

# A Mixed Method Study Investigating Dyslexia and Students' Experiences of Anxiety and Coping

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**Abstract**—Adult students with dyslexia can receive support for cognitive needs but may also experience anxiety, which is less understood. This study aims to test the hypothesis that dyslexic learners in higher education have a higher prevalence of academic and social anxiety than their non-dyslexic peers and explores wider emotional consequences of studying with dyslexia and the ways that adults with dyslexia cope cognitively and emotionally. A mixed method approach was used in two stages. Stage one compared survey responses from students with dyslexia (N = 102) and students without dyslexia (N = 72) after completion of an anxiety inventory. Stage two explored emotional consequences of studying with dyslexia and types of coping strategies used through semi-structured interviews with 20 dyslexic students. Results revealed a statistically significant effect for academic anxiety but not for social anxiety. Findings for stage two showed that: (1) students' emotional consequences were characterised by a mixture of negative and positive responses, yet negative responses were more frequent in response to questions about academic tasks than positive responses; (2) participants had less to say on coping emotionally, than coping cognitively.

**Keywords**—Dyslexia, higher education, anxiety, emotion.

## I. INTRODUCTION

IF negative emotional consequences of dyslexia are exacerbated, this may prevent the dyslexic higher education student from successful completion of their chosen course of study and could have a more harmful impact on student progression than the cognitive deficits associated with dyslexia. Carroll and Iles' UK study assessed the prevalence of anxiety in 16 students with dyslexia compared to 16 students with no history of learning difficulties [1]. A questionnaire was used to measure three specific areas of anxiety – academic, social, and appearance. Students were then given a timed reading test, using the Test of Word Reading Efficiency and their state anxiety levels were measured using the State-Trait Anxiety Inventory [2], [3]. The results indicated that dyslexic students showed slower reading speeds than their controls, but more importantly for this paper, findings revealed that dyslexic students had higher levels of state anxiety (fear, nervousness, discomfort induced temporarily by situations perceived as dangerous) and elevated levels of academic and social, but not appearance anxiety. Although the sample size used by Carroll and Iles was small, dyslexic students (N = 16) and a comparison group of non-dyslexic students (N = 16), they argue that dyslexic students in higher education show anxiety levels well above what is

shown by students without reading difficulties and the anxiety is not solely limited to academic tasks but extends to many social situations. Additionally, despite these levels of anxiety, interestingly, students with dyslexia in higher education have often developed innovative ways of applying somewhat more cognitive than emotional coping mechanisms to deal with the demands of working in an academic environment. In agreement with [1], there is a need for further research to develop an understanding of the compensatory, coping strategies that adult university students with dyslexia are utilising to overcome barriers with their studies.

This study aims to, firstly, extend the findings of previous work by Carroll and Iles with a larger sample to clarify whether students registered as dyslexic at university are still vulnerable to high levels of academic and social anxiety in comparison to their non-dyslexic peers [1]. Based on previous findings, it is expected that dyslexic students will show higher levels of academic and social anxiety. The hypothesis to be tested for stage one of the study therefore is: Adult dyslexic learners in higher education have a higher prevalence of academic and social anxiety than their non-dyslexic peers. Secondly, the study will explore dyslexic learners' experiences of emotion in relation to their studies and will identify types of coping strategies used by students with dyslexia to deal with cognitive and emotional difficulties through the question: what are the emotional consequences of studying with dyslexia, and how do adults with a diagnosis of dyslexia cope both cognitively and emotionally within an academic context?

### A. Academic Anxiety and Social Anxiety

Anxiety in the context of the study is defined as academic anxiety, which specifically is anxiety connected to and affecting academic performance, and social anxiety referring to the fear of social situations involving interaction with other people [4], [5]. In this context, social anxiety is connected to the academic environment only and situations, such as seminar debates, presentations, etc. Thus, in the use of academic and social anxiety in the study, at no point is this referring to clinical anxiety and the sample used for the study has not included adults with a formal diagnosis of generalised anxiety disorder.

### B. State and Trait Anxiety

Anxiety, whether academic or social, can be divided into the categories of state and trait anxiety. The state-trait model of anxiety [6], a psychological model consisting of 40 self-report items pertaining to anxiety affect, has been administered in many studies for the purposes of measuring

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the two types of anxiety within various groups [3], [7], [8]. State anxiety describes the experience of fear, nervousness and discomfort induced temporarily by situations perceived as dangerous whereas, trait anxiety refers to a more stable tendency to experience fear, worry and anxiety across many situations.

### C. Coping

It is necessary to make it explicit here that there is a distinction in the context of the study between coping strategies used to compensate for cognitive difficulties and coping strategies used to help to deal with emotional difficulties. This research is interested in looking at what students with dyslexia are doing, or are not doing, to cope both cognitively and emotionally.

### D. Cognitive Coping

In this context cognitive coping refers to developing cognitive and behavioural learning efforts to manage academic demands that are appraised as taxing. For example, students with dyslexia often report using multisensory and active learning techniques to help with processing, absorbing, retrieving, and retaining information.

### E. Emotional Coping

Emotional coping includes using strategies to manage intense feelings and physical stress that accompanies difficult situations. For example, stress management strategies, relaxation techniques, or participating in sport and recreational activities, for the purpose of relieving negative emotion are considered form of emotional coping.

## II. PREVIOUS RESEARCH ON COMORBIDITY BETWEEN DYSLEXIA AND INTERNALISING DISORDERS IN ADULTHOOD

The studies mentioned above demonstrate that although there is now a growing amount of research on the connection between dyslexia and externalising and internalising emotional difficulties in children and adolescents within school, there is little research looking at these relationships in adulthood and the university environment. The small number of studies having looked at this have found that university students with dyslexia report higher levels of somatic complaints, social problems, lower self-esteem, and higher depression scores than their peers [9], [1], [10]. Other limited studies in the area have looked at dyslexia and anxiety in specific subject areas, such as math and statistics, and in relation to specific study tasks, such as exams and timed tests [11], [12].

Riddick et al. investigated whether dyslexic adults' levels of self-esteem and anxiety are impinged when in high-literacy-demand situations [9]. Their UK study used a sample of 16 dyslexic students aged between 18 and 42 compared to 16 non-dyslexic students with ages ranging from 19 to 35 to examine this. The dyslexic and control groups were asked to complete the Culture-free Self-esteem Inventory, the State-Trait Anxiety Inventory and a questionnaire created by the research team which asked about various aspects of their

educational experiences [13], [3]. Their results revealed that on the Culture-free Self-esteem Inventory the dyslexic group had significantly lower self-esteem scores than the control group. Additionally, they comment that the low self-esteem of the dyslexic students fits with the overall picture given of their individual past and present learning experiences in the questionnaire [9].

Jordan et al. asked 28 undergraduate students with dyslexia and 71 undergraduate students without dyslexia to complete a series of scales and questionnaires [11]. Having a diagnosis of dyslexia was associated with higher mathematics anxiety and, in addition, to having greater levels of worrying, denial, seeking of instrumental support and less use of the positive reinterpretation coping strategy (making the best of the situation by growing from it). This study is limited by focusing specifically on the subject area of mathematics, which now needs to be extended to investigate the extensiveness of anxiety with a varied array of subject areas and academic tasks.

Nelson et al.'s US study examined levels of test anxiety amongst 50 college students with dyslexia compared to 50 college students without dyslexia [12]. Again, a series of scales and questionnaires was used including the Wechsler Adult Intelligence Scale – Fourth Edition (WAIS-IV) [14] as the authors wanted to explore within both the dyslexic and non-dyslexic groups, the relationships of cognitive abilities (i.e. general intelligence, verbal ability, non-verbal ability, working memory, processing speed, reading skills) and consequences for test anxiety, which is a combination of physiological over-arousal, tension and somatic symptoms, along with worry, dread, fear of failure, and catastrophising, that occurs before or during test situations [12]. Results suggested that college students with specific reading disability (RD) (dyslexia) reported higher levels of test anxiety than those without RD, and from the cognitive constructs measured, it was found that lower scores in non-verbal ability and working memory correlated with higher levels of test anxiety. Similarly, to the critique of the Jordan et al., as it has narrowly focused on anxiety in relation to only one topic, mathematics, a critique of the Nelson et al.'s study is that the work has a narrow focus in that it has looked at only one type of academic task, namely tests [11], [12]. This work now needs to be broadened by investigating the presence of anxiety, or of other negative emotions that the dyslexic learner may have with other varied forms of study tasks and assessment methods frequently administered by higher education institutions.

A recent UK study carried out by Stagg et al. used a mixed method approach to look at self-efficacy (which refers to an individual's belief in his or her capacity to execute behaviours necessary to produce specific performance attainments) in undergraduate students with dyslexia [15]. The study compared a sample of 22 undergraduate students with dyslexia between the ages of 18 and 32 years, with a sample of 22 undergraduate students without dyslexia also aged between 18 and 32 years. The first quantitative stage of the study involved participants completing two scales: an eight-item academic

self-efficacy scale designed to cover a variety of skills relevant to academic achievement, followed by a 32 item sources of academic self-efficacy scale, which consisted of four subscales tailored to measure four sources: past achievements, vicarious experience, social persuasion, and psychological state. The second qualitative stage included undertaking non-directive semi-structured interviews with four dyslexic students and four non-dyslexic students. The interview approach used was deductive as the interview protocol was developed using Bandura's four sources of self-efficacy as a theoretical framework to explore the development of student's academic beliefs [16]. Findings revealed that there was a significant difference between the dyslexic and non-dyslexic samples on both the self-efficacy scale with non-dyslexic students' scores being significantly higher than the dyslexic scores meaning that dyslexic students have less belief in their ability to academically succeed than their non-dyslexic peers. Stagg et al. report that "of note were the low scores reported by students with dyslexia on the measure of 'physiological state', which measures physical and emotional discomfort in academic situations, and demonstrates that being dyslexic continues to have a negative psychosocial impact even in higher education" [15, p.36]. Additionally, the interviews revealed two main themes prevalent in the dyslexic sample as compared to the non-dyslexic sample: ability awareness; students with dyslexia seemed to be aware of their academic weakness; and the negative impact of past schooling and experiences from school on the development of self-efficacy. This study is progressive. The combined method of following up on quantitative data through qualitative interviews, to establish that differences between self-efficacy scores of the two groups may be connected to the dyslexic sample focusing more on academic weaknesses and negative previous school experiences, has added prominence and meaning to the quantitative results through adding an extra layer of understanding. The interviews have also provided an outlet for the dyslexic undergraduate student voice in relation to barriers to self-efficacy to be heard. Stagg et al. claim that the findings suggest university students with dyslexia still need interventions to help boost their self-efficacy profiles, despite the level of success they have achieved in gaining a place at university [15]. Furthermore, the limited research on dyslexia and emotional consequences, whilst providing evidence regarding the comorbidity between reading difficulties with externalising and internalising disorders, has primarily focused on children and adolescents, with a disregard in relation to how this potentially maps out onto an adult dyslexic learner and continues into adulthood in the form of internalised anxiety at university level education. In addition, the few studies that have been conducted in this area have typically used small samples which makes the work difficult to generalise [17], [1], [11], [9]. Additionally, these studies tend to be single method, principally quantitative and as such, results have not been followed up on a deeper level through the method of qualitatively validating further and triangulating the quantitative findings through interviews with participants [17], [1], [11], [12]. Despite these criticisms, these studies

have provided a foundation for this research in implying that it is now necessary to investigate on a bigger scale whether dyslexic adult learners do in fact require more ongoing emotional support in relation to their studies, and to identify what they themselves are doing, if anything, to cope with the negative emotional consequences, such as anxiety whilst studying with dyslexia.

### III. MEASURES

For stage one, general trait anxiety was measured using an adaptation of the questionnaire previously used in [1] as method for confirmatory replication of results of their study with an increased sample size. Items in the Carroll and Iles questionnaire had been based on two established and copyright-free questionnaires: The Institute of Personality and Ability Testing (IPAT) self-analysis form [18]. This questionnaire consisted of 40 items divided into five subscales based on the author's extensive studies of the factorial structure of personality. The overall measure of anxiety shows good levels of internal consistency (Cronbach's alpha = 0.81) [19]. Evidence of the scales' validity are limited but it is reported in Psychological Reports to have high correlations with an objective test factor identified with anxiety [19], [20]. The second questionnaire that the Carroll and Iles questionnaire was based on was the Screen for Child Anxiety-Related Emotional Disorders (SCARED), [21]. This was a 38-item questionnaire to screen children for anxiety disorders. The authors of the SCARED initially administered this as an 85-item questionnaire to 341 outpatient children and adolescents and 300 parents. Utilising item analysis and factor analysis, the original scale was reduced to 38 items. A subsample of children ( $n = 88$ ) and parents ( $n = 86$ ) were retested an average of five weeks after the initial screening. The SCARED demonstrated good internal consistency ( $= 0.74$  to  $0.93$ ) test-retest reliability (intraclass correlation coefficients =  $0.70$  to  $0.90$ ), discriminative validity (both between anxiety and other disorders and within anxiety disorders), and moderate parent-child agreement ( $r = 0.20$  to  $0.47$ ,  $p < 0.001$ , all correlations). Carroll and Iles adapted these questionnaires and created items to measure general trait anxiety as existing questionnaires did not concentrate on the three separable areas of anxiety that they wished to investigate. Carroll and Iles's finalised questionnaire was measured as having an overall reliability of  $0.878$ , while reliabilities for the individual subscales were as follows:  $0.903$  for academic anxiety;  $0.870$  for social anxiety; and  $0.892$  for appearance anxiety [1].

As this study's concern was specifically with academic and social anxiety, all items relating to appearance anxiety were deleted. This left a questionnaire comprised of 60 items with 30 questions each allocated to the two areas of anxiety – academic and social. Anxiety was assessed to determine whether students with dyslexia are specifically more anxious than students without dyslexia with regards to both academic and social situations. Overall, reliability for the anxiety scale was  $0.939$ , while reliabilities for the individual subscales were as follows:  $0.917$  for academic anxiety; and  $0.912$  for social

anxiety.

Each item on the questionnaire gave participants three options: *very like me*; *partly true*; and *not like me*, which were scored on a scale of 1-3, with 3 representing the highest levels of anxiety and 1 the lowest level.

#### IV. THE INTERVIEWS

For stage two, 20 one-to-one interviews were conducted in a staged nature, going from an initial deductive and working towards a more inductive approach. For the first set of five individual one-to-one interviews an interview guide was created to capture data on: emotional responses to academic tasks; strategies used to cope with the task; and strategies used to cope with the emotional response to the task. For the second set of 10 individual one-to-one interviews, the interview guide had the aim to be more flexible and to capture not only consistencies, but also unexpected issues. As with the first interview guide, questions were still based on asking about individual study tasks, yet more open questions were used, such as: 'how do you feel about reading tasks, etc?' to obtain a more instinctive response of positive and negative reactions. This contrasted with the first guide which used the more formal question: 'do you, or do you not, have an emotional response to reading tasks, etc?' Additionally, it had become clear from analysis of the first five interview transcripts that reasons for negative emotions connected to specific study tasks were based more on unpleasant childhood experiences, such as feeling embarrassed at school when reading aloud, rather than on current cognitive difficulties with the task. Thus, the focus was placed onto delving into reasons for a particular emotion, by asking prompt questions, such as: 'do you know why you feel that way?' and asking, 'can you give any particular examples?' to enable participants to discuss any negative academic experiences that had led to the emotion. As the first stage of five and second stage of 10 interviews had used a prescriptive list of study tasks, for the third stage of the final five interviews, a more inductive, flexible interview guide was used, which was only partially referred to during the interviews. Although academic tasks were still listed on the guide, these were not discussed in chronological order, but instead each participant was asked to randomly pick any of the tasks listed. Once the task was selected the only two questions asked were: what emotion the participant instinctively felt about the task, and their reason for that emotion. This enabled an identification of tasks particularly problematic. These final interviews were unstructured and led to a more spontaneous open discussion.

#### V. PARTICIPANTS

The survey once created and uploaded to survey software was emailed as a link along with an information sheet about the research and consent form to a list of students who had attended study support sessions at a central London dyslexia consultancy between the period of 2011-2016 and who had a formal diagnosis of dyslexia. Additionally, to generate a larger sample, Disability Service Staff operating within institutions

who outsource their students diagnosed with dyslexia to the consultancy for support were also contacted to help with recruitment for the research. The Disability Services staff at these institutions agreed to email the survey link to all students who were registered with their services with a formal diagnosis of dyslexia. It was specifically requested that only students with an official diagnosis of dyslexia should be forwarded the link. The comparison non-dyslexic sample was recruited via an advertisement posted onto a university research website and broadcast by the university on social media channels, which provided information about the research, together with a link for opening the survey, which non-dyslexic students were able to complete in their own time.

For the qualitative interviews, 20 participants, all university students with a formal diagnosis of dyslexia who were undertaking or had recently attended one-to-one study support sessions at the consultancy agreed to be interviewed. The justification for selecting a relatively large sample of 20 interviewees for the research was due to the twofold aim of wanting to, firstly; have a large enough sample to identify consistent themes emerging in responses to be able to drill down further in the second round of interviews, and secondly; to be able to do more open interviews in the third round and to look for any irregularities in the data. Accordingly, five males and 15 females undertook interviews.

#### VI. DATA ANALYSIS

The qualitative data were analysed by applying thematic analysis [24]. The key areas under analysis involved looking for themes to describe the following: emotion words used in response to specific academic tasks; reasons behind the negative emotions; the types of academic tasks that generated the negative emotions; and vice versa, the academic tasks that incited positive emotion; types of coping to overcome cognitive weaknesses; and types of emotional coping. Additionally, the heart of the study was to focus on emotion associated with dyslexia. Throughout the transcripts various emotion words had been used in response to questions on how students felt in relation to academic tasks. This enabled a word frequency score to be undertaken using the find function in Word. Once this had been conducted, it enabled an identification of academic tasks associated with more negative words and tasks more frequently connected with positive words.

#### VII. QUANTITATIVE RESULTS

In order to examine the differences between the dyslexic and non-dyslexic groups, individual *t* tests were carried out for academic anxiety and social anxiety using SPSS software. *T* tests were also carried out to examine differences between dyslexic and non-dyslexic females and dyslexic and non-dyslexic males on academic and social anxiety. Differences between dyslexic and non-dyslexic undergraduates and dyslexic and non-dyslexic postgraduates were also conducted using *t* tests for academic and social anxiety. Finally, to protect against inflated Type I errors when more than one *t* test

has been performed on a single data set, the Bonferroni correction was used.

In agreement with the findings of [1], dyslexic students reported significantly higher rates of academic anxiety than the non-dyslexic students (dyslexic students  $N = 102$   $M = 65.8$ ,  $SD = 9.7$ , non-dyslexic students  $N = 72$   $M = 57.0$ ,  $SD = 10.9$ ;  $t(172) = 5.59$ ,  $p < 0.001$ , Cohen's  $d = 0.85$ ) (see Fig. 1). However, dyslexic and non-dyslexic students, consistent with [9], reported very similar rates of social anxiety and there was no statistically significant difference (dyslexic students  $N = 102$   $M = 53.5$ ,  $SD = 11$ , non-dyslexic students  $N = 72$   $M = 53.8$ ,  $SD = 11.4$ ;  $t(172) = 0.14$ ,  $p > 0.05$ , Cohen's  $d = 0.02$ ) (see Fig. 2).

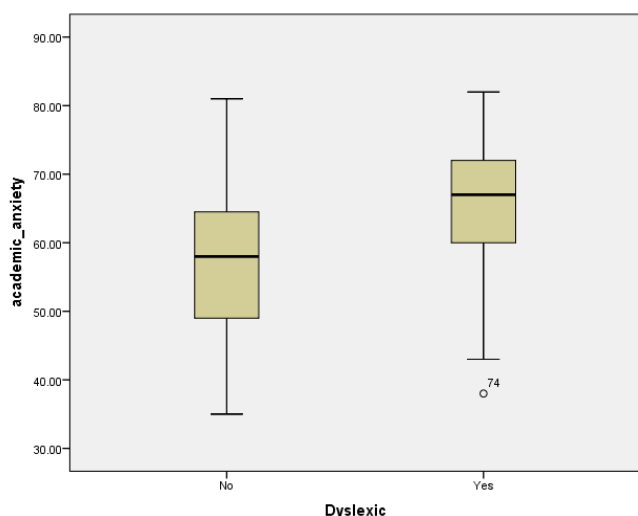


Fig. 1 T test results of academic anxiety between the dyslexic and non-dyslexic sample

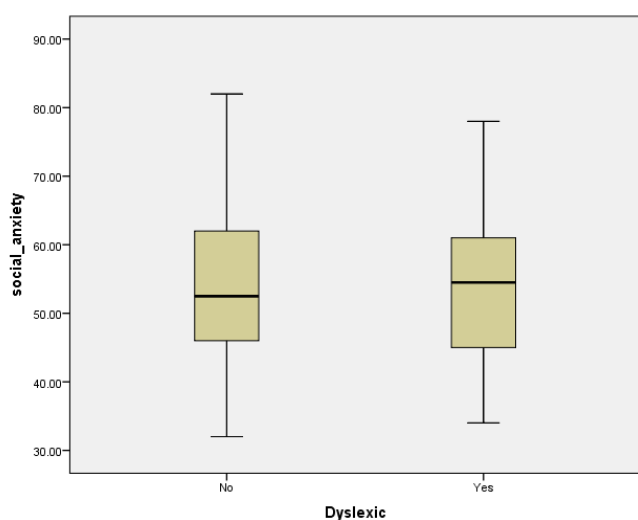


Fig. 2 T test results of social anxiety between the dyslexic and non-dyslexic sample

Analyses were also run separately by gender and by undergraduate/postgraduate status. Gender is frequently associated with anxiety, with women experiencing higher rates than men and therefore separate analysis by gender was

warranted [22]. Carroll and Iles [1] recruited only undergraduates and therefore separate analysis by graduate status was warranted.

#### A. Gender

Female dyslexic students reported statistically significant higher rates of academic anxiety than the female non-dyslexic students (female dyslexic students  $N = 75$   $M = 66.7$ ,  $SD = 9.3$ , female non-dyslexic students  $N = 57$   $M = 57.0$ ,  $SD = 11.3$ ;  $t(130) = -5.59$ ,  $p < 0.001$ , Cohen's  $d = 0.94$ ). Male dyslexic students reported significantly higher rates of academic anxiety than the male non-dyslexic students (dyslexic students  $N = 26$   $M = 63.8$ ,  $SD = 10$ , non-dyslexic students  $N = 15$   $M = 57.0$ ,  $SD = 9.3$ ;  $t(39) = -5.59$ ,  $p < 0.001$ , Cohen's  $d = 0.70$ ). However, female dyslexic and female non-dyslexic students reported very similar rates of social anxiety and there was no statistically significant difference (dyslexic students  $N = 75$   $M = 53.3$ ,  $SD = 11.5$ , non-dyslexic students  $N = 57$   $M = 53.8$ ,  $SD = 12$ ;  $t(130) = 0.14$ ,  $p > 0.05$ , Cohen's  $d = 0.04$ ). Male dyslexic and male non-dyslexic students also reported very similar rates of social anxiety and there was no statistically significant difference (dyslexic students  $N = 26$   $M = 54.3$ ,  $SD = 9.8$ , non-dyslexic students  $N = 15$   $M = 53.9$ ,  $SD = 9.2$ ;  $t(39) = 0.15$ ,  $p > 0.05$ , Cohen's  $d = 0.04$ ).

#### B. Graduate Status

Undergraduate dyslexic students reported statistically significant higher rates of academic anxiety than the undergraduate non-dyslexic students (dyslexic students  $N = 68$   $M = 66.1$ ,  $SD = 9.8$ , non-dyslexic students  $N = 42$   $M = 57.7$ ,  $SD = 11.3$ ;  $t(108) = 4.1$ ,  $p < 0.001$ , Cohen's  $d = 0.80$ ). However, undergraduate dyslexic students and undergraduate non-dyslexic students reported similar rates of social anxiety and there was no statistically significant difference (dyslexic students  $N = 68$   $M = 54$ ,  $SD = 11.8$ , non-dyslexic students  $N = 42$   $M = 55.5$ ,  $SD = 11.9$ ;  $t(108) = -0.69$ ,  $p > 0.05$ , Cohen's  $d = 0.12$ ).

Postgraduate dyslexic students reported statistically significant higher rates of academic anxiety than the postgraduate non-dyslexic students (dyslexic students  $N = 34$   $M = 65.0$ ,  $SD = 9.5$ , non-dyslexic students  $N = 30$   $M = 55.9$ ,  $SD = 10.3$ ;  $t(62) = 3.6$ ,  $p < 0.001$ , Cohen's  $d = 0.92$ ). However, postgraduate dyslexic and postgraduate non-dyslexic students reported very similar rates of social anxiety and there was no statistically significant difference (dyslexic students  $N = 34$   $M = 52.7$ ,  $SD = 9.2$ , non-dyslexic students  $N = 30$   $M = 51.3$ ,  $SD = 10.3$ ;  $t(62) = 0.59$ ,  $p > 0.05$ , Cohen's  $d = 0.14$ ).

#### C. Statistically Significant Items from the Questionnaire

On 11 individual items from the 60-item questionnaire, dyslexic students scored significantly higher levels of academic anxiety than non-dyslexic students and these are presented in Table I.

TABLE I  
STATISTICALLY SIGNIFICANT ITEMS FROM THE QUESTIONNAIRE

	Mann-Whitney U	P Value. Sig. (2-tailed)	Greater Levels of Anxiety for Each Item Indicated by the Higher or Lower Score	Mean Score for Non-Dyslexic Sample	Mean Score for Dyslexic Sample
I am confident and happy with my academic abilities.	2715	.001	Lower	96.8	74.2
I spend longer on my work than most people.	1959	.001	Higher	64	104
I feel a failure academically, in comparison to my peers.	2373	.001	Higher	69.4	100
I feel anxious when reading aloud in front of my class.	2117	.001	Higher	65.9	103
When about to enter an exam, I feel ill / shaky.	2331	.001	Higher	68.8	101
I feel overly anxious when I have exams.	2371	.001	Higher	69.4	100
I feel my literature skills may let me down in exams.	1430	.001	Higher	56.3	109
I am often brought to tears when I think about my academic abilities.	2586	.001	Higher	72.4	98
I get angry with myself for taking so long over one piece of work.	2409	.001	Higher	69.9	100
My work suffers if I am under pressure, and I work better if I have plenty of time.	2624	.001	Higher	72.9	98
I get frustrated when faced with a lot of reading.	2384	.001	Higher	69.9	100

All the items in Table II are related to academic anxiety and not social anxiety. Items “I feel a failure academically, in comparison to my peers”, and “I feel anxious when reading aloud in front of my class” are consistent with findings of these items in [9]. To protect against inflated Type I errors when more than one *t* test is performed on a single data set, the Bonferroni correction has been used, which is a more stringent alpha level to judge statistical significance [23]. The adjusted alpha level is  $p < 0.002$  (0.05/30).

## VIII. QUALITATIVE RESULTS

### A. Emotion Words Used in Relation to Study Tasks

Participants were asked whether they had an emotional response to a list of academic situations/tasks that university courses generally require students to do. The list included reading tasks; remembering reading; spelling; undertaking exams; producing written work and writing essays; doing presentations; using organisation skills; meeting deadlines; taking notes in lectures; and contributing to seminar discussions. Responses from the 20 transcripts were categorised into negative and positive emotions. A word frequency analysis was conducted by counting the number of times each negative and positive emotional word was used. Negative and positive emotional responses are shown in Figs. 3 and 4 in the form of word clouds. The word clouds provide a visual representation of word frequency, as the more frequent the word was said, the bigger and bolder the word appears in the cloud.

What is noticeable from Fig. 3 is the range of negative emotions described, compared to the number of positive words in Fig. 4, and repetition of the word ‘frustration’ described by [25] as ‘the feeling of being upset or annoyed, because of being unable to change or achieve something’, which was prevalent across all academic tasks. With positive emotional responses, again, participants used a wide range of words to verbalise the types of positive emotion that they felt in relation

to their studies with the word ‘enjoyment’ defined as ‘the state or process of taking pleasure in something’ being the term most often used. Also noticeable was the frequency that students spoke about being confident and capable with certain tasks demonstrating that in some academic areas, they are certain of their own strengths and abilities.

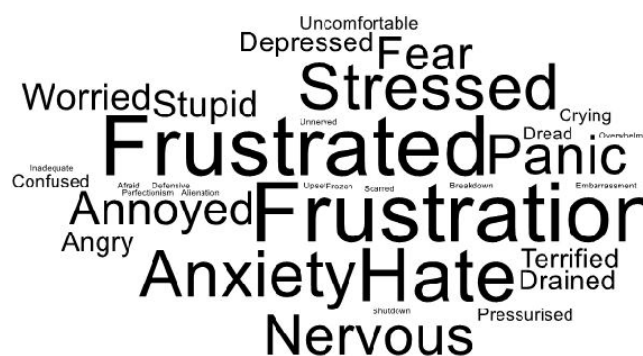


Fig. 3 Word Cloud for Negative Emotion Words



Fig. 4 Word Cloud for Positive Emotion Words

### B. Reasons behind Negative Emotion

With a high degree of consistency, participants had a great deal of awareness of reasons why they felt negative about academic tasks. They did not respond to the question by using it as an opportunity to complain about tasks set by the university, but instead were able to reflect in relation to their

own specific inner difficulties with academic work and why this led to negative feelings, such as frustration and hate for certain tasks. Five main themes on explanations for negative emotions were established from the data.

#### Time

Five of the participants felt the reason for frustration with some tasks like reading was due to the amount of time that had to be allocated to the task. Some students worried that once undertaking the task they were spending too much time on it due to slower reading and processing speeds. Time was also a cause of frustration because some participants felt they were having to repeatedly re-read some academic texts to comprehend them, or to understand the main points.

#### Retention and Retrieval Difficulties

Expanding on the issue of time, eight students had negative emotions connected to tasks, particularly exams, because they were unable to remember information they had previously absorbed from readings and lectures and could not retrieve the relevant knowledge during the tests.

‘I get really frustrated that I don’t remember exactly what it was, or because it’s not that I remember as if I never read it, I know there’s something I know, but I can’t recall it.’

#### Processing Difficulties

As well as retention and retrieval difficulties, processing of language in terms of both output and input was viewed as fostering negative emotion. In relation to output of language, one participant spoke about negative experiences from school of being made to read aloud and being unable to pronounce words, which still resonated with negative feelings. For input, the processing of both written language and auditory information provoked negative reactions. One student spoke about the experience of reading notes and nothing going in, whilst another student recalled being in lectures and being unable to digest the auditory information which impaired the ability to make appropriate lecture notes.

As well as cognitive related difficulties causing negative emotional responses, as described above, psychological related aspects consistent amongst participants were also identified as contributing to negative feelings.

#### Being Evaluated and Judged and the Fear of Looking Stupid and Being Embarrassed

12 out of 20 participants spoke quite openly, and regularly, about negative emotions deriving from academic situations where they felt they were being evaluated and judged. For example, one student, thought it difficult when the lecturer provided reading documents to do during the class, as she felt she was being watched reading by peers and evaluated on her slowness to work through the material. Other participants were embarrassed at being asked to read aloud or were uncomfortable if their spellings were on show for the class to see. In seminar discussions and presentations, a few students felt those types of tasks gave rise to confounded negative responses due to the fear of other people thinking that they

were stupid, or because they themselves felt inadequate in some way. Thus, one student spoke about being uncomfortable in big groups.

‘My insecurities would be like speaking, groups and stuff.’

#### Not Understanding What Is Required or Not Having Strategies to Cope

In addition to both cognitive and psychological causes of negative emotion, four of the participants felt that negativity was centred around not understanding what is required to accomplish academic tasks, or not having appropriate techniques to cope.

‘I’m somehow thinking that it comes from this idea of not really understanding what is required, or, you know like I said earlier about guessing, like when I was in School, I felt like certain things were a mystery and I didn’t really understand’

#### *C.Types of Academic Tasks That Generate Negative Emotion*

From the list of academic tasks discussed during interviews, some tasks were more heavily weighted towards inciting negative reactions. These tasks included exams, deadlines, and note-taking in lectures. A theme which 16 participants spoke about with a high degree of consistency was exams, associated with reports of stress; anxiety; terror; and, panic of failure. One student spoke frankly about how the anxiety provoked in undertaking exams could lead to misinterpreting information and questions on the exam paper:

‘When you get into the exam sometimes, you’re so anxious that you’re not going to be reading the question properly’.

Similarly, to exams, deadlines were principally associated with negative emotion and were equally balanced with exams for generating the largest number of negative responses. These were centred around the themes of stress, worry, anxiety, panic, feelings of dread and being terrified, overwhelmed, sick and nervous. One participant revealed how the dread of deadlines interfered with her concentration and focus on doing the work:

‘Each day it gets closer, I’m just kind of dreading it even more and especially if I haven’t started early enough, that deadline just seems like I can’t make it. I just kind of feel like sick and just worried all the time, even when, like when I’m focusing on work, I just feel not able to put a hundred percent in’.

The main theme regarding emotional responses to note-taking in lectures was frustration and anger targeted towards self, annoyance, stress, panic, worry, and feeling drained and irritated if the pace of lectures was too fast.

#### *D.Types of Academic Tasks That Generate Positive Emotion*

It was predominantly postgraduate students that talked about the mixed emotions of enjoyment and excitement due to the creative production processes involved in writing, the synthesis of ideas coming together and being able to

investigate a topic.

'I always like essays, written work. The whole synthesis of the thing, especially when you get a good conclusion at the end of it and you bring it all together.'

Another postgraduate explained that the enjoyment was connected to investigation and the aspect of solitary work that writing tasks entail:

'I like it because I like to figure things out and to investigate things and I can do it on my own and without somebody pointing at me or telling me all the time what I'm doing wrong, that's okay'.

Positive words used to describe emotions generated in association with writing tasks included: determination; focus; enjoyment; fine; happy; a mixture of excitement and dread; relaxed; positive; excited and chuffed. However, for eight of the undergraduate participants responses to writing were typically more negative. One undergraduate recalled feelings of self-doubt when required to write her first university essay:

'I'm not academic enough, I'm not suitable, they've made a mistake by accepting me, so it was this whole doubt and then when I had to do my first essay, I remember changing my bedsheets and just breaking down crying. I had this panic and I just thought I have no idea what to do, I need to write an essay, I've no idea where to start'.

Organisation and planning may be considered more a strategy than academic task, yet this was categorised for interviews as a task, as it was of interest to see what types of emotions it generated. This is because staying organised and using time efficiently are key components for achieving success at university.

Four postgraduate participants and two final year undergraduates said they loved planning and being organised and had identified this as an essential strategy to ensure academic achievement. A final year participant noted on organisation:

'When I was younger, I was completely disorganised and angry at everything, I thought I was stupid and I was a pretty angry child because of everything, but once I started to organise things, it calmed down a bit because I was able to focus, and my focus was to make sure that everything was organised and then everything did have a place, and it was a bit more logical.'

Positive emotion words associated with organisation and planning ranged from: love, obsessed, satisfied, enjoyment, fine, and competent.

#### *E. Cognitive Coping*

It became apparent during interviews that participants talked extensively about types of cognitive techniques that helped their learning, rather than discussing any types of emotion-focused coping strategies. They appeared to value the opportunity to reveal their own unique devices and methods employed for the purposes of cognitively coping with academic learning. Thus, it became clear that dyslexic learners at university level have made it to this stage of education due to their resourcefulness and knowledge on types of cognitive

techniques suitable for their individual learning styles. The six main cognitive themes identified from the substantial amount of data in this area included: application of specific cognitive techniques; use of specialist technology; multisensory ways of learning; doing practical things; alleviating scotopic sensitivity; and use of favourite materials. Additionally, although emotional coping appeared to be of little importance for participants, in some cases, cognitive coping, such as organisation techniques, rehearsal and preparation particularly of presentations, was being used to alleviate negative emotions such as anxiety and stress.

#### *F. Emotional Coping*

Participants were less forthcoming about coping strategies to deal with emotional issues, in contrast to the battery of cognitive coping strategies they were using. A few participants did admit that they did not cope emotionally, whilst other participants considered things such as exercise and hobbies, which they categorised as their ways of coping with the more emotional and mental health effects of studying as a dyslexic student. As such, themes for emotion-focused coping included: avoidance; withdrawing from social interaction; getting stressed, worried and crying; panicking; seeking comfort; planning and using strategies; implementing breaks; participating in exercise; using mental resilience; talking to someone and seeking support. A few of these themes are elaborated on below:

#### *Avoidant Strategies*

By far, the most consistent theme used by eight of the 20 participants was avoidant strategies. Avoidance was applied across the range of study tasks. Some learners would avoid reading more complex materials for their courses. For other students, reading was still associated with negative experiences encountered at school, so avoidance would be used to prevent harmful memories from school days re-occurring:

'I think when I was younger, I probably used to read out loud in school, but I always used to mess up my words and go wrong and things like that, so I just kind of started to avoid it at all costs really.'

Some learners would use avoidance for writing and spelling tasks by evading writing certain words in front of others.

'Avoid writing in front of someone else.'

Instead, more difficult words would be replaced with words with the same meaning, but words that the learners could spell, which acted as a mask to disguise spelling difficulties.

'I was quite good at avoiding certain words, so I would actually write *gift* instead of *present*.'

Although this form of avoidance with words is to substitute the difficulty with an alternative, the more harmful type of avoidance involved not making any attempt to undertake some study tasks. One learner had avoided all formative and summative presentations.

'It's a way of coping with it, but it irritates me because sometimes I feel like I've got lots to say. I would love to stand up. Yeah, one day I'll do it.'



### Panicking and Freezing

A further interesting reaction to emotions was panic, defined as 'sudden uncontrollable fear or anxiety, often causing wildly unthinking behaviour' mentioned by six participants. One post-graduate recognised that panic led to thinking unhealthily which impacted on working memory processes:

'I will panic about it and I have now identified that that is unhelpful thinking, and I will start to think more unhealthily, which will take out more of my working memory, which will make me less able to do it and it just gets worse.'

Panic and other forms of negative emotional reactions impacting on working memory and processing abilities, were also experienced by an undergraduate student, who observed that due to not having strategies to cope emotionally would breakdown, freeze and be disabled from absorbing her learning:

'I don't cope with it. I have a breakdown. I don't cope. I try and move on and I just get stuck. Last Saturday, I wanted to finish this lecture on diabetes. Anyway, there was seventy-five slides in the whole thing and I'm on slide thirty-six, and I was on slide thirty-six on Saturday at 9 a.m., and I was still on slide thirty-six at 7 p.m. I didn't even move on one slide. I just froze.'

### Planning and Using Strategies

Some participants were using planning and preparation to avoid feeling stupid in front of their peers. One participant, rather than read aloud sections of research papers during seminars in front of peers, devised the strategy of summarising the paper in her own words, which she then presented to the seminar group. That way she was able to relinquish the anxiety felt when difficulties could potentially be exposed to the class by the act of reading aloud.

'I read it, then summarise to the class what the scenario was about. That way no one ever knows.'

### Exercise and Healthy Things

A consistent theme for emotional coping was the use of exercise and healthy things, with 12 of the participants speaking about going to the gym, or undertaking activities, such as running, or walking, if they felt the need to alleviate negative emotion:

'If it's building up, I will go to the gym.'

'I used to go running, just for general like stress.'

'During my dissertation, I went for quite a lot of walks and that helped to like have a change of scene.'

On helping with anxiety and nervousness, three of the learners spoke about using mindfulness and breathing techniques, and a couple of participants did meditation and yoga. A postgraduate student, new to mindfulness techniques explained how in hindsight she would have used this approach to help during exams:

'If I looked at it now having practised more mindfulness, I would have probably visualised it and got more comfortable.'

### Mental Resilience, Persistence and Determination

Applying hard work, developing mental toughness by reading self-help books to cultivate the right mental attitude was also being used by two of the participants:

'Hard work always solves problems. Mental toughness is... I've got a few books on it at home, like it's, if you can cultivate the right mental attitude you can overcome a lot of problems.'

Additionally, four participants' spoke about instilling a strong work ethic; perseverance; and drive to cope both cognitively and emotionally. This was often fostered out of a need of wanting to prove others wrong, and wanting to prove to self and to others that it could be done:

'I always wanted to prove that I was able to get into the Schools I needed to, I could get the grades I wanted to, which is probably why I did Science, rather than Art, because Art was probably the less challenging for my intellect than Science is.'

'It makes me work a lot harder, because I know that if I don't, it could all go wrong. I think it's given me a sense of perseverance, and it's also made me realise, I've got to do it and I've got no excuses.'

'I think the fact that it makes me work that much harder to find things out is a real bonus. It's made me a really driven and resilient person.'

## IX. DISCUSSION

In response to the hypothesis, findings confirmed that dyslexic students are on average more anxious about academic matters than their non-dyslexic peers. This is consistent with results from previous literature focusing on identifying the extent of comorbidities between dyslexia and internalising disorders in adulthood [11], [12]. Furthermore, findings corroborated results from both [9] and [1] small-scale studies in confirming that a statistically significant difference between the dyslexic and non-dyslexic sample for academic anxiety exists. However, unlike [1], yet consistent with [9], this study did not find a significant difference for levels of social anxiety between the dyslexic and non-dyslexic samples.

A possible explanation for the difference in the findings on social anxiety for this study compared to [1] could be differences associated with the younger age of the dyslexic sample used in [1] in comparison to the dyslexic sample used for this research. Carroll and Iles's [1] dyslexic sample (N = 16) was all undergraduate students with ages ranging from 19 years to 24, whereas of the 102 dyslexic students in this study, 34 were at postgraduate level and ages for the sample ranged from 18-64 years. This possible reason for the difference in the findings was tested with separate t tests for social anxiety for both the undergraduate and postgraduate groups and no significant difference was found between the dyslexic and non-dyslexic samples in relation to social anxiety for both the undergraduates and the postgraduates. Thus, the data do not support the theory that younger, lesser experienced dyslexic students will be more socially anxious than their non-dyslexic peers. On the other hand, results for social anxiety may be

affected by the younger age of the non-dyslexic sample. For instance, out of the 102 dyslexic students, 49 were aged 18-24 years, yet 53 were aged 25+ years which implies they entered higher education at an older age. Whereas the non-dyslexic sample, out of the 72 students, 48 were aged 18-24 years and 24 were aged 25+ years. However, as identified, not only in this study, but also in [1], [11], [12], [9], higher levels of academic anxiety in dyslexic students in higher education have been established when compared to groups of non-dyslexic students. Additionally, from the findings, it is evident that participants are experiencing more than just *temporary* state anxiety. Respondents reported anxiety and distressed emotion occurring across all academic situations, which is more suggestive of trait anxiety. When looking at some of the statistically significant items on the survey, such as: 'I lack self-confidence in academic situations'  $p = .001$ ; 'I feel a failure academically in comparison to my peers'  $p = .001$ ; and 'I am often brought to tears when I think about my academic abilities'  $p = 0.001$ ; it implies that negative emotional consequences are pervasive across many circumstances for participants. Thus, the anxiety is not confined to one individual situation for these participants and it is not always a *temporary* feeling of discomfort as suggested by the model of state anxiety.

In response to the research question, 'what are the emotional consequences of studying with dyslexia, and how do adults with a diagnosis of dyslexia cope both cognitively and emotionally within an academic context?' consistent with findings from the quantitative study, the qualitative study revealed that dyslexic students experience more negative emotions, such as frustration; hate; anxiety; and stress than positive emotions. These are particularly in relation to academic tasks, such as exams; deadlines and note taking in lectures. Nevertheless, interestingly, findings also showed that students had high levels of cognitive coping through using specific cognitive techniques, which they had tailored to meet their learning needs. However, in relation to coping emotionally, participants had a lot less to say with regards to individual techniques that they use. In fact, the question of 'how do you cope emotionally?' was frequently met with silence and ambivalence from interview participants. However, discussions on emotional coping with participants, did still identify some coping methods which included: avoidance; getting stressed, worried and crying; using anger targeted at self, or others; panicking; withdrawing from social interaction; seeking comfort; planning and using organisation strategies; implementing breaks to maintain focus; participating in exercise and healthy things; developing mental resilience, such as persistence and determination.

Possible reasons why participants found it difficult to talk about emotional coping could be twofold. Firstly, for students with dyslexia, the important issue is dealing with and overcoming the cognitive challenges of their dyslexia. Therefore, they understandably invest their energies into developing cognitive coping and may be unconscious of or neglect the more emotional wellbeing aspects of their academic lives. Secondly, emotional responses may not be

considered as important to university students with dyslexia due to the emphasis from higher education institutions on academic success and achievement over a more therapeutic approach to learning. Therefore, for many students with dyslexia, the focus on developing strategies for what could be negatively viewed as emotional weaknesses, may be associated with a fear that they will be stigmatised and perceived as having mental health difficulties.

## X.CONCLUSION

The results of the study have shown that dyslexic students may be vulnerable to negative emotional consequences in association with studying at university in general, and/or in connection with specific study tasks. Findings have provided evidence to add to previous literature to suggest that in order to fully comprehend the effects of dyslexia on the adult student, it is necessary to not only understand the nature of the cognitive difficulties that the particular student is experiencing, but it is essential for dyslexia practitioners to acknowledge the symbiotic relationship between dyslexia and negative emotional consequences for the adult learner. The dyslexia tutor is required to provide appropriate interventions for dealing with *both* cognitive and emotional difficulties in a holistic approach.

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