

Investigate Differences in Anxiety Among College Students with and Without Dyslexia

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## Abstract

The purpose of this research was to investigate difference in anxiety among college students with and without dyslexia. We were curious to see if there was a significant difference between the two groups and if so, does the current research support these findings. The research question that we set out answer was, are levels of anxiety higher among students with dyslexia and those without. Question two was, are levels of test anxiety higher among those with dyslexia and those without. In line with the questions in the current research we found it tough to locate and find relevant literature that was interested in the same topic, in particularly from an Irish context. However, what we did find, was literature highlighting those students with dyslexia experience high levels of anxiety throughout their time in higher education as well as dropping out within the first year of college (Olofsson et al., 2015). This study aims to compare the two groups (dyslexic and non-dyslexic students) generalized anxiety and test anxiety levels to see if there is a significant difference between them. The current study recruited participants within higher education institutes, ( $n=82$ ). Participants then took part in an online questionnaire containing 3 sections, unidentifiable demographic questionnaire, generalized anxiety questionnaire and test anxiety questionnaire. Using independent sample t-test, we found there to be a statistical significances for both generalized anxiety scores and test anxiety scores. The results highlighting a large effect size, with those having dyslexia suffering from higher levels of anxiety compared to those without. This study aimed to offer more information around this area of research, in order for further research or potential action to mitigate high levels of anxiety among dyslexic students.

**Keywords:** Dyslexia, Dyslexic, students, anxiety.

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## **Introduction**

Learning disabilities come in various forms and characteristics, ranging from severe to mild and is often accompanied by a specific set of unique challenges to the individual (Shaywitz, 1998). While there is a number of learning disabilities people have been diagnosed with. Throughout this research we will focus primarily on dyslexia. As the title of our research states, we aim to “investigate difference in anxiety among college students with and without dyslexia”.

### **Overview of Dyslexia**

While dyslexia has become one of the more known learning disabilities within the majority of the world (Coltheart & Jackson, 1998), not much is actually known about it other than the flippant comments such as “he or she is just slow at reading” or “he or she is poor at spelling” (Carlson & Martin, 2000). While these comments are not far from the truth, dyslexia is far more complex than just poor spelling and reading (Carlson & Martin, 2000).

We aim to explain the inner workings, complexities and struggles associated with dyslexia. However, we feel it is important to offer a definition as a base line. While there are many variations of the definition that fit the same characteristics. We feel it is best to refer to the American Psychological Association definition, “A neurologically based learning disability manifested as severe difficulties in reading, spelling, and writing words and sometimes in arithmetic” (APA, 2022). This definition highlights the surface level issue an individual with dyslexia might face. However, as we previously pointed out dyslexia is more complex than what is stated above. dyslexia is an often misunderstood learning disability (Hudson et al., 2007). We can see that individuals with dyslexia make up 4% of the population (Carroll & Iles, 2006).

The struggles an individual is most likely to face is directly linked to issues such as, difficulty associating the spelling with that of a word with the verbalization of the word, having letters and words jump around the page they are attempting to read (Hudson et al., 2007).

Fundamentally, the issue with dyslexia is at the word level, an individual will struggle with the recognition of the words in front of them (Thambirajah, 2010). This causes the accuracy of the individual's ability to read, and spell be at a lower level than their peers or the average ability for their age (Thambirajah, 2010). Some of these issues are to do with how the words and letter are acting when presented to that person, due to the words jumping around on the page, it is hard for that person to follow a sentence in comparison to someone without dyslexia (SOLAN, 1993). As a result of these difficulties and problems, an individual's grammar is affected (SOLAN, 1993). One of the main hallmarks of dyslexia is phonological processing (speech) (Scerri & Schulte-Körne, 2009). Phonological processing in large is a limitation for individuals with dyslexia, the impairment poses difficulties in the acquisition of printed words translated into sound (Gus & Samuelsson, 1999). This impairment has even been present in children who haven't even begun to read yet (Thambirajah, 2010). With the discovery of phonological process defect, most researchers within the field of dyslexia agree that it is a core element to identifying if an individual has dyslexia (Mugnaini et al., 2009). While phonological process is an important discovery into dyslexic research, it's not without its critics. Some of whom have issues and have highlighted that the phonological processing hypothesis fails to account for other impairments that can lead to phonological possessing issues (Nicolson, 1996).



The impairments that have not been accounted for include and are not subjected to are as follow, short term memory, visual processing issues and issues with coordination (Nicolson, 1996). Due to this failure to account for other impairments can run the risk of individuals being diagnosed with dyslexia, but in fact are not dyslexic (Peterson & Pennington, 2012).

### **Environmental Factors of Dyslexia**

Nature vs nurture, always a topic of debate and when research is attempting to discover the origins of something, in our case dyslexia, what causes it and is it caused by biological influence or environmental influence. The current research and literature suggest that there is an influence of both biological and environment, with biological having a more dominant role in the cause of dyslexia (Jorm, 1979) The evidence for an environmental factor being a causality is not entirely concrete (Holttum, 2016). The current research looking into the environmental factor highlights that communities of which an individual grows up in can have a significant impact on the prevalence of dyslexia, this is dependent on adopted writing styles within the community (Scerri & Schulte-Körne, 2009). The evidence that was found showed that dyslexia was less common with countries that used language such as Italian or Spanish, the reason is due to the language having direct as well as transparent links between phonemes and graphemes (Scerri & Schulte-Körne, 2009). Further evidence has proposed that low socioeconomic status have a large influence on an individual's development and ability to read with much studies showing evidence of a higher proportion of members within that community having dyslexia (Nicolson, 1996). While that may be the case, the research was not able to directly link low socioeconomic status with the cause of dyslexia, rather highlight that dyslexia is more prevalent within those communities (Nicolson, 1996). It could be said that those who have dyslexia end up in low socioeconomic status due to a lack of early intervention and supports.

**Biological factors**

As the current research suggests, the strongest link to the cause of dyslexia is genetic and hereditary (Shaywitz, 1998). The link between genetics and dyslexia are well established and provide evidence that suggests that dyslexia hereditary and runs in the family, it only takes one parent of a child to potentially pass down the genetic marks for dyslexia (Shaywitz, 1998). Evidence for passing down dyslexia indicate that 40% of parents who have dyslexia themselves will pass it on to their offspring (Thambirajah, 2010). There is also a significant difference between genders, fathers a 46% more likely to pass it on whereas mothers are 33% more likely (Thambirajah, 2010). There is a current suggestion that boys are more susceptible to inheriting dyslexia in comparison to their female siblings (Scerri & Schulte-Körne, 2009). Furthermore, IQ is usually pulled into question when the topic of dyslexia comes up with questions such as, is IQ linked to dyslexia (Scerri & Schulte-Körne, 2009). Findings between a study that looked at twins found that it is actually the opposite to the belief that low IQ is linked to dyslexia. The study found that the heritability between those who higher IQ are more likely to inherit dyslexia (Scerri & Schulte-Körne, 2009).

**Neurological bases for Dyslexia**

When looking at the brain through the use of functional brain imaging, there are going to be three main areas to look at when attempting to identify any abnormalities or differences among those with dyslexia as to those without. The area's researchers aim to focus on are as follow, the left hemisphere as this section of the brain is largely responsible for all of language (Habib, 2021).

Within the left hemisphere there are three main areas, the anterior area which encapsulates the Broca's area, and this is located in the frontal gyrus (Habib, 2021). This area of the brain is what controls speech. When a person is reading this area is responsible for phonemic word analysis (Habib, 2021). The second part of the left hemisphere is the parietotemporal area which houses the Wernicke's area, this area of the brain is mostly responsible for the mapping of letters and associating them with sound, it is also responsible for phonological processing (Habib, 2021). Lastly the third part of the left hemisphere is the occipitotemporal area which is also linked to Brodmann's area 37. This area is effectively a mental dictionary and responsible for word recognition (Habib, 2021). Research that looks into dyslexia is interested in whether or not there are any noticeable differences or irregularities between the brain of an individual with dyslexia compared to an individual without dyslexia (Shaul et al., 2012). Research has provided significant evidence that there are significant differences to the brains of those who have been diagnosed with dyslexia to those who have not (Habib, 2000). It was discovered that the superior temporal gyrus or better known as planum temporal in those with dyslexia lacked the normal asymmetry in comparison to those who do not have dyslexia, their brains showed normal asymmetry (Habib, 2000). We know that it is normally larger in the left hemisphere in comparison to the right, however in the dyslexic brain, the size for both left and right hemisphere were the same size (Habib, 2000).

## **Overview of Anxiety**

Anxiety in some ways is viewed similarly to dyslexia, it is well known yet what's known about it is only surface level in relation to what it actually is and how it can affect an individual (Conroy et al., 2021). Like we did for dyslexia, we feel that a definition is required in order to provide a baseline to what anxiety is and its effects on those who suffer with it. According to the American Psychological Association, "ANXIETY is an emotion characterized by feelings of tension, worried thoughts and physical changes like increased blood pressure" (American Psychological Association, 2022). Those who suffer from anxiety disorders express consistent and recurring thoughts of concern (Domschke et al., 2010). We find that most individuals who suffer with anxiety disorder tend to avoid and not partake in situation due to their own worry and overthinking of negative outcomes of the situation they might be faced with (Domschke et al., 2010). Individuals who suffer with anxiety disorder can be plagued with and display certain physical symptoms such as, rapid heartbeat, increase to blood pressure, sweating, shakes and the feeling of being ill from worry (Goldin et al., 2009). What are some of the causes of anxiety, well firstly it is important to highlight that unlike dyslexia, anxiety is subjective in a way, while the symptoms can across the board are effectively the same (Prisnie et al., 2018). The trigger that causes anxiety is subjective, what might induce anxiety in one individual might not for another (Prisnie et al., 2018). Anxiety can be cause by a plectra of factors, events and situations, examples being such as, work, school, relationships – personal or intimate, financial, social, unforced events (in the current world, Covid 19 being an example) (Tambs et al., 2011).

More specifically and relatable to our research, how does anxiety effect individuals enrolled in academia. While you can argue that many college students experience anxiety through their years of studies and that anxiety is to be expected as they are embarking on a difficult journey (Trifone & Shahini, 2011). For some students it is more than just the normal expected levels of anxiety, it can have severe impact on the learning and grade outcome (Trifone & Shahini, 2011). There is evidence to suggest that the structure of most western colleges are more focused on the ability of an individual to memories large quantity of information and be able to demonstrate their ability to memories a module in an exam that be two hours (Trifone & Shahini, 2011). The issue with this is that there is less focus on the actual learning and understanding of material, there is a number of research studies that have highlighted that most students who complete a bachelors only retain 35 – 45% of the knowledge being lectured (Tobias, 1979).

As a result, this causes a greater levels of anxiety, more than the normal amounts, causing a student to limit the amount they retain over a module (Mahmoud et al., 2012). According to current literature, if the structure was changed to where it was done on a continuous assessment, this will reduce the excess anxiety one might suffer as they are focusing on segmented parts of the materials, (Mahmoud et al., 2012) this will also increase the student's ability to retain information, rather than have to memorize a best part of a semester's worth of information, only to forget a large portion of the information by the next semester (Baloğlu, 2003).

### **Current Literature & Research related to this research**

As our research is looking at “investigate difference in anxiety among college students with and without dyslexia”, we feel it’s important to highlight and discuss current literature surrounding this specific topic to gain a better understanding of this field of research and whether our research has already been covered and therefore is not necessary.

Individuals who suffer from dyslexia do have difficulties with academic work, however that does not stop them from embarking on further education (Carroll & Iles, 2006). While it is amazing that they embrace the daunting road of future education, it’s not without its specific difficulties for that individual with dyslexia (Carroll & Iles, 2006). Current literature highlights that there are record numbers of students with dyslexia entering higher level education, unfortunately it also finds that most students with dyslexia leave or abandon the course within the first year (Olofsson et al., 2015).

It could be argued that this is due to education systems acknowledging dyslexia but not tailor their teaching style as well as the structure not been adapted to suit (Olofsson et al., 2015). From an educational perspective a lot of research has looked into the diagnosis, cognitive ability, and the techniques they use to compensate, as individuals with dyslexia (Olofsson et al., 2015). In the case of students who suffer from anxiety and have dyslexia, anxiety can be seen as the outcome of a deeper issue within the dyslexic student (Riddick et al., 1999). The deeper issue stems from a low self-esteem, a study has highlighted that past and present students have self-reported as well as scored lower on a culture free self-esteem questionnaire. Students reported that they felt they were more anxious through their time in college and felt their writing and academic ability was not adequate or at the same level of their counter parts who are not dyslexic (Riddick et al., 1999).

A further trigger for Students with dyslexia is in the ability to keep up with the pace of learning. Students with dyslexia fall behind when taking notes, reading articles, or assigned reading which causes stress and anxiety of falling behind or having to play catch up (Kirby et al., 2008). One of the largest issues in in the final year exams, dyslexic students have reported that this is where they are subjected to the highest levels of anxiety, in the process of studying for the exam they are required to read and consume large amounts of text and information (Nelson & Gregg, 2010). As we know, People with dyslexia struggle with this exact task, the ability to read quickly and understand and retain the information as well as maintain the level of focus and attention becomes a huge challenge for them, this puts unnecessary stress and anxiety on the individual (Nelson & Gregg, 2010). As a result of the excess anxiety levels, the student is going to struggle to memorize the material required, coupled with the low self-esteem this produces a student to think they have failed before even taking the test (Nelson & Gregg, 2010). While this is also the case of students without dyslexia there is evidence to suggest that it is not the same levels, nor is it as severe as it can be for so students (Rawson et al., 1994). We can see that students without dyslexia face high levels of anxiety throughout their time in college, however we can see that their stress levels fluctuate based on up and coming events, such as assignment deadlines and exams, whereas the levels for dyslexic students remain high throughout (Riddick et al., 1999).

### **Rational & Hypothesis**

Our research is looking into whether there is a difference in the levels of anxiety among college students with dyslexia and those without. We aim to answer this question as it might offer a greater insight into better ways to accommodate students with learning disabilities such as dyslexia.

If our hypothesis is to be correct, then we can offer the information to learning support staff within the college which will give them the ability to better their knowledge of how to help students with dyslexia during their time in college and test-based environments, potentially adding benefit to future programs. Our hypothesis (1), Levels of anxiety are higher among students diagnosed with dyslexia and those without. Hypothesis (2), levels of test anxiety is higher in students with dyslexia vs those without.

Our rationale for conducting this research, while research conducted in the area of dyslexia as well as higher level students with dyslexia is very well researched. There is very little in comparing anxiety levels between those with dyslexia and those without, on a general level as well as a test-based level. What we were able to find using tools such as, google scholar, Ebsco and Scopus was research into levels of anxiety among dyslexic student and then levels of anxiety among college students but never a direct comparison. As this is not a topic that is heavily researched, we believe that it will add greater value to the topic of students with dyslexia as well as offer a comparison between dyslexic and non-dyslexic students' level of anxiety within higher level education. We can also see that from our literature review that there is truly little done on this particular area of research within the Irish population.



## Methods

### Participants

Participants for this research were recruited in a number of ways. The types of sampling used in order to recruit participant were as followed, snowball samples and convenience sampling. Friends and family members who are currently in higher level education were asked to participate and share the research questionnaire around their college. Furthermore, the questionnaire was shared through my class WhatsApp group as well as shared on Instagram with a request to participate if you are a college student. 2 independent sample t-tests were conducted in this study and G\*Power was used in order to gauge the required sample size for an independent sample t-test (Faul et al., 2009). It was found that a sample size of 102 participant would be required in order to reduce a type 1 error. Our sample size came in at 82 participants, while this is under the recommended sample needed, the smaller sample size should be accounted for in the event of recreation of this research, as well as the have a potential impact on the generalizability.

The sample of participants obtained consisted of 82 individuals, all of which are over 18 years of age. None of the participants were exclude from the analysis all completed the questionnaire in full, the reason for this was that it was built into the questionnaire if you did not or could not answer a question, you would be referred back to the information sheet. The only main exclusion scenarios could be inf you are under the age of 18 or not currently in higher level education course (i.e., university). The final account of the sample is as follows, 82 participants (Males = 32, Females = 50). A mean age bracket of 18 – 22. Students who have been diagnosed with Dyslexia, yes = 16 participants (19.5%), no = 66 participant's (80.5%). The mean of academic years, year 3.

## Measures

**Demographics,** Participant who took part in the study were asked about general information, what academic year are you currently in (year 1 up to year 4), what gender do you identify with (male, female, other and prefer not to choose), have you been diagnosed with dyslexia (yes or no), what age bracket do you fall into (18 up to 50 and older).

**Generalized Anxiety Disorder Questionnaire** (Rodebaugh et al., 2008), was the second questionnaire participants were required to take. The questionnaire is compiled of 10 item questions, each question has 4 possible answers to choose from, they are as follow, not difficult, somewhat difficult, very difficult and extremely difficult. Examples of the questions which can also be seen in Appendix C are, 1. Excessive anxiety or worry about a number of events or activities, 2. Finding it difficult to control worrying. The generalized anxiety disorder questionnaire was developed by the DSM (diagnostic and statistical manual), is a self-reported questionnaire, it is designed to identify whether a person fit the category of suffering with any forms of anxiety disorder (Rodebaugh et al., 2008). However, is it's not a tool to be used to diagnose an individual with dyslexia, it is simply a questionnaire to identify if an individual fits the criteria in order to carry out a diagnosis (Rodebaugh et al., 2008). The questionnaire is to be taken by the participant and their scores will be totaled up in order to highlight their levels of anxiety. Scores are to be added up and their total will determine which category they fit into, 11 – 15 (mild), 16 – 20 (moderate), 21 – 30 (severe) (Rodebaugh et al., 2008).

**Test Anxiety Questionnaire** is a 14 item self-reported questionnaire (Núñez-Peña et al., 2016). The questionnaire is designed to assess the anxiety levels a student may face when talking an academic test/exam. The questionnaire is a 6-point Likert-type scale which ranges from almost never to almost always. Example questions can also be seen in Appendix D are as follow, While I'm sitting a test, I think about how badly I'm doing (Núñez-Peña et al., 2016). Higher scores will indicate a higher level of anxiety an individual feels when they take a test (Núñez-Peña et al., 2016).

### **Design**

The research design that will be a qualitative approach. We will be using a cross sectional design. We believe that a cross sectional design is best suited as it offers the best way in which to examine the levels of anxiety among the students with dyslexia vs those without. We will be focusing on the quantitative research as our data will be derived from 3 questionnaire's. The first questionnaire will be comprised of general information which about the participant (non-identifiable questions) see appendix B. the second questionnaire will involve the participant filling out a general anxiety questionnaire see appendix C. The third questionnaire will have the participant fill out a test anxiety questionnaire, see appendix D. Questionnaire 1 will assess, gender, age, academic year and whether they are dyslexic. Questionnaire 2 will provide a base level of the participants anxiety level. Questionnaire 2 will highlight different levels of anxiety among the participants anxiety level during a test/exam. For Hypothesis 1, the IV is diagnosis of Dyslexia, our DV is general anxiety scores. For Hypothesis 2, our IV is diagnosis of Dyslexia, our DV is levels of test anxiety scores.

## Procedure

The data collected for this study was obtained through Google Forms surveys. The survey contained 5 sections, section one was the information sheet/ consent which was a template provided by the National College of Ireland, it was modified to suit the current studies, see Appendix A. Section two is the general information questionnaire, see Appendix B. Section 3 is the generalized anxiety questionnaire, see Appendix C. Section Four, is the test anxiety questionnaire, see Appendix C. Lastly is the debriefing section, see Appendix E. Once the survey was finalized, it was sent out to various medias and people, it was sent to the class WhatsApp shared online (Instagram) and then sent to friends and family who are currently in higher level education. A brief description was provided, followed by a request to take part.

The information sheet/ consent sheet, highlights what the aims of the study are as well information about what is involved in taking part and how their data will be used as well the criteria for taking part, we expressed that their identity will be anonymized. They were made aware that the survey should take up to 5 – 10 minutes, but there is no time limit. We made it clear that they are under no obligation to take part and there is no compensation for taking part either. We also highlighted that once they submitted their survey, we would not be able to exclude them from the survey as we will not be able to identify them. Support services were provided if a participant was to be triggered. A box was provided which asked that they have read the information sheet and consent to taking part. Section two, participant are required to answer all 4 questions of the general information questionnaire before they are to move on to section three, if they are not to answer a question they will be prompted to return to that question and answer it before moving on.

Section 3, the generalized anxiety questionnaire, they are required to answer all 10 questions and like section two if they do not answer all ten, they cannot move on to the next section. Section four, test anxiety question, follows the same structure as the previous section, they are required to answer 14 questions in order to move on. Last section is the debriefing section, we will thank the participant for taking part, re hash the aim of the study as well as remind them that this is the last point in which they can opt out of the survey. Due to the nature of the study, it may be triggering to some. We have provided supports from National College of Ireland as well as external supports if they are to find the survey difficult or triggering. They will then be required to click on the box saying, to submit your response, please click on the option of yes, I wish to finish and submit.

Participants will be presented with all details and information of the study. We aim to not deceive or mislead the participant in any way. They will have full contact to myself and supervisor if they are unsure or need help with any queries surrounding the research. Participants must be 18 years and over to take part. Since this study is looking to recruit participants with learning disabilities, we recognize that we need to take extra steps in order to offer further support and protection to their physical, mental, and social statuses. The questions was designed in such a way that is targets our research question but at the same time limits the harm or risk to our participants mental and physical wellbeing. Due to the possibility of triggering or effecting the mental health of the participant we will be presented with multiple links and numbers to support services. This study has been approved by the National College of Irelands ethics committee. It has followed the guidelines set out by the Psychological Society of Ireland Code of Professional Ethics. It has also been reviewed and approved with the additional amendments by the research supervisor, Dr Caoimhe Hannigan.

### Results

Descriptive statistics for demographic variables can be seen in Table 1. A large proportion of the sample consists of 61% ( $n=50$ ) females and 39% ( $n=32$ ) males. Diagnosis of Dyslexia had 19.5% ( $n=16$ ) selected yes and 80.5% ( $n=66$ ) selected no.

**Table 1**

*Frequencies for the current sample groups on each demographic variable (N=82)*

<b>Academic Year</b>	Frequency	Valid %
Year 1	16	19.5
Year 2	3	3.7
Year 3	62	75.6
Year 4	1	1.2
<b>Gender</b>		
Male	32	39.0
Female	50	61.0
<b>Dyslexia Diagnosis</b>		
Yes	16	19.5
No	66	80.5
<b>Age</b>		
18 – 22	51	62.2
23 – 26	19	23.2
27 – 30	5	6.1
31 – 35	6	7.3
36 – 49	1	1.2

As stated previously the current data has been taken from a sample of 82 participants ( $n=82$ ) and can be seen in table 2. Participants had a mean academic year of 2.59 ( $SD=0.81$ ) and a range of 3. The mean for gender is 1.62 ( $SD=0.49$ ) and a range of 1. Diagnosis of dyslexia's mean is 1.80 ( $SD=0.39$ ) and a range of 1. The mean for age is 1.62 ( $SD=0.97$ ) and a range of 4. For the generalized anxiety total scores, the mean was 21.57 ( $SD=6.04$ ) and a range of 30.0. for the test anxiety total scores, the mean was 42.57 ( $SD=11.80$ ) and a range of 63.0. All test of normality showed that the data was normally distributed, linearity and homoscedasticity within normal rang as well as skewness and kurtosis. Upon inspection of the data, we identified 7 outliers, after further inspection of the data we can see that these outliers were still within the boundaries of the scores for the measures. The outliers will remain in the final analysis as they had no impact on the results when the analysis was conducted without them.

**Table 2**

*Descriptive statistics for all Continuous variables (N=82)*

Variable	<i>M</i> [95% CI]	<i>SD</i>	Range
<b>Generalized Anxiety</b>	21.57 (20.90-22.90)	6.04	30.0
<b>Test Anxiety</b>	42.57 (39.97-45.16)	11.80	63.0

### **Inferential Statistic**

Levene's test for equality of variance was non-significant for generalized anxiety scores ( $p=0.67$ ), therefore the data does not violate the assumption of homogeneity of variance. Test for normality revealed that general anxiety scores were normally distributed. An independent sample t-test was conducted to compare the generalized anxiety scores for those diagnosed with and without Dyslexia. The results have shown that there is a significant difference in scores with those who choose yes for a diagnosis ( $M= 27.31, SD=5.19$ ) and those who choose no for a diagnosis ( $M=20.18, SD= 5.40; t(4.77), p= 0.01$ , two-tailed). The magnitude of the difference in the means (mean difference = 7.13, 95% *CI*: 4.15 to 10.10) was a large effect (eta squared = 1.34).

Levene's test for equality of variance was non-significant for test anxiety scores ( $p=0.98$ ), therefore the data does not violate the assumption of homogeneity of variance. Test for normality revealed that test anxiety scores were normally distributed. An independent sample t-test was conducted to compare the test anxiety scores for those diagnosed with and without Dyslexia. The results have shown that there is a significant difference in scores with those who choose yes for a diagnosis ( $M= 53.81, SD=10.60$ ) and those who choose no for a diagnosis ( $M=39.84, SD= 10.44; t(4.78), p= 0.01$ , two-tailed). The magnitude of the difference in the means (mean difference = 13.96, 95% *CI*: 8.15 to 19.77) was a large effect (eta squared = 1.32).



### Discussion

The aim of this current study was to investigate levels of anxiety among college student with dyslexia and those without. In order for us to do this we chose to stick with two areas of anxiety, those being general anxiety and test anxiety. While one might assume that it is an obvious answer that individuals who have a learning disability will encounter higher levels of anxiety in higher education. Assumptions are not a valid way to answer the question, is there a difference or not. As for our measures of anxiety among those diagnosed with dyslexia and those without, we found our results to be statistically significant and display a large effect size between both the scores of genialized anxiety and test anxiety among our sample with those diagnosed with dyslexia scoring higher levels of anxiety as to their counterparts. Our two hypothesis, hypothesis (1), Levels of anxiety are higher among students diagnosed with dyslexia and those without. Hypothesis (2), levels of test anxiety is higher in students with dyslexia vs those without. Our findings for hypothesis one, our results support our hypothesis that levels of anxiety are higher among college student with dyslexia, therefore we can reject the null hypothesis as there was a large effect size among the groups. This goes for hypothesis two as well our result support the hypothesis, levels of test anxiety are higher in students with dyslexia, again we can reject the null hypothesis as there was a large effect size between the groups.

This is in line with current literature, while levels of anxiety scores for generalized anxiety and test anxiety where high across both groups (dyslexic and those without) those with dyslexia were significantly higher, this can be explained due to those having dyslexia, find the overall education and in particular higher education system and structure more difficult and strenuous (Olofsson, Taube, & Ahl, 2015).

Tasks and request to read large body of text, articles, studying for exams by attempting to review and consume an entire module as well as take notes are very challenging for those with dyslexia, this constant high level of anxiety can be explained due to attempting to maintain the workload and pace of the course can cause excess anxiety on a general basis which can increase when exams are then introduced (Olofsson, Taube, & Ahl, 2015). The literature shows that those with dyslexia will encounter high levels of anxiety, higher levels to those without dyslexia. As a result, this can have detrimental effects not only academically but also socially (Carroll & Iles, 2006). Feeling of failure or going to fail are higher among those with dyslexia, this can lead to future issues such as low self-esteem and personal view that they are not good enough to do the work (Nelson & Liebel, 2017).

While the current literature is in line with our results, we feel it is important to highlight that the current literature is only looking specifically at those with dyslexia. We found it to be very difficult to find literature that is looking at the comparison between those without and those with dyslexia. Therefore, we are having to look at compare our research to literature that focus on just individuals with dyslexia. However, we can see specific literature looking at self-esteem and anxiety among college students with dyslexia that does compare to other students with dyslexia (Riddick, Sterling, Farmer, & Morgan, 1999). It is highlighted that those with dyslexia develop lower performance in higher education due to a high workload that requires a student read and study large quantities of text (Riddick, Sterling, Farmer, & Morgan, 1999). We know that at the heart of dyslexia reading ability reading rate and comprehension of text is slower than those without dyslexia.

This can have significant impacts on a dyslexic student's performance, and in particular their working memory (Riddick, Sterling, Farmer, & Morgan, 1999). Coupled with negative mood and high anxiety can cause a dyslexic student to have impairments on their memorization of the material they are required to learn (Riddick, Sterling, Farmer, & Morgan, 1999).

If we go back to what was discussed previously, phonological processing is one of the biggest limitations a dyslexic individual is faced to deal with (Scerri & Schulte-Körne, 2009). As we know the main issue with phonological processing is the struggle of acquisition of words translated into sound, we can also see from the literature that on average, dyslexic individuals will find a single paragraph five times harder to read and interpret what the paragraph is explaining or discussing in comparison to their counterparts who are non-dyslexic (Holttum, 2016). How does this relate to the current literature, well if a dyslexic student is required to maintain the same pace and structure as students without learning disabilities, we will see an increase of excessive levels of anxiety among dyslexic students due to the fact that they consume, interpret, and understand the material at a slower pace than those without dyslexia (Holttum, 2016). Having to maintain the same pace and workload as those without dyslexia puts the dyslexic students at an unfair disadvantage because from day one, they will be having to try and keep up due to the structure not being adapted to suit their specific learning needs (Holttum, 2016).

### **Practical Implications**

Does the current research have real world application, considering that we found a large and significant result providing evidence that those with dyslexia suffer from higher levels of anxiety compared to those without, what does it offer higher levels of education.

Firstly, we feel it's important to express that we are not trying to shame higher education by highlighting that more can be done to help dyslexic student, from first-hand experience higher levels of education has increased its awareness of those with learning disabilities and provided supports, like extra time and sometimes readers, which has greatly helps those with dyslexia and other learning disabilities. We can also see huge strides in technology that has the power to provide great resources and aids that can help a dyslexic student overcome certain challenges throughout their degree.

A great example of this is Grammarly and read aloud on word. Students are told to proof read their work and make sure it's all correct, however it's very difficult for a dyslexic student to check for spelling mistakes or errors in grammar, simply because to them it is correct. Grammarly has the ability to eliminate a huge proportion of those errors, this can then help that student not lose marks one things they may not be able to identify.

While all this is amazing, and the fact that higher level educations don't intent to just stop at all that has been done so far, this research was done with the hopes of providing more information particularly around the topics of test-based anxiety. For real world applications, higher level education systems could look to re-structure how students are assessed on the materials being taught, rather than an exam being required at the end of each semester, continuous assessment be the main way a student demonstrates their knowledge of the subject. It will limit the high levels of anxiety not only for students with learning disabilities but students across the board because having continuous assessment over exams means that they are assessed on the knowledge that has just been taught meaning they focus on one area of that module at a time which will also help with retention of learning.

### **Future research**

Further research that can follow on from this current research, could take the direction of focusing in primarily on the higher education. While our study give good inside into the different levels of anxiety it is hard to distinguish whether that general anxiety is also being influenced by outside factors that are unrelated to education. A strong recommendation would be to develop a new survey with questions that specifically target higher education. Ideally the questions would be designed in such a way that it looks at specific examples within the higher education can result in anxiety.

We also believe that a qualitative approach might offer more insight into the experience of an individual with dyslexia. This might offer a more of an in-depth reason as to why students with dyslexia have higher levels of anxiety as well as add to the literature surrounding this topic. Lastly, upon researching current literature, we found it to be extremely difficult to localize the literature to an Irish population or study. We feel that this is a strength to our research and feel that further research using an Irish population can add tremendously to the further research.

### **Limitations**

Within this current study there are a number of limitations that should be addressed if this research as to be replicated. Our first limitation that should be addressed is the small sample size that was collected for this study the sample size ( $n=82$ ), this can potentially have a significant effect on the generalizability of the research. The small sample size can potentially be explained due to current circumstance, which leads into another limitation being Covid 19 and the restrictions that were in place. This caused us to have to recruit participant solely on an online basis.

As a student we were unable to speak to people face to face in an attempt to recruit which might have hindered our ability to recruit as many people needed or desired. It should be noted that, while our research has shown a statistical significance between the two groups and their levels of anxiety. We feel the need to express that the scales used (generalized anxiety and test anxiety) were effective in gathering the data required. We feel that going forward the surveys should be more defined. The questionnaires offered a middle ground answer (example., sometimes). By removing this and placing questions that required a more specific answer, we feel a more that the data can be more accurate. It is also important to note that the first questionnaire (generalized anxiety) is simply a means of screening individuals who fit the criteria for anxiety disorders. Perhaps a questionnaire given by a qualified individual, which looks to use a more in-depth questionnaire might reduce the overall scores of anxieties, giving a more accurate account of individuals who suffer from a diagnosable anxiety disorder. Although the data highlighted great insight into the different levels of anxiety among those with dyslexia and those without. It is important to highlight that a large proportion of our sample consisted of students in their third year 75% ( $n=62$ ). As a student who is in the same year and with it being the final year that required use to produce our thesis. Anxiety levels can be expected to be higher than normal. This may have an effect of the total scores if certain exclusion criteria were to be used, for example., focusing only on year one or two.

**Conclusion**

In conclusion, dyslexia as a learning disability has complex layers to it and comes with specific challenges to individuals who have it. This does not mean that they are in any way less able to achieve and accomplish goals and tasks alongside their counterparts. It just means that they employ different strategies and techniques that will allow them to overcome the challenges they face as dyslexic. In this present study, there was a large statistical significance between anxiety levels of those with dyslexia and those without. As well as a large statistical significance between levels of test anxiety among those with dyslexia and those without. The purpose behind this study was to provide a greater insight from an Irish context into the different levels of anxiety among those with dyslexia and those without. With the information produced in this current study we feel it can be used as an aid in implementing possible change to suit those with dyslexia in a higher educational setting. We also hope that it will inspire others to look into this area of research in greater detail. We feel that by addressing higher education anxiety can lead to a better outcome for the students and for the institutes. By reducing one's levels of anxiety can potentially lead to less dropouts, better performance in grades as well as an overall positive and enjoyable experience

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## Appendix A

### Information Sheet

You are being invited to take part in a research study. Before deciding whether to take part, please take the time to read this document, which explains why the research is being done and what it would involve for you. If you have any questions about the information provided, please do not hesitate to contact me using the details at the end of this sheet.

Thank you for considering taking time out of your schedule and partake in this questionnaire.

What is this study about?

My name is Ben Richardson (x19101775@student.ncirl.ie), I am a final year student in the BA Psychology course program at National College of Ireland. As part of my degree, we must carry out an independent research project. My project aims to investigate whether there are differences in levels of anxiety between students with and without dyslexia. This project is being supervised by Dr Caoimhe Hannigan (Caoimhe.Hannigan@ncirl.ie). This research has been approved by the Research Ethics Committee of National College of Ireland.

What will taking part in the study involve?

If you decide to take part in this research, you will be asked to complete this online questionnaire, which includes some general demographic questions, as well as some questions about dyslexia and anxiety. The entire questionnaire should take approximately 5 – 10 minutes to complete.

Who can take part?

To partake, you must be over the age of 18 and be a current undergraduate student of third level education within Ireland.

You cannot take part in this study if you have been told by a doctor that you have a diagnosis of dementia, or a problem with your memory or thinking that interferes with your day-to-day life.

Do I have to take part?

Please be aware that you have the right to not complete the questionnaires and exit the questionnaire at any point up until submission. Once you have submitted your questionnaire, it will not be possible to withdraw your responses from the study because data is collected anonymously.

What are the possible risks and benefits of taking part?

The questionnaire includes items related to learning disabilities/dyslexia and anxiety, and there is a small risk that some of these items might cause distress for some participants. If you experience any distress, you are free to exit the questionnaire at any time. Contact details for appropriate support services are also provided at the end of this page.

Will taking part be confidential and what will happen to my data?

The questionnaire is anonymous; it is not possible to identify a participant based on their responses to the questionnaire. All data collected for the study will be treated in the strictest confidence.

Responses to the questionnaire will be stored securely in a password protected/encrypted file on the researcher's computer. Only the researcher and their supervisor will have access to the data.

Data will be retained for 5 years in accordance with the NCI data retention policy.

What will happen to the results of the study?

The results of this study will be presented in my final dissertation, which will be submitted to National College of Ireland.

Who should you contact for further information?

If you have any questions, you can contact either the researcher Ben Richardson (x19101775@student.ncirl.ie), or the research supervisor Dr Caoimhe Hannigan (Caoimhe.Hannigan@ncirl.ie).

If at any point you feel distressed or if this study is to cause you mental stress, discomfort or harm please avail of the services provided, that will be able to help and comfort you in a professional and professional manner:

- Pieta House – 1800 247 247 - <https://www.pieta.ie/>
- Aware – 1800804848 – [www.aware.ie](http://www.aware.ie)
- Turn2me – [www.turn2me.ie](http://www.turn2me.ie)
- Grow – 1890 474 474 – [www.grow.ie](http://www.grow.ie)
- Mental health Ireland (a list of services for mental health support) – [www.mentalhealthIreland.ie](http://www.mentalhealthIreland.ie)
- NCI disability’s support – [karen.mooney@ncirl.ie](mailto:karen.mooney@ncirl.ie) – (01) 6599 269
- NCI student counselling & wellness service – [Counselling@ncirl.ie](mailto:Counselling@ncirl.ie) – Text NCI – 50808

**Appendix B**

**General Information Questionnaire**

1. What academic year are you currently in: \*

Year 1

Year 2

Year 3

Year 4

2. what gender do you identify with: \*

Male

Female

Other

prefer not to choose

3. Have you been diagnosed with dyslexia: \*

Yes

No

4. What age bracket do you fall into: \*

18 - 22

23 - 26

27 - 30

31 - 35

36 - 49

50 – older



## Appendix C

### Generalized Anxiety Questionnaire

1. Excessive anxiety or worry about a number of events or activities. \*

Not at all

Several Days

More than half the days.

Nearly every day.

2. Finding it difficult to control worrying. \*

Not at all

Several Days

More than half the days.

Nearly every day.

3. Feeling restless, keyed up or on edge. \*

Not at all

Several Days

More than half the days.

Nearly every day.

4. Being easily fatigued. \*

Not at all

Several Days

More than half the days.

Nearly every day.

5. Difficulty concentrating or your mind going blank. \*

Not at all

Several Days

More than half the days.

Nearly every day.

6. Being irritable. \*

Not at all

Several Days

More than half the days.

Nearly every day.

7. Having muscle tension. \*

Not at all

Several Days

More than half the days.

Nearly every day.

8. Having disturbed sleep, such as falling asleep, difficulty staying asleep or restless unsatisfying sleep. \*

Not at all

Several Days

More than half the days.

Nearly every day.

9. Feeling distressed because of the problems. \*

Not at all

Several Days

More than half the days.

Nearly every day.

10. How difficult have these problems made it for you to do your work, take care of things at home, or get along with other people. \*

Not difficult

Somewhat difficult

Very difficult

Extremely difficult

**Appendix D****Test Anxiety Questionnaire**

1. During a test I feel nervous if the teacher stands next to me and then I can no longer answer the question. \*

Almost never

Seldom

Sometimes

Often

Usually

Almost always

2. I often cry after a test, thinking about how badly I've done, even if I don't know my mark. \*

Almost never

Seldom

Sometimes

Often

Usually

Almost always

3. While I'm sitting a test, I think about how badly I'm doing. \*

Almost never

Seldom

Sometimes

Often

Usually

Almost always

4. I get nervous if I see that others have finished the test before me. \*

Almost never

Seldom

Sometimes

Often

Usually

Almost always

5. I think the teacher is constantly watching me. \*

Almost never

Seldom

Sometimes

Often

Usually

Almost always

6. I usually bite my nails or chew my pen during a test. \*

Almost never

Seldom

Sometimes

Often

Usually

Almost always

7. I'm constantly restless throughout a test (moving my feet, playing with my pen, looking around the room, at the clock etc.) \*

Almost never

Seldom

Sometimes

Often

Usually

Almost always

8. I think I'm going to fail the test, even if I've studied beforehand. \*

Almost never

Seldom

Sometimes

Often

Usually

Almost always

9. Before taking the test, my thought is that I've forgotten everything and that I'm going to fail. \*

Almost never

Seldom

Sometimes

Often

Usually

Almost always

10. If I sit at the front of the class i feel more nervous. \*

Almost never

Seldom

Sometimes

Often

Usually

Almost always

11. If the test is time-limited I get more nervous and do worse. \*

Almost never

Seldom

Sometimes

Often

Usually

Almost always

12. My feeling as I leave the test room is that I've done badly. \*

Almost never

Seldom

Sometimes

Often

Usually

Almost always

13. I think beforehand that I'll be nervous and that I'll forget everything. \*

Almost never

Seldom

Sometimes

Often

Usually

Almost always

14. It takes me a long time to answer most of the questions or to decide to hand in my test paper. \*

Almost never

Seldom

Sometimes

Often

Usually

Almost always



## Appendix E

### Debriefing Sheet

I would start with a line that thanks the participant for completing the questionnaire. This sheet will provide information that you should know and for support that might help you after completing the questionnaires. The purpose of this study was to examine whether there are different levels of anxiety among college students with dyslexia vs those without.

As this research is completely anonymous and your data can not be traced back to you. Your information will be coded and unidentifiable. As a result of that if you have any further questions, you can contact the researcher who will happily answer any questions or concerns you may have. Researcher: Ben Richardson – [x19101775@student.ncirl.ie](mailto:x19101775@student.ncirl.ie) or if you are not comfortable with speaking to a current student, please contact the research Supervisor: Dr Caoimhe Hannigan ( [Caoimhe.Hannigan@ncirl.ie](mailto:Caoimhe.Hannigan@ncirl.ie) ). Thank you again for partaking. If this research has resulted or caused any distress or mental harm, please remember that there are supports available as previously stated. Please see supports available below:

- Pieta House – 1800 247 247 - <https://www.pieta.ie/>
- Aware – 1800804848 – [www.aware.ie](http://www.aware.ie)
- Turn2me – [www.turn2me.ie](http://www.turn2me.ie)
- Grow – 1890 474 474 – [www.grow.ie](http://www.grow.ie)
- Mental health Ireland (a list of mental health support) – [www.mentalhealthIreland.ie](http://www.mentalhealthIreland.ie)
- NCI disability's support – [karen.mooney@ncirl.ie](mailto:karen.mooney@ncirl.ie) – (01) 6599 269
- NCI student counselling & wellness service – [Counselling@ncirl.ie](mailto:Counselling@ncirl.ie) – Text NCI - 50808

To submit your response, please click the option - Yes, I wish to submit and finish.

I would like to thank you again for participating.