

Dyslexia in the United Arab Emirates University – A Study of Prevalence in English and Arabic

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Received: May 28, 2011 Accepted: June 14, 2011 doi:10.5539/ijel.v1n2p64

Sponsor: United Arab Emirates University Research Affairs (Grant Number: 01-06-1 -11)

Abstract

Background: A steadily increasing number of students with dyslexia are entering higher education internationally. If identified early, they can be helped to adapt and cope with their difficulties and acquire the skills they need to reach their full potential. English speaking countries have recently started to research dyslexia in higher education. In the United Arab Emirates (UAE), generic research on dyslexia has, until today, been limited. **Methods:** This study investigated the prevalence of dyslexia among female students attending the UAE University during the academic year 2007/2008. The study also explored the language in which dyslexic-features are evident, whether it is Arabic - the students' mother-tongue, or English - the students' second language, or both, as well as the association if any with the students' choice of subjects of study. **Results:** Our findings suggest that the prevalence of features consistent with dyslexia is 17.6% among female Emirati University students, that they experience these difficulties in both English and Arabic, and that they tend to choose courses that are more job-oriented. **Conclusion:** Our findings confirm the occurrence of dyslexia among higher education students in the UAE and highlight the need for systematic screening programs for dyslexia. The present data also suggests that despite differences in the linguistic contexts of English and Arabic, dyslexia crosses language boundaries.

Keywords: Dyslexia, United Arab Emirates, English, Arabic

Introduction

Dyslexia is a learning difficulty that is most commonly viewed as impairment in the processing of reading and writing resulting in a reading ability that is significantly below the person's intellectual level (Snowling, 2000a & b). The British Psychological Society (BPS) defines dyslexia as evident when accurate and fluent word reading and/or spelling develops very incompletely or with great difficulty (British Psychological Society, 1999: reprint 2005). According to BPS reports, dyslexia affects about one in ten people with around 4% of the world's population being severely dyslexic, and a further 6% having mild to moderate problems.

Typically, dyslexia is characterized by problems with reading, spelling, and word recognition (Grigorenko, 2001). Internationally recognized indicators of dyslexia include hesitant and labored reading, with a low level of comprehension and difficulty in selecting main ideas of read texts. Failure to recognize familiar words, missing lines, and omitting or adding extra words into texts are some other reading problems that they might encounter. Specific types of problems experienced in writing include poor standards of written work with poor handwriting and confusion in spelling. Compared to normal readers, they have difficulty with punctuation, grammar, and taking notes. Difficulties may also manifest as impairments in short-term memory, and visual processing (Fawcett & Nicolson, 1994; Beech & Singleton, 1997); and they may also find organization of work and personal timetabling especially difficult. Such difficulties that are assumed to be the defining characteristics of dyslexia often result in great frustration and problems in interpersonal skills. Interestingly, those individuals are often of high or above-average intelligence, but they do not seem to reach their full potential in academic fields (Snowling & Hayiou-Thomas, 2006).

Dyslexia is an internationally recognized condition with close links to literacy development in higher education (Singleton 1999). The importance of reading and literacy development has attained a global appreciation and several countries including few in Africa (e.g. Egypt) and the Middle East (e.g. Lebanon) have adopted a number of measures to reduce levels of illiteracy in their nations. However, it is only quite recently that prevalence rates of dyslexia in higher education have become a research inquiry. In English speaking countries, the subject of investigation surrounded two significant issues: 1). the extent to which dyslexia exists at the University level, and 2). ways to identify and support students with dyslexia (Gilroy & Miles 1996). In Greece, practices for identifying and provisions for supporting such students in colleges were examined in order to accommodate their educational needs (Stamppoltzis and Polychronopoulou 2008).

Unfortunately, such conceptual awareness of the prevalence of reading problems and dyslexia in English speaking countries has not been matched in Arab countries. In fact, dyslexia is still not widely recognized in the Arab world; and academic research on this specific condition in the region is extremely scarce. Among studies on Arabs, Al Mannai and Everatt (2005) reported that dyslexia has analogous underlying causes in both English and Arabic and that there is potentially a common causal pathway for the phenomenon across different languages. With regard to the prevalence of dyslexia in Arab populations, a nationwide study by the Kuwait Dyslexic Association reported a rate of 6% among Kuwaiti nationals (Kuwait National Dyslexic Association, 2002). A later study (Elbeheri, Everatt, and Al Malki 2006) identified a higher prevalence of 20% among young Kuwaiti offenders.

Internationally, the number of students with dyslexia entering higher education has been increasing steadily. Alarming, the overall incidence of dyslexia in English-speaking higher education institutions increased by almost 41%-47% between 1994 and 1996 (Dearing, 1997). According to the Higher Education and Adult Training for People with Handicap (HEATH, 2001), the proportion of students with dyslexia in first-year US universities stood at 2.4% in the year 2000, and reached 5% by 2005. Since 1993, the number of students with dyslexia in UK universities, too, has steadily increased with a reported increase from 1.3% in the academic year 1996-1997 to 2% in the academic year 2001-2002 Higher Education Statistics Agency (HESA, 1998; Singleton and Aisbitt 2001). This further increased to just under 5% in 2005, and it is estimated that there are currently more than 10 times as many students with dyslexia in UK universities as there were in 2005 (AHEAD, 2008). While those students in Western Universities are identified and receive the necessary assistance, such programs do not exist in the Gulf region. Students in the United Arab Emirates University (UAEU), and in the country for that matter, are not assessed, systematically or otherwise, for dyslexia. Determining the prevalence of dyslexia in higher educational institutions in the UAE is therefore a pressing need, as it would facilitate planning for necessary intervention. This study was thus carried out to determine the prevalence of dyslexia in the UAEU Emirati bilingual student population and to record the vocational interests and fields of study of the students who display features of dyslexia. In addition, this study examined whether dyslexia crosses language boundaries between Arabic as the mother-tongue of those students and English as their second language.

As detailed above, students with dyslexia experience difficulties with reading, writing and note-taking, numeracy and time management and a substantial number of students at the UAEU experience such difficulties on a daily basis. Some students struggle with slow, labored, inaccurate reading of single words in isolation. Others could read words on one page, but won't recognize the same on following pages. Misreading words involving saying substitutes with the same first and last letters, and words with the same shape is a usual occurrence in UAEU classrooms. Some of those students also experience difficulties in applying their knowledge of phonics to sounding out unknown words and some insert or leave out letters when reading; and finally reading and listening comprehension are particularly poor among those students. Since such difficulties are consistent with dyslexia, it was hypothesized that:

- 1) UAEU students presenting with such symptomatic difficulties could possibly be dyslexic or at risk of dyslexia.
- 2) A substantial proportion of “undiagnosed” students with dyslexia entered the UAEU higher education programs without ever being formally identified.
- 3) Since UAE has recently been shown to have one of the highest ratios of students entering higher education in the world, there would be more students at risk of dyslexia in their first year than students in subsequent years of study.

Subjects and Methods

Data were collected from 2500 female students at the UAEU, which has a total of 10 colleges and 60 departments (Table 1 shows sampling per college). Participants ranged in age from 18 to 23 years old, and were all native female speakers of Arabic, who acquired English as a second language over 12 years of school exposure to the language. This feature made our data comparable in terms of the two languages, ensuring that the cohort had the same gender, educational level and cultural and linguistic background.

The educational context at UAEU

Since the founding of the national university UAEU in 1977, the proportion of Emirati students entering higher education has risen remarkably at a rate that has not been achieved in any other country in the world. The number of Emirati students enrolling at UAEU doubled during the years 1990 to 2004 (The 2007 report on the progress of MDGs in the UAE states). The overall Emirati adult literacy in 1988-89 was 53.5%, with 58.4% for males and 38.1 for females (United Nations Human development Report 2007/2008). Those rates rose to an overall 79.5% between 1989 and 1995 and 88.7% in the years 1995-2005, reaching 90% overall literacy rate in 2007. According to the United Nations, female adult literacy rate at the UAE went up to 87.8% in 2005, and outnumbered male rates by a ratio of two to one.

Moreover, over the last three decades UAEU has become a leading tertiary institution in education, research, and community service. Currently, it is the most popular destination for students seeking higher education in the UAE, with over 16,000 students studying at its facilities. Education at UAEU is segregated on the basis of gender; and upon completion of high school. 77% of Emirati women who graduate UAE schools continue on to higher education at UAEU; and Emirati female students comprise 75% of the student population at UAEU. The primary language of instruction at UAEU is English, with few programs conducted in Arabic. Students are expected to be fluent in both Arabic and English, but improving English language skills at all levels of education is a government priority under the ‘Education 2020’ plan.

Measures

The identification of dyslexia at UAEU involved two kinds of evidence. The first source of evidence came from a demographic questionnaire which was used to collect information relevant to learning from all participants. General information on age as well as family characteristics that could influence the development of reading ability was collected. Participants were also asked to indicate any academic areas of difficulty, and were instructed to rate their self-appraised reading skills on a scale ranging from 1 (excellent) to 5 (very poor), and their enjoyment of reading on a scale ranging from 1(very much) to 5 (not at all). Information on learning attitudes and styles were also obtained. The second source of evidence was the administration of dyslexia detection, computer-administered screening test, taken by students using computers. The test involved indicators of whether a reading difficulty is present.

Data collected in the demographic questionnaire and screening test were then examined and interpreted for results. Neither source of evidence was intended as a full comprehensive diagnostic test. In combination, however, the demographic and the screening results provided a basis for determining whether a student is at risk of dyslexia as well as indicating the source of a student’s reading problem. Upon completion of the screening

assessment, a report based on students' performance in the computer based assessment and their demographic evidence were generated. In this report, the screening results and recommendations on the need for any further assessments were specified.

Screening for dyslexia at UAEU

Dyslexia has traditionally been identified by tests that measure intellectual ability and skills related to reading. Research on dyslexia has not yet been able to highlight one type of assessment tool as better than another in identifying those with dyslexia, and there are no internationally accepted screening tools that are conclusive (The British Dyslexia Association; International Dyslexia Association). In practice, an identification that may suggest an individual is at risk should look for specific signs or indicators of dyslexia. The Emirates Dyslexia Indicator Test (EDIT), which was specifically designed as a screening instrument for dyslexia at UAEU, included five indicators. The indicators, which were solely used to identify Emirati students 'at risk' of dyslexia, and highlight those who need further assessment were

- Letter/word/non-word identification – measuring ability to identify letters/ words/ non-words
- Number identification – measuring ability to identify numbers and numbers in sequence (in correct order and in reverse order)
- Sequencing memory – measuring memory of phone numbers, days/weeks/months of the year.
- Mathematical ability – measuring addition, subtraction, multiplication and division
- Directionality identification – measuring ability of identifying direction via line drawings (telling left from right, up from down), and ability to identify words referring to directionality (first-last, next-previous, over-under)

Additional measures included:

- Academic profile – measuring performance on academic testing
- Learning attitude profile – measuring attitudes to learning
- Reading enjoyment – measuring enjoyment in reading as well as spelling and writing

EDIT was developed for the bilingual Arabic population of the Gulf on the basis of the Reading Success Lab diagnostic tool, with the addition of the directionality indicator. Indicators related to academic, learning attitude, and reading enjoyment profiles as described above were included as standardizing references measuring abilities that are of low relationship to literacy, but high relationship to performance.

EDIT has a total of sixty screening items with two clusters of questions: general questions on memorizing, directionality, attention, and attitudes; and more specific questions involving reading accuracy and speed, sequencing tasks and math. The measures used to provide indicators of dyslexia were chosen based on the general understanding of dyslexia-related manifestations in adult populations. All test items were presented with reference to both Arabic as language 1 (L1) and English as language 2 (L2). Separate testing sessions were given to measure the English and Arabic versions.

Results

Data was collected in the academic year 2007/2008 with all information about registered, new enrollments, freshmen and students in subsequent years of study obtained through the Institutional Research and Planning Support Unit at UAEU. A total of 2500 completed assessments were collected. Table 1 features the number of participants per college in the sample. Academically, UAEU colleges are either vocationally or theoretically oriented. In this regard, Colleges of business and economics, food and agriculture, engineering, medicine and health science as well as science offer more vocationally-oriented courses. Humanities and social sciences, information technology, education, sharia (religion) and law, and the general requirements unit are, on the other hand, largely theoretically-based. Humanities, business, and the general requirement units have the highest student numbers and hence students from these colleges formed the majority of the sample.

Using EDIT, a total of 450 students out of 2500 were found to have a deficit in at least three areas of indicators associated with dyslexia. Students' scores on each task of the measures of EDIT were compared against scores expected by population norms of the same age group- i.e. students' results were compared to results of other students of the same age group on the same task. For each measure, a score that is below the level of performance in normal population was considered a deficit, and therefore an indicator of dyslexia. Students with at least three indicators of dyslexia were considered as having or 'at risk' of dyslexia. Based on these criteria, 17.6% of the Emirati student population at UAEU were found to exhibit features consistent of dyslexia.

UAEU students with dyslexia features were not equally distributed with regard to the major field of study but were noted to prefer science, engineering, and food and agriculture as their field of study. Figure 1 shows the number and percentage of such students per college in the academic year 2007-2008. The rates varied across different type of colleges from 27.6% in the college of food and agriculture to 2.2% in education. Also, the college of science had three times (31.7%) more students with dyslexic features than the IT college (9.7%).

The rate of students identified as at risk of dyslexia among students who were in their first year of study versus students who were in subsequent years of their study in 2007-2008 ranged from 12.6% to 18.4% with a 2.5 % increase in the number of Emirati students at risk of dyslexia entering higher education each year with more students at risk of dyslexia in their first year than students in subsequent years of study.

Table 2 displays the profile of students with possible dyslexia as defined by the presence of deficits in three or more areas. Results on each of the tasks are compared to a percentile score representing expected results of typical students of the same age group on the same tasks (1 lowest to 99 highest). UAEU students' performance was below the average range of typical people in that age group in letter (phoneme), word identification, non-word identification (ability to decode letter strings into an appropriate sound form), and sequencing memory (ability to recognize, retain, and reproduce sequenced stimulus). Their performance was only slightly better than average in number identification, and just above average in mathematical ability and directionality.

In English, which is their second language, UAEU students clearly had greater difficulties in their ability to decode letters and non-words accurately (27.3), with an accompanying naming speed of 0.95 and 1.37 seconds; although they maintained above average (63.6) accuracy in decoding real words and an impressive accuracy (88.8) in mathematical ability involving adding, subtracting, multiplication and division. Identification rates of real words and mathematical equations with 1.21 and 1.55 seconds respectively were within the range of normative data and average scores in performance of typical unaffected people. UAEU students were also average in accuracy (50.7) but rather slow in speed rate (2.24) on tasks measuring sequencing memory. Tasks measuring directionality showed a poor accuracy score (40.8), with an accompanying speed of 1.14. Number identification showed a reasonable accuracy score (83) with a rate of less than a second in speed (0.63).

In Arabic, which is their mother tongue, students showed accuracy weaknesses in non-word identification (22.2), directionality (32.8) and sequencing memory (59.1). Rates for those measures showed long delays of 2.24, 1.23 and 2.09 seconds respectively. Better accuracy performance was displayed in letter (72.1), word (79.5), and number identification (93) as well as mathematical ability (87.2); and all those latter four measures displayed reasonable identification speed rates (0.64, 1.01, 0.60, and 0.71). When averaged with typical people of the same age, the lowest percentile in the Emirati students' performance in Arabic appeared in non-word identification (1.7), followed by sequencing memory (49.2), word identification (50), directionality (50.8), and letter identification (53). Comparisons between measures in Arabic and English as presented in figure 2 indicate that tasks on decoding accuracy of real words and non-words produced very similar scores for both Arabic and English.

However, considering students' general ability as a potential confounding factor in the assessment, a student self-report questionnaire on attitudes as well as the achievement as recorded in the UAEU academic records were gathered to ensure that the difficulties displayed by our students are indeed defining characteristics of dyslexia and not due to weaknesses in general ability. Table 3 shows mean percentages of achievement and attitudes of students at risk of dyslexia. Of all the students at risk of dyslexia in the academic year 2007/2008, as many as 72% and 79% registered average to excellent academic performance on English and Arabic testing. Also, more than seventy percent of those students reported a keen interest in learning. However, none of the students stated any real enjoyment in reading, writing, or spelling; and the majority found those skills a burden.

Discussion

Around 18% of UAEU students were found to have evidence of deficits consistent with dyslexia. This rate is far higher than the 4 to 6% prevalence reported in the general world population, but correlates well with the 10-17.5% estimate of dyslexia observed in a recent UK-based study (Rack 2005). It is also very close to the prevalence reported (Elbeheri, Everatt & Al Malki, 2008) among Kuwaiti young offenders. This also represents a substantial proportion of "undiagnosed" Emirati students who reached higher education without ever being formally identified as having features of dyslexia. We believe that these students have been disadvantaged as there are no screening programmes at schools that could identify, define, and repair their difficulties. Our finding of higher rates in the first year than in subsequent years is in keeping with similar observations about the increasing rates of students with dyslexia entering higher education reported from elsewhere (Stampoltzis & Polychronopoulou, 2008).

The core difficulties that were the defining characteristics of dyslexia at UAEU were the inability to decode real word letter sequences (word identification) and to transfer letter strings into appropriate pronunciations (non-word identification), as well as an inaccuracy in retaining and reproducing sequenced numbers (working memory span), labored ability in accessing mathematical factual information, and slow accessing of directionality of line drawings and words. Students with these difficulties may find particular aspects of learning more difficult and this in turn may affect their subject choice. They may choose subject areas that offer more job-related courses such as Science, Engineering and Food and Agriculture that place less stringent requirements on reading and writing. Similar findings about subject choices were reported in the UK (Richardson & Wydell, 2003) and in the US (Horn & Berkold, 1999).

Our sample of 'Arabic as first-language' and 'English as second-language'- speaking young UAEU participants aged between 18 and 23 seem to show a consistent 'at risk' profile across the two languages of English and Arabic. In fact, cross language comparisons of the difficulties displayed in Arabic and English by the UAEU students indicate below average ability on a number of measures with deficits that are similar in level as in occurrence in both languages. Consistent with the findings from another study from Kuwait (Al Mannai & Everatt, 2005), we found evidence for the generality of dyslexic symptoms across languages with students who had problems in sound recognition within English words being equally disabled in predicting the variability of sounds in Arabic words.

Epidemiological data on learning disorders such as dyslexia is crucial in the planning of educational services for the country and in determining the need for remedial educational services. The results of this study indicate that the rates and nature of occurrence of dyslexia in the UAE is not very different to that of industrialized countries. However, some of the limitations of this study need to be acknowledged. First of all, given the differences in the methodology and measures used, the comparison with other studies in the literature is hard to interpret. Furthermore, while this data provides much needed baseline information on the prevalence of dyslexic features among University students, the rates are not definitive for the diagnosis of dyslexia as confirmatory diagnostic evaluations were not carried out and formal testing of intelligence was not done. Also, information on biological, cognitive, and socio-demographic factors relevant to dyslexia as well as co-morbid mental health and related difficulties were not ascertained in this study.

Notwithstanding these limitations, we hope that these pilot findings will provide the much needed information for planning necessary screening procedures as well as for the allocation of funds for related remedial services. Future studies should explore the interplay of cognitive, behavioural and socioeconomic factors in the genesis of dyslexia. In this regard, biological factors including decreased neural integration and reduced audio visual integration (Blau, Atteveldt, Ekkebus, Goebel, Blomert, 2009), genetic factors such as consanguinity in Arab communities (Abu Rabia & Moroun, 2009) as well as poor home literacy experiences (Jimenez, Rodriguez, & Ramirez, 2009) have all been linked to reading disability. It has also been shown that parental education moderates genetic influences on reading disability with environmental influences being lower for children whose parents had a higher level of education (Friend, Defries, & Olson, 2008). These factors would merit further exploration in the UAE society where the rapid socio-economic change since the advent of oil and its impact on the population has been significant. Furthermore, our findings that the difficulties are consistent in both English and Arabic will have implications on our understanding of literacy development and models of literacy deficits. In this regard, using semantic priming effects, it has been argued that despite the shared origin and the daily use of both spoken Arabic and Literary Arabic, the Literary Arabic is a second language for native Arabic speakers (Ibrahim & Aharon-Peretz, 2005).

Conclusion

To the best of our knowledge and as per Medline research, this is the first study to explore dyslexia among female UAE national students and is a testament to the fact that Emirati students with dyslexia features are entering the higher educational scene and that the difficulties transcend language boundaries. The present data also suggests that presence of features consistent with dyslexia influences the students' choice of study subjects with a preference for vocationally oriented courses.

While dyslexia and related reading difficulties are often associated with poor long term academic achievement, there is good evidence that early recognition together with individualized instruction such as increasing phonological awareness can change the course to better long term effect on academic achievement. Available evidence from the literature points to the importance of early identification as it increases opportunities for remedial intervention but currently there are no programmes for systematic assessment of dyslexia in the UAE. While some of the industrialized countries have programmes for identification of dyslexia among University

students, systematic screening or provisions for supporting these students are not available in the higher educational institutions in the Gulf countries including the UAE. Our findings highlight the need for national assessment programmes, as early diagnosis and appropriate intervention can significantly improve outcomes.

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Table 1. Student population screened within colleges

College	Students Approached	Students with Completed Assessment	Students Excluded (incomplete Assessment)
Business & Economics	740	673	67
Food and Agriculture	152	141	11
Engineering	222	219	3
Medicine and Health Sciences	25	25	0
Science	277	277	0
Humanities and Social Sciences	260	233	27
Information Technology	145	134	11
Education	198	197	1
Sharia and Law	19	19	0
Univ. General Requirements Unit	594	582	12
Total	2632	2500	132

Table 2. Mean scores produced by 'at risk' students in each of the measures associated with dyslexia shown in both English (Eng) and Arabic (Ara)

Task	Speed (sec)	accuracy (%)	percentile (%)	St. Dev.
	Eng/Ara	Eng/Ara	Eng/Ara	Eng/Ara
Letter identification	0.95/0.64	64.0/72.1	47.0/53.0	0.11/1.23
Word identification	1.21/1.01	63.6/79.5	36.0/50.0	0.35/0.67
Non-word identification	1.37/2.24	27.3/22.2	2.0/1.7	0.26/0.99
Number identification	0.63/0.60	83.0/93.0	69.0/73.7	0.08/0.21
Sequencing memory	2.24/2.09	50.7/59.1	45.0/49.2	0.54/0.12
Mathematical ability	1.55/0.71	88.8/87.2	58.0/58.6	0.99/0.54
Directionality	1.14/1.23	40.8/32.8	52.1/50.8	1.46/1.22

Table 3. Mean achievement percentages on indicators of general ability shown in both English (Eng) and Arabic (Ara)

Task	Poor (%)	Average (%)	Excellent (%)
	Eng/Ara	Eng/Ara	Eng/Ara
Academic testing	28/21	29/39	43/40
Attitude to learning	11/10	16/15	73/75
Reading enjoyment	83/85	17/14	-/1
Writing enjoyment	65/76	7/20	-/4
Spelling enjoyment	93/98	27/2	8/-

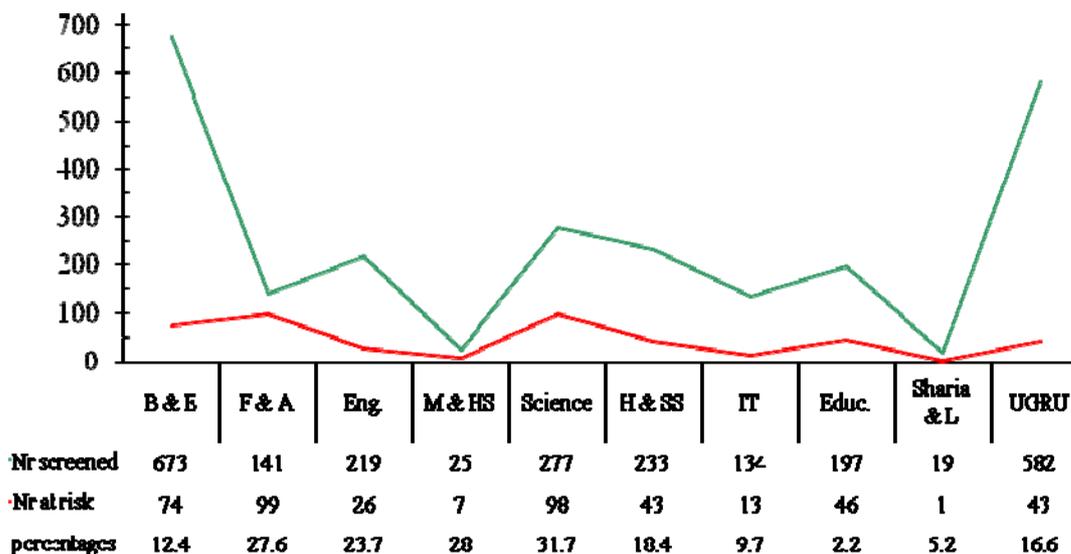


Figure 1. Number and percentage of dyslexic/at risk Emirati female students in the academic year 2007-2008 shown by college

Key: B&E= business and economics; F&A= food and agriculture; Eng.=engineering; M&HS= medicine and human sciences; H&SS= humanities and social sciences; Educ.=education; Sharia&L=sharia and law; UGRU=university general requirements unit

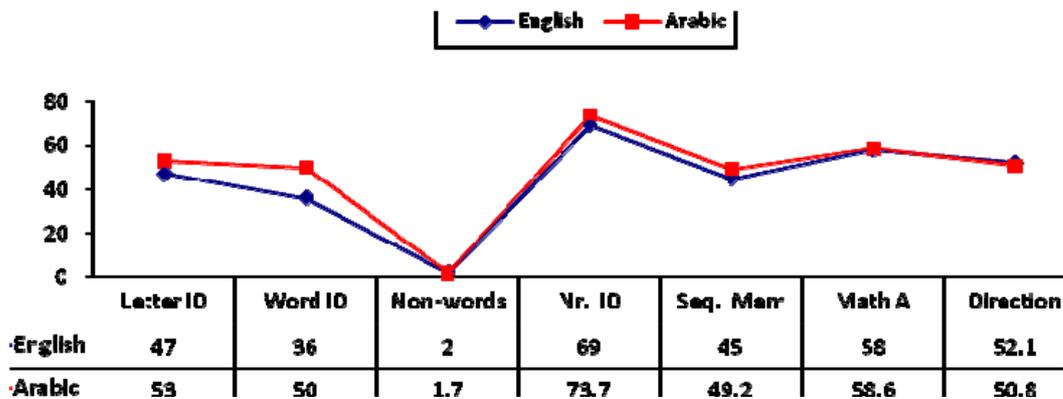


Figure 2. Comparisons of Arabic and English against norms on tasks indicative of dyslexia

Key: ID=identification; Seq. Mem.=sequencing memory; Math A= mathematical ability; Direction=directionality.