain why the correlation analysis is so weak despite group means moving in the same direction. This potentially limits the usefulness of group means comparison analysis to understand the data. As such, I propose to create a further analysis of the results of both CS1 and CS2 to explore the individual pathways through the intervention. The following chapter will consider a 'whole' impact response to build on the analyses presented heretofore, which have reduced the coaching outcome into the sum of modular variable parts.

Chapter Seven

Meta-Impact and the Diverse, Personalised Effects of Coaching

In the previous two chapters I have evaluated the impact of coaching on two samples of adults with dyslexia through field studies, which mimic the delivery of coaching in the workplace. The studies comprised a Pragmatic, (Critical) Realist approach to data collection and analysis (Houston, 2014; Pawson, 2006; Simpson, 2018). I have built on the narrative systematic review presented in chapter four where I used inductive reasoning to understand how programmes of coaching interventions might work in principle, and hypothetico-deductive evaluation to explore which intervening psychological mechanisms may be most useful in protecting dyslexic adults from occupational exclusion, in line with legislative guidelines. In this chapter, using principles of abductive reasoning (Van Maanen et al., 2007), I seek to review the data patterns emerging from my field research and further develop a theoretical understanding of the results. The data from CS1 and CS2 are herein reanalysed using a novel process in which I create a 'Meta-Impact' score across the different domains of influence to ascertain if the coaching had *any* significant impact, rather than exploring the details of *which* impact, as previous chapters report.

I mainly explored three psychological domains to assess coaching impact in Coaching Study 1 (CS1), cognitive (WM), behavioural (WMRS; work performance) and psychosocial (General Self-Efficacy; GSE), including one emotional measure (stress management). Further exploration in Coaching Study 2 (CS2) utilised improved measures of cognitive and psychosocial domains (Contextualised, Workplace Self-Efficacy; WSE) but also included metacognition within which was a more developed emotional domain measure. To introduce this chapter I first summarise my interpretation of the two data sets' combined implications, per domain, to set the context, before describing the development of the data analytic strategy that I employed to derive an overall outcome variable.

Cognitive, behavioural and psychosocial results. While the studies have produced consistent improvements in the cognitive domain, measuring working memory (WM) ability, these improvements are not limited to the intervention groups, indicating a potential Hawthorne Effect / practice effect; CS2 showed some evidence of the effect being sustained through regular prompting of self-reflection. In both CS1 and CS2 the initial observed increase in WM mean scores taken from a group level analysis obscured two, numerically distinct separate clusters within the sample; those who improved and those who did not, as opposed to varying levels of improvement across all individuals. Sufficient numbers of

improvers within the intervention groups' data produced marginally significant effects at the group level of analysis. Behavioural domain improvements were reported in CS1, though these improvements were not observed by third parties (supervisors) who rated the dyslexic employees as achieving high performance before the intervention which they did not perceive to be further improved by the intervention. In both CS1 and CS2, the psychosocial variables were unclear; GSES in CS1 did not improve following the coaching intervention and, for those in the one-to-one condition, it decreased significantly; in CS2 a small improvement in WSE was reported, albeit tenuously significant.

Metacognition results. The metacognitive / emotional subscales in CS2 (use of strategies, perceived capacity, anxiety around memory, perceived importance of memory and perceived ability to control memory; Dixon & Hultsch 1983) were intended to explore possible pathways from baseline to increased WM score. However, they provided inconsistent results. From my review of the raw data, it appears that some individuals experienced an improvement in strategy use but not anxiety, behaviour or psychosocial variables etc; these individual effects are not aligned and the pattern of results is different for each participant.

The limits of domain-specific analysis. Clarification on *how* coaching could be effective for adults with dyslexia has not been forthcoming through the exploration of different domains so far. In order to understand my results, I revisited the treatment of psychological domains within the extant coaching psychology literature, which indicated that change is possible across the cognitive, behavioural, emotional and psychosocial domains (Jones et al., 2016; Theeboom et al., 2014), all of which are theoretically plausible mediators of improved workplace performance for dyslexic adults (de Beer et al., 2014; Gerber, 2012; Gerber et al., 2004; McLoughlin & Leather, 2013; Price et al., 2003). The extant coaching literature does not, at this stage, differentiate between one or more of these domains being more important than another as an outcome and indeed, neither do my data.

Coaching psychology leans heavily on psychotherapeutic research in considering outcome effectiveness (de Haan & Duckworth, 2012; O'Broin, 2016) and has imported the conceptual assumption of 'outcome equivalence'(Bordin, 1979) or 'general effectiveness' (de Haan & Duckworth, 2012), which suggests that there is little differentiation in client (/coachee) outcome, behavioural content and psychological mechanisms at work within an intervention, despite a myriad of intervention approaches. The recommendation is thus that, instead of comparing coaching techniques, we should instead seek alternative explanations

for intervention success. Neither the import nor the recommendation are without criticism (respectively: O'Broin, 2016; Stiles, Shapiro, & Elliott, 1986) but both have been adopted in coaching psychology's search for 'active ingredients' affecting the *process* such as coach/coachee characteristics (Stewart, Palmer, Wilkin, & Kerrin, 2008) and the strength of the working alliance between coach and coachee (Baron & Morin, 2009; Gessnitzer & Kauffeld, 2015). However, a recent systematic review of coaching effectiveness (Bozer & Jones, 2018) critiqued the field for failing to compare outcomes across domains and recommended a more nuanced approach to active ingredients of *process* and *mechanism.* This is also recommended in the development of the original psychotherapeutic literature (Paul, 1967; Stiles et al., 1986).

My working, abductive explanatory hypothesis builds on a more nuanced approach to outcome, i.e. that participants are improving in one or two domains, resulting in an equivalence of global outcome ("did it work") but not of mechanism ("how did it work"). They are personalising their learning and their response according to some prior condition such as their resources, their workplace need or their perceived strengths and weaknesses, but all could be perceived as a positive result. To test this hypothesis I propose to explore the between-groups variation using a computed overall coaching 'Meta-Impact' variable which adds individual experience from a range of domains. I will first draw out whether each individual coachee experienced a significant improvement for *any* of the variables, rather than each or all of the variables, and then assess the frequency of these improvements per group. My methodology for this computation will be outlined in the next section. I predict that when comparing an intervention group to a control on this Meta-Impact variable, the data will produce a more consistent result with larger effect size than the variables measured so far.

H1: Participants in a coaching intervention are more likely to have experienced a significant, positive improvement overall. There will be a significant difference between intervention and control groups as to the number of variables in which a participant is experiencing an improvement.

Tested in CS1, but not further explored in CS2 due to time and resources constraints, was the difference between one-to-one coaching and peer group coaching. As outlined in chapter four, group coaching is widely reported in the research literature (Jha et al., 2010; McDowall & Butterworth, 2014; Miranda et al., 2013) yet, in practice, coaching is delivered one-to-one for our client group (Bewley & George, 2016; Doyle & Mcdowall, 2015; Doyle

et al., 2016; Melvill et al., 2015) at great cost to employers and the Department of Work and Pensions service 'Access to Work' (Melvill et al., 2015). I therefore propose to use the new Meta-Impact variable to test any differences between-group and one-to-one conditions again. Based on the effects reported in chapter five and the previously discussed naturally-occurring presence of social cognitive learning theory compliant protocols within the group coaching condition (SCLT: Bandura 1986) that are harder to contrive in one-to-one contexts, I predict that the group coaching condition within CS1 will report a higher number of variables positively impacted by the coaching.

H2: The group condition will report a significantly higher number of variables improved by coaching than the one-to-one coaching condition.

A major limitation of CS2 was the magnitude of the pooled WM gain retained at the final interval by the control group, unlike CS1 where their improvement at the second (T2, immediately after) interval was eliminated by the third interval (T3). Using the Meta-Impact variable I can explore this further. I have previously proposed that this effect could be attributed to methodology - a shorter time difference between T2 and T3 creating the illusion of a sustained Hawthorne effect, but it is also possible that the control group improvements in CS2 were an active effect of the questionnaire. In CS2 there were other variables where control group improvements masked intervention group results (Memory Strategy use, Memory Anxiety decrease, WSE increase), which further suggest that the questionnaire itself was contributing to psychological change for participants. If the questionnaire itself provided an active ingredient, then using the Meta-Impact score I should be able to notice a difference between the control groups in CS1 and CS2. Comparison of the mean number of variables improved between the CS1 and CS2 control groups will indicate if these differences were significant.

H3: The control group from CS2 will experience a significant impact on more variables than the control group from CS1.

It is plausible that the variety in domains through which coachees experience change is not accidental and based on an as yet unidentified prior condition. Using the existing data, I can explore one of these hypothetical conditions; namely the possibility that the coachees direct their learning towards areas where they perceive to have the most need. They may, either consciously or subconsciously, take from the coaching intervention what they *need* to take from the coaching intervention, engaging their development in domains where they have weak baseline scores. Those most concerned about emotional management such as

stress or anxiety, develop improvements in those areas, coachees who perceive themselves as most needing to improve behaviour improve behaviour. If this hypothesis is accurate, the improvement scores will be negatively correlated with the baseline scores for those variables.

H4: Improvement between T1 and T3 will be negatively correlated with T1 scores, i.e. the lower the original score, the larger the improvement effect.

In the next section I will explain the approach to allocating the dependent variables to the broader psychological domains and outline in detail, for transparency, the data analytic strategy that I have devised to compute the Meta-Impact variable.

Method

Process for computing the new data set

I followed five steps in the process to create a new data set: (1) review of the existing dependent variables and determine which to include in the analysis and where to allocate them according to domains; (2) computing an improvement score for each variable by subtracting the baseline score from the final score; (3) convert the improvement score to a standardised *z*-score to remove differences in the numerical range of the measures; (4) set a limit for how much difference constitutes an 'improvement' and lastly (5) compute a Meta-Impact mean improvement score for each participant. This process was proposed to and reviewed with a psychology research methods lecturer not previously connected with this thesis, prior to the analysis taking place. I will now provide a detailed explanation of each of the above five steps.

Step 1: Inclusion of variables

Which dependent variables to include, and how to group them, was considered based upon the results gained so far within this thesis, rather than the original work of the authors of the scales/measures. Table 7.1 outlines the four psychological domains referenced to date, and which specific variables they include.

From CS1, six variables were measured and analysed at all three intervals: Verbal Working Memory (VWM); Working Memory Behaviour Rating Scales (WMRS); WM related Job-Performance (JPWM); Psycho Social, or SE related Job-Performance (JPSE); General Self-Efficacy Scale (GSES) and the single item measure of workplace Stress Management. Though there are arguments for combining the contextual workplace items into one performance variable, this was avoided in CS1 as the items were qualitatively and numerically distinct and were deemed to elicit feedback related to slightly different aspects of behaviour. I retain the scales as two variables but allocate both to the behavioural domain. Though there is an argument for allocating the SE-related performance items to the psychosocial domain, reflection on the items themselves indicates that they are related to distinct social actions (behaviour) rather than solely indicative of beliefs or values. The single item measure of stress management is already identified as comparatively weak (though not without precedent Houdmont & Randall, 2018); however I included it as an exploratory variable in CS1 and found some differences between the groups using within-groups means comparisons. However, these were not powerful enough effects to be elicited

through ANCOVA. I determined that the single stress item should remain in this analysis, since previous research highlights the importance of stress management in dyslexia coaching specifically (Doyle & McDowall 2015) and in general when managing executive functions in the workplace (Jha et al., 2010). Additionally, the failure of the memory anxiety measure in CS2 to elucidate the stress/well-being influence means that I do not have an adequate replacement in the data set. However, to accommodate the risk posed by comparatively weak measures, I will explicitly explore the number of people reporting a significant improvement in both variables and the weight of their inclusion on the each whole data set, such that I can ascertain the hypothetical importance of the emotional domain and make recommendations for future research should it prove essential.

From CS2 seven variables were measured and analysed at three intervals: verbal working memory (WM); memory strategy use (MemStrat); perceived memory capacity (MemCap); anxiety around memory use (MemAnx); perceived importance of memory (MemAchieve); perceived control over memory (MemCtrol, which is essentially memory SE) and lastly, the workplace self-efficacy scale (WSES). All the subscales drawn from the meta-memory questionnaire (Dixon & Hultsch, 1984) have been previously termed a 'meta-cognitive' domain. However, on re-inspection, the subscale items do appear to address qualitatively distinct experience and, therefore, I have reanalysed the construct validity of each item and allocated them individually across the behavioural, emotional and psychosocial domains. I will now explain the justification behind each reallocation and its purpose in the Meta-Impact improvement analysis; all items in the scales are listed in Appendix 6.2 for further review.

Behavioural subscales. Memory Strategy and Memory Capacity were allocated to the behavioural domain. For example, the Memory Strategy included items such as: "When you are looking for something you have lost, do you retrace your steps in order to locate it" and "do you keep things in a familiar spot so that you won't forget them when you need them"; Memory Capacity included items such as "I am good at remembering names" and "I am good at remember places I have been". While these items invite the individual to reflect on their internal mental processes around memory, as originally conceived in the meta-memory scale development by Dixon and Hultsch, they also relate to clear behavioural tasks or thought processes about tangible activities.

Emotional Subscales. There is a construct overlap between emotional and psychosocial domains which requires acknowledgment. To explain: through coaching we

could be supporting individuals to (1a) improve their beliefs about their abilities, (1b) to reformat their beliefs about how important workplace performance is to their social value and either of these actions could lead to (1c) a decrease in stress or anxiety, or indeed the ability to manage stress and anxiety could lead to a more (2) positive self-appraisal. Nalavany et al. (2017) suggest that these two domains are correlated, yet I have not found evidence of that in CS1 and CS2, and I have therefore retained the separation for this analysis.

Memory anxiety was allocated to emotion and has already been highlighted in CS2 as addressing the need for an emotional measure. It is qualitatively different from the direct question about managing stress at work from CS1, but I would equally expect improvements on this scale if the intervention had improved participants' ability to manage emotion related to work. Both are retained as emotional domain variables.

Psychosocial subscales. Memory Control and Memory Achievement were allocated to the psychosocial domain, being deemed to relate to the interaction of our self-belief and values and how we portray these in a social context. For example, the Memory Achievement item "I think a good memory is something of which to be proud", identifies a socially-constructed value; pride is related to how others view us, our social standing. Items such as "it bothers me when I forget an appointment" are also about attributing a social value to our actions and competence, considering how we affect others. I find these items more similar to SE, which also relates to our beliefs our socially-valued competence, than I do to the concept of metacognition which should reflect self-awareness of thought processes.

Due to the consistently weak results for SE reported in CS1 and CS2 conflicting with the consistent message from previous findings that (a) SE is a vital lever for dyslexic adults (Gerber, 2012; Leather et al., 2011) and (b) strong research evidence that SE is usually positively impacted by coaching (McDowall & Butterworth, 2014; Mcdowall et al., 2014; Tsai et al., 2011), improvement rates for the psychosocial variables included in CS2 were considered separately from the total. I created a domain-specific Meta-Impact mean to explore if the combined weight of all three psychosocial variables were distinct between the control and intervention groups. The inclusion of a wider range of psychosocial variables will allow me to identify if any change is occurring in the psychosocial domain compared to control, without the need to rely on an SE measure that may not have been adequately specific.

Table 7.1

Domains and dependent variables allocated

Domain	Dependent Variables included	From which study	Raw score range
Cognitive	VWM	CS1	1-19
	VWM	CS2	1-19
Behavioural	JPWM	CS1	1-5
	JPSE	CS1	1-5
	WMRS	CS1	1-4
	MemStrat	CS2	1-5
	MemCap	CS2	1-5
Emotional	Stress Management	CS1	1-5
	MemAnx	CS2	1-5
Psycho-social	GSE	CS1	1-5
	WSE	CS2	1-5
	MemAchieve	CS2	1-5
	MemCtrol/SE	CS2	1-5

As shown in Table 7.1, there is at least one measure in each domain for both data sets and all original measures from CS1 and CS2 were deemed relevant for inclusion, despite some methodological concerns already highlighted in the chapters about the relevance or reliability of the measure and discussed here to provide transparency of decision-making. My discussion of Meta-Impacts across the domains will refer to the results from the inclusion of these variables accordingly.

Steps 2-5, computing the scores and improvement range

2. Determining Improvement. Each dependent variable had a mean score for each participant computed from the total for the items contained with the scale, divided by the number of items, as originally reported in chapters five and six, with the exception of the stress management item which had one sole score. To ascertain 'improvement' across the length of the intervention, the baseline mean score (or item score for stress) was subtracted from the final (T3) mean score (or item score for stress) for each individual.

3. Standardising the numerical range. The improvement scores were not comparable in scale; for example, WM means scores ranged from 1-19 and WMRS questionnaire results used a range of 1-4. A standardised *z*-score was computed for each variable, which allowed me to identify the magnitude of improvement for each individual in

each dependent variable using a consistent numerical format and reduced any undue weighted influence of the WM scores or under influence of WMRS.

4. Determining the margin of improvement. A straightforward positive number (rather than a decrease) does not qualify as indicative of improvement; small increases in values may represent chance effects and between-groups comparison of this number would replicate CS1 and CS2 marginal results. Instead, I determined a numerical limit of *comparative* improvement; a number above which the *z*-scores could represent an *actual value* increase that could plausibly represent a more tangible effect. To identify the numerical limit above which an improvement may be considered significant I considered the precedent of using standard deviation, as is common in demarcating qualitatively different groups in psychometric IQ testing (Weschler, 1993, 2008). Seeking to be cautious and stringent in this rather unprecedented analysis, I propose that a *comparative* improvement score of at least plus one standard deviation from the norm (*z*-score of =/>+1), represents a numerically distinct improvement in *actual* score, thus delineates a group of significant 'improvers' for that variable.

To illustrate how this contrived boundary affects the interpretation of impact further I shall use the example of WM scores, as a core variable in this thesis. In CS1 and CS2 the mean improvement in intervention groups was an *actual value* increase in standard scores of between 0.98 and 1.88 (the WM standard scores range from 1-19). WM studies extracted in chapter four's review also indicated that *actual value* improvements of 1-2 standard scores represented the mean significant effect. Mean experimental improvements were thus consistently higher than the typical practice effect 0.6 (Hausknecht et al., 2007; Weschler, 2008).

Following conversion of the improvement magnitudes to *z*-scores in my data sets, $z=0$ would therefore represent a cognitive ability improvement similar to published research on working memory. In the CS1 and CS2 samples, baseline WM scores for intervention groups were on the lower cusp of the average range (7.8-8.3, where the average range = 8-12) so the mean, significant improvement (i.e. + 0.98-1.88) meant that individuals were likely to remain in the lower half of the qualitatively interpreted 'average range' (8.78-10.18). However, it also meant that, participants achieving *over* the mean improvement were more likely to move into the above average range of ability. Review of the raw z-score data in CS1 and CS2 indicated that a *comparative value z*-score =/>1 represented an *actual value* standard score increase of =/>2.5, which translated to =/> 10.3-10.8 standard score. As such

the ‘improvers’ were consistently at or above the average score of 10, which is interpreted by occupational testers as ‘competent’ for most activities (Grant, 2009; McLoughlin & Doyle, 2013; Weschler, 2008). I consider this a more reliable, demonstrable impact than the previous reported mean *actual value* improvement and suggest that it effectively segregates the top improvers from the rest of the participants.

I propose that the same qualitatively distinct change can be inferred across the other variables using the same numerical limits. To clarify, in order to qualify as ‘improved’ on any given variable in this analysis, a participant had to be in the top group of improvers, as determined by a comparative improvement score of z=/>1. This limited the ability of the whole data set to qualify as improved for that variable but drew out those who will most likely experience palpable change. I acknowledge that this approach risks omission of consistent, more marginal improvements for many participants, but I argue that these effects have already been explored fully in chapters five and six with group means comparisons. The purpose of the Meta-Impact analysis is to compare the frequency of demarcated psychological changes between the conditions, rather than calculate mean effect size for a variable.

5. Final Meta-Impact score. Each participant then received a new improvement score of ‘one’ for each variable which registered an improvement *z*-score =/>1, and zero for <1. The total number of improvement scores for each participant was then divided by the total number of variables (i.e. a mean) to create the ‘Meta-Impact’ variable. This final step was necessary as the number of variables differ between CS1 and CS2 and homogenising the Meta-Impact score permits a comparison between studies to address Hypothesis 3 specifically, in which I propose a different result between control groups. As explained above, for CS1 the Meta-Impact score with and without the stress item was computed, and for CS2 with and without MemAnx to ascertain if an emotional change measure exerted a similar influence to CS1 with the stress item. For CS2 a general psychosocial Meta-Impact score was computed from all included variables to explore whether the lack of compelling results for SE to date are likely to be a methodological artefact relating to the sensitivity of the SE measure or a true response that, for this client group, no psychosocial domain improvements were gained.

Data analysis

The new variable 'Meta-Impact'(improve) was tested for parametric assumptions and, since these were not met, group comparisons were planned using non-parametric tests selected according to the number of independent groups. Post hoc calculations of effect size *r* for non-parametric comparisons (Field, 2013) were computed. Bonferroni corrections were not applied to the new variable, since the incidence of family-wise error does not apply to the creation of a new variable any more than one would apply a correction to the mean score of a computed scale based on the number of individual items in the scale; I argue that I am not comparing the means of the subscales, I am adding data from the subscales together.

Between-study comparisons were conducted by collating control group scores across both cohorts, with acknowledgement that this comparison is tenuous due to the heterogeneity of the measures leading to the improvement score, yet of interest given that all domains are represented in both cohorts. It should be noted at this point that several participants experienced significant *decreases* in score, using the same limit of one standard deviation from the norm (z=>-1) and therefore this number was compared between-groups to assess if these differences were affected by the intervention (Meta-Impact decrease). I also reviewed the raw data to consider the number of intervention participants who had failed to achieve a single significant improvement measure. However, this endeavour was compromised by the number of participants who only reported WM from the CS1 cohort (many were missing questionnaire data, which were collected remotely and subject to far higher attrition). The raw number review is therefore reported for CS2 only as this was more indicative of genuine failure to improve as opposed to missing data. The improvement scores were correlated with T1 scores for all variables; Spearman's Rho was employed for bi-variate correlation with non-parametric data.

Results

I report the results of the Meta-Impact intervention/control group comparisons separately for each study, followed by the control group comparison and the correlation analysis. The raw improvement *z* scores per person are shown in Appendix 7.1 for CS1 and in Appendix 7.2 for CS2.

Hypotheses 1 and 2: differences between intervention and control; differences between intervention type

CS1 results. Table 7.2 shows the descriptive statistics for the computed *z*-score per variable as well as the new mean Meta-Impact 'improve' and 'decrease' scores for CS1. Please note that differentiation between the mean *z*-scores as presented here is no more illuminating than the ANOVA analysis in CS1 and CS2; they are presented for due diligence and transparency of reporting only and not for further inferential statistical analysis. The table shows two Meta-Impact improvement scores; one which includes the single stress item and one which does not. The two Meta-Impact scores are compared to consider the relative importance of this measure to participant outcomes. To remind, the means presented for Meta-Impact improvement or decrease scores represent a group average of the number of variables in which each participant scored over one standard deviation, divided by the number of variables.

Table 7.2

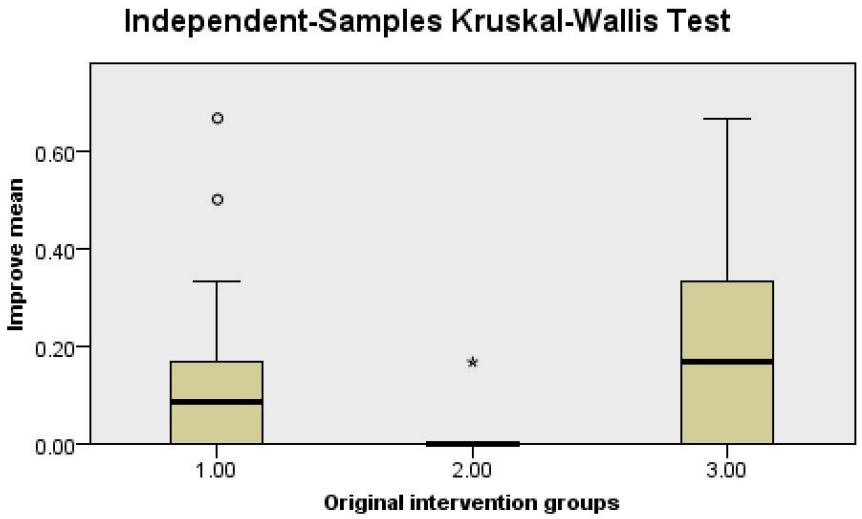
Descriptive z-score statistics and Meta-Impact scores, CS1

	One-to-one			**Group**			**Control**		
	N	*Mean*	*SD*	*N*	*Mean*	*SD*	*N*	*Mean*	*SD*
WMRS	12	0.49	1.18	11	0.15	0.70	7	-0.85	0.60
JPSE	12	0.18	0.84	13	0.28	0.95	8	-0.81	0.96
JPWM	11	0.18	1.09	11	0.38	0.79	7	-0.94	0.57
Stress	12	0.11	0.71	13	0.27	1.31	8	-0.48	0.61
WM	15	-0.05	0.94	13	0.26	0.78	12	-0.26	1.13
GSES	12	-0.50	0.42	13	-0.19	0.63	8	0.03	0.40
MI Improve (mean)	**16**	**0.15**	**0.20**	**15**	**0.19**	**0.19**	**12**	**0.01**	**0.05**
MI Decrease (mean)	**16**	**0.06**	**0.12**	**15**	**0.07**	**0.11**	**12**	**0.11**	**0.16**
MI Improve (minus stress)	**16**	**0.15**	**0.19**	**15**	**0.16**	**0.19**	**12**	**0.02**	**0.06**

The Meta-Impact (MI) scores were irretrievably positively skewed and/or leptokurtic, thus non-parametric analysis was conducted using a Kruskal-Wallis test for between-group effects, finding a significant difference in MI improvement scores (K(2,43)=9.379, p=.009) and no differences between the groups for MI decrease scores (K(2,43)=0.857, p=.651). Post hoc Mann Whitney comparisons of the MI improve score revealed a significant effect for group vs control (U(27)= 2.447, p=.014,r=.47), but not one-to-one versus control (U(29)=1.873, p=.061, r=34). Both effect sizes are in the medium range (Durlak, 2009; Field, 2013) and it is likely that the second comparison's p values are compromised by small sample size and consequential lack of power (as in the original study). Graph 7.1 shows the improvement means and confidence intervals for each condition.

Graph 7.1

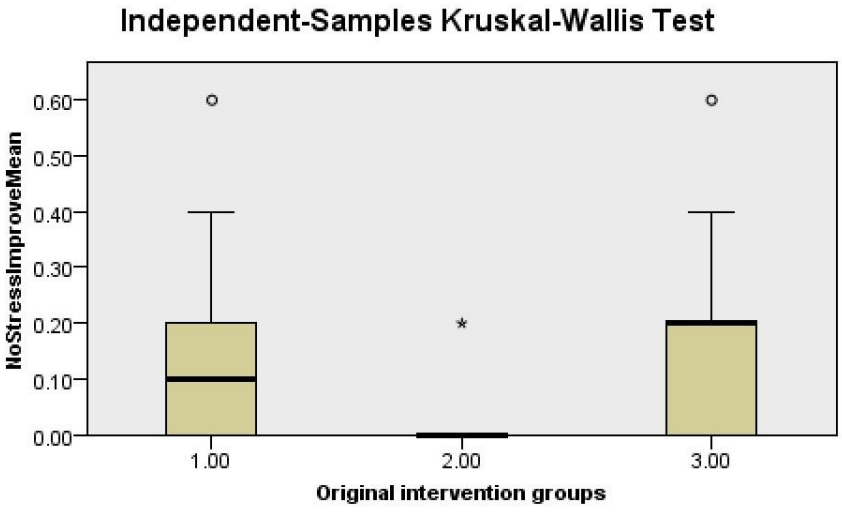
Means and confidence intervals for Meta-Impact scores (incl. stress) for CS1 (1=one-to-one; 2=control; 3=group coaching)



Removing the stress management variable had a deleterious impact on the MI improvement comparisons. Raw data indicated that though only two participants (both from group condition) had stress management as the sole improvement; it was present as a significant improvement for seven people in total, all from intervention conditions (2 x one-to-one; 5 x group). As such, removal of this item reduced the magnitude of the effect and, though a Kruskal-Wallis test was still significant ($K(2,43)=6.744$, $p=.034$). Post hoc comparisons indicated that, with this variable removed, the one-to-one condition remained only marginally significantly different to control ($U(28)=2.339$, $p=.053$, $r=.40$, likewise the group condition $U(27)=2.461$, $p=.041$, $r=.43$. Observation of the similar, medium effect sizes and borderline alpha values for both comparisons would suggest a similar effect to both groups of removing the stress item, as well as representing low power due to sample size. Graph 7.2 shows the group means and confidence intervals for the improve score with the stress item removed.

Graph 7.2

Means and confidence intervals for Meta-Impact scores (stress deleted) for CS1 (1=one-to-one; 2=control; 3=group coaching)



CS2 results. Table 7.3 shows the descriptive statistics for the mean computed z-score per variable as well as the mean MI scores. The MI scores were again highly positively skewed and, as such, non-parametric analysis was conducted using a Mann-Whitney U test for between-group effects, finding a significant difference between-groups for MI improvement ($U(52)=3.014$, $p=.003$,$r=.42$), no difference between-groups for MI decrease $U(52)=0.795$, $p=.427$) and a significant difference for the MI psychosocial variable ($U(52)=2.814$, $p=.005$,$r=.39$). The MI improve score without the MemAnx measure was still significantly different between the groups but less so ($U(52)=2.527$, $p=.012$, $r=.33$). In the intervention group, eight (out of 26) participants failed to register a single significant improvement across any of the variables, yet for the control group this was far higher with seventeen people (out of 26) failing to register a single significant improvement (See Appendix 7.2)

Table 7.3

Descriptive z-score statistics and Meta-Impact scores, CS2

	Intervention			**Control**		
	N	*Mean*	*SD*	*N*	*Mean*	*SD*
WM	26	0.19	1.10	26	-0.19	0.87
Strat	25	0.14	1.00	20	-0.18	0.99
Cap	25	0.15	0.97	21	-0.17	1.03
Anx	25	-0.07	1.04	21	0.08	0.97
Achieve	25	0.32	0.94	21	-0.39	0.95
Ctrol	25	0.17	1.17	21	-0.20	0.73
SE	26	0.07	1.19	23	-0.08	0.75
MI Improve mean	**26**	**0.21**	**0.20**	**26**	**0.07**	**0.12**
MI Decrease mean	**26**	**0.13**	**0.13**	**26**	**0.12**	**0.17**
MI Improve mean minus Mem Anx	**26**	**0.17**	**0.20**	**26**	**0.04**	**0.13**
MI Psychosocial only mean	**26**	**0.24**	**0.24**	**26**	**0.08**	**0.17**

Hypothesis 3: Comparison of control groups.

While there was a small difference in MI improve means between the CS1 and CS2 control groups (respectively, *M*=0.01, *SD*=0.05; *M*=0.07, *SD*=0.12), this difference did not achieve a significant result using non-parametric Mann Whitney U analysis (*U*(38)=1.532, *p*=.243).

Hypothesis 4: improvement targeted at weakest baseline skill.

Table 7.4 shows the correlations between T1 and improve scores for all variables in CS1. Table 7.5 shows the correlations between T1 and improve scores for all variables in CS2, both using Spearman's Rho for non-parametric continuous data. Significant correlations are emboldened within the tables. I will outline the correlations by domain, reporting both CS1 and CS2 concurrently to identify trends within the domain rather than the cohort.

The baseline cognitive WM scores were significantly and negatively correlated with the magnitude of the improvement for CS1 only (CS1 *r*=-.472, *p*=.001; CS2 *r*=-.068, *p*=.634). The psychosocial scores at T1 significantly correlated with the magnitude of the improvement for CS2 WSE and MemAchieve only (CS1 GSE *r*=-.228, *p*=.201; CS2 WSE *r*=-.331, *p*=.02; CS2 MemCtrol *r*=-.112, *p*=.457; CS2 MemAchieve *r*=-.427, *p*=.003).

For behavioural domains, all comparisons were negatively significantly correlated (CS1 WMRS *r*=-.523, *p*=.003; CS1 WorkPerfWM *r*=-.655, *p*<.001; CS1 WorkPerfSE *r*=-.432, *p*=.014; CS2 MemStrat *r*=-.542, *p*<.001; CS2 MemCap *r*=-.544, *p*<.001). For all emotional domains, all comparisons were negatively significantly correlated (CS1 Stress *r*=-.729, *p*<.001; CS2 MemAnx *r*=-.452, *p*=.002).

Table 7.4

Correlation co-efficients between T1 (baseline) and Meta-Impact scores, CS1

		WM Improve	WMRS Improve	SE Improve	WorkPerf SE Improve	WorkPerf WM Improve	Stress Improve
WM T1	Corr. Coef.	**-.472****					
	Sig. (2-tailed)	0.001					
	N	46					
WMRS T1	Corr. Coef.	.298*	**.523****				
Mean Score	Sig. (2-tailed)	0.049	0.003				
	N	44	30				
SE T1	Corr. Coef.	0.242	0.244	-0.228			
Mean Score	Sig. (2-tailed)	0.114	0.193	0.201			
	N	44	30	33			
JobPerf	Corr. Coef.	-0.001	-0.072	-0.061	**-.432***		
SE T1 Mean	Sig. (2-tailed)	0.994	0.712	0.739	0.014		
Score	*N*	44	29	32	32		
JobPerf	Corr. Coef.	-0.161	-0.247	.456**	-.363*	**-.655****	
WM T1 Mean	Sig. (2-tailed)	0.308	0.205	0.010	0.044	0.000	
Score	*N*	42	28	31	31	29	
Stress	Corr. Coef.	-0.111	-0.103	-0.007	-0.188	-.415*	**-.729****
Single item T1	Sig. (2-tailed)	0.475	0.588	0.970	0.296	0.025	0.000
	N	44	30	33	33	29	33

Table 7.5

Correlations between T1 and Improve scores for all dependent variables in CS2

		Digit-Span T1	Mem Strat T1	Mem Cap T1	Mem Anx T1	Mem Achieve T1	Mem Ctrol T1	SE T1
WM Improve	Corr. Coef.	-0.068						
	Sig. (2-tailed)	0.634						
	N	52						
Strat Improve	Corr. Coef.	-.296*	**-.542****					
	Sig. (2-tailed)	0.048	0.000					
	N	45	45					
Cap Improve	Corr. Coef.	0.077	0.001	**-.544****				
	Sig. (2-tailed)	0.612	0.995	0.000				
	N	46	45	46				
Anx Improve	Corr. Coef.	0.123	0.171	-0.040	**-.452****			
	Sig. (2-tailed)	0.417	0.261	0.790	0.002			
	N	46	45	46	46			
Achieve Improve	Corr. Coef.	-0.125	-0.139	0.118	0.164	**-.427****		
	Sig. (2-tailed)	0.406	0.361	0.434	0.277	0.003		
	N	46	45	46	46	46		
Ctrol Improve	Corr. Coef.	0.033	0.000	-0.134	-0.079	0.205	-0.112	
	Sig. (2-tailed)	0.829	0.998	0.376	0.600	0.172	0.457	
	N	46	45	46	46	46	46	
SE Improve	Corr. Coef.	-0.035	0.135	-0.177	-0.201	.351*	-0.009	**-.331***
	Sig. (2-tailed)	0.814	0.360	0.223	0.166	0.013	0.950	0.020
	N	49	48	49	49	49	49	49

****. Correlation is significant at the 0.01 level (2-tailed).**

***. Correlation is significant at the 0.05 level (2-tailed).**

Discussion

The results from this additional analysis will be discussed per hypothesis, followed by the study limitations and the implications for research and practice.

Control versus intervention groups comparisons

I first outline the Meta-Impact improvement comparison between-groups and then discuss in more detail the findings regarding the emotional and psychosocial domains.

H1: Participants in a coaching intervention are more likely to have experienced a significant, positive improvement within at least one of the dependent variables than control group participants. There will be a significant difference between intervention and control groups as to the number of variables experiencing an improvement.

H2: The group condition will report a significantly higher number of variables improved by coaching than the one-to-one coaching condition.

Hypothesis 1 is supported by the data in this sample using the Meta-Impact variable. Similar to the results in CS1, the group condition outperformed the one-to-one condition on the new variable; effect sizes (with stress) were larger r=.47 and r=.34 respectively, which supports Hypothesis 2. By alpha significance alone, the one-to-one coaching result indicates that it was not a successful intervention for dyslexic adults, however, with a medium effect size and small data sets the risk of a Type II error indicates to me the need for further research rather clearly disputing the effectiveness of one-to-one coaching for dyslexia. Nevertheless, my research to date does cautiously yet consistently suggest, both through chapter four's systematic review and the samples in CS1 and CS2, that group coaching is a reliable intervention, potentially more so than one-to-one.

Interestingly there were no significant differences between the intervention and control groups in either cohort for decrease Meta-Impact scores; neither was there any consistency in which variables were more susceptible to decrease in competence / perceived ability. I suggest that the decrease Meta-Impact variable represents the various, individual life events that plague action research and field studies. Yet it is important to note that, for all participants, these decreases were present and thus, in a practical coaching scenario, we can expect some areas to decrease despite direct intervention; the coaching cannot eliminate the impact of real life contextual difficulties across the domains. The interference of life

events in research does not detract from our ability to extrapolate meaningful results; rather it makes any resulting theories more transferable and robust when indeed they are found (Pawson, 2013; Van der Elst et al., 2008).

Emotional Domain. The analysis of both CS1 and CS2 improvements showed that, without their inclusion, there was less difference between control and intervention groups, which indicates that the emotional domain is a salient mechanism for mediating coaching success. Though expressed through a single item in CS1, it contributed to the overall Meta-Impact improvement score for participants, highlighting its value to the analysis and justifying its retention in this sample. The importance of the emotional domain was further supported in the CS2 Meta-Impact analysis by the salience of the more developed Memory Anxiety subscale.

Psychosocial Domain. The number of improvements within the psychosocial domain were significantly different for the intervention compared to control in CS2, which indicates that, despite a lack of clear, strongly significant SE improvement in the original studies, some form of development in self-belief and socially-contextualised values can occur through the coaching. This result is important as the lack of SE improvement in CS1 and CS2 runs contrary to all predictions, which are grounded in a solid evidence base about how to facilitate SE (as outlined in chapter four) and indeed the salience of the variable reported by both dyslexia researchers and practitioners alike (Leather et al., 2011; McLoughlin & Leather, 2013; Nalavany et al., 2017). It may be that the workplace SE measure included in CS2 alone is not capturing sufficient information about self-belief changes, whereas the conceptually-related Memory Control (significantly correlated; see chapter six, Table 6.16) and the Memory Achievement variables provide sufficiently diverse directions for personal change within this domain. It has been suggested that General SE (as measured in CS1) is a more effective independent variable rather than dependent variable (Bozer & Jones, 2018; Stewart et al., 2008) and that more task-specific SE scales are required for coaching evaluation; the results from CS2 and the current chapter concur with this recommendation.

Control group comparisons between cohorts

H3: The control group from CS2 will experience a significant impact on more variables than the control group from CS1.

The control group data were compared between CS1 and CS2, to identify whether the CS2 cohort were reporting a higher number of significant changes than CS1, which would provide insight into the potential active effects of the repeated questionnaire. These data were hard to compare due to large standard deviations, erratic distribution and disparate independent group sizes. Though the CS2 control cohort experienced marginally more Meta-Impact improvement than the CS1 cohort, there did not seem to be a strong pattern for either control group and no significant differences were identified. While consistent small increases in participant scores raises the group means used in CS1 and CS2 between-group comparisons, these increases do not necessarily bring any definable, operational change to individuals within the cohort. Indeed, review of the raw data in Appendix 7.2 shows that six participants from the CS1 intervention group met / exceeded the improvement limit of z=/>1 for WM, compared to only one from the control group, despite the group mean improvement z-score being similar (-.19 for control and +.19 for intervention). This example shows clearly the obscuring effect of consistent marginal improvement to group means and illustrates that despite similarity of group mean, control group participants were not able to translate familiarity and practice into my contrived category of significant impact. As such, the magnitude of the coaching effect is better differentiated from the potential questionnaire effect by the current Meta-Impact analysis. The null hypothesis is retained for H3.

Correlation between T1 and Improvement magnitude and direction

H4: Improvement between T1 and T3 will be negatively correlated with T1 scores, i.e. the lower the original score, the larger the improvement effect.

Partial support was found for Hypothesis 4. For all behavioural and emotional variables, baseline scores at T1 were negatively, significantly correlated with improvement scores; this is in the expected direction, i.e. the smaller the T1 score, the larger the improvement score or vice versa. The significant correlations suggest that coachees' learning and development could be agent, directed to where they had self-reported a need.

However for the cognitive domain WM variables only CS1 data performed as predicted and for the psycho-social domain only two of the four variables (WSE and

MemAchieve, CS2) were significantly correlated in the expected direction. Further to the proposal above that coachees may be agent in directing their learning, it is possible that resources are directed only where they believed they could make a difference. If this premise is true, the results here suggest that the cognitive and psycho-social domains are perceived as less susceptible to effort.

Study Limitations

Data analytic technique. Most intervention evaluation studies chose their dependent variables a priori and place a simple 'yes' or 'no' result on the success of the intervention to achieve change in each of the measures which typically represent one domain (Bozer & Jones, 2018). In this chapter, I have created a 'whole is greater than the sum of the parts' analysis to identify if individuals in the study were able to benefit in any or some domains, rather than within individual measures pertaining to a single domain. The methodology that I used to compute the scores is novel and without prior validation, the arbitrary limit of one standard deviation representing a significant change (or indeed significant decrease) must be considered an exploratory method rather than a conclusive result. Contriving a novel data analytic technique within a doctoral thesis is not without risk to a junior researcher, though I counter that such an endeavour has been well-constructed and objectively reviewed. I suggest that the technique in and of itself represents a potential contribution to intervention evaluation protocols with wider implications for future research and I suggest replication to refine the process.

Domain conceptual clarity. The lack of conceptual clarity surrounding the domains to which the measures were allocated also requires acknowledgement as a potential limitation within the discussion. In particular (1), the redistribution of the meta-memory subscales amongst the broader psychological domains of behaviour, emotion, and psychosocial and (2) the overlap between within the emotional and psychosocial domain variables. To defend, with hindsight, the meta-memory scale that I adapted for use in CS2, though high in face validity and preferable to the rejected clinical/education scales, it appears to be less about self-directed metacognitive *control* of memory and more about *self-awareness* of the behavioural, emotional and psychosocial impacts of memory. I also defend combining SE and subscales of Memory Control and Memory Achievement together for the purpose of this chapter, since they appear related from a qualitative item content analysis perspective and indeed numerically, which has some support in the literature (Valentijn et al., 2006). However, there remains a valid critique that none of the adopted measures were

quite suitable, and instead there may be a need to develop bespoke scales to assess the impact of coaching for people with dyslexia on the workplace.

Heterogeneity of measure. CS2 was intended to build on and further develop the findings of CS1, and therefore slightly different measures were used. While this was the right choice for elucidating a wider range of potential mechanisms and their relationship in CS2, a further limit of this chapter's study is that the measures are not easily comparable (excepting WM) between the studies and therefore I cannot justify aggregating the studies to increase statistical power through a larger sample size. Specifically, I cannot add CS1's General SE to CS2's Workplace SE nor CS1's workplace performance to CS2's memory strategies, though I have explained the conceptual relatedness of the items.

Implications for research

The main implications for research from this chapter are twofold. Firstly, the development of a data analysis strategy that accommodates diverse responses to interventions and, secondly, the finding that participants mainly target their improvements towards the areas where they begin with a weakness.

The Meta-Impact analysis contributes to our understanding of how coaching works at an individual level in real-life settings and provide a method for application to field research. This is potentially an important contribution since field-based studies are lacking in occupational psychological research generally (Wheeler, Shanine, Leon, & Whitman, 2014), and specifically within dyslexia research (Burden, 2008; Gerber, 2012; Leather et al., 2011; Rice & Brooks, 2004). The execution of empirical research in field settings is known to be problematic, lacking control over extraneous, heterogeneous life events, conflicting with the generalisation of research to practice, which requires such extraneous influences to be acknowledged and incorporated where possible (Pawson, 2006, 2013; Randall et al., 2005). Here, I have shown that individual coachees, who are experiencing different extraneous influences upon their learning and thus lack uniformity in outcome at the mechanism level, can still contribute scores to an empirical evaluation of outcome at a group level. Whereas qualitative measures have been recommended to evaluate individual heterogeneity in impact (Nielsen & Randall, 2013); my quantitative technique could be developed to help answer the broad question 'does it work' even when the 'how does it work' question results in personalised answers. Further, I contend that using field research to hone coaching interventions down to a constituent 'active ingredient' that constitutes one key difference may be a futile endeavour. It may be appropriate to laboratory-based research

intended to develop understanding of conceptual relationships, but I suggest that it is impractical when evaluating the psychological impact of applied psychological practice.

The direction of impact, and the potential role of participant agency in selecting which domain to target remain of interest for further research. The active role of the participant in negotiating outcomes has been explored in the coaching psychology literature; however, this currently feeds into the narrative that the agreement on task/goals between coach and coachee within a Coaching Alliance holds the predictive power rather than the domain itself (Baron et al., 2011; Bordin, 1979; Gessnitzer & Kauffeld, 2015). The suggestion that coaching experiences are broadly equivalent within coaching psychology (de Haan & Duckworth, 2012) is challenged by the data presented here, which suggests that individuals are having differentiated, personalised experiences. Further research should clarify the extent to which these mechanism differences feed into overall perceptions of impact outcome (self and employer rated).

Implications for practice

The results presented in this chapter indicate that the coaching is likely to benefit recipients on a cognitive, behavioural, emotional and/or psycho-social level, but we are not able to predict which individual will require which level of intervention. As such, the advice for practitioners is to be client-led, supporting the 'androgogical approach' advocated by practitioners McLoughlin and Leather (2011) and raising the importance of joint goal setting advocated by coaching psychologists (Baron & Morin, 2009; Baron et al., 2011; S. Gessnitzer & Kauffeld, 2015; O'Broin & Palmer, 2007). Since it is possible that the individual coachee can be agent in identifying which domain requires improvement, my work indicates that the contracting and goal-setting elements at the start of a coaching programme should be well executed.

Chapter Summary

In summary, the results from the data presented in this chapter indicated that the coaching intervention produced a significant improvement in at least one dependent variable for a significant majority of participants. The volume of variable improvements for those receiving one-to-one and group coaching was significantly higher than the control groups, with medium effect sizes for all post hoc comparisons on Meta-Impact improvement scores. Those in the group coaching condition experienced marginally stronger results when compared the control group. The dependent variables were related to different domains: cognitive, behavioural, emotional and psychosocial. Significant negative correlations were found between the baseline scores and the magnitude of the improvement in all domains, though not for all variables. The results indicate that coaching participants experienced the coaching differently, taking from it what they needed on an individual basis, rather than following the same personal development journey. For some, improvement in the cognitive domain was found but not emotional; for others, behavioural differences were made but not cognitive, and so on. This supported my abductive hypothesis for the chapter that the relatively weak results in chapters five and six stem not from a weak result for the individual coachees, but from a methodological artefact created by using group mean comparisons per variable (the 'sum of the parts'), which can obscure a clear result that the majority of coaching participants are able to receive some workplace-relevant benefit as a result of the intervention (the 'whole'). This has implications for the prescription of a coaching protocol and the proposed pathway following chapter four (figure 4.3); leading to a refined, personalised pathway which I describe in the next chapter.

Chapter Eight

Summary and Limitations

Summary of Findings

In this penultimate chapter, I will summarise my interpretation of the main, significant findings of the surveys, review and quasi-experimental field studies detailed so far. Though I have already outlined initial and iterative conclusions with the chapters themselves, due to the variety of studies and the mixed methodologies, a summary chapter is necessary to bring these observations together and relate them to my central research question. While limitations have been addressed within each chapter as learning points in my journey of research, my approach in this chapter is to focus on those pertaining to the development of the field overall, with suggestions for future work. Implications and conclusions of the thesis as a whole will be addressed in the following, final chapter. The findings are comprised of the research (rather than introductory) chapters: (chapter 3) survey results; (4) narrative synthesis; (5) coaching study 1 (CS1); (6) coaching study 2 (CS2) and finally; (7) the Meta-Impact analysis. These findings are summarised in table 8.1.

Table 8.1

Summary of findings

Study	Key findings
Chapter 3: WANSS survey	Dyslexic adults receive a variety of assistive technology, coaching support and naturally-occurring supports as disability adjustments in the UK.
	Executive Functions coaching was reported as less prevalent than natural supports (36.68% and 43.17% respectively). Literacy coaching is further less prevalent (19%). EF coaching was valued highly by respondents.
Chapter 4: Narrative Synthesis	WM and SE are reported by stakeholders, researchers and practitioners as the predominant mechanisms of interest for adults with dyslexia.
	Empirical research demonstrates the potential for WM and SE to be improved via a SCLT compliant coaching protocol, incorporating Goal-Setting Theory, with metacognitive development and/or stress management.
	This finding hypothetically supported the principle of using coaching as an accommodation for dyslexic adults, though not directly evaluating this population.
	A hypothetical pathway detailing coaching intervention protocol to influence psychological mechanisms was devised.
Chapter 5: CS1	WM was observed to be significantly improved for many coachees undergoing a SCLT compliant one-to-one or group coaching intervention, when compared to control. Not all coachees responded positively; rather than a graduated variance in the magnitude of improvement there were two distinct clusters of 'improvers' and non-improvers.
	General SE was not improved via the same coaching compared to control.
	WM-related behaviour was improved via coaching compared to control.
	Self-reports of work performance, both related to WM dependent tasks and SE related tasks, were improved via coaching.
	Self-reports of stress management were improved for some but not significantly differently to control at the group level.
	The group coaching condition improvements were marginally greater than the one-to-one condition improvement, though this could be due to increased practice time.
	The control group experienced an initial improvement, which then returned to

	baseline at the third interval (potential Hawthorne effect). WM and improvements were not significantly correlated with behavioural improvements.
Chapter 6: CS2	WM was significantly improved for all participants including the control – this was again potentially a Hawthorne effect that did not correct due to contracted timescales. Workplace SE was significantly improved for many coachees but not in sufficient magnitude and volume to achieve a significant result when compared to control. The control group did not register improvement on this measure but reported erratic increases and decreases. Memory Control was significantly improved for intervention coachees when compared to the control group. Memory strategy use, memory capacity and memory anxiety did not improve significantly overall for either control or intervention participant groups. Memory achievement decreased significantly for control group when compared to intervention. The repeated use of the questionnaire was proposed as potentially creating an active effect for control participants beyond standard practice or Hawthorne effects, though the reduced final time interval may have masked a return to baseline after time effect as observed in CS1. WM improvements were correlated with memory achievement only.
Chapter 7: Meta-Impact variable analysis	A Meta-Impact (MI) score was computed and used to compare overall experiences between the groups. The number of significant improvements experienced by intervention group participants across any (rather than each) of the active domains is significantly different from the control groups in both CS1 and CS2. The group coaching condition participants' improvements were again stronger than one-to-one coaching participants. The control groups did not differ in MI scores across the studies, which did not support the hypothesis that the questionnaire was an active intervention for control participants in CS2. The magnitudes of improvement were negatively correlated with baseline scores consistently for all behavioural and emotional domain measures and for some variables within the cognitive, and psychosocial domains.

Research Question

In this section I return to my original research question and employ the Realist research framework of Context, Intervention, Mechanism and Outcome (Denyer et al., 2008)to narrate the sequence of mixed methodology activities and findings that represent the potential contribution of this thesis to scientific knowledge. I then provide a summative paragraph per question clause. To remind, my central research question, reported at the end of chapter one, was as follows:

"Given a legislative context in which the dyslexic adult is considered disabled, and a social context which confers increased vulnerability to occupational and social exclusion, (1) what types of intervention exist to mediate such risk, (2) on which psychological mechanisms do they aim to operate, (3) and to what extent do interventions achieve a successful outcome?"

Context and intervention. The introductory chapters of this thesis demonstrated an immature research field for the occupational, psychological consideration of adult neurodiversity in general, including dyslexia. Highlighting the dearth of within-discipline work, I argued that reviews of existing knowledge had to be drawn from non-psychological journals, with potentially non-dyslexic populations, and conducted an exhaustive search across disciplines for relevant work that might inform my research design. From my expanded review, as well as the dyslexia-specific literature, I highlighted an over-reliance on child-based and medico/educo-normative study designs and a lack of critical thinking in the research fields. I observed that the evolutionary critique has not been sufficiently absorbed into published, empirical work related to dyslexia. The scant qualitative and cross-sectional papers identified provided insight into an exclusive social context in which the dyslexic adult is marginalised in terms of career ambitions and disproportionately unemployed and incarcerated. The review provided minimal elucidation of relevant accommodation interventions for adults, despite acknowledgement that these are a legal obligation for organisations and a consistent call for adult-specific dyslexia research. Through my critical review of the research context, I confirmed that the occupational, psychological context for dyslexia coaching as a disability accommodation was heretofore lacking in any empirical body of work and dependent on practitioner reports. The occupational psychological experience of dyslexia was thus set as the context for this thesis and, specifically, I drew on work from workplace coaching psychology and herein contributed a framework depicting

the potential of individual-level interventions to mediate between the employee and organisation (the meso-level, figure 1.2).

I determined that preliminary work was required to more comprehensively catalogue the context of practice as it currently stands, similar to earlier activities reported in the development of the coaching psychology literature (for example , Bono et al. 2009; Blackman et al. 2016). This aim developed into an extensive scoping exercise. I initially conducted a survey to objectively describe what the delivery of reasonable adjustments represents in practice. The findings from the survey sample indicated the presence of adjustment activities for dyslexic adults in UK workplaces that were congruent with legislative frameworks and consistent with practitioner reports citing coaching and assistive technology as the formal adjustments recommended by psychologists (Bewley & George, 2016; McLoughlin & Leather, 2013; TUC, 2011; United Kingdom Parliament, 2010). Additionally, I identified a range of informal adjustments and enquired as to which items dyslexic adults reported as valuable. The individual items of formal adjustment (e.g. type of assistive technology and coaching topics) reported by practitioner manuals were evaluated both in terms of their reliability and construct validity within a scale, which can now be used to further dyslexia research in adults. Formal adjustments comprised four main categories: assistive technology and tools, workstation adaptations, executive functions coaching and literacy coaching.

Having outlined the context of practice in which to evaluate, I then selected one such intervention for the remainder of the thesis: coaching; specifically the development of psychological theory pertaining to the delivery of coaching as a dyslexia accommodation. The development of executive functions (EF) coaching was selected as a focus, since this was more prevalent than literacy coaching both in the survey sample and in my practitioner, pilot research (Doyle & McDowall, 2015). The broadly positive response to EF coaching in both data sets indicated a positive perception of this intervention, but no clues as to how or why coaching might be effective. The intervention protocol was honed during the systematic review, which employed inductive reasoning within a Realist, narrative synthesis protocol to elicit principles within coaching that were potentially active in creating successful outcomes. The synthesis revealed the importance of Social Cognitive Learning Theory (SCLT: Bandura, 1986) and Goal Setting Theory (GST: Locke & Latham, 2002) in intervention design, as well as highlighting mechanisms of interest as described below. Taking care to ensure fidelity to SCLT and GST (whilst incorporating metacognition and stress management as variables of interest), I designed two quasi-experimental field studies,

mimicking the interventions of current practice as far as possible, yet including a group coaching condition in response to the widespread use of group coaching highlighted in the narrative systematic review.

Mechanisms of interest. I brought together the disparate threads of research from multidisciplinary journals within the systematic review in order to propose a range of potential mechanisms by which dyslexia symptoms in adults might be improved in the workplace. A panel scoping process in preparation for a narrative systematic review (Denyer & Tranfield, 2009; Pawson, 2006) helped to crystallise the emerging picture of working memory (WM) and self-efficacy (SE) as primary variables of interest in an executive functions-based coaching intervention that is sympathetic to meso-level mediation. The importance of these variables is evident in the small set of research papers published regarding the adult dyslexic (de Beer et al., 2014; Gerber et al., 2004; Leather et al., 2011; Swanson, 2012; Varvara et al., 2014) and indeed the related conditions discussed in chapter one. However, power of coaching to effect change across these variables, using a sample that was either directly adult dyslexics or comparable populations, was heretofore unevaluated empirically.

As expected, the studies extracted for SE which provided fidelity to the four stages of SE development outlined in Social Cognitive Learning Theory (SCLT: Bandura 1986), along with clearly-contextualised and socially-relevant goals (Goal Setting Theory, or GST: Locke & Latham 2002), consistently facilitated working age adults to improve SE. SE was therefore measured as a dependent variable in my studies in order to ascertain its value and malleability in an adult dyslexic sample. More surprisingly, from the WM extraction I inferred that it was also possible for coaching to improve WM using SCLT-compliant protocols. WM was therefore measured as a dependent variable and again evaluated in relation to my specific sample.

The review indicated some intervening mechanisms as potentially instrumental in improving WM functioning, including a reduction in stress levels (Chambers et al., 2008; Jha et al., 2010) and the concept of metacognition (self-awareness of thought processes, and the potential to control thoughts: Flavell 1979; Moro et al. 2015; Ariës et al. 2014). I thus elicited three potential domains for exploring the impact of coaching on WM for dyslexic adults: (1) WM targeted at the cognitive level, potentially related to metacognitive strategy development; (2) WM related to emotion, improved through reduced stress or anxiety and lastly; (3) WM-related performance targeted at the behavioural level upon workplace

difficulties for dyslexics as outlined in practitioner work (Doyle & Mcdowall, 2015; Bartlett et al., 2010). The emotional domain additionally shares features with SE, in that there is great overlap between affective well-being and SE (De Caroli & Sagone, 2014; Nalavany et al., 2017), which is cited independently as an important variable for improving dyslexic difficulties in the workplace (Gerber, 2012; Leather et al., 2011; Price et al., 2003; Taylor & Walter, 2003).

Outcomes. The definitive outcome upon which any disability accommodation must be predicated is job sustainability. This is achieved through ensuring that work performance is adequate for the demands of the role and, for disability, not compromised by features of the condition. Based on the mature extant literature regarding the aforementioned psychological mechanisms (as detailed in chapter four), I used these as proxies of work performance against which I could evaluate the impact of a coaching programme. However, a rudimentary scale of work performance in CS1 was also included, incorporating the topics identified in chapter three, such as time management and organisational skills. In CS1, paired and independent *t*-tests found reasonable effect sizes across the cognitive and behavioural domain outcomes for self-reported and objectively-tested measures.

General self-efficacy was not improved by coaching, neither were supervisor-rated behavioural measures, though some of the supervisor measures were reduced to samples of 5 by T3 and therefore it is hard to draw conclusions. An apparent Hawthorne effect at T2 (immediately after the coaching) for the control group indicated a potential influence of the testing itself. I therefore repeated the intervention in CS2, using a meta-cognition questionnaire to provide a qualitative mental model process analysis of what was happening during the intervention and between the intervals. Coaching Study 2 was conducted in similar quasi-experimental field conditions. A contextualised measure of SE was employed (workplace SE: Pepe et al. 2010). In this sample, which retained a reasonable number of participants at T3 (N=52 in total), both control and intervention improved in WM cognitive scores. Group mean comparisons of the metacognitive awareness subscales and SE measure did not initially produce insight as to *how* WM was being improved during the intervention, leaving unanswered questions as to how the outcome of cognitive and behavioural coaching impact had been achieved.

Using Realist evaluation as a guiding framework and employing abductive reasoning in response to unexpected results (Van Maanen et al., 2007), I then focused my attention on the individual experiences of participants within the interventions. Understanding the ‘rules

of complexity' within any Realist evaluation (Pawson, 2013), I embraced the ambiguity in outcome and instead sought evidence that *any* improvement had been made, rather than searching for specific changes; thus matching variability in outcome with coachee individuality. This review proved fruitful and the analysis of raw improvement (T1-T3) scores indicated that a significant majority of participants in the interventions groups were improving within at least one domain, but those domains differed between individual participants within the cohorts. I inferred that the mechanisms through which coaching for adults with dyslexia acts to facilitate a workplace performance outcome improvement may be personalised to the needs of individual coachees. Each client brings their own, unique set of employment contexts, employment history, supervisor relationships, educational background, personality and cognitive profile to the experience; all of which are relevant to coaching outcomes (Bozer & Jones, 2018; Stewart et al., 2008), learning transfer (Grossman & Salas, 2011) and meso-level interventions in the workplace (Nielsen & Randall, 2013). When we compare group means within single domain variables, we may be obscuring potential personalisation of coaching outcomes at the individual level and the corresponding adjustment of which elements of learning have transferred.

I now provide summative responses to my central research question, broken down into its constituent clauses, as follows:

"Given a context in which the dyslexic adult is considered disabled and more vulnerable to occupational and social exclusion, what types of intervention exist to mediate this risk?

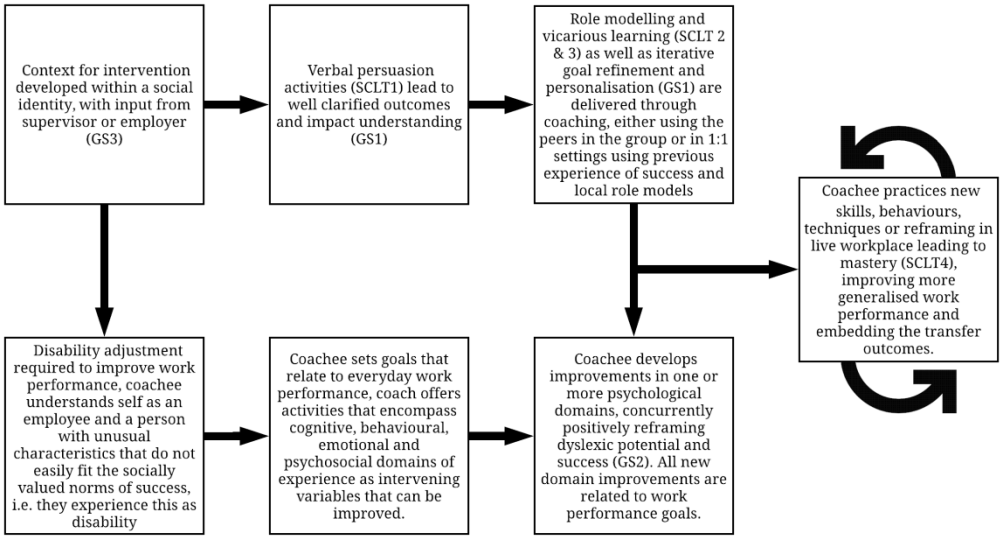
Formal dyslexia adjustments in operation in the UK comprise assistive technology and tools, executive functions coaching, literacy coaching and workstation adjustments; these are not uniformly applied and have been heretofore deployed without research-based guidance. Informal adjustments, including adaptations to work environment, flow and support are also provided widely in the UK. Adjustments are facilitated by the statutory government programme 'Access to Work'. Both formal and informal adjustments are perceived as helpful to their recipients, though many informal adjustments might represent naturally-occurring good practice and be of benefit to all employees. The extent to which dyslexic people specifically benefit from adjustments is not known, and therefore neither is the extent to which this provision is able to mediate risk of social and occupational exclusion.

On which psychological mechanisms does coaching [do they] aim to operate?

WM and SE are psychological mechanisms relevant for improving the work performance of dyslexic adults. There are further, more nuanced mechanisms within the cognitive emotional and behavioural psychological domains through which coaching holds the potential to facilitate improvement in work performance. Interventions that adopted protocols consistent with SCLT and Goal-Setting Theory were identified as able to facilitate change across these mechanisms in chapters five and six, though which mechanism was most pertinent was revealed to be personalised as shown in chapter seven. The refined, personalised pathway of intervention and mechanisms is depicted in figure 8.1.

Figure 8.1

Personalised pathway for development of WM and SE in coaching



To what extent does coaching [do they] achieve a successful outcome?"

The Meta-Impact variable analysed in chapter seven indicated a strong global outcome result for the intervention groups when compared to control. A significant majority of the intervention group experienced domain improvement that sustained, or improved further, beyond the last session for at least six weeks. I consider this a reliable result and a preliminary contribution of research to evidence that coaching is a viable accommodation practice. However, predictions concerning the extent to which they achieve the expansive outcome of protecting employment and facilitating equal access remain tenuous. In

particular, my observations regarding the lack of causal pathways between mechanisms question the use of WM and SE herein as proxies of work performance.

Additionally, since within each cohort and data analysis there was a minority group who did not report any improvement, understanding their experience is vital to determining the extent of outcome success. It may be that their positive experience was not captured in the measures, but also that the intervention was not successful for them. The legal and ethical implications of this finding for dyslexia coaching practice will be reviewed in the final chapter.

Limitations of the Research

In this section I will (1) acknowledge the limit in my scope of research and, following this, (2) describe some methodological considerations which need to be improved in future studies that broaden the scope.

Scope of research. Organisational climate is known to be of relevance to intervention studies (Randall et al., 2005, 2018), training transfer (Grossman & Salas, 2011) and, in particular, perceptions of support by dyslexic populations (Doyle & Cleaver, 2015; Gerber et al., 2004). Meso-level factors, highlighted in chapter one and two as relevant to the interpretation of legislation, are also known to impact on workplace coaching outcomes in general (Bozer & Jones, 2018; O'Broin & Palmer, 2010). Some of these broader contextual factors were categorised specifically to the client group in chapter three, though not chosen for further analysis in the thesis and therefore represent a limit in scope. Further research should incorporate perceptions of organisational climate and job satisfaction into longitudinal designs evaluating dyslexia coaching as well as other formal and informal adjustments. One focus for coaching investigation might be the relationship between organisational climate and self-efficacy (Baron et al., 2011; Bozer & Jones, 2018) or the broader emotional domain (Bachkirova & Cox, 2007); also applicable is research into organisational factors affecting wellbeing in general (Demerouti et al., 2001; Nielsen & Randall, 2013; Randall et al., 2018).

From an ethical perspective, the most pressing practice need is to understand whether the advice given to individuals and employers is adequate and meets the aims of the legislative frameworks intended to afford equality of occupational inclusion to adults with dyslexia. Such is the lack of research in this field that any development is a step forward; my work represents a contribution to understanding how to deliver interventions to support adults with dyslexia. Yet I must stress that my findings are limited in addressing the need for definitive results; the research blind spot still exists. I have taken some necessary first steps: to classify the nature of the current advice being given and to synthesise a theoretical framework which provides a principle upon which coaching activities can be offered as disability accommodation for this group. I have contributed empirical evaluations of interventions using a robust research design within a field setting directly applicable to current practice. My focus was the psychological principles within the coaching; I did not conduct year-long sustainability and job retention analysis and therefore I cannot confidently contribute to the legislative and policy priority of understanding how to protect employment.

Furthermore, by focusing my studies on the evaluation of coaching, I have neglected the provision of assistive technology and tools, work station adaptations and the myriad of informal adjustments that are in use and are in equal need of process and outcome analysis. I offer the defence that the value of this thesis was not intended to lie in informing public policy; I have started the process and these broad questions can only be addressed with a significant, mature body of research to support findings.

Methodological issues. These fall into three main categories: (1) intervention protocol design; (2) selected measures of both cognitive, behavioural and emotional domain outcomes and (3) attrition. These have been discussed in previous chapters where the limits relate to my learning and development or sampling, in this section I shall outline limitations relevant to future studies.

1. Intervention protocols

The intervention protocols did not always match dyslexia coaching practice, nor match each other, in two important variations. Firstly, in practice, a demonstrated or anticipated performance difficulty is commonly the instigator of a coaching intervention, and the supervisor would therefore have vested interest and engagement from a one-to-one perspective. The voluntary nature of recruitment in CS1 and CS2 has therefore provided a deviation that may have affected the representativeness of my sample; participants were likely to be less 'panicked' about the outcomes and / or potentially also less 'invested' in improving. Furthermore, this is likely to have affected the supervisor data in CS1 and therefore requires acknowledgement and recommendation. Variations in who initiates interventions are known to affect outcomes in related fields such as occupational stress (E. Demerouti et al., 2001; Nielsen & Randall, 2013) and the identification of job security threatening performance issue by supervisor versus employee is surely a salient factor in disability accommodation. Coaching psychologists report the importance of supervisor engagement (as representative of organisation and supportive relationship) in predicting outcomes (Blackman et al., 2016; Bozer & Jones, 2018; O'Broin & Palmer, 2007; Palmer & McDowall, 2010) and power dynamic issues in the triad between coach, coachee and employer (Welman & Bachkirova, 2010). Future disability research can draw on these findings and must include supervisor or organisational data (Smewing & McDowall, 2010) whilst acknowledging potential inaccuracies in supervisors' ability to perceive performance difficulties stemming from additional effort expended on the part of their employee to achieve what might be a baseline performance (Doyle & McDowall, 2015; Kemp, 2008).

Secondly, in CS1, the group coaching was delivered over six sessions, compared to the four sessions delivered for one-to-one coaching. This mirrored my own practice, however, it created variability in experience. While this prevents me from concluding with confidence that group coaching is more effective than one-to-one for this client group, as highlighted in chapter five, I note that there was no significant difference in outcome between-group and one-to-one studies in chapter four's review. Indeed, meta-analytic reviews of coaching have not found conclusive evidence that the number of sessions significantly affects outcomes (Jones et al., 2016; Theeboom et al., 2014). Anecdotally, drawing from experience from my own social enterprise which provides intervention for over 2000 people per year, one-to-one coaching is more prevalent in occupational contexts; group coaching is more prevalent with the unemployed and incarcerated. I tentatively conclude that both protocols have potential for success, which is useful for practitioners working in these different settings and I suggest that comparing group vs one-to-one protocols is a rich area for further investigation.

2. Measures

The adapted scale in the WANSS survey was not found to be a reliable measure for dyslexic populations, though the newly-constructed items were valuable and represent a contribution to further research. Though I attempted to reconcile the potential dyslexic difficulty of burdensome questionnaire design in the subsequent chapters, the selection of adequate measures for WM and SE, as well as the other psychological domain mechanisms, remained problematic and represented a limitation of this thesis. I strongly recommend trialling any measure designed for this group with attention to inter-item correlation and qualitative interviewing to assess for interpretative accuracy / consistency.

The extent to which the measures achieved construct and ecological validity has been noted as a limitation in previous chapters, however the learning may also represent a contribution. I shall therefore further address the difficulties here, in the following order: WM cognitive/behavioural measures, Meta-memory from CS2 and lastly the SE measures.

In general, WM measures did not produce consistent outcome data and, while this is partially explained in chapter seven by the personalisation analysis, the tools used to collect data also require consideration as potential limitation. The Digit-Span tests (Reynolds & Voress, 2007; Sheslow & Adams, 2003; Weschler, 2008) represent simple repetition of a narrow, modular task, while that the real question appears to be around how a change in WM score affects day-to-day ability and performance (Chaytor et al., 2006; Söderqvist & Nutley,

2017; Van der Elst et al., 2008). I argue that the limitation posed by the unreliable WM results pertained not to the effectiveness of the coaching, but the relevance of the measure, this will be explored further in the following chapter, as the implications run wider than the scope of the dyslexia field. The use of the WMRS proved indicative of behavioural domain change for a significant number of CS1 intervention participants; equally so did the work performance measures, representing a viable measure for use in further dyslexia coaching research. For disability and dyslexia studies, further research is needed to develop the WMRS scale for adult populations. Also required is a bespoke measure of work performance that suits the dyslexic population, building on the learning herein regarding the importance of criterion and face validity, and of employing a parsimonious sentence structure.

The adapted meta-memory scale (Dixon & Hultsch, 1984) promised reliability and construct validity, both in published papers and through the due diligence that I gave to analysis of my own abbreviated version. The subscale of mental strategy use, reported as a potentially viable method of WM improvement in general and clinical populations (Barrouillet & Camos, 2015; Dixon & Hultsch, 1983; Moro et al., 2012, 2015; Noack, Lövdén, & Schmiedek, 2014), was not shown to be related to gains in cognitive WM in this sample. On review of the meta-memory scale, in preparation for my Meta-Impact analysis in chapter seven, it became clear that items tapped into a wider range of psychological domains. Some were emotional, some were based on behaviour and some were, as sold, self-awareness on how one uses one's memory. While this was helpful for the purposes of chapter seven in analysing changes across the different domains, I would recommend revising this scale by being more domain-specific on an item-by-item level, rather than being concerned with maintaining fidelity to the original scale in order to retain its validity as a measure. An item-by-item consideration of all subscales used would ensure greater ecological validity.

SE measures were problematic in both intervention studies. The general SE scale in CS1, included for its reliability and also relatedness to emotional measures (Judge et al., 2003; Nalavany et al., 2017), was not specific enough to elicit a positive response as discussed in chapter five. I suggested that such broad items as "I can handle the situations that life brings" take a longer and more comprehensive intervention to be affected than the duration of this study, and there was an unexplained negative result for the one-to-one group using this measure. This issue was methodologically overcome in CS2 using the more appropriate workplace SE scale used in CS2, which was more sensitive to the effects of the

coaching and registered a small difference between control and intervention. However, it was strongly correlated with the Memory Control which, on further inspection, seems to include items that would be more appropriately named memory self-efficacy; for example, "If I were to work on my memory I could improve it" (Valentijn et al., 2006). Psychosocial measures made a reasonable contribution to overall impact, as shown in chapter seven, and thus the difficulties I perceive with choosing appropriate scales may instead simply reflect the variety of individual responses within the samples. The overall limitation of selecting appropriate SE measures could be overcome with a custom designed scale but also further studies need to consider whether the power of SE in dyslexic populations operates as an independent, rather than dependent variable as has been suggested in previous coaching psychology research (de Haan, Grant, Burger, & Eriksson, 2016; Stewart et al., 2008).

3. Attrition.

Attrition is consistently an issue in field study research (Zahrly, 1990) but it is not a deterrent. Research is obliged to ensure ecological validity of findings and removing participants from their environment, examining isolated variables or experimentation using student samples only risks generalisability (Pawson, 2006; Pawson & Tilley, 1997; Wheeler et al., 2014). CS1 is very hard to interpret due to attrition; the supervisor feedback in particular is bordering on meaningless due to the low numbers at T3. It may be better to conclude nothing from this data set or indeed to exclude it. However, steps were taken to manage attrition in CS2 that were broadly successful, though not without cost, as outlined in chapter six. The methodological considerations I have recommended to address attrition included: reduced questionnaire burden, maintaining contact with control group, recruiting those with 'vested interest' and engaging employers through supervisor interactions. These should be applied in further research.

Chapter Summary

The collection of empirical studies and accompanying narrative synthesis and interpretation provides insight into whether or not, how and why coaching might be a valuable accommodation intervention, potentially providing support for practitioner claims (Bartlett et al., 2010; McLoughlin & Leather, 2013) and disability employment advice for managing dyslexia at work (ACAS, 2016; Achieve Ability, 2016; Doyle et al., 2016). Within the wider legislative context provided by the Equality Act in the United Kingdom (United Kingdom Parliament, 2010), which is similar to legislation in other developed, post-industrial economies (Gerber et al., 2012; U.S. Equal Employment Opportunities Commission, 2008), my thesis begins the process of evaluating the impact of policy and contributes theoretical analysis and novel methodological tools to further investigations with a wider scope.

The results and findings of this thesis provide a consistent indication that coaching, employed as a disability adjustment for dyslexia, will be of value across a range of behavioural, emotional and cognitive domain mechanisms. Individuals experience change differently across the domains, indicating that practitioners need to offer activities pertaining to each, in order that the most appropriate mechanism for change is available to the individual. The findings remain limited in scope; we cannot infer that the perceived value of the psychological changes experienced from the perspective of the individual participants will translate into an employer-recognised work performance and therefore job retention, as would be the social policy goal of a disability accommodation. However, they do provide a set of hypothetical mechanisms upon which to base further enquiry. Many of the limits are attributed to the expected complexity in executing field research and therefore indicate the need for persistence, replicating / refuting findings and refining concepts and measures. The next chapter explores the implications of my findings in more detail according to theory, research and practice.

Chapter Nine

Implications, Conclusions and Contribution Summary

I approach the final chapter firstly with implications for theory and research, secondly with implications for practice and with a final concluding section summarising the potential contribution to scientific knowledge. Whilst some implications have already been presented at the chapter level, this section is intended to summarise themes across the chapters and speak more broadly to the field of research rather than individual study results.

Implications for Theory

The nature of dyslexia. Conceptually, the inconsistent ontological definitions of dyslexia have been discussed and reviewed but are untested in this thesis, in favour of 'what works' evaluative research; a need prioritised in response to the ongoing delivery of unsubstantiated practice. However, having observed 'what worked', I can now draw inference for what dyslexia 'is'. A potentially significant contribution to theory thus emerges from the observation of SCLT and GST-compliant protocols facilitating a productive intervention judged across a range of domains and mechanisms for dyslexic adults. The neurodiversity movement's evolutionary critique that dyslexia is not a straightforward physical disablement, but a complex interaction between socially-valued 'norms', cognitive strengths / weaknesses and individual psychosocial factors such as self-efficacy chimes with this intervention pedagogy. Furthermore, while WM deficit is widely reported as a key aetiological factor in dyslexia research to date (Smith-Spark et al., 2003; Swanson & Siegel, 2001), within the current samples of coaching participants it appeared no more salient to overall impact than improvements within behavioural, emotional and/or psychosocial domains. Further support for dyslexia operating as an interaction between a person and an environment came from the perceived value of informal, organisational-level accommodations reported in chapter three. I infer support for the definition of dyslexia proposed in chapter two. To remind the reader, the following statement outlines my operational conceptualisation of dyslexia:

Dyslexia represents a 'spiky' neurocognitive profile, where differerences between strengths and weaknesses are more extreme than the average person. Dyslexic difficulties typically include poor verbal working memory, determined using both within and between person comparisons of ability according to standardised psychometric testing. Neurocognitive difficulties often lead to delayed acquisition of literacy in childhood, and more amorphous performance impediments in the workplace, such as time management and

organisational skills. Verbal and visual abilities are known to be either unaffected, or indeed represent strengths. The juxtaposition of strengths and weaknesses is currently poorly accommodated in modern education and workplaces, which are predicated on a more evenly- balanced presentation of ability.

The active ingredients in dyslexia coaching. In chapter eight I suggested that all CIMO elements needed to be included and further refined to expand our theoretical understanding of the active ingredients in dyslexia coaching. Contextual factors include applying Person-Environment theory (Lewin, 1936) and accommodating the social model of dyslexia (Riddick, 2001) blended with known influences such as organisational support and climate (Bozer & Jones, 2018; Randall et al., 2005). Successful intervention ingredients include fidelity to Social Cognitive Learning and Goal Setting Theories; these are congruent with the development of mutually-agreed goals within a strong, relational working Coaching Alliance (Gessnitzer & Kauffeld, 2015). The non-equivalence of intervening mechanisms is highlighted as a potential critique of the adoption of wholesale outcome equivalence theory (or general effectiveness) and represents a contribution to the theoretical development of coaching placed as disability accommodation.

I additionally proposed the need to explore the impact to the Coaching Alliance when the intervention is predicated on a potential threat to job sustainability. This may initiate a sense of dependence for the coachee ("save me") or it might pose that the coach is the agent of the employer, depleting trust ("you're taking their side, it's not me it's them"). Power imbalance issues between coach and coachee may affect outcomes (Diochon & Nizet, 2015; Law, 2010; Welman & Bachkirova, 2010) but could conceivably be mitigated by support from peers perceived to be trusted and equal, similar to the group-based coaching interventions reported herein.

Implications for Research

I approach this section with recommendations for further research into Context, Intervention, Mechanism and Outcomes pertaining to dyslexia but also more widely according to the challenges to accepted wisdom posed in previous chapters.

Context, interventions and longitudinal outcomes for dyslexia disability accommodation

Firstly, I created a taxonomy of adjustments particular to formal, dyslexia-specific activities that can now be used in future research exploring how different adjustments contribute to longer-term employment and career outcomes. To further this necessary starting point, the different accommodation categories need to be understood in terms of their contribution to occupational inclusion (as judged by employment rate and promotion rate compared with population prevalence). It is possible that the self-reported 'helpfulness' scores hold predictive power, the scale must be adapted in a more accessible and brief format such that the value of naturally occurring or organisational-level activities can be explored further.

The experimental results from my intervention studies now need to be replicated or refuted and we need to better understand the link between the reported improvements and observable, objective workplace performance measures (Smewing & McDowall, 2010). The refined, personalised pathway (figure 8.1) could be re-used in longitudinally-extended coaching research with dyslexic (and indeed other neurodiverse) adults, in occupational settings but also in populations of socially-excluded individuals. Drawing on findings from the thesis and workplace coaching psychology in general, I now outline the following, testable hypotheses pertaining to dyslexia intervention evaluation.

H1: Adjustments vs no adjustments.

H1a: Presence of any of the adjustment types reported in the formal dyslexic adjustment taxonomy will lead to higher rates of occupational inclusion than no adjustments.

H1b: The self-reported value of the adjustments is a valid predictor of adjustment success; for example, use of assistive technology and tools adjustments only will result in significantly lower occupational inclusion rates than use of

coaching, work station or informal adjustments; assistive technology and tools with no training will result in yet lower inclusion rates.

H1c: Targeted investigation of informal adjustments using a bespoke scale will demonstrate that their presence leads to higher rates of occupational exclusion than their absence.

H1d: Contextual accommodation measures of organisation climate and perceptions of organisational support will provide a moderating impact on longitudinal outcomes.

H2: Dyslexic recipients of SCLT and GST-compliant coaching protocols, who improve significantly on one or more psychological domain variables, will be more likely to sustain employment and achieve promotion over a longer time period, compared to the control group or those who do not register a significant improvement.

H3: Engagement of supervisors in identifying contextualised performance outcomes and determining current performance levels will improve the effectiveness of the coaching in facilitating occupational inclusion.

H4: Further comparisons of group vs one-to-one coaching interventions that are synchronised in intervention time and delivery protocols will result in significantly larger improvement scores for group participants across a range of domain outcomes.

Mechanisms of value in dyslexia interventions

The unexpected results and limits of the WM and SE measures in my review and data have been explored in previous chapters. In this section I wish to draw particular attention to the challenge my data posed to the role of WM in dyslexia, outcome equivalence and the need for meso-level mechanisms.

WM and dyslexia. The Digit-Span task was selected as a measure of WM because (1) it is used as a predictive variable in dyslexia diagnosis, (2) it has a large body of evidence to validate its use and (3) it is used in other intervention research, allowing for comparison of effect size achieved in coaching compared to other intervention types such as computerised training. However, the Digit-Span task was shown here to be subject to a lot more within-person variance across intervals than standardised test manufacturers report (Reynolds &

Voress, 2007; Sheslow & Adams, 2003; Weschler, 2008), showing significant decrease as well as increase. The implications of this for WM research per se are outlined in the next section, however I also consider the possibility that the Digit-Span is simply less reliable for dyslexic people, specifically. In practice, people with dyslexia consistently achieve lower WM scores than their peers (Smith-Spark et al., 2003; Swanson & Siegel, 2001; Varvara et al., 2014) yet some manage to achieve great performance in the workplace (Leather et al., 2011; Logan, 2009). My data did not support a correlation between WM improvements and other, arguably more context-specific emotional, psychosocial or behavioural performance measures for dyslexic adults. Other predictors of WM scores, such as fatigue and ill health (Melby-Lervåg & Hulme, 2012; Zeidan et al., 2010), may be more relevant to the observed variance and need examining in dyslexia-specific contexts. In summary, I found that improvements using this testing tool were not observed to have strong relationships with any contextually-dependent variables. Against a weight of pre-existing evidence, I am thus compelled to propose that WM, at least when measured using a tool such as the Digit-Span, has poor value as a mechanism mediating contextualised success for occupational dyslexia interventions.

My individual-level, data-led concerns regarding the validity of WM testing are compounded by critique from the social model of dyslexia perspective (Armstrong, 2010; Riddick, 2001). Lower than average individual WM scores, though evidently present in dyslexic populations (Smith-Spark et al., 2003; Swanson & Siegel, 2001) might be accommodated through circumventing, management of, or compensation for difficulties using emotional, psychosocial, behavioural or metacognitive means. To illustrate, an employee who has learned that they cannot remember more than three names on introduction might simply stop trying, and instead write them down. A learner who is aware that four clauses in an instructive sentence are too many for them, might ask to record the instructor using a voice recorder or phone. In this way, they are adapting the social norms of their environment rather than changing themselves.

Furthermore, an evolutionary critique of this individual-level 'problem' would counter that perhaps the dyslexic is not necessarily biologically lacking, but that the difficulty arises in response to modern stipulations that certain tasks must be conducted in a manner that requires attention and retention of large amounts of verbal information whilst in distracting environments. We insist that cognitive WM is a fundamental, required skill in many educational and employment contexts, whereas technical adaptations such as recording equipment or different social norms such as quiet spaces to concentrate (unlike busy

classrooms or open plan offices) might offset our dependency. The status quo view of WM pre-eminence (and therefore a deficit conferring disability status) is divergent from other cognitive domain abilities where individual differences are accepted and considered normal; such as lower spatial awareness leading to difficulties in navigation or team sports prowess. These skills are not held to the same level of importance in education or work contexts despite their arguably more essential human evolutionary purpose. Individuals who are not successful in navigation and team sports are unlikely to leave education with the same level of damage to SE as dyslexics, however they would make poor hunters or fighters (Shelley-Tremblay & Rosen, 1996). Thus the very notion of the WM deficit represents a socio-historical norm rather than an objective truth (Sehgal Cuthbert, 2015) and it becomes increasingly questionable as the mechanism of value in dyslexia interventions.

Outcome equivalence. The outcome equivalence concept imported from psychotherapeutic research suggests that there is little differentiation in client (/coachee) outcome, behavioural content within the intervention and psychological mechanisms at work within an intervention, despite a myriad of intervention approaches (Bordin, 1979; Stiles et al., 1986). In chapter seven I observed, using data from within field-based, morphogenic contexts, the overall usefulness of the intervention protocol for a sample of dyslexic adults was not reliant on a uniform psychological mechanism, including the heretofore proposed WM. Indeed, contrary to predictions of mechanism equivalence, participant experience was personalised according to mechanisms within four broad psychological domains. It remains debatable as to whether a personalised pathway for individuals, which did result in a broadly equivalent 'Meta-Impact' for the intervention group, provides equivalence of outcome when participants (or indeed their supervisors) are asked 'did it "work?" Further intervention research must therefore be open to diversity in the salience of emotional, psychosocial and behavioural factors at the individual level for dyslexic adults.

Meso-level mechanisms. As argued in chapters one and two, no individual-level intervention can negate the legislative requirement for disability accommodation to incorporate a meso-level mediation between the person and their environment (Colella & Varma, 2001; Jackson et al., 2000; Tanner, 2009; Wilton, 2006), whether it 'works' or not. As such, the important question may not be 'which psychological mechanisms' but 'which inter-relational mechanisms'. I posit that the occupational inclusion of dyslexic adults might be better served by research which explores the interdependence of occupational activities and individual mechanisms of working memory / self-efficacy outside the medical paradigm. Therefore, in addition to the longitudinal evaluation of adjustments outlined above, I propose

the following hypotheses related to developing our understanding of the 'active ingredients' in occupational dyslexia accommodations blending mechanism with salience of mechanism in context:

H5: Occupationally and educationally successful dyslexics may not uniformly obtain higher WM scores relative to their dyslexic peers, but instead may report higher use of (a) behavioural strategies, (b) emotional management, and/or (c) psychosocially reframing the importance of WM-related tasks; for example, placing less value on mental numerical computation (Toll & Van Luit, 2013) or taking detailed instructions (Alloway et al., 2008) in favour of prioritisation of strengths such as creativity or problem solving.

H6: The number and range of psychological domains to target in a dyslexia coaching intervention, that are first collaboratively selected by coachees as salient active ingredients for them personally, will be significantly correlated with measured improvements in these domains after coaching completion.

H7: Organisational contexts, in which the importance of typical dyslexic difficulties in WM are diminished relative to dyslexic strengths, will be significantly correlated with a higher proportion of dyslexic inclusion. Inclusion can be measured as recruitment and/or the promotion rate of dyslexic employees relative to non-dyslexic employees/population prevalence. Organisational contexts could include:

H7a: Industries where visual and spatial skills are prized (Eide & Eide, 2011; von Karolyi et al., 2003) and entry to careers is not prohibited by low literacy ability or working memory capacity.

H7b: Environments systemically applying informal adjustments to manage working memory deficit as outlined in chapter three (for example decreasing background noise).

H7c: Roles where assistive technology and tools and work station accommodations that pre-empt WM-related difficulties are proactively dispensed by the organisation at induction, rather than prescribed following performance failure.

H7d: Dyslexic people working in environmentally-accommodated roles will have SE levels comparable to neurotypical peers.

The ecological validity of the WM Mechanism

The WM research field is comparatively mature, with conceptual links to work performance and 'higher order thinking skills' well-established by accomplished authors in education research (Ariës et al., 2014; Gathercole & Pickering, 2000; Holmes et al., 2009) adult dyslexia research (Hock, 2012; Leather et al., 2011; Smith-Spark et al., 2003; Varvara et al., 2014) and further across general and clinical populations (Baddeley, 2007; Conway et al., 2005; Weicker & Thöne-Otto, 2015). It remains risky to question the underpinning theory as I have in this thesis, yet in all cases I have been unable to replicate a consistent link between WM ability and contextual measures. I propose that this implication may run further than dyslexia-specific samples and specifically that the Digit-Span task may lack ecological, transferable validity; a concern shared by some contemporary clinical researchers (Chaytor et al., 2006; Van der Elst et al., 2008) and educational researchers (Karmiloff-Smith, 2009; Söderqvist & Nutley, 2017). To reiterate my concerns from previous chapters, computerised interventions for WM report consistently lower or negligible effect sizes for measures of 'far transfer' such as comprehension skills compared to the intended 'near transfer' WM effect (Melby-Lervåg et al., 2016; Weicker & Thöne-Otto, 2015). Conversely, the socially-contextualised coaching interventions presented in chapter four have been successful at improving both WM scores and contextual measures such as comprehension skills (Ariës et al., 2014), attention and concentration (Miranda et al., 2013) and positive and negative affect (Chambers et al., 2008); though these improvements sometimes occurred without significant increase in WM scores (Ariës et al. 2014 study 2; Zylowska, Ackerman, Yang, Futrel, Horton, Hale. 2008). This finding posed a question: if WM improvement does not easily precipitate improvement in contextual measures, why do we seek to change it? Following my investigations, I contend that even if we are able to move peoples' Digit-Span scores significantly, and potentially affect the neurology of developing brains (Holmes et al., 2009), there is a lack of evidence in support of the assumed causal chain that these changes will then create the intended, real world outcome of improved educational and occupational performance. Such doubts potentially challenge contemporary WM theory and yet they are supported in both population-specific and more general reviews (respectively: Dunning et al., 2013; Melby-Lervåg et al., 2016).

I posit that the ubiquitous use of the Digit-Span test reflects a meta-theme that I have observed in my literature reviews, where scientific enquiry is often in search for the 'one best variable', or 'the difference that makes a difference'; I find this activity akin to a search for the holy grail, present in psychological research in general and in particular within this field, noted in chapter two where I explore the reductive search for a common dyslexia aetiology. Though WM is reported as a *predictor* variable in intelligence (Unsworth et al., 2011), strongly correlated with occupational inclusion (Conway et al., 2005); criminal desistance (Paternoster & Bushway, 2009) and academic success (Holmes et al., 2009), it may not necessarily have power as an *intervening* vehicle for change. Instead, the social, contextualised learner may require social, contextualised interventions that present high fidelity to contextualised outcomes (Billing, 2007; Grossman & Salas, 2011). Viewed this way, the Digit-Span task, which requires participants to remember and recite numbers backwards, resembles a party trick; it is representative of very few real life job roles and very few GCSE exam conditions and I question the behavioural relevance of the task (Unsworth et al., 2011). I therefore cautiously propose that the Digit-Span may not be an appropriately contextualised variable for field-based intervention evaluation and that WM research needs to return to a basic exploration of conceptualisation and hypothetical pathways. In my opinion, we lack proof of principle that (a) the Digit-Span represents contextualised WM ability and (b) WM cognitive improvements thus measured are capable of mediating far transfer, rather than high WM simply being correlated with contextualised success in the general population (Söderqvist & Nutley, 2017). Contextual specificity theories, though well-researched in short-term memory span recall tasks (Baddeley et al., 1975; Coveney et al., 2013; Stark et al., 2017; Tulving & Thomson, 1973), have not translated to investigations which compare transfer outcomes from computerised training (low fidelity environments) to transfer outcomes from socially-contextualised training such as group training and workplace coaching environments (high fidelity). The contextual specificity research provides a rich resource for further analysis of WM development (Coveney et al., 2013; Stark et al., 2017; Unsworth et al., 2011, 2012) for both coaching and computerised training-based interventions.

I concede that my inferences are based upon populations with low WM. There is some experimental support for differences between people who develop naturally high WM capacity and those who do not. For example, Unsworth et al. (2011) found that people with naturally high WM were more susceptible to contextual specificity (meaning that when environmental was dissimilar between training and testing, scores were worse). Those with naturally high WM have advantages in choosing to apply WM to their learning or work

performance activities, those with low WM may have already built adaptive strategies to circumvent, such as the dyslexia success stories (Leather et al., 2011; Logan, 2009). Individuals with congenitally capable WM who lose capacity through illness or injury may benefit more from interventions to deliberately increase WM since they are used to relying on it as a strategy. I suggest a need to explore the experience of WM improvement within different populations.

In this thesis, behavioural strategies, increased self-awareness of limits, use of workstation tools, emotion management and increased SE have been highlighted as potential intervening variables to improve WM-related performance, though perhaps not WM itself. I propose the following testable hypotheses for future WM studies:

H8: WM interventions that involve training protocols and measurement tools with higher fidelity to the intended contextualised outcomes will precipitate improvements not limited to the cognitive domain, but also behavioural, psychosocial and emotional-level change.

H9: WM improvement will result in higher 'far transfer' levels for populations who acquire WM deficits than those who have developmental WM weakness.

H10: Enquiry into the metacognitive experience of individuals performing contextual WM-dependent tasks (for example mental numerical computation (Toll & Van Luit, 2013) and taking detailed instructions (Alloway et al., 2008)) will reveal a difference in approaches to the task. Specifically, individuals who are successful yet possess developmental WM weakness may report: (1) the use of self-acquired synaesthesic strategies such as visualisation (Bor, Rothen, Schwartzman, Clayton, & Seth, 2014); (2) behavioural strategies such as recording equipment; (3) emotive strategies such as breathing exercises to manage anxiety; and/or (4) psychosocial strategies such as mentally diminishing the importance of the task within a bigger picture of their overall work performance.

Hypothesis ten could be initially explored through qualitative interviewing, using a questioning technique that avoids influencing interviewee metacognitive experience such as Clean Interviewing (Tosey et al., 2014), followed by the development of a bespoke, metacognitive questionnaire.

Accommodating heterogeneity of mechanism in wider populations

In chapter seven I devised a data analysis process that quantified the extent of participant variation in the mechanisms employed to arrive at a positive outcome following coaching. I contend that the results outlined in chapter seven demonstrated greater ecological validity as a measure (Gouvier et al., 2010) in that the approach incorporates of heterogeneity in the learning goals of coachees. The quantitative analytic strategy potentially contributes to the development of field-based intervention studies, permitting us to aggregate global effect observations within samples of heterogeneous participants, not unlike the weighted calculation of a Hedges *g* in meta-analytic research. Coaching research in particular has been criticised for lack of adequate outcome differentiation (Theeboom et al., 2014) and reliance on single outcome variables (Bozer & Jones, 2018) which reduces ecological validity and contributes to complaints that occupational psychology research at large is lacking an evidence base (Briner & Rousseau, 2011). Psychology is trying to overcome its reliance on students and contrived laboratory conditions (Demerouti & Rispens, 2014), which are often conducted precisely in response to the complexity of evaluating real-world settings which hamper clear and publishable results (Briner & Walshe, 2013; Kepes & McDaniel, 2013). Domain-specific variables are typically subjected to between or within comparisons, as in CS1 and CS2, a method which I propose may not generalise into practice due to the differing needs of coaching participants. In situ studies further our understanding of interventions (Pawson, 2013) and contribute to evidence-based practice. My thesis and 'Meta-Impact' variable contributes an experimental data treatment protocol which allows for quantified variation in the psychological process within an intervention. I posit that further refinement and testing of my Meta-Impact variable could set a precedent in complex field settings, resolving the weak group-level results when different outcomes are achieved for different people. Further research in this area could build numerical nuance into outcome equivalence research and provide development direction for Coaching Alliance research. This proposition can be explored in neurodiverse and neurotypical populations alike by testing the following hypotheses:

H11: Field-based intervention studies constructed with multiple possible dependent variables across a range of psychological domains will observe:

H11a: Improvement magnitudes consisting of one or more standard deviations above the norm across one or more of the domain measures for intervention participants; the number of measures featuring improvements will be significantly larger than control group participants.

H11b: The improvement magnitude will be significantly negatively correlated with baseline measures.

The potential wider importance of the observed relationship between baseline scores and improvement magnitude speaks to potential agency and intent on the part of the participant (Goal Setting: Locke & Latham, 2002), the known variation in intervention success resulting from personalisation of aspects such as motivation and initiation (Nielsen & Randall, 2013) and the importance of negotiating which outcome would be most valued in context (Gessnitzer & Kauffeld, 2015; Grossman & Salas, 2011). Hypothesis 11b enables further testing of this proposal, yet qualitative interviewing would be useful in determining the extent of conscious intentionality.

Implications for Practice

When I commenced this programme of research, of great concern to me was the unsubstantiated common practice of psychologists making recommendations for dyslexic adults concerning activities that are purported to protect employment outcomes. The practice was devoid of theoretical explanation or investigative and evaluative studies to explore why, how and if such a practice might be viable. The research gap still poses a problem for practitioners wanting to adhere to evidence-based principles as part of our wider ethical obligations as occupational psychologists and coaches (Briner et al., 2009; Briner & Rousseau, 2011; Law, 2010). In focusing on coaching interventions, I have developed an understanding of personal development needs of the adult dyslexic and demonstrated that change is possible. A practice guideline produced by this thesis is the therefore preliminary support of coaching as an accommodation intervention, with specific guidance on how to operationalise the intervention, which I will now share.

A collaborative, client-led coaching relationship. The data suggest that change occurs where it is most needed, whether this is conscious and deliberate or not remains unknown. However, for application in practice this would echo the calls in the dyslexia practitioner literature for the 'androgogical approach' (McLoughlin & Leather, 2013) where coaching support occurs in partnership and coaching occurs within a dialectic pedagogy, as opposed to the didactic instruction of prescribed strategies.

I conclude, as suggested in chapter two, that the operational definitions and principles presented in the workplace coaching literature apply to this population. Coachees understand what they need to address, coaches can facilitate them to make changes in those areas through an interpersonal relationship based on trust, solution focus and equality of power (Baron et al., 2011; Hawkins & Schwenk, 2010; Welman & Bachkirova, 2010) and a positive Coaching Alliance (Baron et al., 2011; Gessnitzer & Kauffeld, 2015). Social Cognitive Learning Theory and Goal-Setting Theory compliant activities are recommended in determining coaching content and approach.

Dyslexia coach training. There is no objective benchmarking of standards for coaching adults with dyslexia in the UK; referrals via 'Access to Work' are not currently predicated on any particular qualification or experience (Doyle et al., 2016). Social Cognitive Learning Theory compliant protocols are not expressly recommended in the dyslexia intervention field (McLoughlin & Leather, 2013). Instead, delivery can be provided by dyslexia 'experts', who have amassed qualifications providing knowledge of the reported

neurocognitive profile of the dyslexic and the range of literacy interventions used to remediate educational needs; there are no adult-specific courses available in the UK (BDA, 2018). I suggest that dyslexia 'expertise' and literacy teaching skill are pedagogically divergent from, and will not automatically translate into, the occupational coaching context. Coaching employed as a disability accommodation is not about achieving success in tests, but is instead concerned with relationships, communication and management of neurodiverse thinking in a neurotypical world. As such, there is a gap in the practice context for coach training.

Coaching psychology training protocols such as those provided to executive coaches might be more relevant than the transfer of condition-specific knowledge as is currently in practise (BDA, 2018). Coaches in general need to have a variety of competences and techniques (Hawkins & Schwenk, 2010; Lai & McDowall, 2016; Law, 2010); I suggest that this holds for application to dyslexia accommodations. The skills of a practitioner workplace coaching psychologist may thus be a good basis for training, but for disability-specific practice we need to additionally teach practitioners the implications of 'reasonable adjustment' and how this would fit into a Matrix Paradigm (Paul, 1967) determination of coaching goals; i.e. not all coaching activities will be equivalent and need selection according to the specifics of the individual situation. To clarify, dyslexia coaching practitioners need to be trained in adapting dyslexia-specific considerations to different occupational settings (Hawkins & Schwenk, 2010), such as (1) the psychosocial dynamics of the workplace; (2) the relationship between employer and employee; (3) the concept of person-environment fit; (4) job design.

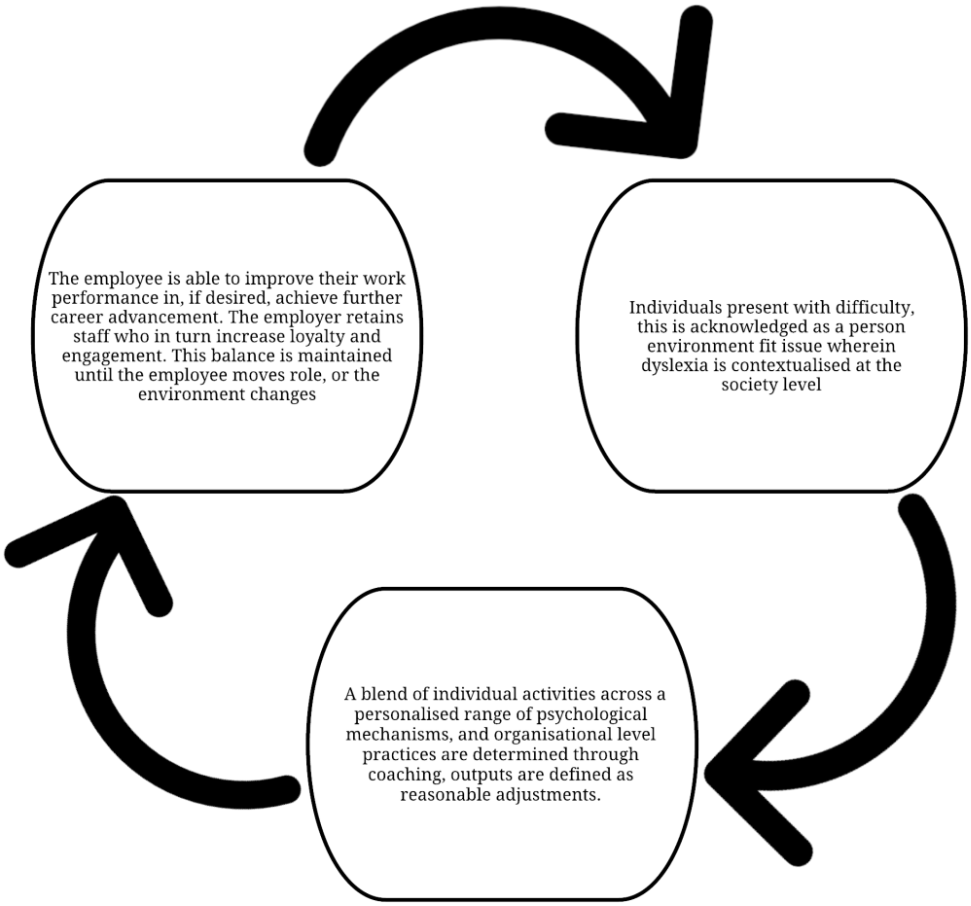
Coaching expectations and contracting. Once trained, practitioners must navigate the paradox of requiring individual personal development and change as a disability accommodation. In the introductory chapters, I outlined my misgivings about the ethics of positioning dyslexia coaching in this way, when compared to visible disabilities that require change to environments to fit the individual rather than vice versa. As suggested in the general popularity of the 'informal measures' in chapter three, employer-led changes to the environment may produce performance dividends comparative to or greater than individual-level personal development. However, when targeting the behavioural domain as an outcome this must be framed as facilitating the coachee to devise more specific day-to-day strategies for work flow and subtle changes to their environment that will enable them to work at their best, for example use of note-taking strategies or coloured markers to aid memory. On this basis, the coaching is not the adjustment in and of itself; it is not the black

box into which the employee is sent to be 'fixed'. It is a bespoke, sophisticated review of the environment through which the adjustments can be determined according to a personalised fit, and an individual reframe of competence to counter the disempowerment of the medical model.

Basing coaching expectations and contracting on a disability-specific premise as above could mitigate the risk of employer bias (Colella et al., 1998; Colella & Varma, 2001; Kemp, 2008) and ethically supports coaching as both an individual and organisational meso-level adjustment (Diochon & Nizet, 2015). We can balance the need for pragmatic intervention activities for individuals who are experiencing distress with the social model of disability that posits the cause of the distress is environmental not biological. It then follows that the employer must be aware of changes and activities, including how they can be facilitated. The employer must understand the relevance of each strategy; clear reporting of strategies must be left in place once the coaching is complete. Note-taking or colour coding to aid memory or organisational skills might require additional stationery, or the acceptance of different behaviour in team meetings. The emphasis on the coaching *output* as the reasonable adjustment rather than the *input* needs to be made clear at recommendation, to coachee and employer. Such a consideration raises the imperative to include supervisors in initial discussions, to ensure that their engagement is solicited from the outset, all of which is contrary to current 'Access to Work' practice in which supervisors do not play a role (Doyle et al., 2016) but consistent with extant coaching research which highlights the importance of supervisor support (Bozer & Jones, 2018). Figure 9.1 reflects the virtuous circle of coaching interventions applied at the meso-level to mediate between person-environment as a method of improving outcomes that can be useful across a career.

Figure 9.1

Mediating the balance between person-environment fit to enhance career outcomes through coaching



Coaching doesn't always work. For some participants, using the herein reported dependent variables as markers of success, coaching did not 'work'. There were individual cases where no significant improvements were made (reported in chapter seven, eight out of twenty-six coachees in CS2) and, though they may have found the experience sufficiently enjoyable to return week after week, they did not experience a tangible improvement in any of the domains that were measured. While this was not the norm, and may reflect the inadequacy of my measures, I must address the socio-legal problem of coaching failure. Any potential for no-effect on an individual level poses problems in implication for disability coaching practice. If an individual is unable to achieve an improvement in any domain, given that job security may be contingent on success, we need to ensure that such an *individual* does not feel that they have 'failed'. Instead, the experience should be likened to

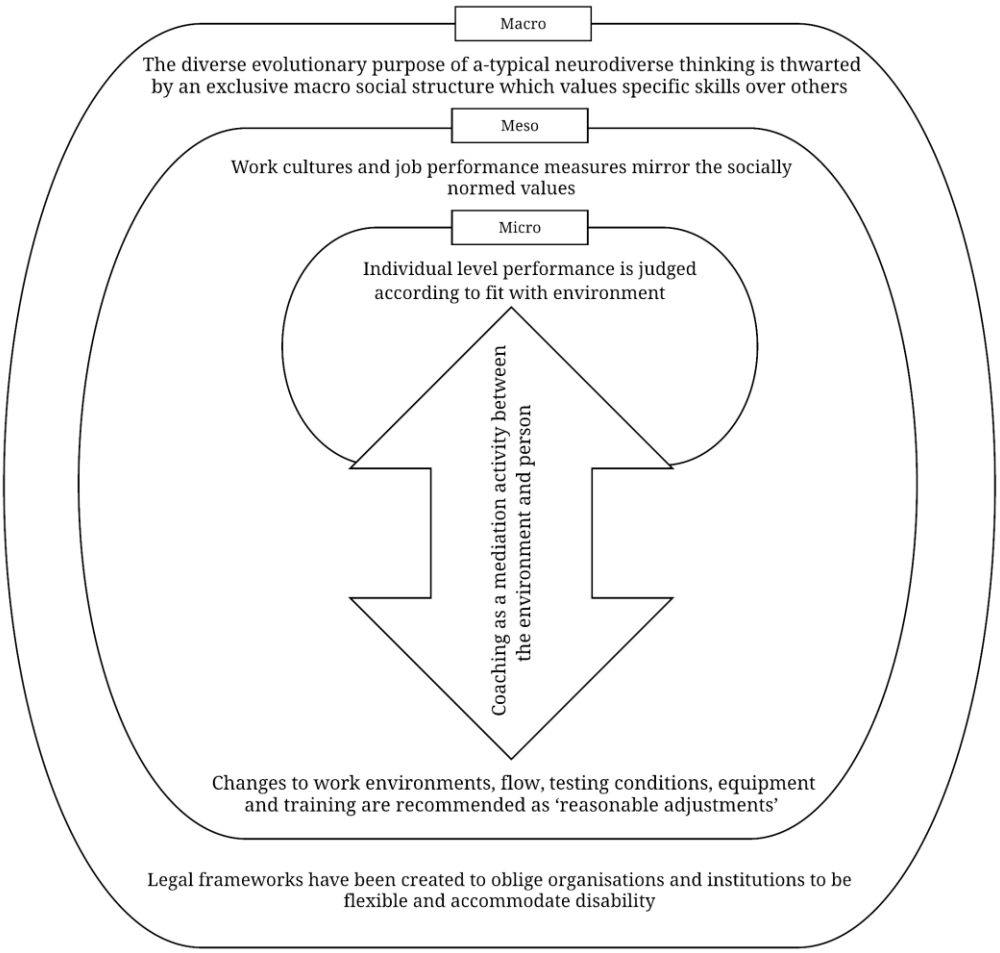
a failure of a wheelchair to move through an office – we would in such a case review the tools and environment layout to achieve 'success', not blame the wheelchair user. Further, it may simply be the case that the nature of the individuals' dyslexia is prohibitive to the job they are attempting to deliver. To stay with the wheelchair metaphor, we would not expect a wheelchair user to act as a fire-fighter; there are limits to accommodation activities, and they must be considered 'reasonable' from the employer's perspective. Within current 'Access to Work' provision there is no mechanism in operation for such contextualising feedback to occur, either to reassure and try new adjustments or to determine a point where it is agreed that all adjustment potential has been exhausted and either job redesign or a new career is the next logical step. The implications for practitioners is that the potential for coaching failure should be acknowledged and planned for at the outset, as part of an ethical obligation and the development of transparency within the Coaching Alliance (Diochon & Nizet, 2015; Gyllensten & Palmer, 2007; Law, 2010; O'Broin & Palmer, 2007).

A Critical Realist Analysis of Coaching as a Disability Accommodation

Taking into consideration the implications of the research upon my operational conceptualisation of dyslexia, how dyslexia creates and perpetuates social exclusion, and the psychosocial dynamics required for successful outcomes, interventions to support dyslexic adults must incorporate psychosocial and organisational measures as well as cognitive, emotional individual measures. Returning to the model of macro- and meso- influences on the micro experience as outlined in chapter one, I propose that coaching is a viable intervention to support individual performance, however I add the caveat that it acts as an extended mediation process. Rejecting a medical model wherein dyslexia (and specifically WM deficit) is a sickness to be healed through the presence of an instructive expert, coaching can instead provide a forum for enhanced reflection of person-environment fit and the development of self-regulation, awareness and agency for dyslexic employees. Positioning coaching as such helps to redress the imbalance of the medical model towards the individual being at 'fault' for not conforming to social expectations of cognitive ability consistency, and meets the legal implications contained with the Equality Act (United Kingdom Parliament, 2010) that the organisation must make changes. Figure 9.2 illustrates how this fits into the wider levels of influence originally depicted in chapter one (figure 1.2). The framework does not directly challenge the status quo, nor address in detail the inadequacy of the predominant medical model: this would involve making recommendations for institutional changes that could remove the current barriers for neurodiversity; for example reducing the literacy component of modern apprentices as mentioned in chapter two. However, my conceptualisation suggests how to leverage current structures for supporting individuals during the current climate in a manner which does not undermine the social and evolutionary critique and is therefore consistent with a Critical Realist position.

Figure 9.2

Meso-mediation positioning of coaching as a disability accommodation



Though very specific in target population and context, the interventions evaluated herein provide insight as to the power of coaching interventions in general to influence psychological mechanisms that are of relevance to a much wider population across broader contexts. Many people with disabilities experience the same limited ambition difficulties that exist for adults with dyslexia (Doyle, 2017; McGonagle et al., 2014; Shakespeare & Watson, 1997; Wilton, 2006); also cognitive difficulties with working memory (WM) and executive functions more broadly (Grant, 2009; Herrero, Escorial, & Colom, 2010; Kapp, Gillespie-Lynch, Sherman, & Hutman, 2013; Doyle, 2017). The wider field of 'hidden disability' or neurodiversity remains subject to legislative protection in the UK; interventions are prescribed to many in education (Rose, 2009), social inclusion interventions (i.e. incarceration and unemployment) (Baker & Ireland, 2007; Fazel et al., 2008; Jensen et al.,

2000) as well as in work (Doyle et al., 2016; Gifford, 2011; Melvill et al., 2015). It is plausible that my findings could support further research in a wider population and speak to other existing bodies of work in the coaching and neurodiversity fields.

As a practitioner-researcher I hold the aspiration that the psychological practice of occupational dyslexia adjustments should be evidence-based, according to the high standard set within professional criteria (Briner & Rousseau, 2011). Though large gaps in our knowledge remain, I assert that this thesis represents some necessary first steps, developing a theoretical pathway for understanding how and why coaching may work as an intervention for this marginalised population, additionally providing primary evaluative data that can contribute to later systematic reviews, in line with advice on the development of nascent research fields (Passmore & Fillery-Travis, 2011). Using the CIMO framework (Denyer et al., 2008), I have begun answering the calls for adult-specific dyslexic research and can now hypothesise that, in an employment context, a coaching intervention provided to dyslexic employees is more likely to result in a positive outcome for at least one mechanism when compared to a control group.

The search for the salient mechanisms upon which coaching may act has provided a most interesting focus for the journey of my research. The outcomes were not as predicted and mechanisms were not as well correlated as one might have expected given the extant literature. My data have converged with contemporary critics of WM research (Chaytor et al., 2006; Melby-Lervåg et al., 2016; Söderqvist & Nutley, 2017) and diverged from contemporary positivist dyslexia research (Smith-Spark et al., 2003; Swanson & Siegel, 2001; Varvara et al., 2014), suggesting that we should not rely on the WM deficit as the predominant lever for change, and challenging the prediction that gains therein will solve any presenting difficulties, at least within a dyslexic population. Instead, the empirical work that I have conducted elucidates a range of active ingredients (of which WM may be 'one') that may provide a contextualised change mechanism for dyslexic employees, more reflective of a psychosocial ontology (de Beer et al., 2014; Gerber, 2012; Leather et al., 2011; Nalavany et al., 2017). The novel, experimental data analytic method that I employed in chapter seven served to clarify this position and could support intervention evaluation research in psychology more generally, as it allows us to accommodate the individual level of impact variability within a field research sample, thus blending rigour with versatility. I suggest that such a process is a pragmatic compromise between the need to conduct action research, incorporating the numerous variables that this precipitates when in situ, with the need for clear, significant results that differentiate between intervention and control groups.

I hope that further coaching research is able to make use of this process, leading to more ecologically valid studies in coaching.

Multiple active mechanisms have thus been reabsorbed into my proposed coaching intervention protocol for dyslexia, aligning with existing research from workplace coaching psychology and training transfer, indicating that effective interventions draw on more nuanced wider social relationships (O'Broin & Palmer, 2007, 2010) and a range of relevant outcomes (Bozer & Jones, 2018; Smewing & McDowall, 2010) that are contextualised in high fidelity training environments (Billing, 2007; Coveney et al., 2013; Grossman & Salas, 2011; Unsworth et al., 2011), rather than simple, individual level 'x input = y output' design. Further dyslexia- specific studies might explicitly focus upon; for example, the organisational climate, the coaching triad relationship and training for dyslexia coaches, whilst attending to extended longitudinal outcomes of occupational inclusion such as job retention and achievement of career potential.

A Critical Realist epistemology has facilitated the iterative development and refinement of theory, permitting an evaluation of 'what works' without compromising a critique of current research and practice paradigms. I both acknowledge the macro-, socio-historical reality in which the individual is subject to socially-constructed disablement, and propose that coaching is a legislatively compliant accommodation activity which can operationalise mediation of fit between the person and their environment, thus conferring increased agency to the dyslexic employee. In our current macro climate, disability inclusion is a moral, social and economic imperative. We all lose when human potential is squandered.

Appendices

Appendix 3.1

Original WANSS Items

Are you able to change the font or size of the reading material electronically?
Do you have access to the internet or your personal emails for support during your working hours?
Do you receive support from your family?
Are you provided with feedback from your employer and/or coworkers?
Do you have a written to do list?
Does your workplace encourage interactions between coworkers?
Do you have access to a laptop and agenda to help you organise your tasks?
Do you receive support from your friends?
Do you have the possibility to make up time?
Do you use a planner to help you set work priorities and goals?
Is your work environment naturally supportive if you need help?
Do you have weekly or monthly meetings with your supervisor to discuss workplace issues?
Do you have a flexible schedule (e.g. permission to start or finish earlier or later)?
Do you have access to educational resources (such as books, apps, videos etc)?
Does your employer or supervisor remind you of important deadlines?
Are you able to change the noise levels (including wearing headphones)?
Does your employer/supervisor establish written short and long term goals?
Do your coworkers or supervisor take time in order to assist / guide you?
Are you able to do part of your work from home?
Do your coworkers/supervisor provide you with emotional support (such as offering you time to talk)?
Are you able to make changes in the arrangement of your workplace (e.g. the direction your chair faces to decrease distractions)?
Do you have written minutes of each meeting?
Can your job tasks be changed (such as varying the tasks to keep you interested, decreasing excessive workloads, changing assignments)?
Have you been provided with text-to-speech software?
Do you have access to written instructions and well as to verbal instructions?
Is it possible to adapt work rules, policies or procedures to accommodate your needs (e.g. hot-desking or providing notes in advance of meetings)?
Do you have a private office or space enclosure to work in when required?
Have you been provided with speech-to-text software?
Have you been provided with specialist training to use any of the above technological adjustments?
Do you receive rewards and/or recognition from your supervisor and/or coworkers?
Does your employers/supervisor develop strategies to deal with problems when they arise?
Do you have access to extra job training in order to learn new or specialist job skills?
Are you able to share your tasks with a co-worker?
Do you have access to an employee assistance programme?

Have you had specialist strategy coaching to support you with memory issues?
Have you been provided with a digital voice recorder for use in meetings and interviews?
Have you had specialist strategy coaching to support you with organisational issues?
Are you able to take longer or more frequent work breaks?

Is your job description clearly defined to you (an effort was put in to reduce role conflict and ambiguity)?
Are you trained in your job in the use of self-management tools (e.g. time management and task planning)?
Have you been provided with a specialist spell checker?
Have you had specialist strategy coaching to support you with time management issues?
Have you been provided with a whiteboard, pin board, coloured post it notes or anything similar?
Have you been provided with mindmapping software?
Have you had specialist strategy coaching to support you with stress management?
Have you been provided with coloured overlays, coloured paper or similar to help reading?
Do you receive support from your peers (other dyslexic people)?
Have you been provided with a dual screen or reading stand?
Was training adjusted to your learning pace?
At work, are you provided with training in communication skills?
Were tasks introduced gradually to allow you to become accustomed to your job?

Does your employer modify his/her expectations of your performance, for example lengthening the learning period or allowing for more errors?
Are you able to change the intensity of the lighting?
Are you able to exchange work tasks with others?

Have you had specialist strategy coaching to support you with spelling difficulties?
Are there meetings with your coach, your supervisor and yourself?
Are you provided with a mentor?
Do your co-workers receive training in dyslexia awareness?
Is there a dyslexia support professional in your workplace that you can consult?
Have you had specialist strategy coaching to support you with writing style?
Have you had specialist strategy coaching to support you with reading?
Are you provided with a co-worker buddy?

Appendix 4.1

How do you define adult dyslexia?

Emergent Criteria for Definition				
	WM	Neurocognitive	Literacy	Other
Literacy-based			1	
Processing Speed		1		
Working memory	1	1		
Reading disability			1	
Working memory based cognitive deficit	1	1		
neurodifferent		1		
Reading disability caused by specific language impairment		1	1	
Dyslexia is about difference in the brain, whether by design or compensation there are strengths		1		
Social and biological interaction – poor fit – rather than the classical reading stuff				1
Output based – the input is too heterogeneous to be clarified				1
Problems caused by underlying brain difficulties		1		
Disorganisation of thought, holistic way of thinking, frustration because this makes things slower at the beginning		1		
Over focus on literacy, what about WM, verbosity, too much narrowing down to common core elements linked to literacy	1	1		
	3	9	3	2
	17.6%	52.9%	17.6%	11.8%

Appendix 4.2

What occupational issues exist for adults with dyslexia?

	WM related	**Psycho social SE**	**Other**
Efficiency at work	1	1	
Practical level			1
Short term memory will affect any job	1		
Literacy depends on the job			1
Emotional level within the client and emotion of the supervisor and the client relationship		1	
Depression, lack of feeling of success		1	
Working memory	1		
Self-efficacy		1	
Working memory	1		
Self-efficacy		1	
Working memory	1		
Self-efficacy		1	
Working memory	1		
Working memory	1		
Speed of processing			1
Procrastination, organisation	1	1	
Making appointments			
Disclosure		1	
Society's attitude		1	
Self-Efficacy – identity – positive – role modelling		1	
Time and extra hours of working	1		
Short term memory issues when under pressure with time	1		
If you can't synthesise the issues quickly enough you get stressed and can't think, jump around.	1		
Less admin support checking errors etc	1		
Time management and organisation	1		
disclosure		1	
Working memory issues – following instructions, keeping up with conversations, meetings, remembering what people have said.	1		
Personal organisation – pointed out as a weakness of mine	1	1	
Proof reading making errors not spotting mistakes in spreadsheets	1		
Given praise for being a problem solver and dealing well		1	
Lower level task, output is more difficult than at higher level	1		
Organisation	1		
Financial trader – kick backs from the lower levels of working memory	1		
Conversational – rushing into the answer rather than thinking through the question	1		
Social professional issues about impression management		1	
Working memory – on the ground – diagnosed later in life working memory critical	1		
The people I've dealt with have never even heard of WM.	1		
A lot of focus on manifestations of WM (literacy) without identifying it as a separate subject.	1		
Memory aspect is certainly the key element.	1		
Self-efficacy in achievement and also day-to-day.		1	
	25 56.8%	16 36.4%	3 6.8%

Appendix 4.3

What gaps are there in our knowledge, in your opinion?

	Intervention evaluation	Career	Strengths	Other	Causes
Overlaps [with other conditions]				1	
Intervention evaluations	1				
Intervention evaluations	1				
Extent of neurodiversity				1	
How strengths and weaknesses affect career		1	1		
Ttreatments	1				
About strength and compensatory abilities			1		
The support system that should be in place and the ways in which dyslexic people can improve business capacity	1				
Job design appraisal systems to enhance ability rather than manage.	1		1		
Career options		1			
What mechanisms work?	1				
Working memory?					1
Processing problem?					1
Coloured lenses work as a placebo effect	1				
Could cog med [electronic brain training programs] develop a placebo effect? Is it sustained over time?	1				
Does SE continue over time [to improve]?	1				
Practical problems that we face at work and solutions to these	1				
Open plan office research	1				
Career pathing and difficulties		1			
Accessible research to dyslexics				1	
HOW it actually is GCHQ preferentially recruiting people – for what? Pattern recognition			1		
Career choice advice – should we be choosing certain roles? Whole teams of graphic designers with dyslexia for example		1			
Natural tendency and then you have people who overcome – do we want whole career groups of certain types of thinkers?		1			
Attention on positive			1		
Interventions to support working memory.	1				
Interventions to support self-efficacy.	1				
	13 46.4%	5 17.9%	5 17.9%	3 10.7%	2 7.1%

Appendix 4.4

Working memory quality scoring table

Author	(Alloway & Warner, 2008)	(Ariës et al., 2014)	(Chambers et al., 2008)	(Craik et al., 2007)	(Jha et al., 2010)	Miranda et al (2013)	(Moro et al., 2015)	(Moro et al., 2012)	(Toll & Van Luit, 2013)	(Zeidan et al., 2010)	Zylowska et al 2008
Are the primary research questions/ hypotheses clearly described?	2	2	2	1	2	2	2	2	2	2	2
Is the paper adequately integrated in a theoretical framework?	0	2	1	1	2	1	1	1	2	1	0
Is the sample or other data as appropriate clearly contextualised?	2	1	2	2	1	2	2	2	2	2	2
Have sufficient steps been taken to remove bias?	0	2	1	2	1	0	0	0	2	2	1
Are the research procedures transparent, audible and replicable?	1	1	2	2	1	1	0	2	2	2	0
Are the chosen methods/ methodology appropriate regarding the stated research aims?	2	2	1	1	1	2	2	2	2	2	1
What is the study design's methodological quality?	2	2	2	2	0	2	2	2	2	2	1
Are the applied data collection methods appropriate?	1	2	2	1	2	2	1	1	2	2	1
Are the chosen data analysis methods appropriate regarding the stated research aims?	2	2	1	1	0	2	0	0	2	0	2
Are the main findings of the paper clearly described?	2	2	2	2	2	1	1	1	2	1	2
Is there a clear link between the drawn conclusions and the stated research aims?	2	2	2	2	2	2	1	1	2	1	2
Are the reported findings generalisable to other relevant populations?	1	1	2	1	2	0	0	0	2	0	1
Does the paper spell out clear implications?	2	2	2	0	2	2	2	1	2	1	2
Overall quality	19	23	22	18	18	19	14	15	26	18	17

Appendix 4.5

Self-efficacy quality scoring table 1

Author	(Bell et al., 2010)	(Engin & Cam, 2009)	(Franklin & Doran, 2009)	(McDowall & Butterworth, 2014)	(Mcdowall et al., 2014)	McGonagle et al. (2014)	Ogan-Bekiroglu & Aydeniz (2013)	(Platt, 2011)
Are the primary research questions/ hypotheses clearly described?	2	1	2	2	2	2	2	0
Is the paper adequately integrated in a theoretical framework?	1	2	2	1	2	2	2	0
Is the sample or other data as appropriate clearly contextualised?	1	1	1	1	1	1	1	0
Have sufficient steps been taken to remove bias?	0	0	2	1	0	1	1	1
Are the research procedures transparent, audible and replicable?	2	2	2	2	2	1	1	1
Are the chosen methods/ methodology appropriate regarding the stated research aims?	1	1	2	1	2	2	0	2
What is the study design's methodological quality?	1	1	2	1	2	2	1	2
Are the applied data collection methods appropriate?	1	2	2	2	2	2	0	1
Are the chosen data analysis methods appropriate regarding the stated research aims?	1	1	1	2	1	2	0	1
Are the main findings of the paper clearly described?	2	2	2	2	2	1	1	0
Is there a clear link between the drawn conclusions and the stated research aims?	2	2	2	2	2	2	0	1
Are the reported findings generalisable to other relevant populations?	**0**	**1**	**1**	**1**	**2**	**1**	**0**	**0**
Does the paper spell out clear implications?	1	1	2	2	2	1	1	1
Overall quality	15	17	23	20	22	20	10	10

Appendix 4.6

Self-efficacy quality scoring table 2

Author	(Reed et al., 2011)	(Reif et al., 2013)	(Stensrud et al., 2014)	(Style & Boniwell, 2010)	(Tsai et al., 2011)	(Tschannen-Moran & McMaster, 2009)	(Watt et al., 2011)	(Zwerver et al., 2013)
Are the primary research questions/ hypotheses clearly described?	1	2	2	2	1	0	2	1
Is the paper adequately integrated in a theoretical framework?	0	1	1	1	0	2	2	2
Is the sample or other data as appropriate clearly contextualised?	1	2	1	1	2	1	1	2
Have sufficient steps been taken to remove bias?	0	1	0	0	2	2	0	2
Are the research procedures transparent, audible and replicable?	2	2	2	1	0	2	2	2
Are the chosen methods/ methodology appropriate regarding the stated research aims?	2	2	1	2	2	2	2	2
What is the study design's methodological quality?	1	2	1	1	2	2	1	2
Are the applied data collection methods appropriate?	2	2	1	1	2	2	2	2
Are the chosen data analysis methods appropriate regarding the stated research aims?	2	2	1	1	1	2	1	2
Are the main findings of the paper clearly described?	2	2	2	0	1	2	2	2
Is there a clear link between the drawn conclusions and the stated research aims?	2	2	2	1	2	2	2	2
Are the reported findings generalisable to other relevant populations?	1	1	0	0	1	1	1	1
Does the paper spell out clear implications?	2	2	1	1	1	2	2	2
Overall quality	18	23	15	12	17	22	20	24

Appendix 5.1 the Working Memory Rating Scale (original and adapted)

Child-focused item (Alloway et al., 2008)	Adapted adult-focused item	Not typical at all	Occasionally	Fairly Typical	Very Typical
To move on to the next step in an activity, needs frequent prompts by teaching staff	Requires supervision to stay on track with activities that have multiple steps	0	1	2	3
Puts hand up to answer a question but forgets what s/he intended to say when asked	Contributes less in meetings where s/he has to wait to speak in turn	0	1	2	3
Frequently asks for help	Frequently asks for help	0	1	2	3
Abandons activities before completion	Abandons activities before completion	0	1	2	3
Does not respond (e.g. shrugs shoulders or nods head) when asked direct questions	Becomes flustered when asked direct questions, particularly during meetings or in busy environments	0	1	2	3
Mixes up material inappropriately, e.g. incorrectly combines parts from two sentences rather than reading each one accurately	Mixes up material inappropriately, e.g. seems to jump around in communication from one idea to a seemingly unrelated one	0	1	2	3
Frequently stops during lengthy activities or those involving multiple steps	Frequently stops during lengthy activities or those involving multiple steps	0	1	2	3
Needs regular reminders of each step in a written task	Needs regular reminders of each step in a written task	0	1	2	3
Forgets how to continue an activity that was previously started, despite teacher explanation	Asks for reminders to follow processes or procedures, despite explanation	0	1	2	3
Benefits from continued teacher support during lengthy activity	Benefits from supervision when completing lengthy activities	0	1	2	3
Requires support for effective use of memory aids such as useful spellings and number lines	Requires support to follow process maps or access the correct material in manuals	0	1	2	3
Loses his or her place in complicated activities	Loses his or her place in complicated activities	0	1	2	3
Incorrectly repeats the same response, e.g. by writing the same word twice in a sentence	Makes repetition errors in speech and written work, making it hard to follow what s/he is saying	0	1	2	3
Does not follow classroom instructions accurately, e.g. carries out come but not all steps in an instruction	Finds it hard to follow detailed protocols or data entry sequences, leaves gaps omissions	0	1	2	3
Raises hand but gives inappropriate or incorrect answers	Makes contributions in meetings or interviews that seem out of sequence or at odds with the current flow of information	0	1	2	3
Is making poor progress in literacy and maths	Takes much longer than peers to adopt new processes, software or equipment	0	1	2	3
Unable to explain what s/he should be doing in a particular activity when	Difficulty communicating work flow when supervised	0	1	2	3

asked					
Not able to focus during activities	Difficulty concentrating in busy environments – might come in early / stay late or request use of earphones to avoid noise distraction	0	1	2	3
Requires regular repetition of the instructions	Requires regular repetition of the instructions	0	1	2	3
Depends on neighbour to remind them of current tasks	Repeatedly checks with colleagues as to what needs to be done and how	0	1	2	3

Appendix 5.2 the GSES questions (Judge et al., 2003)

I can handle the situations that life brings
I usually feel that I am an unsuccessful person
I often feel that there is nothing that I can do well
I feel competent to deal effectively with the real world
I often feel like a failure
I usually feel I can handle the typical problems that come up in life
Whether or not I get to be a leader depends mostly on my ability
I usually feel I can handle the typical problems that come up in life
When I make plans, I am almost certain to make them work

Appendix 5.3 The Job Satisfaction Questions (Greenhaus et al., 1990)

How satisfied you are with your present job overall?
How satisfied you are with your pay?
How satisfied are you with your relations with management?
How satisfied are you with the work itself?
How satisfied are you with the hours?
How satisfied are you with your job security?
How satisfied are you with your promotions?
How satisfied are you with your ability to use initiative?

Appendix 6.1 Full Meta-memory Items (Dixon & Hultsch, 1984)

Item	Subscale (1= Strategy use; 2= Task; 3= Capacity; 4= change; 5 = Anxiety; 6 = Achievement; 7= Locus of control)	Reversed item?
Do you keep a list or otherwise note important dates such as birthdays and anniversaries?	1	
When you are looking for something you have recently misplaced, do you try to retrace your steps in order to locate it?	1	
When you have not finished reading a book or a magazine, do you note the place where you have stopped?	1	
Do you think about the day's activities at the beginning of the day so that you can remember what you are supposed to do?	1	
Do you post reminders of things you need to do in a prominent place such as on bulletin boards or note boards?	1	
Do you routinely keep things in a familiar spot so that you won't forget them when you need them?	1	
When you want to take something with you, do you leave it in a prominent place, such as putting your suitcase by the door?	1	
When you try to remember people you have met do you associate names and faces?	1	
When you have trouble remembering something do you try to remember something similar in order to remember	1	
Do you consciously try to reconstruct the day's events in order to remember something?	1	
Do you try to relate something you want to remember to something else in the hope that this will increase the likelihood of remembering it later?	1	
Do concentrate hard on something you want to remember?	1	
Do you make mental pictures or images to help you remember?	1	
Do you mentally repeat things that you are trying to remember?	1	
Do you ask other people to remind you of something?	1	
Do you write yourself reminder notes?	1	
Do you write appointments on a calendar to help you remember them?	1	
Do you write shopping lists?	1	
For most people, facts that are interesting are easier to remember than facts that are not	2	r
For most people it is easier to remember information they need to use immediately then information they will not use for a long time	2	r
Most people find it easier to remember directions to places they want or need to go that to places they know they will never be going	2	r
For most people it is easier to remember words they want to use than words they know they will never use	2	r
for most people it is easier to remember the names of people they especially like, than people who don’t make an impression on them	2	r
Most people find it easier to remember words they understand than words that don't mean very much to them	2	r
For most people, words they have seen and heard are easier than words that are totally new to them	2	r
Familiar things are easier to remember than unfamiliar things	2	r
It is easier for most people to remember things that unrelated to each other than things that are related	2	r

Most people find it easier to remember concrete things than abstract things	2	r
Most people find it easier to remember things that happened to them than things that happened to others	2	r
For most people it is easier to remember things in which they are most interested than things in which they are less interested	2	r
It is easier for people to remember bizarre things than usual things	2	r
Most people find it easier to remember visual things than verbal things	2	r
Most people find it easier to remember unorganised things than organised things	2	
I am good at remembering names	3	r
I am good at remembering birthdates	3	r
I have no trouble keeping track of my appointments	3	r
I am poor at remembering trivia	3	
I am good at remembering the order that events occurred	3	r
I am good at remembering conversations I have had	3	r
I often forget who was with me at events I have attended	3	
I am good at remembering places I have been	3	r
I have no trouble remembering when I put things	3	r
I am good at remembering things like recipes	3	r
I am good at remembering the titles of books, films and plays	3	r
I have no trouble remember the lyrics of songs	3	
I am good at remembering the names of musical selections	3	r
After I have read a book I have no difficulty remembering factual information from it	3	r
I am good at remembering the content of news articles and broadcasts	3	r
Remembering the plots of stories and novels is easy for me	3	r
I am usually able to remember exactly where I read or heard a specific thing	3	r
I can remember things as well as always	4	r
I'm less efficient at remembering things now than I used to be	4	
The older I get the harder it is to remember clearly	4	
I am as good at remembering as I ever was	4	r
I am much worse now at remembering the content of news articles and broadcasts than I was 10 years ago	4	
Compared with 10 years ago, I am much worse at remembering the titles of books, films or plays	4	
I remember my dreams much less now than 10 years ago	4	
I misplace things more frequently now than when I was younger	4	
As people get older, they tend to forget things more frequently	4	
Compared to 10 years ago, I now forget many more appointments	4	
My memory for important events has improved over the past 10 years	4	r
My memory for phone numbers will decline as I get older	4	
My memory for dates has declined in the last 10 years	4	
My memory for names has declined greatly in the last 10 years	4	
I know of someone in my family whose memory improved significantly with old age	4	r
My memory has improved greatly in the last 10 years	4	r
My memory has declined greatly in the last 10 years	4	
My memory will get better as I get older	4	r
I get upset when I cannot remember something	5	r
I find it harder to remember things when I am upset	5	r
I get anxious when asked to remember something	5	r
I have difficulty remembering things when I am anxious	5	r
I am usually uneasy when I attempt to remember a problem that requires me to use my memory	5	r
I feel jittery if I have to introduce someone that I have just met	5	r
If I am put on the spot to remember names, I know I will have difficulty doing	5	r

it		
I would feel on edge right now if I had to take a memory test or similar	5	r
When I am tense and uneasy at a social gathering I cannot remember names very well	5	r
When someone I don't know very well asks me to remember something, I get nervous	5	r
I get anxious when I have to do something I haven't done for a long time	5	r
I get tense and anxious when I feel my memory is not as good as other peoples	5	r
I do not get flustered when I am put on the spot to remember new things	5	
I would feel very anxious if I visited a new place and had to remember my way back	5	r
It is important to me to have a good memory	6	r
I think a good memory is something of which to be proud	6	r
It bother me when others notice my memory failures	6	r
Having a better memory would be nice but it is not important	6	
It doesn't bother me when my memory fails	6	
I think it is important to work at sustaining my memory abilities	6	r
I work hard at trying to improve my memory	6	r
I admire people who have good memories	6	r
My friends often notice my memory abilities	6	r
I often notice my friends' memory ability	6	r
It's very important that I am very accurate when remembering names of people	6	r
It's important that I am accurate when remembering significant dates	6	r
It bothers me when I forget an appointment	6	r
I like to remember things on my own, without relying on people to remind me	6	r
I'm highly motivated to remember new things than I learn	6	r
It gives me great satisfaction to remember things I thought I had forgotten	6	r
I can't expect to be good at remembering post codes at my age	7	
Most people find it easier to remember the names of people they especially dislike than people they hardly notice	7	
I have little control over my memory ability	7	
As long as I exercise my memory it will not decline	7	r
I know if I keep using my memory I will never lose it	7	r
It's up to me to keep my memory from deteriorating	7	r
Even if I work on it, my memory will go downhill	7	
No matter how hard a person works on his memory, it cannot be improved very much	7	
If I were to work on my memory I could improve it	7	r
I think a good memory comes mostly from working at it	7	r

Appendix 6.2 retained meta-memory items and their subscale

	Subscale
Do you keep a list or otherwise note important dates such as birthdays and anniversaries?	MemStrat
When you are looking for something you have lost, do you try to retrace your steps in order to locate it?	MemStrat
Do you think about the day's activities at the beginning of the day so that you can remember what you are supposed to do?	MemStrat
Do you post reminders of things you need to do in a prominent place such as on bulletin boards or note boards?	MemStrat
Do you keep things in a familiar spot so that you won't forget them when you need them?	MemStrat
When you try to remember people you have met do you associate names and faces?	MemStrat
When you have trouble remembering something, do you try to remember something similar in order to remember	MemStrat
Do you consciously try to reconstruct the day's events in order to remember something?	MemStrat
Do you try to relate something you want to remember to something else in the hope that this will increase the likelihood of remembering it later?	MemStrat
Do concentrate hard on something you want to remember?	MemStrat
Do you make mental pictures or images to help you remember?	MemStrat
Do you mentally repeat things that you are trying to remember?	MemStrat
Do you ask other people to remind you of something?	MemStrat
Do you write yourself reminder notes?	MemStrat
Do you write appointments on a calendar or in your phone to help you remember them?	MemStrat
I am good at remembering names	MemCapacity
I am good at remembering birthdates	MemCapacity
I have no trouble keeping track of my appointments	MemCapacity
I am good at remembering the order that events occurred	MemCapacity
I am good at remembering conversations I have had	MemCapacity
I am good at remembering places I have been	MemCapacity
I have no trouble remembering where I put things	MemCapacity
I often forget who was with me at events I have attended	MemCapacity
I have no trouble remember the lyrics of songs	MemCapacity
I am usually able to remember exactly where I read or heard a specific thing	MemCapacity
I find it harder to remember things when I am upset	MemAnx
I get anxious when asked to remember something	MemAnx
I have difficulty remembering things when I am anxious	MemAnx
If I am put on the spot to remember names, I know I will have difficulty doing it	MemAnx
I would feel on edge if I had to take a memory test or similar	MemAnx
I do not get flustered when I am put on the spot to remember new things	MemAnx
It is important to me to have a good memory	MemAchieve
I think a good memory is something of which to be proud	MemAchieve
Having a better memory would be nice but it is not important	MemAchieve
I think it is important to work at sustaining my memory abilities	MemAchieve
I work hard at trying to improve my memory	MemAchieve
It bothers me when I forget an appointment	MemAchieve

I'm highly motivated to remember new things that I learn	MemAchieve
It gives me great satisfaction to remember things I thought I had forgotten	MemAchieve
I have little control over my memory ability	MemCtrol
No matter how hard a person works on his memory, it cannot be improved very much	MemCtrol
If I were to work on my memory I could improve it	MemCtrol
I think a good memory comes mostly from working at it	MemCtrol

Appendix 6.3 Self-efficacy items considered and adapted scale

Workplace Self-Efficacy Scale (Pepe et al., 2010)	Occupational Self-Efficacy (Schyns & Collani, 2002)
Original prompt: Thinking of future work, how well can you... *Adapted prompt: Thinking about your work, how well can you…*	When I make plans concerning my occupational future, I can make them work.
achieve goals that will be assigned	One of my problems is that I cannot get down to work when I should. (R)
respect schedules and working deadlines	When I set goals for myself in my job I rarely achieve them. (R)
learn new working methods	When unexpected problems occur in my work, I don't handle them very well. (R)
concentrate all energy on work	I avoid trying to learn new things in my job when they look too difficult for me. (R)
finish assigned work	When something doesn't work in my job immediately, I just try harder.
collaborate with other colleagues	I feel insecure about my professional abilities. (R)
work with people of diverse experiences and ages	As far as my job is concerned I am a rather self-reliant person.
have good relationships with direct superiors	When something doesn't work well in my job, I give up easily. (R)
to behave in an efficacious (edited to 'effective') way with clients	I do not seem capable of dealing with most problems that come up in my job. (R)
to work in a team	I can always manage to solve difficult problems in my job if I try hard enough.
	I am confident that I could deal efficiently with unexpected events in my job.

Appendix 7.1 raw and computed improve scores for all participants in CS1

WMRS	JPSE	JPWM	Stress	VWM	GSES	Improve mean	Decrease total	Improve no stress Mean
				-.94		.00	.00	.00
				1.10		.17	.00	.20
				-.43		.00	.00	.00
0	0	1	0	2.13	-1	.17	1.00	.20
1	0	-1	0	.08	0	.17	.00	.20
1	0	-1	0	.08	0	.17	.00	.20
3	1	2	0	.08	-1	.33	1.00	.40
0	1	1	1	1.36	-1	.67	.00	.60
0	1	0	-1	-.43	0	.17	.00	.20
0	1	2	1	-.94	-1	.50	.00	.40
0	-1	-1	-1		0	.00	2.00	.00
-1	0		-1	.08	-1	.00	.00	.00
-1	0	0	0	-1.19	0	.00	2.00	.00
1	-1	-1	-1	-.94	0	.00	.00	.00
0	-1	0	-1	-.43	-1	.00	.00	.00
				-.43		.00	.00	.00
-1	0	-1	-1	-.43	0	.00	.00	.00
-1	-1	-2	-1	-1.96	0	.00	2.00	.00
				.08		.00	.00	.00
	0	0	-2	.08	0	.00	1.00	.00
				-2.47		.00	1.00	.00
				.59		.00	.00	.00
0	0	-1	0	.34	-1	.00	.00	.00
0	-3		-1	.59	0	.00	.00	.00
-1	-1	-1	0	-.94	0	.00	.00	.00
-2	-2	-1	-1	-.94	1	.00	3.00	.00
				.59		.00	.00	.00
-1	0	-1	-1	1.36	1	.17	1.00	.20
1	1	1	1	-1.45	-1	.33	1.00	.20
	0	0	-2		-1	.17	1.00	.20
	2	2	2	.59	2	.67	.00	.60
0	0	0	1	.59	0	.17	.00	.00
0	1	0	-1	.59	0	.00	.00	.00
0	0	1	0	-.17	-1	.00	.00	.00
1	1		0		-1	.33	.00	.40
1	0		1	.59	0	.17	.00	.00
				1.10		.17	.00	.20
0	0	1	-1	1.10	-1	.33	.00	.40
				1.36		.17	.00	.20
-1	-1	0	0	-.43	0	.00	1.00	.00
0	1	0	1	-.17	-1	.33	1.00	.20
0	-1	0	0	-.43	0	.00	1.00	.00

Appendix 7.1 raw and computed improve scores for all participants in CS2

Conditions (1 = intervention, 2 = control	VWM	Mem Strat	Mem Cap	Mem Anx	Mem Ach	Mem Ctrol	WSE	Improve Mean	Decrease Mean	Psycho Soc Mean	Improve no Mem Anx Mean
1.00	.89	.18	1.93	1.06	.65	.54	.68	.29	.00	.00	.17
1.00	-.87	.35	.15	1.04	1.18	1.01	.68	.43	.00	.67	.33
1.00	-.87	-1.90	1.21	1.72	-1.75	1.01	.98	.43	.29	.33	.33
1.00	1.47	-.46	1.91	1.06	-1.49	2.21	1.87	.71	.14	.67	.67
1.00	2.06	.18	-1.26	-.58	.11	1.49	1.87	.43	.14	.67	.50
1.00	-.87	.97	-.22	-.60	-.17	.54	.68	.00	.00	.00	.00
1.00	-.28	.49	.85	-.26	-.42	-.18	-2.01	.00	.14	.00	.00
1.00	-.28	.97	-2.34	-2.24	-.42	-3.29	-2.01	.00	.57	.00	-.17
1.00	.89	-1.56	.15	.39	1.18	.54	-.22	.14	.14	.33	.17
1.00	-1.45	.32	-.92	.39	.11	-.66	.38	.00	.14	.00	.00
1.00	-1.45	-.13	.87	-.91	.37	.06	.08	.00	.14	.00	.00
1.00	-.87	.01	1.21	.39	.11	.77	1.27	.29	.00	.33	.33
1.00	.89	.18	-.58	-1.92	1.46	.77	.38	.14	.14	.33	.00
1.00	1.47	.18	.15	-.26	1.18	.54	-1.12	.29	.14	.33	.33
1.00	2.06	-.77	.15	-.91	-.70	-.90	-1.12	.14	.14	.00	.17
1.00	.89	.66	.15	.39	1.18	-.18	-.82	.14	.00	.33	.17
1.00	-.28	1.78	.51	-1.25	-.70	1.01	-.22	.29	.14	.33	.17
1.00	-1.45						-1.12	.00	.29	.00	.00
1.00	.30	.35	-.19	-.26	.11	-1.38	-1.71	.00	.29	.00	.00
1.00	-.87	.18	.51	-.60	.90	.30	1.27	.14	.00	.33	.17
1.00	.30	-.44	.49	1.40	.11	1.73	1.27	.43	.00	.67	.33
1.00	1.47	2.90	-.92	-.60	2.00	-1.14	-1.41	.43	.29	.33	.50
1.00	1.47	-1.56	.51	1.04	1.72	.54	.68	.43	.14	.33	.33
1.00	.30	.01	-.92	.08	.90	-.90	-.52	.00	.00	.00	.00
1.00	.30	.01	-.22	-1.25	.65	-.90	1.57	.14	.14	.33	.00
1.00	-.28	.66	.51	1.04	-.17	.77	.38	.14	.00	.00	.00
2.00	.30	2.09	.85	1.06	.11	1.25	1.27	.57	.00	.67	.50
2.00	-.87	-.46	.51	1.06	-1.77	-1.14	-1.12	.14	.43	.00	.00
2.00	-.28	-.13	-.22	.08	.39	-.18	-.22	.00	.00	.00	.00
2.00	-.87	-2.21	-.22	2.70	-1.49	.30	.38	.14	.29	.00	.00
2.00	-.28						.08	.00	.00	.00	.00
2.00	.30	-.13	.15	-.26	1.18	-.90	-.22	.14	.00	.33	.17
2.00	.89							.00	.00	.00	.00
2.00	-.28	-.30	1.21	.39	-.14	-.42	.08	.14	.00	.00	.17
2.00	-1.45	-.63	.49	-1.25	.37	-.42	.08	.00	.29	.00	-.17
2.00	-.28							.00	.00	.00	.00
2.00	.89		-1.98	-.40	-.42	.06	.38	.00	.14	.00	.00
2.00	.89						.08	.00	.00	.00	.00
2.00	-.87	-1.73	.51	.73	-1.77	-1.62	-.82	.00	.43	.00	.00
2.00	.30	-.13	-1.28	.39	-.42	-.90	-1.41	.00	.29	.00	.00
2.00	-2.04	-1.90	-3.04	-.60	-2.31	-.18		.00	.57	.00	.00
2.00	.89	.80	-.92	-.91	1.44	.30	-.82	.14	.00	.33	.17
2.00	.30	.35	.51	.06	-.42	1.25	.68	.14	.00	.33	.17

2.00	-.28						1.27	.14	.00	.33	.17
2.00	.30	.49	-.56	-1.92	-.17	-.42	-.82	.00	.14	.00	-.17
2.00	.30	.01	-.22	.39	-.42	.06	.08	.00	.00	.00	.00
2.00	-1.45	.35	.51	-.93	-.96	.06	.38	.00	.14	.00	.00
2.00	-1.45	.66	-.92	-.26	-.42	-.66	.38	.00	.14	.00	.00
2.00	-.87	-.77	-.56	.08	-.96	.30	.68	.00	.00	.00	.00
2.00	-.28	-.30	.15	.39	-.42	-.90	-1.12	.00	.14	.00	.00
2.00	1.47	-.30	.51	.73	-.14	-.66	-1.12	.14	.14	.00	.17
2.00	-.28	.66	.87	.08	.65	.54	.08	.00	.00	.00	.00

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