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Artigo Original

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Exploratory study of the teaching of neuropsychology in the curricula of undergraduate courses in Speech-Language Pathology

Estudo exploratório do ensino da neuropsicologia nos currículos dos cursos de graduação em fonoaudiologia

Keywords

Language and Hearing Sciences
Neuropsychology
Higher Education
Cognitive Neuroscience
Neurology

ABSTRACT

Purpose: To determine the level of teaching of neuropsychology within undergraduate courses of speech-language pathology in Brazil using an exploratory document analysis of the curricula of the undergraduate courses. **Methods:** It is a quantitative exploratory document analysis. A review of available documents from websites and/or received from course directors (pedagogical course project, course content, and/or syllabus) of public and private universities in Brazil was carried out. Using an agreed consensus checklist, 3 researchers verified which universities offered subjects on neuropsychology by means of a search for the term 'neuropsychology' or neuropsychological'. Associations between type of university and region and the provision of neuropsychology courses were also explored. **Results:** 72 universities were included in the study and only nine of them offered subjects on neuropsychology. None of the associations tested was statistically significant. **Conclusion:** The provision of neuropsychology for speech-language pathology undergraduate students is limited, and not associated with the type of university, the year of the pedagogical course project, or the region in which the university is located. The findings call attention to the need to adapt undergraduate curricula in speech-language pathology to consider the entire scope of this profession and address the epidemiology of communication disorders.

Descritores

Fonoaudiologia
Neuropsicologia
Educação Superior
Neurociência Cognitiva
Neurologia

RESUMO

Objetivo: Identificar a presença do ensino da neuropsicologia nos cursos de graduação em fonoaudiologia no Brasil através de uma análise exploratória dos currículos dos cursos de graduação. **Método:** Estudo documental exploratório quantitativo. Foi realizada uma busca de documentos (projeto pedagógico de curso, ementário e/ou matriz curricular) nos websites das instituições de ensino superior públicas e privadas, ou via e-mail. A busca das informações necessárias para o estudo foi feita por três pesquisadores através de um *checklist* elaborado em consenso. Dessa maneira, pôde-se caracterizar as instituições de ensino e, posteriormente, foram investigadas quais delas ofereciam disciplinas que abordassem o tema da neuropsicologia através de uma busca pelo nome da disciplina. Foram exploradas associações entre a natureza da instituição de ensino superior, ano do projeto pedagógico de curso e região demográfica, com a presença de disciplinas sobre neuropsicologia. **Resultados:** Foram incluídas no estudo 72 instituições de ensino, sendo que destas apenas nove ofereciam a disciplina de neuropsicologia. Nenhuma das associações testadas gerou diferença estatisticamente significativa. **Conclusão:** Há uma carência na oferta de disciplinas de neuropsicologia para os estudantes de fonoaudiologia, e esta carência não tem relação nenhuma com a natureza da instituição de ensino superior, o ano do projeto pedagógico de curso ou com a região demográfica. Os achados chamam a atenção para a importância de um currículo que considere todo o escopo de atuação profissional e se ajuste à epidemiologia dos distúrbios da comunicação.

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INTRODUCTION

Neuropsychology was recently recognized as a specialty within speech-language pathology by the Federal Council of Speech-Language Pathology (in Portuguese *Conselho Federal de Fonoaudiologia* (CFF)) through resolution No. 453/2014[1] and the attributions and competencies in this field were also described by the resolution CFF of No. 466/2015[2]. The contribution of speech-language pathology to the field of neuropsychology predates the recognition of the specialty, as neuropsychological principles have been incorporated in the evaluation and treatment of communication disorders. In addition, many Brazilian speech-language pathologists were involved in the development of neuropsychological instruments that are currently used by professionals from various disciplines[3].

Neuropsychology is an interdisciplinary science that focuses on behavior and cognition, and how behavior is coordinated by cognitive functions, such as memory, language, attention, perception, executive functions and praxias[4,5]. These cognitive functions are the object of study of the speech-language pathologist specialist in neuropsychology, because the work of the speech-language pathologist is in the prevention, evaluation, and treatment of communication disorders due to changes in cognition and brain functioning[3]. The expertise of this professional is their ability to use neuropsychology as applied to linguistic difficulties resulting from neurological, psychiatric, neuropsychiatric and developmental conditions[3].

The relationship between speech-language pathology and neuropsychology can be illustrated by giving some specific neurological conditions as examples. Aphasias, for instance, are language disorders caused, most often, by stroke[6,7]. The neuropsychology contribution to aphasias is the use of cognitive and language evaluation batteries to diagnose and plan speech therapy for these cases[6,8].

Auditory processing depends on additional cognitive processes, such as selective and sustained attention in the perception of figure-ground[9,10]. There is even evidence indicating that changes in auditory processing may be a preclinical biomarker of Alzheimer's disease (AD)[11].

Neuropsychology also has a strand that studies developmental changes, such as learning difficulties. Learning is a mental process that requires a certain level of activation and attention, observation and information selection, that is, it depends directly on cognitive functions[12]. Learning difficulties are divided into two subtypes: verbal and nonverbal. Verbal difficulties are associated with problems in acquiring symbolic written reading processes, such as dyslexia and dysgraphia. Nonverbal ones are characterized by significant deficits in perception, visual and tactile memory, praxis, calculations, complex psychomotor skills, attention, executive functions and are commonly associated with neurological disorders, such as traumatic brain injury (TBI), hydrocephalus, epilepsy, autism, brain tumors and cerebral palsy (CP)[13,14].

Another important example of the relationship between speech-language pathology and neuropsychology is in cases of dementia. This neurological condition is characterized by significant cognitive and functional decline, in which the individual becomes dependent on the caregiver for everyday tasks[15]. Communication skills gradually decrease over the course of the disease and individuals may have language problems or even mutism[16,17]. In a specific type of dementia, Frontotemporal Dementia (FTD), in addition to cognitive changes in executive functions, there can also be prominent changes in language itself and in social cognition[18].

Data on the Brazilian population show that there are increases in longevity and in the proportion of the elderly population. These data indicate a greater need for public policies aimed at chronic diseases of aging, such as dementia[19]. For this reason, a document published by the World Health Organization (WHO) and the World Bank Group (WBG) estimates that by 2030, 40 million new jobs involving social and health care around the world are needed. It is estimated that about 18 million additional health workers will be required to care for people with dementia, especially in health services with few resources[20]. In Brazil, the numbers of people with dementia has also been growing, but it is still difficult to define the exact prevalence and incidence figures, since there is a lack of information for the entire national territory[21]. The need to increase the number of professionals who are able to deal with dementia and other neurological and psychiatric conditions means that we need to prioritize training in this area and for this reason training in neuropsychology is essential.

Speech-language pathology is strongly connected to the field of neuropsychology, and this relationship has been developed since the last century, when the first standardized instruments to assess language were created, such as the Minnesota, Boston and Montreal-Toulouse batteries, introduced in Brazil thanks to the commitment of speech-language pathologists[3]. There is also an increase in research and use of neuropsychological testing in speech-language pathology in recent years.

Considering that the speech-language pathologist can now specialize in neuropsychology, these professionals should develop basic knowledge and skills in this field during their undergraduate training. The curricular guidelines of the speech-language pathology course recommend training at a general practitioner level and, for this, undergraduate students need to be exposed to all areas of speech-language pathology knowledge and practice. Thus, contact with neuropsychology at undergraduate level allows the student to become familiar with the area and generate interest in learning more, enabling the professional to seek specialization in neuropsychology or in other types of postgraduate courses in this area. However, it is not known whether undergraduate programs in speech-language pathology in Brazil provide exposure to specific courses on neuropsychology, as there have been no studies investigating this question. Thus, this study aimed to identify if exposure to neuropsychology teaching was being provided in undergraduate courses in speech-language pathology in Brazil, using an exploratory document analysis of undergraduate course curricula.

METHODS

Study design

Quantitative exploratory document analysis.

Selection of participating educational institutions

In the study, all higher education institutions (HEI) that offered the speech-language pathology course in Brazil, that were registered in the Ministry of Education (in Portuguese *Ministério da Educação* (MEC)), and that made available the Pedagogical Project of the Course (in Portuguese *Projeto Pedagógico de Curso* (PPC)), program and/or curriculum of the course for this research were included in this study. Figure 1 shows the flow chart for inclusion of the participating institutions.

Procedures

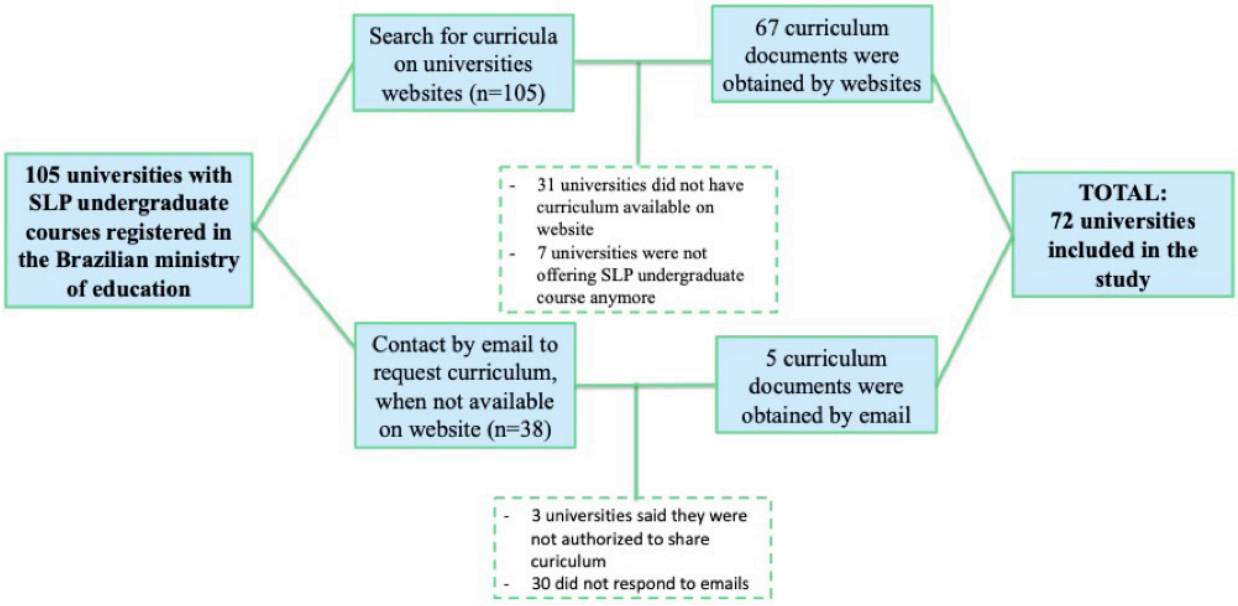
The documents (PPC, program and/or curriculum) for this research were searched on the websites of these educational institutions. When not available on the websites, they were requested via email from the directors of the undergraduate courses in speech-language pathology.

The search for the information necessary for the study was carried out by three researchers using a consensus checklist (Chart 1). Information collected to characterize the HEI included: demographic region; HEI category (public/private); workload of the course; year of curriculum update and type of document provided (PPC, program, curriculum matrix).

It was then verified which HEI offered courses that addressed the theme of neuropsychology by searching for keywords in the names of the courses. The keywords used were: "neuropsychology", "neuropsychological". The number of courses on neuropsychology, the workload and its category (mandatory or elective) were then computed.

Outcomes

The primary outcome of this study was the number of HEIs that offered courses on neuropsychology. Secondary outcomes were the characteristics of educational institutions that offered courses on neuropsychology and the characteristics of neuropsychology courses and associations between these data.



Caption: SLP = speech and language pathology
Figure 1. Flow chart for inclusion and exclusion of participating institutions

Chart 1. Checklist used to search information for the study

Features of universities	- Name of university - Demographic region of university - University category (private or public) - Total load of the HEI undergraduate course - Update year of the HEI pedagogical project - Data source (e-mail or website) - Document type obtained (PPC, program or curriculum matrix)
Features of neuropsychology courses	- Presence or absence of neuropsychology course - Number of neuropsychology courses - Course category (mandatory or optimal) - Course workload

Caption: HEI= higher education institute; PPC = pedagogical project of the course

Table 1. Description of the HEIs included in the study

	N (%) or Mean (SD)
Region – N (%)	
South	17 (23.6)
Southeast	26 (36.1)
North	5 (6.9)
Northeast	17 (23.3)
Midwest	7 (9.7)
Nature of the Institution – N (%)	
Public	23 (31.9)
Private	49 (68.1)
Course Workload – M (SD)	3695.98 (513.91)
Year of PPC – N (%)	
From 2014	20 (27.8)
Before 2014	14 (19.4)
Document obtained – N (%)	
PPC	24 (33.3)
Program	11 (15.3)
Curriculum	37 (51.4)

Caption: HEI = higher education institution; M = mean; PPC = pedagogical project of the course; SD = standard deviation

Table 2. Description of the neuropsychology courses and HEIs that offer these courses

	N (%) or Mean (SD)
Workload – M (SD)	42.11 (13.62)
Nature of course – N (%)	
Mandatory	6 (67.7)
Elective	3 (33.3)
Year of PPC – N (%)	
From 2014	3 (33.3)
Before 2014	2 (22.2)
Missing information	4 (44.4)
Nature of HEI offering course – N (%)	
Public	4 (44.4)
Private	5 (55.6)
HEI region – N (%)	
South	5 (55.6)
Southeast	3 (33.3)
Midwest	1 (11.1)
Northeast	0 (0)

Caption: HEI = higher education institution; M = mean; PPC = pedagogical project of the course; SD = standard deviation

Data analysis

The data were analyzed and stored using the Statistical Package for the Social Sciences (SPSS®) software, version 25. Categorical variables were described using absolute and relative frequency (n and percentage), while continuous variables were described as mean and standard deviation. Associations were tested using the Chi-square test with significance level of 5%.

Ethical aspects

This study did not involve the direct participation of human beings and, therefore, did not require signing a Free and Informed Consent Form (IC) and approval by an ethics committee. The study was registered with the Research Commission of the Federal University of Health Sciences of Porto Alegre (Universidade Federal de Ciências da Saúde de Porto Alegre (UFCSPA) under number 042/2018.

RESULTS

72 HEIs were included in the study, and the characteristics of these institutions are described in Table 1. The analysis of the curricular documents showed that only nine of these 72 HEIs offered a neuropsychology course, and the description of the neuropsychology courses is shown in Table 2.

Associations between the HEIs that offered courses in neuropsychology and the characteristics of these institutions were performed using the Chi-square test in order to verify whether the HEIs profile could explain a greater or lesser number of courses in this knowledge area. When testing the association between the presence of the neuropsychology course and the nature of the university (public or private), no statistically significant difference was found (p=0.390) (Table 3). There was also no significant association between the presence of neuropsychology course and the PPC year (p=0.954), nor with the HEI location (p=0.106) (Table 3).

Table 3. Association between HEIs characteristics and presence of neuropsychology courses

	Presence of neuropsychology courses (%)	Absence of neuropsychology courses (%)	P***
Nature of HEI			
Public	44.4	30.2	0.390
Private	55.6	69.8	
Year of PPC			
From 2014	60	58.6	0.954
Before 2014	40	41.4	
Demographic Region			
South	55.6	19	0.106
Southeast	33.3	36.5	
North	0	7.9	
Northeast	0	27	
Midwest	11.1	9.5	

***Chi-square (x^2) was the statistical test used
Caption: HEI = higher education institution; PPC = pedagogical project of the course

DISCUSSION

Neuropsychology was recently recognized as a specialty of speech-language pathology in Brazil[1]. When a speech-language pathology professional decides to specialize in this area, it is important to have prior exposure to this area during their undergraduate studies in order to acquire basic knowledge of neuropsychology and to be aware of this specialty. The aim of this study was to determine if neuropsychology teaching and exposure to neuropsychology occurs in the speech-language pathology courses provided by Brazilian HEIs.

Because neuropsychology is now a specialty of speech-language pathology in Brazil, it was expected that most of the HEIs would offer courses on the subject. However, the results of this study

showed that only nine (12.5%) of these HEIs provided course, and three of the courses offered by these institutions were elective. No other studies with objectives and methodology similar to this one could be found. One study conducted in 2008 found that there were few studies that explored language evaluation in the context of neuropsychology. This same study indicated a growth of scientific articles on language evaluation in the neuropsychological context, predominantly in the preceeding 6 years[22]. There were no studies specifically on availability of neuropsychology courses in speech-language pathology training.

Additionally, our research sought to understand the reason for the paucity of neuropsychology courses in speech-language pathology undergraduate programs by examining the association between the presence of neuropsychology courses and HEIs characteristics. The associations investigated and the hypotheses related to them were as follows: 1) Year of the PPC: we hypothesized that courses with PPCs that were updated after the recognition of the specialty in neuropsychology[1,3], that is, after 2014, would have a greater number of courses . Although the results showed a trend indicating a greater number of courses from 2014, this association was not significant (p=0.954). 2) Demographic region of HEIs: the hypothesis was that HEIs located in the south and southeast regions would have a number of courses due to a greater historical involvement of speech-language pathologists in these regions that were involved in the development of neuropsychological test instruments. The absolute results suggested a trend that corroborates this hypothesis, but this association was not significant (p=0.106). 3) Nature of HEIs (public or private): the hypothesis was that public universities would offer more neuropsychology courses because they had a higher workload than private universities; however this association was also not confirmed (p=0,390).

In this study, only the courses that contained the keywords of interest within the name of the discipline were included. Thus, courses that had neuropsychology teaching in their programs, objectives or content, but did not in their name, may not have been included in the study. This limitation occurred, because it was not possible to obtain information from the programs, objectives and contents in the PPCs or programs of the courses, and few HEIs made these documents available. Thus, although the curriculum contains only the course name and its workload, we chose to analyze these documents because they were more readily available (curricula were available individually or within the PPCs and programs). It was considered that exclusive neuropsychology courses offer the opportunity to integrate knowledge from the fields of cognitive neurology, linguistics, psychology, and others, in order to give meaning to the practical application of neuropsychology. However, it is important to highlight that there are courses that, although not using the term neuropsychology in their title, provide knowledge that constitute the foundations of neuropsychology, such as neurology and psycholinguistics courses. We did not consider such courses in this study to avoid possible biases due to the difficulty of standardization of data collection.

PPCs provide the most complete institutional documents regarding undergraduate courses. The researchers searched on the websites and made contact with the HEIs in order to request the PPCs. Many private universities answered that they were not allowed to make the documents available, a reason why we obtained a low number of PPCs and decided to analyze the curricula in the study.

The recognition of neuropsychology as a specialty of speech-language pathology was an important milestone for Brazilian speech and language professionals. In the international context, which we often use as a model, the formalization of this speech-language pathology specialty is not common. In the United States of America (USA), neuropsychology is not recognized as a specialty of speech-language pathology, but the American Speech-Language-Hearing Association (ASHA) encourages the referral of patients and collaborations between speech-language pathologists and clinical neuropsychologists[23]. The ASHA also states that attempts to make tests and interventions between one area and another exclusive will result in the failure to provide a high-quality service for the patient. They also understand that the focus of these efforts should be on the clinical usefulness of certain information aimed at collaboration among professionals with different skills and knowledge in order to influence patients' outcomes in a beneficial way[23]. In the USA, speech-language pathologist undergraduate training are full of courses based on understanding neuropsychology, and speech-language pathologists are protected from test restriction through ASHA.

In Europe, neuropsychology as a specialty in speech-language pathology has a long history. In a research conducted in Italy, most of the participants who practice neuropsychology did not have a psychology background, and among them, there were speech-language pathologists[24]. In Italy, the law does not set any limitation on the practice of neuropsychology; therefore, other health professionals may use some neuropsychological diagnostic tools that are not classified for the exclusive use of psychologists or may offer neuropsychological rehabilitation, even if they have never attended any training in neuropsychology[24]. In a similar study conducted in Spain, only two participants who worked in neuropsychology had speech-language pathology training[25]. In this country, until the time of this publication, accreditation in neuropsychology or neuropsychology training programs has not been recognized by the government[25].

In countries such as China and Japan, neuropsychology is limited to few departments and institutes with research interests in neuropsychology. Moreover, neuropsychological testing is limited only to physicians. Across the rest of Asia, including Thailand, Vietnam, Laos and Brunei, there is little or no practice of clinical neuropsychology, as well as in Africa, with the exception of South Africa[26]. In other countries such as Singapore, Taiwan, the Philippines and also Hong Kong (the autonomous Special Administrative Region (SAR) of China, the profession is led by neuropsychologists who have studied in the USA or Australia and have returned to their countries. However, many of them do not return which ends up being a limiting factor of neuropsychology development in underdeveloped countries[26]. In South Africa, India, Israel and New Zealand there are also comprehensive opportunities for training in neuropsychology and opportunities to specialize working in the area[26].

Across Latin America, some countries have no formal postgraduate training in neuropsychology, such as Bolivia, Cuba,

Uruguay, Venezuela, El Salvador, Honduras and Panama. On the other hand, there is training in other Latin American countries, such as Brazil, Mexico, Colombia, Argentina, Chile, Ecuador, Paraguay, Costa Rica and Guatemala[27]. Most professionals who work in neuropsychology in these countries have a background in psychology, but not all[27].

The main obstacle to neuropsychology growth suggested in literature is the lack of academic training and clinical supervision[24-27], which was observed in the the results of the current study. In addition, in Brazil, there have been attempts to restrict the use of neuropsychological evaluation instruments by speech-language pathology, but these restrictions did not materialize and were one of the important points that led to the need of the specialty recognition. Neuropsychological rehabilitation in the Brazilian setting, as well as in other Latin American countries such as Cuba, is described in the literature as offering a standard of care that exceeds that of many Western countries[27]. This demonstrates the quality of professional practice of neuropsychology in Brazil and its potential to expand and benefit the population, despite the limitations and obstacles that exist.

Finally, it is worth mentioning that this study had a number of limitations: the fact that it was not possible to include all HEIs in the study; the difficulty in obtaining the same type of document from all HEIs (having as the ideal obtaining pedagogical projects); the problems in analyzing neuropsychology teaching in other contexts besides specific courses on neuropsychology. To address these limitations, we recommend the elaboration of other methods to investigate more broadly neuropsychology teaching in other contexts, as well as the replication of this study in the future to determine whether adaptations were made in the curricula of speech-language pathology courses in Brazilian HEIs.

CONCLUSION

This study is the first to evaluate neuropsychology teaching in undergraduate courses in speech-language pathology in Brazil following the recognition of neuropsychology as a specialty. It was possible to conclude that there is a dearth of neuropsychology courses for students of speech-language pathology, and that this lack is not related to the type of HEI, the year of the PPC or the location of the institution. The findings draw attention to the importance of a curriculum that covers the entire scope of professional training and takes into consideration the epidemiology of communication disorders, as this is a significant factor in professionals training.

It is important to highlight the interdisciplinary nature of neuropsychology and its importance for speech-language pathology. This should be taken into account when applying the guidelines of this activity field in undergraduate courses, because the specialty of neuropsychology is not exclusive to a single profession.

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Author contributions

ACB: idea conception, study design, data collection, data analysis, manuscript writing, review and approval of the final version; TLL: data collection, data review and results, review and approval of the final version; MLFC: planning and guidance of the research project; BL: planning and guidance of the research project; BCB: idea design, study design, data analysis, review and approval of the final version, research supervision.