Personal, educational and psychological characteristics of university students with dyslexia and matched controls: A pilot study

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Abstract

An increasing number of students enter higher education every year. There is a need to develop time and cost effective ways to identify students with dyslexia reliably. The present study investigates whether a protocol based on self-report questions could be a valid screening measure for dyslexia in a sample of university students. The protocol was constructed on the basis of the Adult Dyslexia Checklist, the Visual Problems Checklist and the Academic and Professional Profile Questionnaire. Non-parametric statistical analysis found several significant differences between dyslexic students and controls (adult dyslexia score, visual difficulties score, performance at school, written ability at primary school and university, anxiety at university) as well as correlations between certain variables. This study supports the usefulness of self-report assessment of dyslexia in adult population. It also discusses the possibility of combining self-report measures of dyslexia with several cognitive tasks which have been found to discriminate students with dyslexia from their peers.

Keywords: students with dyslexia, self-report assessment, adult dyslexia

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Introduction

Dyslexia is a neurodevelopmental disorder which mainly affects the development of reading accuracy, fluency and spelling skills (British Dyslexia Association 2006, International Dyslexia Association 2002). While definition of dyslexia is a work in progress, we take it to be a reading difficulty of physiological origin, resulting from a lack of phonological awareness (Snowling 2000) which, often in combination with limited short-term memory, hinders the development of automaticity in processing written language (Chanock et al. 2010). According to the Rose Report (2009:10), 'dyslexia primary affects the skills involved in accurate and fluent word reading and spelling. Co-occurring difficulties may be seen in aspects of language, motor co-ordination, mental calculation, concentration and personal organisation, but these are not, by themselves, markers of dyslexia'. A growing body of literature suggests that there could even be multiple causes and sub-types of dyslexia (Wolff 2009, Miles 2004).

University students with dyslexia are presumed to be seen as able to compensate for their difficulties in reaching higher education. However, several studies show that they still exhibit problems in specific cognitive and literacy tasks. For example, Snowling et al. (1997) found that the most marked differences between dyslexic university students and their non-dyslexic peers were on non-word reading, spoonerism accuracy and speed, phonemic fluency and phoneme deletion. In another study, Hanley (1997) found that individuals with dyslexia performed more poorly than controls on lexical decision tasks (non-word reading, non-word spelling and working memory). Hatcher, Snowling and Griffiths (2002) found that although the students with dyslexia in their study had performed well at school and had apparently compensated for their difficulties, they still performed worse than controls on reading and writing tasks. Typical difficulties they experienced at university included low reading speed, more errors in spelling tasks and poor writing skills. As a result, they needed extra time during exams and in reading and writing assignments.

Riddick et al. (1999) compared the self-esteem, anxiety, past and present educational histories of 16 dyslexic students and 16 matched controls. She found no significant differences on the anxiety measures, but the dyslexic group was found to have significantly lower self-esteem than the controls. On the five-point rating scales the dyslexic group reported themselves as feeling more anxious and less competent in their written work at school than the controls and rated themselves at university as less competent both in their written work and in their academic achievements. Sterling et al. (1998) compared the essay writing of the above sample of students. They found that the dyslexics wrote more slowly and produced shorter essays, they used more monosyllabic words and their spelling error rate was much greater than that of the controls. In addition they produced more errors attributable to

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phonological impairment. These data are consistent with previous research suggesting a continuing phonological deficit in adult students with dyslexia.

Until now, studies mainly concerned Anglophone subjects. As research has concentrated on the case of individuals who have difficulties in reading and writing in the English language, results cannot be fully generalised to languages with different characteristics. From the literature, we know that poor phonological awareness is one of the primary deficits of dyslexia in non-transparent languages such as English and French. On the other hand, in countries with languages that do not have the same difficulties with English, there are still children with specific problems (Miles 2000).

Lami et al. (2008) followed 33 Italian young adults who received the diagnosis of dyslexia when they were about 10 years old. The authors found that reading abilities improve with schooling but this improvement depends on the severity of the disorder in childhood. In fact, children with a medium or mild dyslexia showed greater improvement in reading than children with severe dyslexia. Nevertheless, dyslexia seemed also to persevere in mild cases, because all individuals with dyslexia showed they needed extra time in reading and writing assignments (e.g. during exams or in academic situations).

According to Mapou (2008) manifestations of adult learning disabilities may be subtle and remained manageable in secondary education because pupils received educational support and developed compensatory strategies to deal with some of their difficulties. However, these limitations may become again evident in higher education because of the much higher study load. Finally, lecturers in higher education are proponents of valid and reliable assessment in order to be willing to grant special arrangements like extra exam time to students with dyslexia.

Adult assessment of dyslexia has implications for adult higher education and employment prospects. A proper screening and assessment of dyslexia in university students help us to discriminate between university students who need assistance in academic classes and students who simulate dyslexia to get facilitation. A screening test has to be able to discriminate between individuals with dyslexia and those without to a reasonable degree of accuracy (Re et al. 2011). In addition, students who have never received a diagnosis of dyslexia although they have some indications, have the right to ask for an assessment at university.

According to the literature, for many disorders in general, self-report inventories have proven to be reliable instruments in adult samples both for clinical diagnoses and for quantitative measurements. Self-reports of dyslexia among adults have proven to be surprisingly reliable and valid procedures (Lefly & Pennigton 2000). Obviously, people are capable and willing to report problems that 'have discomforted'

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them for a considerable part of their lives (Wolff & Lundberg, 2003). If the questioning is in a suitable frame and the questions are posed in an appropriate, easily interpretable and specific way, there is a high probability that the self-report will elicit important information. For example, Cohen (1984), found that 25 college students with learning disabilities showed a high correlation between self reports of their reading and mathematics ability and their performance on objective tests of reading and mathematics (0.78 and0.76 respectively). This correlation reached 100% for their assessment of their written skills.

Snowling et al. (2012) validated a protocol for adult self-report of dyslexia and related difficulties in a sample of 417 adults. The sensitivity of the scale was acceptable but it missed some cases of low literacy. The protocol provided a useful tool for screening dyslexia and related difficulties.
Finally, questionnaires and rating scales provide a time-saving way of estimating risk factors for dyslexia. Many dyslexia screening questionnaires include not only questions about literacy skills but also items which tap problems such as attention, organisation and everyday problems (e.g., Cooper & Miles, 2011, Smythe & Everatt 2002). Potentially, these questionnaires offer additional information relevant to the quantification of risk, but few are validated. However, as universities are unlikely to approve accommodations based on students' self-reported difficulties (because of a perceived potential for abuse), we should consider, instead, the combination of self-report questionnaires with objective tests of performance on tasks known to be difficult for people with dyslexia (Chanock et al. 2010).

Dyslexia in Greek higher education

Dyslexia is a legally recognised disability in Greece in all levels of education (primary school, high school, lyceum) according to the Law 3699/2008. Pupils with a formal diagnosis of dyslexia are examined orally for entry into higher education. Oral examination and generic counselling are the only legally and educationally recognised provisions offered to pupils with dyslexia in secondary and tertiary education (Stampoltzi, 2003). No other official accommodations are offered to students with dyslexia at university.

According to Stampoltzis and Polychronopoulou (2008) the reported incidence of dyslexia in Greek higher education is very low, which means that students prefer not to disclose their disability at university as far as they do not receive special arrangements. A new law (4009) reforming higher education was voted in 2011. As far as dyslexia is concerned, the law states that the assessment of dyslexic students must be specified by the internal regulation of each university. Despite the minor changes in legislation on provision for dyslexia, many attitudinal and practical barriers still exist for students with dyslexia. For example, it is almost impossible for students who have never received a diagnosis to be assessed for dyslexia through

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the Greek university support services. Because of the growing number of dyslexic students entering Greek higher education, there is an increasing need for screening and diagnostic tools of dyslexia for students and adults.

University students with dyslexia are capable of reporting accurately problems that discomfort them in different aspects of their lives. The present study investigates whether a protocol based on self-report questions covering different aspects of dyslexia apart from literacy could be a valid screening measure for dyslexia in a sample of university students.

Participants

The sample consisted of 8 dyslexic students from a medium sized Greek university, ranging in age from 20 to 24, and 8 non-dyslexic students ranging in age from 19 to 25. They were matched as closely as possible for age, gender, academic discipline and social background. The dyslexic students all had a recognised assessment of dyslexia or specific learning difficulties and were registered with student services as dyslexic. They were all volunteers who were contacted through student services or publicity posters. The controls were obtained by asking the dyslexic students to nominate a same sex friend of roughly the same age on the same course who might be interested in taking part in the research. In each group there were six males and two females. The basic characteristics of the sample is given below (Table 1)

Table 1: Characteristics of the sample

Participant	Age (years)	Gender	Course	Severity of dyslexia
Dyslexic				
D1	23	male	Electrical engineering	mild/moderate
D2	25	male	Mechanical engineering	mild/moderate
D3	20	male	Civil engineering	mild/moderate
D4	24	female	Civil engineering/counselling	severe
D5	20	female	Civil engineering	severe
D6	20	male	Mechanical engineering	mild/moderate
D7	20	male	Civil engineering	mild/moderate
D8	20	male	Electronic	mild/moderate
Controls				
C1	23	male	Electrical engineering	
C2	24	male	Mechanical engineering	
C3	20	male	Civil engineering	
C4	25	female	Civil	

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			engineering/counseling
C5	20	female	Civil engineering
C6	20	male	Mechanical engineering
C7	20	male	Civil engineering
C8	19	male	Electronic

Research instruments

The following research instruments are used in the present study. The Adult Dyslexia Checklist (Smythe & Everatt 2002) is a self-report questionnaire which gives an indication of some of the areas with which people who have dyslexia may have difficulties. It consists of 16 questions that were found to be more predictive of dyslexia. The checklist has been standardised in a British sample of students and employees aged 16-68 years. A score of 43 is a cut-off score for dyslexia. An indication of mild/moderate or severe dyslexia is drawn from the score.

The Visual Problems Checklist consists of seventeen questions exploring visual aspects of information process, seven of them are the most predictive of visual-type difficulties in dyslexia. Each item is rated with 0 or 1 point and a total score is obtained. The higher scores reveal more visual problems in relation with reading. The Academic and Professional Profile Questionnaire (Riddick et al. 1999) explores the personal and academic characteristics of students. It has five main sections covering 'biographical information', 'at school', 'between school and university', 'at university' and 'the future'. Several items ask the students to rate themselves relative to their peers on items such as writing, academic performance and levels of anxiety. The 'at school' part of the questionnaire is divided into primary school and secondary school and, where appropriate, identical questions were asked about both settings. Most items are assessed on a five-point scale.

Finally, the adult version of the Culture-Free Self-esteem Inventory has three subscales—for general self-esteem (16 items), for social self-esteem (eight items) and for personal self-esteem (eight items)—the scores of which can be combined to obtain a total score. In addition to this, there is a fourth scale (eight items) which is supposed to measure truthfulness. The result is not added to the main score but is believed to give an indication of how truthfully someone is responding to the overall inventory. The inventory has been standardised on a Greek sample and the reliability has been calculated 0.81 (Argyrakouli-Tsouma 2000).

All instruments, apart from The Culture-Free Self-Esteem Inventory, were translated into Greek by two researchers. The transcripts were compared and the researchers discussed and resolved disagreements. Inter-rater reliability was calculated by dividing the total number of agreements and disagreements (Meijer, Verloop & Beijaar 2002). The inter-rater reliability was 87%.

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Procedure

Participation was voluntary for all participants. Data were collected in one session with each student. The session was held in the university library of the institution. Questionnaires were given to the students in a different order and explanations were given if necessary. Students with dyslexia started with the first, second, third or fourth instrument according to an ABCD-design. Their control student always started with the same instrument. There was a break halfway through the session.
Results

Table 2 shows the results of thirteen variables related to school and educational characteristics of the students (dyslexic and controls). The differences between the two groups were compared with the Mann-Whitney statistical test. Four variables (Adult Dyslexia Checklist, Visual Problems Checklist, Visual Problems Checklist-loaded items and written ability at university) elicit the largest differences between students with and without dyslexia. In addition, two other variables (performance at primary school and written ability at primary school) elicit statistically significant differences at the .05 level (p= .03). As a result, writing, self-report questions and visual processing problems were among the variables with the largest differences.

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Table 2: Educational and academic characteristics of students

	Dyslexic				Controls				Mean difference		
	min	*max*	*mean*	*s.d*	*min*	*max*	*mean*	*s.d*	*U*	*z*	*p*
Adult Dyslexia Checklist	41	68	53.5	9.13	27	46	34.8	6.71	3.5	-3	.001
Visual Problems checklist (loaded items)	8	14	10.0	2.14	0	8	3.5	2.33	1.5	-3.26	.001
Visual Problems checklist	11	21	14.5	3.07	4	13	6.9	2.85	2.5	-3.11	.002
Performance at primary school	2	4	3.3	.89	3	5	4.3	.71	13	-2.15	.032
Performance at high school	2	4	3.1	.84	3	5	3.9	.84			n.s
Performance at lyceum	4	5	4.3	.46	3	5	4.4	.74			n.s
Performance at the last years of lyceum compared to classmates	3	5	4.0	1.07	3	5	3.6	.74			n.s
Written ability (primary school)	1	3	1.9	.84	2	3	2.8	.46	13	-2.17	.030
Written ability (high school)	1	3	2.1	.84	2	4	2.9	.64			n.s
Written ability (lyceum)	2	5	2.8	1.17	2	4	2.8	.89			n.s
Performance at university	3	5	3.5	.76	3	4	3.4	.52			n.s
Written ability at university	1	3	1.8	.72	2	3	2.8	.46	9	-2.60	.009

Notes: Scores for performance and written ability range from 1 to 5 with higher mean scores represent better performance.
n.s=not significant

Table 3 shows the results of six variables related to psychological characteristics (anxiety and self-esteem) of the students. The only variable which discriminates dyslexic and controls were anxiety at university. No differences were observed in aspects of self-esteem which suggests that as dyslexic students grow older, they manage to keep a positive image of themselves.

Table 3: Psychological characteristics of students

	Dyslexic				Controls				Mean difference		
	min	*max*	*mean*	*s.d*	*min*	*max*	*mean*	*s.d*	*U*	*z*	*p*
Anxiety at school	3	5	3.9	.69	2	5	3.5	.93			n.s
Anxiety at university	3	5	3.6	.74	2	3	2.9	.35	14	-2.308	.021
Total Self-esteem (CFSEI-AD)	11	29	22.6	5.95	16	31	23.5	5.83			n.s
General self-esteem (CFSEI-AD)	5	16	11.8	3.37	8	16	11.8	3.01			n.s
Social self-esteem (CFSEI-AD)	5	8	6.9	1.13	6	8	7.0	.76			n.s
Personal self-esteem (CFSEI-AD)	1	7	4.0	2.39	1	8	4.8	2.77			n.s

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Notes: Scores for anxiety ranges from 1 to 5 with higher mean scores represent negative answers. n.s =not significant

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In order to measure the strength and direction of the relationship between the main variables of the study, the Spearman Rho correlations were calculated (Table 4). The most important correlations are those related to the Adult Dyslexia Checklist which seems to be a reliable tool to assess dyslexic students' difficulties. Students' anxiety at university is positively correlated with the Adult Dyslexia Checklist and the Visual Problems Checklist (full form or loaded items). Positive correlations were observed between writing ability at different educational levels (primary school, high school, university). Performance at the last two years of lyceum is positively correlated with social self-esteem (.661, p=0.01). A negative correlation (-.517, p=.05) was observed between the Adult Dyslexia Checklist and performance at primary school which means that the worse the academic performance at primary school, the greater score on the Adult screening test (Adult Dyslexia Checklist).

Table 4: Correlations between the main variables of the study

	ADC	VPC	VPC (l)	Perf.prim	Perf.high	Perf.lyc	Perf.last years lyc	Wr. prim	Wr. high	Total SE	Gen. SE
VPC	.875**										
VPC (loaded)	.866**	.957**									
Perf.prim	-.517*										
Perf.high				.820**							
Wr. prim.				.571*	.536*						
Wr.high								.743**			
Perf.univ.											
Writ. Un.								.623**	.542*		
Anx.univ.	.581*	.660**	.613*								
Social SE						.524*	.661**			.664**	.548*

Statistical significance *p=.05 **p=.01
ADC=Adult Dyslexia Checklist

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VPC= Visual Problems Checklist
VPC (l)=Visual Problems Checklist (loaded)
Perf.prim=Performance at primary school
Perf.high=Performance at high school
Perf.lyc=Performance at lyceum
Perf.last years lyc=Performance at the last two years of lyceum
Wr. prim.=Writing ability at primary school
Wr. high=Writing ability at high school
Writ.Un=Writing ability at university
Perf.univ.=Performance at university
Anx.univ.=Anxiety at university
Total SE=Total Self Esteem
Gen. SE= General Self-Esteem
Soc.SE = Social Self-Esteem

Discussion

The present study supports the idea that students with dyslexia, even if they managed to enter higher education, they still have difficulties in cognitive, literacy and everyday tasks. More specifically, our research shows some similarities with Riddick et al.'s (1999) study who found that the dyslexic group reported themselves as feeling more anxious and less competent in their written work at school than the controls, and rated themselves at university as less competent in their written skills. In addition, self-report questionnaires (such as the Dyslexia Adult Checklist and the Visual Problems Checklist) clearly differentiate the dyslexic group from the control group. These screening questionnaires include not only questions about literacy but also items which cover problems such as attention, visual process and organisation (Cooper & Miles 2011). They also provide a time-saving way of estimating risk factors for dyslexia.

According to Lefly and Pennigton (2000), self-reports of dyslexia among adults have proven to be surprisingly reliable and valid. If the questionning is in a suitable frame and the questions are posed in an appropriate, easy interpretable way, there is a high probability that the self –report will collect important information and will have a high correlation with objective tests of reading, writing or mathematics (Cohen 1984). In our study, self-report questionnaires have the advantage that they were used successfully in a Greek sample after appropriate changes. For the needs of the present study, when we translated the questionnaires, we took into account aspects and situations that are typical for the Greek educational system and Greek dyslexic population.

The fact that the participants report greater anxiety at university in comparison to their fellow students can be explained because their literacy difficulties combined

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with situational factors and past learning problems may put them at greater risk of becoming anxious. Gilroy (1995), who has supported over 150 dyslexic undergraduates, comments on how study difficulties can set off a circle of anxiety and insecurity which further reduces students' ability to cope with their work overload at university. A similar finding is reported by Barga (1996) who found that students with learning disabilities could adopt either positive or negative coping strategies and that negative strategies—such as covering up or avoiding difficulties—led to greater anxiety.

The present study underlines the need for developing reliable and valid screening and diagnostic tools for dyslexia in students and adults. Adult assessment of dyslexia has implications for adult career and employment prospects. A proper screening and assessment of dyslexia in university students will help us to find students who need assistance in academic classes and exams early on. This is in line with Re et al's (2011) suggestion to provide reasonable accommodations to students with dyslexia who struggle at university after we recognise them.

In addition, a combination of self-report questionnaires and objective tests of performance in several cognitive tasks will shed light on the issue of whether students with dyslexia in higher education form a homogeneous group or comprise several subgroups. It is important to test this hypothesis not only in Anglophone subjects but also in students from non-Anglophone countries. This is in line with Lami et al.'s research (2008). Especially, in the Greek context, as there are no diagnostic tests for dyslexia in students and adults, a detailed self-report protocol covering many aspects of dyslexia apart from literacy can be the first step of validating a screening tool. The present study tested several questionnaires with items that might differentiate between dyslexic students and controls. Even if the sample was small, we found some promising statistically significant results. Information from different instruments can be pulled together and examined in the light of the others, because they are inter-related. In addition, the research instruments used in the present study can be tested in a larger sample of university students from different disciplines.

Conclusion

Students with dyslexia form an interesting group to study. For many people, dyslexia persists beyond the school years and may significantly affect choices. If institutions of higher education want to provide programme adjustments and exam accommodations to students with dyslexia, it is necessary to have objective criteria. Although considerable efforts have been made to develop relevant screening tests for Anglophone subjects, there is still much uncertainty about how the screening can be organised efficiently. The present study concludes that validated diagnostic protocols can be used as screening tools in large universities, saving time and

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money. In a second step, certain cognitive tests known to be difficult to people with dyslexia can be administered to students with indications of dyslexia and related difficulties. In this way, we can help to avoid adverse consequences in dyslexics people's lives that might result from the disorder in a society where most activities are regulated through reading and writing.

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