

2020

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## **GREEK ADULT POPULATION WITH SPECIFIC LEARNING DISABILITIES: EPIDEMIOLOGY, DEMOGRAPHICS AND GENDER DIFFERENCES**

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**Abstract:** The aim of this study was to collect information about demographic characteristics of a clinical sample of Greek adults with specific learning disabilities (SLD) who referred themselves for learning assessment in a State Certified Diagnostic Center. Greek adult population with SLD is under-researched and difficult to access. The sample comprised 132 Greek adults (66.7% males) meeting the Diagnostic and Statistical Manual of Mental Disorders criteria for SLD. Data were collected through self-report records and case records which included demographic information and learning assessments. Most of the participants came from urban areas and they were studying in post-secondary non-tertiary or in tertiary education. As regards the prevalence of the main types of SLD and their comorbidity our findings agree with international data. The demographic characteristics, such as educational level and employment status, are discussed within the Greek socio-cultural context.

**Key words:** Adults with specific learning disabilities, Comorbidity of learning disabilities, Specific learning disabilities

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## INTRODUCTION

According to the National Joint Committee on Learning Disabilities (NJCLD), Specific Learning Disabilities (SLD) is a general term referring to a heterogeneous group of disorders (Horowitz, Rave, & Whittaker, 2017). They are neurobiological in origin and are characterized by difficulties to process, organize, and retain verbal or nonverbal information (Harrison, Nichols, & Larochette, 2008; Horowitz et al., 2017; Oga & Haron, 2012). The main types of SLD are impairment in reading, written expression and mathematics (Selekman & Diefenbeck, 2014). SLD may exist across the lifespan (Horowitz et al., 2017; Patel, Greydanus, & Calles, 2010; Scanlon, 2013). Unlike school-age children and adolescents, adults may have, to a large extent, managed to compensate for their difficulties, but residual traces of the original problems can still be found (Berninger, Nielsen, Abbott, Wijsman, & Raskind, 2008b; Cavalli et al., 2018; Colombo, Fudio, & Mosna, 2009; Law, Wouters, & Ghesquière, 2015; Warmington, Stothard, & Snowling, 2013), and they are likely to experience problems that significantly affect their academic achievement in post-secondary and higher education, and their lives (Cavalli et al., 2018; MacCullagh, Bosanquet, & Badcock, 2017; McDonald & Deacon, 2019).

Research in SLD focuses mainly in childhood while research during adulthood is limited within the last three decades (Gerber, 2012; Levine & Nourse, 1998; Seo, Abbott, & Hawkins, 2008; Sharfi & Rosenblum, 2014) and presents a series of methodological issues such as sample ascertainment, use of convenient samples such as students, missing data, different selection criteria, aggregate sample mixing SLD with other disabilities, lack of precise demographic characteristics etc. (Cavalli et al., 2018; Gerber, 2012; Law et al., 2015; Lindgren & Laine, 2007; Seo et al., 2008; Sharfi & Rosenblum, 2014).

Epidemiological studies in children and adolescents report comparable prevalence rates of 4 – 9% for deficits in reading and 3 – 7% for deficits in mathematics (American Psychiatric Association, 2013; Hall, 2008; Patel et al., 2010; Snowling, 2005). Among SLD, dyslexia is the most well-researched and common disorder (Hall, 2008; Patel et al., 2010; Snowling, 2005), identified in 80% of cases with SLD while written language disorder is the least researched SLD (Patel et al., 2010). In adult populations prevalence rates have not been accurately reported (Cortiella & Horowitz, 2014; Sharfi & Rosenblum, 2014) and most research findings come from self-reports and tertiary or non-tertiary student population (Gerber, 2012). According to DSM-V (APA, 2013), the estimate of SLD among adults is 4%, while, in the US, the National Center for Learning Disabilities (Cortiella & Horowitz, 2014) estimates that 1.7 percent of the general population reports having a learning disability.

Stampoltzis and Polychronopoulou (2008) estimate that the incidence rates of Greek dyslexic students in tertiary education is 0.16%, while UK data estimate that 0.42 of students in higher education were dyslexic (Richardson & Wydell, 2003).

Comorbidity reflects the relations between underlying cognitive mechanisms and brain processing areas which subserve reading, writing and mathematics skills (Molfese, Molfese, Molnar, & Beswick, 2006). Comorbidity rates in the SLD population are not researched thoroughly (Landerl & Moll, 2010; Moll, Kunze, Neuhoff, Bruder, & Schulte-Körne, 2014) even though studies have started examining the relationship between deficits in different learning domains (deficits in reading, in writing and in mathematics) in order to better understand their overlap. Research with adults is scarce, however, findings suggest that, across the lifespan, people with SLD experiencing a deficit in one learning domain frequently show deficits in other domains as well (Scanlon, 2013; Wilson et al., 2015). In childhood reading, disorder is highly comorbid with written language disorder (Hall, 2008; Molfese et al., 2006; Patel et al., 2010; Snowling, 2005). In addition, deficits in mathematics often co-occur with reading disorder (Hall, 2008; Kaufman & Von Aster, 2012; Moll et al., 2014; Snowling, 2005; Oga & Haron, 2012) even in adulthood (Wilson et al., 2015).

Epidemiological studies in child, adolescent and adult populations show that more males than females are identified as having SLD (Cortiella & Horowitz, 2014; Horowitz et al., 2017; Liederman, Kantrowitz, & Flannery, 2005; Newman & Madaus, 2015; Patel et al., 2010; Rutter et al., 2004; Seo et al., 2008; Vlachos et al., 2013; Vogel & Holt, 2003). Gender differences could be attributed to the fact that males are less likely to compensate than females (Anderson, 1997) and to referral bias, as boys and young males, across their life span, are more likely to exhibit externalizing behavior and are more often referred for learning assessment (Hall, 2008; Limbrick, Wheldall, & Madeline, 2011; Quinn & Wagner, 2015; Vogel, 1990; Vogel & Holt, 2003; Wheldall & Limbrick 2010). More specifically, in clinical samples, SLDs seem to be more prevalent among males in all ages (Berninger, Nielsen, Abbott, Wijsman, & Raskind, 2008a; Wadsworth, DeFries, Stevenson, Gilger, & Pennington, 1992; Willcutt & Pennington, 2000).

With regards level of education, findings agree that most adults with SLD complete high school (Ferrari, 2009; Horowitz et al., 2017; Vogel & Holt, 2003). Legislative and educational changes in the US and Canada, where most studies have been conducted, have increased services for school students with SLD (learning strategy tutoring, reduced course load, extended time on exams, alternative methods of assessments), thus producing more adult learners who have completed secondary education and are eligible for postsecondary education (Harrison et al., 2008; Horowitz et al., 2017; Levine & Nourse, 1998; Luftig &

Muthert, 2005; Mellard & Patterson, 2008; Ruban, McCoach, McGuire, & Reis, 2003; Trainin & Swanson, 2005).

Concerning the type of postsecondary education, young adults with SLD tend to enroll in non-tertiary post-secondary education programs at higher rates than in higher education (Horowitz et al., 2017; Joshi & Bouck, 2017; Murray, Goldstein, Nourse, & Edgar, 2000; Newman et al., 2011; Wagner & Newman, 2015) and are more likely to choose technical or vocational non-tertiary training (Hakkarainen, Holopainen, & Savolainen, 2015; Horowitz et al., 2017; Murray et al., 2000; Newman & Madaus, 2015; Seo et al., 2008). Research shows that young adults with SLD tend not to pursue higher education as they face many challenges (Horowitz et al., 2017; McGregor et al., 2016). Some of the difficulties they encounter are: lack of academic skills, underlying cognitive processing problems, cognitive difficulties with concentration, listening, organization and memory (Mortimore & Crozier, 2006; Olofsson, Ahl, & Taube, 2012; Olofsson, Taube, & Ahl, 2015), inability to manage their study duties and deal with complex textbooks, limited foreign language skills etc. (MacCullagh et al., 2017; Olofsson et al., 2015; Simmons, & Singleton, 2000). Additionally, they find it difficult to complete degree requirements (Newman et al., 2011).

SLD also pose challenges and limitations regarding the field of education one may choose. Academic programs that emphasize reading, writing or mathematical skills, might exclude adults with SLD (Fuller, Healey, Bradley, & Hall, 2004; Mellard & Patterson, 2008; Patel et al., 2010). The most frequently reported fields of study are social sciences, business administration and finance (Madaus, Foley, McGuire, & Ruban, 2002; Newman et al., 2011). British national data report that university students with dyslexia were more likely to be taking degrees in agriculture, creative arts, engineering, architecture, natural sciences, humanities, social studies, biological sciences and computer science (Richardson & Wydell, 2003). A recent study of Italian university students with SLD enrolled in 19 Universities found that the highest numbers of SLD students were reported in the faculties of Statistics, Agriculture, Veterinary Science, Education, and Architecture (Longobardi, Fabris, Mendola, & Prino, 2019).

In so far as employment is concerned, there is evidence that the rate of employment among working-age adults with SLD are lower than their non-SLD peers (Corley & Taymans, 2002; Cortiella & Horowitz, 2014; Gerber, 2012; Vogel & Holt, 2003). According to the 2010 American census data, half (46%) of working-age adults with learning disabilities were employed, compared to 71% of adults without learning disabilities and they were more likely to drop out of the labor force completely as compared to their peers without learning disabilities (Horowitz et al. 2017). A number of studies have shown that most adults with SLD have difficulties with the adult life transition and employment, whereas others manage efficiently enough in the same

areas (Ferrari, 2009; Newman et al., 2011). The overrepresentation of young adults with SLD among the unemployed may be due to their specific difficulties (writing, reading, mathematics) in performing the tasks required for certain jobs (Corley & Taymans, 2002; Janus, 2009) and mainly their inadequate literacy skills (Mellard & Patterson, 2008). The most frequent types of employment they choose are business (professional, technical, executive, administrative, managerial, marketing/sales), followed by education, health care, and technology (Madaus, 2006; Madaus, et al., 2002; Newman et al., 2011; Taylor & Walter, 2003). Similarly high proportions of SLD employees can be found in 'blue collar' jobs (service/skilled trades/agriculture/elementary work) than in 'white collar' jobs (professional/ technical/ clerical work) (Vogel & Holt, 2003). Adults with SLD may perceive that their reading and writing skill deficits could prevent them from asserting jobs requiring more academic-oriented skills (Mellard & Patterson, 2008).

Findings on gender differences in adults with SLD, concerning their level and field of education, and their employment suggest that men and women do not differ in their post-secondary enrollment (Newman et al., 2011). However, women with SLD are less often employed than men (Corley & Taymans, 2002; Levine & Nourse, 1998; Madaus, 2006; Seo et al., 2008) and make less earnings (Levine & Nourse, 1998; Madaus, 2006; McLaughlin, Speirs, & Shenassa, 2014).

### ***Adults with SLD in Greece***

As already mentioned, research in the area of SLD during adulthood is very limited (Gerber, 2012; Levine & Nourse, 1998; Seo et al., 2008; Sharfi & Rosenblum, 2014) and, more specifically, in Greece where very few research findings are reported about epidemiology, demographics, education level and employment status of adults with SLD. Access to this special population of adults with SLD is difficult since they are rarely referred to psychoeducational services for learning assessment or if they have been assessed in a younger age they don't follow up. Therefore, research studies with Greek adult population report findings mainly from higher education students with dyslexia as sampling presents serious obstacles. These few findings reveal that the incidence of dyslexia within the Greek student population is lower than that reported in other countries (Stampoltzis & Polychronopoulou, 2008), which means that young adults with SLD in Greece either choose not to disclose such information when they enter tertiary education or fail to enter tertiary education or don't even try to enter. Ρότσικα et al. (2007) reported that the success rate of dyslexic students in the very competitive higher education entrance examinations was 39.76%, which was statistically lower than the 65.36% of the general population of candidates. In so far as their study preferences are concerned, findings (Αργυροπούλου, 2001; Ρότσικα et

al., 2007; Stampoltzis & Polychronopoulou, 2009) agree that dyslexic students prefer fields of study mainly in technological sciences, agricultural sciences and business because there is less demand for reading and writing, and they can rely on non-verbal skills and their ability to manage people and organisations. However, a study on Greek parents of dyslexic secondary education students (Diakogiorgi & Tsiligirian, 2016) suggested that they chose as more appropriate professions for their children, professions with low academic requirements but still not manual.

The demand for higher education is very high in Greece, and educational attainment in higher levels has always been considered a major factor affecting social mobility, as a university degree provides more job opportunities and guarantees better income while associated with higher social status (Kyriazis & Asderaki, 2008; Marginson, 2016; Papadimitriou 2015). Greek families are pursuing higher education at any cost (Psacharopoulos, 2003; Psacharopoulos & Papakonstaninou, 2005). Therefore, the importance attributed to higher education by middle class families leads many adolescents to diagnostic centers in order to obtain an SLD diagnosis, which will facilitate their access to higher education (Anastasiou & Polychronopoulou, 2009; Τζουριάδου, 2011). Previous research (Bonti, Bampalou, Kouimtzi, & Kyritsis, 2018) regarding the reasons Greek young adults seek formal diagnosis of SLD, indicated that the most common reason was academic exams. Adults requested learning assessment in order to be eligible to receive accommodations, which would help them succeed more easily in the highly selective National Entrance Exams to higher education or to overcome the academic obstacles when attending higher education and similar academic settings.

### ***The present study***

The present study aimed to collect data about demographic characteristics of a clinical sample of adults with SLD in Greece. Studies on adults with SLD in Greece and worldwide rely mostly on convenience sample and self-reports. In this study we used a clinical sample of adult population with SLD who referred themselves for learning assessments in a State Certified Diagnostic Center in order to investigate the following research questions:

- a. Which is the prevalence of the main types of SLD -difficulties in reading, written expression and mathematics- and their comorbidity? In other words, which are the most frequently co-occurring types of learning difficulties in a clinical population of Greek adults?
- b. Which are the demographic characteristics of adults with SLD (age, gender, geographical area, level of education, field of education, employment status)?

- c. Are there gender differences in Greek adults with SLD regarding their level of education, field of education and employment status?

## METHOD

### *Participants*

The study sample consisted of 132 adults, 66.7% ( $n = 88$ ) of whom were male, meeting the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; *DSM-IV-TR*; American Psychiatric Association [APA], 2000) criteria for SLD. Their mean age was 25.25 years ( $SD = 6.71$ ), and all of them were native Greek speakers from urban and rural areas of Greece. All the records used in the study came from participants who had referred themselves in a State Certified Diagnostic Center for Learning Difficulties during the years 2012-2014. The Diagnostic Center was part of the Psychiatric Department in a University General Hospital. At the time of the study, this diagnostic center was the only State Certified Diagnostic Center in Northern Greece conducting learning assessments for adults, therefore our sample came mainly from various parts of Northern Greece, but also from Epirus, Thessaly and the islands. As is the common practice for all patients assessed in the Diagnostic Center, participants had signed a written consent accepting that all or part of their evaluation data may be used anonymously for research purposes. Also, approval was obtained from the director of the Psychiatric Department where the Diagnostic Center is situated.

This study analyzed data that came from confidential self-report records collected from adults with SLD through clinical interviews (to obtain background information, developmental histories, and demographic data) in the broader context of the learning assessments. Additionally, the data collected from case records included information on cognitive and learning assessments conducted in the State Certified Diagnostic Center. For a case to be included, the learning assessment had to unambiguously state that the adult met the criteria for an SLD according to the *DSM-IV-TR* (2000).

The definition of learning disorders incorporates exclusion criteria such as absence of extreme behavior, absence of neurological problems or sensory impairments, and absence of problems presumed to be the result of environmental, economic, or cultural factors (APA, 2000). In Greece, the identification process of SLD is based on the criterion of a severe discrepancy between intellectual ability, as measured by the Greek Wechsler Intelligence Scale for Children–III (WISC-III) for children and WAIS-III, and now WAIS-IV, for adults, and academic performance as assessed by



non-standardized tools (Agaliotis, 2016; Anastasiou & Polychronopoulou, 2009). The SLD diagnosis of the collected case records in our study was given after completion of the diagnostic procedure which had been conducted in the daily routine of the Diagnostic Center by a psychologist, an educational specialist, and a psychiatrist, according to the DSM-IV-TR diagnostic criteria. DSM-IV-TR was used because during the period 2012-2014 the Greek version of DSM-V had not been released. Moreover, the software used in the Diagnostic Center for managing medical records - the SAP ERP (Enterprise Resource Planning) - required the registration of diagnoses to be based only on DSM-IV-TR.

The diagnostic assessment included the following:

1. *The Wechsler Adult Intelligence Scale-III* (WAIS-III) (Κοκκέβη, Ρεπάπη, Αδάμου, & Στεφανής, 1979; Wechsler, 1997). To meet accepted diagnostic criteria and to exclude individuals of mental retardation, all participants had Verbal, Performance, and Full-Scale WAIS-III IQ scores of 70 or above.

2. Appropriate clinical and psychometric assessments documenting a history of academic difficulties: This established the presence of the DSM-IV-TR criteria that requires marked impairment of academic skills.

3. Achievement tests regarding learning processes mainly in reading, writing, mathematical calculation, and mathematical reasoning. In Greece, there are several standardized ability/skills or achievement tests for children and adolescents each of them assessing a particular cognitive or academic area (e.g., language, phonological skills, arithmetic). However, they are not widely accepted and consistently used by all Diagnostic Centers (Agaliotis, 2016; Al-Yagon et al., 2013; Anastasiou & Polychronopoulou, 2009). For the adult population, it is worth noting that a significant barrier to the assessment of learning disabilities internationally is the scarcity of standardized, normed-referenced tests that demonstrate adequate reliability and validity (Gregg, Coleman, Davis, Lindstrom, & Hartwig, 2006; Gregg et al., 2008; Harrison et al., 2008; Schelke et al., 2017). In fact, research has questioned the reliability, validity and normative data of most of the psychoeducational assessments (Harrison et al., 2008; Hughes & Smith, 1990). It has been suggested that informal types of assessment (e.g., curriculum-based assessment) might be more productive in the case of adults, given the above mentioned particular developmental picture of learning difficulties in adulthood and the fact that the existing tests are inadequate for assessing higher-order skills of reading, math, writing in college students (Hughes & Smith, 1990). This suggestion agrees in part with the recommendations of DSM-V, which highlight the fact that diagnosis in adults with SLD should include a comprehensive assessment based on a synthesis of the individual's medical, developmental, educational and family history, previous school reports, portfolios of

work requiring academic skills, curriculum-based assessments. (American Psychiatric Association, 2013).

For the present study, the SLD diagnosis of the collected case records was based upon assessment tools that have been constructed for the assessment of adults referred for educational and learning problems (Μπόντη, 2013) and are used in daily practice by the clinicians in the State Certified Diagnostic Center for Learning Difficulties of the Psychiatric Department in the University General Hospital. This assessment battery consists of tasks evaluating academic skills in the areas of literacy, language, and mathematics, which provides a full and clear picture of the different academic skills of the adults being evaluated.

### ***Materials and Procedure***

#### *Confidential self-report record*

The self-report records used in this study included background information, developmental history, and demographic data of adults with SLD collected through clinical interviews. Interviews were conducted prior to the present study by the clinicians in their daily practice of the learning assessments in the State Certified Diagnostic Center for Learning Difficulties of the Psychiatric Department in the University General Hospital.

#### *Case records*

Case records included information on cognitive and learning assessments. The records were completed by the clinicians of the Diagnostic Center prior to the study following the above-mentioned diagnostic procedure which is the usual for the Greek context.

The demographic data were coded focusing on three types of information:

*Level of education:* To categorize the level of education an adult was attending or had completed, at the time of the assessment, we used the International Standard Classification of Education 2011 (OECD, European Union, UNESCO Institute for Statistics, 2015). Level of education was defined as: 'Upper secondary education-Vocational School' (ISCED level 3), 'Post-secondary non-tertiary education – 2-year Vocational Training Institute' (ISCED level 4), Tertiary Education: Technological Higher Education and University, Master's/Doctoral level (level 6, 7 and 8).

*Field of education.* To categorize the educational background of the participants into different disciplines, we used the International Standard Classification of

Education – ISCED (UNESCO, 2014). The response categories were classified as: (a) Arts & Humanities, (b) Business Administration and Finance, (c) Natural Sciences (Physical Science, Chemistry, Mathematics), (d) Information Technology/Engineering (e) Health and Welfare.

*Employment status.* Employment status was defined by determining whether the individual was employed or not or he/she was enrolled in any level of education. The response categories were classified as (a) current student in Level 3, 4, 6 and above, (b) employed, and (c) unemployed.

## RESULTS

### *Type of SLD*

Concerning the type of SLD, findings are presented in Table 1, where the arithmetic data of “Yes” indicate the case records that unambiguously stated that an adult met the criteria for an SLD or for mixed SLD or stated that a prior diagnosis of an SLD was supported by the assessment results. The “No” indicates the case records that did not state the corresponding SLD diagnosis. Therefore the “Yes” and “No” refer, respectively, to the adults of the sample that did and did not meet the criteria for the each mentioned SLD diagnosis as this data were derived from the relevant case records of cognitive and learning assessments conducted prior to the present study according to the diagnostic procedure mentioned above in the Method. According to the findings 81.8% ( $n = 132$ ) of the participants had reading difficulties, 87.9% ( $n = 116$ ) had writing difficulties and only 33.3% ( $n = 44$ ) had arithmetic difficulties. Moreover, a significant percentage of them ( $n = 96$ , 72.7%) had reading and writing difficulties but only 30.3% ( $n = 50$ ) had reading and arithmetic difficulties or writing and arithmetic difficulties or reading, writing and arithmetic difficulties.

**Table 1. Prevalence of SLD types and comorbidity in the clinical sample of the study**

	No		Yes	
	<i>n</i>	%	<i>n</i>	%
Reading difficulties	24	18.2	108	81.8
Writing difficulties	16	12.1	116	87.9
Arithmetic difficulties	88	66.7	44	33.3
Reading and writing difficulties	36	27.3	96	72.7
Reading and arithmetic difficulties	92	69.7	40	30.3
Writing and arithmetic difficulties	92	69.7	40	30.3
Reading, writing and arithmetic difficulties	92	69.7	40	30.3

**Gender differences****Table 2. Demographic characteristics by gender  $\chi^2$  analysis**

	Male ( <i>n</i> = 88)		Female ( <i>n</i> = 44)		Total		$\chi^2$	<i>p</i>
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
<b>Geographical area</b>							1.030	.310
Urban	52	59.1	30	68.2	52	59.1		
Rural	36	40.9	14	31.8	36	40.9		
<b>Level of Education</b>							2.869	.238
Level 3: Upper Secondary Vocational School	42	47.7	15	34.1	57	43.2		
Level 4: Vocational Training Institute	12	13.6	10	22.7	22	16.7		
Level 6: Technological Higher Education/ University/ Master's & Doctoral Level	34	38.6	19	43.2	53	40.2		
<b>Field of Education</b>							40.457	< .001
Arts & Humanities	0	0.0	12	27.3	12	9.1		
Business Administration & Finance	4	4.5	8	18.2	12	9.1		
Physical Sciences	14	15.9	0	0.0	14	10.6		
Information Technology/ Engineering	54	61.4	16	36.4	70	53.0		

Table 2 presents the demographic characteristics of our sample. Concerning their employment status, at the time of their referral and learning assessment most of the participants (75%) were students enrolled in education, attending secondary, upper secondary or tertiary education. Only 20.5% of the participants were employed while a small percentage (4.5%) was unemployed. As regards their level of education, all participants were attending or had completed secondary education. Half of the participants had attended or were currently attending upper secondary vocational school and 16.7% had attended or were attending 2-year Vocational Training Institutes at post-secondary level. A large percentage of them, 4 out of 10, were currently attending or had attended Higher Education (40.2%), that is, either Technological Higher Education or universities. The field of education they had chosen varied. Most of the participants (53%) had chosen to study Information Technology or Engineering. Other choices included Health and Welfare (18.2%), Natural Sciences (10.8%), Arts and Humanities (9.1%) and Business and Administration (9.1%).

To answer the third research question, that is, whether there are gender differences in Greek adults with SLD regarding their level of education, field of

education and employment status, chi square analysis was used. The results indicated that there was no statistically significant association between gender and level of education of Greek SLD adults,  $\chi^2(6) = 8.790$ ,  $p = .186$ , and between gender and employment type,  $\chi^2(2) = 1.770$ ,  $p = .413$ . However, there was a statistically significant association between gender and field of education,  $\chi^2(6) = 45.362$ ,  $p < .001$ . More men than women chose Information Technology and Engineering and Natural Sciences while more women chose Arts and Humanities.

## **DISCUSSION**

The present study investigated the demographic characteristics of a clinical sample of Greek adults with SLD, attempting to enrich the limited research on this area. The results partly agree with international findings regarding the epidemiology, comorbidity, and demographic characteristics of adults with SLD. The fact that the data come from a clinical sample of adults who have referred themselves for learning assessment, present a challenge when explaining our findings and comparing them to findings coming from census data or epidemiological studies.

Concerning the prevalence of the main types of SLDs, it seems that among Greek adults the most common SLD is reading difficulties, followed by writing difficulties and arithmetic difficulties. Regarding comorbidity, the most frequently occurring form is reading and writing difficulties, as also indicated by the existing literature on children (Hall, 2008; Kaufman & von Aster, 2012; Moll et al., 2014; Oga & Haron, 2012; Snowling, 2005) and adults (Wilson et al., 2015). Findings confirm that adults experiencing a deficit in one learning domain frequently show deficits in other domains as well (Scanlon, 2013; Wilson et al., 2015) and make evident the complexity and the diffuse nature of the underlying cognitive mechanisms and brain processing areas which subserve reading, writing and mathematical skills (Molfese et al., 2006).

Concerning the level and field of education of Greek SLD adults, it was observed that all participants currently attended or had completed some type of secondary education. This finding agrees with epidemiological studies showing that three out of four SLD adults have completed high school (Ferrari, 2009; Horowitz et al., 2017). Participation in special education support programs in childhood and the provision of appropriate test accommodations for the high school exit exams (Anastasiou & Polychronopoulou, 2009; Τζουσιάδου, 2011) may explain the high rate of Greek SLD adults that have completed secondary education. Research findings agree that legislative and educational changes for primary and secondary education students with SLD (Harrison et al., 2008; Horowitz et al., 2017; Levine & Nourse, 1998; Luftig

& Muthert, 2005; Mellard & Patterson, 2008; Trainin & Swanson, 2005) or the use of compensatory mechanisms such as cognitive, metacognitive learning strategies and help-seeking behaviors (Law et al., 2015; Ruban et al., 2003; Seo et al., 2008; Trainin & Swanson, 2005) have increased the number of adult learners who are eligible for postsecondary education.

In contrast to existing findings showing that SLD students do not prefer higher education institutes (Hakkarainen et al., 2015; Horowitz et al., 2017; Seo et al., 2008) and previous Greek studies agreeing that SLD students are under-represented in higher education (Ρότσινα et al., 2007; Stampoltzis & Polychronopoulou, 2008), 4 out of 10 adults in our SLD adult sample (40.2%) was enrolled or had completed higher education studies. This finding can be understood in view of the value placed by Greek society in Higher Education, where a University degree is considered to provide more job opportunities and a better income (Kyriazis & Asderaki, 2008; Marginson, 2016; Papadimitriou, 2015; Psacharopoulos, 2003; Psacharopoulos & Papakonstantinou, 2007). Moreover, the participants in our study were adults who were interested in academic achievement as they had referred themselves for learning assessment, mainly for educational purposes (Bonti et al., 2018). As academic demands increase in young adulthood (university entrance exams, university term exams, or other types of exams), SLD young adults seek a diagnosis for their learning deficits in order to receive accommodations.

Concerning the field of education, Greek SLD adults choose, information technology and engineering were most frequently reported. Our findings suggest that regardless of level of education, most of the SLD adults in our sample had chosen technical studies. Although the sample in our study was small, this finding is in agreement with data from other countries (Madaus et al., 2002; Newman et al., 2011; Richardson & Wydell, 2003). Literature indicates that SLD adults prefer studies of manual, technical and vocational orientation in secondary or postsecondary non-tertiary education. (Horowitz et al., 2017; Seo et al., 2008). Academic programs that emphasize reading, writing or mathematical skills, may not be attractive for students with SLD (Fuller et al., 2004; Mellard & Patterson, 2008; Patel et al., 2010). Students with SLD are at distinct disadvantage as their lack of necessary skills may impede learning. Such are, cognitive deficits (Mortimore & Crozier, 2006; Olofsson et al., 2012; Olofsson et al., 2015) lack of study skills, inability to deal with demanding textbooks, limited foreign language skills etc. (MacCullagh et al., 2017; Olofsson et al., 2015; Simmons & Singleton, 2000).

Regarding the employment status of Greek SLD adults, in contrast to previous research findings that many young adults with SLD are unemployed (Corley & Taymans, 2002; Cortiella & Horowitz, 2014; Gerber, 2012; Horowitz et al., 2017;

Janus, 2009; Madaus et al., 2002; Vogel & Holt, 2003), only a very small percentage in this study reported being unemployed, as most of them were currently attending secondary, post-secondary or Higher Education. However, the small clinical sample of our study is difficult to compare with samples from national and census data.

With regards to gender differences, our findings confirmed that more men than women choose technological studies and natural sciences while more women than men tend to choose arts and humanities. No other gender differences were found concerning the level of education and the employment status in contrast to research showing that women are less often employed than men (Corley & Taymans, 2002; Levine & Nourse, 1998; Madaus, 2006; Seo et al., 2008). In respect to gender it is also worth noting that our sample consisted of twice more men than women, a difference which seems to be very common in clinical samples (Berninger et al., 2008a; Wadsworth et al., 1992; Willcut & Pennington, 2000). Recent findings (Cortiella & Horowitz, 2014; Horowitz et al., 2017; Liederman et al., 2005; Newman & Madaus, 2015; Seo et al., 2008; Patel et al., 2010; Vlachos et al., 2013; Vogel & Holt, 2003) agree that more males are referred and diagnosed as having SLD than females.

In summary, our findings are in line with other studies regarding the prevalence of the main types of SLD and their comorbidity. The higher rates of adults in our study who attended Higher Education along with other characteristics of our sample, such as urban origin and student status, can be attributed to the value the Greek society attributes to education as a means to enhance social status. Thus, young adults with SLD continue to pursue higher educational goals following the Greek cultural norms. This leads them to seeking help for their learning deficits even at an older age in order to facilitate their academic life.

### ***Limitations***

This research is subject to several limitations. The diagnostic procedure was based on non-standardized assessment which should make us cautious when interpreting the results. Moreover, this study lacks equivalent comparison groups which could help determine if the adults with SLD differed from comparative adults of the general population. It should also be noted that the present study did not address other important factors which have persistently been found to account for the individuals' educational and professional choices such as family socio-economic status and parental education, as this kind information was missing from the case records.

Although the study has limitations, it also has significant strengths. The sample represented many geographical areas of Greece and different levels of education and the findings give useful quantifiable information describing the picture of post-

secondary education life of Greek adults with SLD. Even without making cause-and-effect statements, the data of this research provide the necessary information to improve the established policy and practice of service delivery and the quality of life for Greek adults with SLD.

### ***Implications for practice***

The results of the current study have important implications for clinical and educational practice. The significant delay among a significant proportion of the Greek SLD population in seeking learning assessment and diagnosis from a Certified Diagnostic Center at a later stage of their life should raise concerns. More systematic and effective screening procedures during childhood and adolescence for all students and appropriate intervention programs may enable students with SLD to manage successfully their academic and employment opportunities. Moreover, SLD adults should be facilitated to develop an understanding of the nature of SLD in adulthood in order to be able to have a realistic appraisal of successful personal adjustment. Postsecondary and higher education institutes should be ready to cover the individual needs of SLD students and provide support.

In addition, this study showed that SLD adults tend to prefer technical oriented fields of study than academically oriented ones. Given the above fact, employment and education services should work together to check with SLD adults whether unrealistic perceptions of skill limitations in reading and writing might prevent them from pursuing employment opportunities that are truly within their reach. An early screening for the identification of children who are especially at risk for writing and reading problems during the school years and relevant early intervention programs will again prove useful for their academic and employment future prospects.

### ***Future research***

Our findings indicate the need for more research in adult population with SLD. Census data, epidemiological studies, small scale qualitative studies will help us gather information for the under-researched population of adults with SLD, such as demographic characteristics, socioeconomic status, employment, educational attainment, personal life, emotional and social needs. Additional data would be necessary to investigate which factors, such as IQ scores, gender, type of SLD, family socioeconomic status, have the greatest impact on adults' with SLD educational and career choices. Further investigation could also consider the effect of different types of SLD in educational and career choices. Do different types of SLD affect



adolescents and young adults in choosing a field of education or their future job? Comparative studies exploring the differences in adult populations with and without SLD could clarify whether having a learning disability determines educational and career choices.

Other than the criteria of DSM, there is little direction concerning the diagnosis of adults with SLD. Future research needs to be directed towards the development of a comprehensive but useful diagnostic system with instructional validity for SLD in adulthood. The lack of standardized assessment presents many risks in the field of research and intervention.

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