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To cite this article: Alberto Luis Fernandez, Aldo Ferreres, Alejandra Morlett-Paredes, Diego Rivera & Juan Carlos Arango-Lasprilla (2016) Past, present, and future of neuropsychology in Argentina, *The Clinical Neuropsychologist*, 30:8, 1154-1178, DOI: 10.1080/13854046.2016.1197313

To link to this article: <http://dx.doi.org/10.1080/13854046.2016.1197313>




Published online: 10 Aug 2016.



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Past, present, and future of neuropsychology in Argentina

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ABSTRACT

Objective: To describe the history, current situation, and future challenges of Argentinian neuropsychology. **Method:** A brief historical description highlighting the most representative authors and publications is made. In addition, a survey was administered to a sample of 135 neuropsychologists practicing neuropsychology in Argentina. The survey explored the current neuropsychological practices among the respondents. **Results:** Results show that most Argentinian neuropsychologists are: psychologists, women, and work in the clinical field in the country's major cities. Besides, the practice of neuropsychology is mostly unregulated with few training opportunities. **Conclusions:** Argentinian neuropsychology emerged from neurology in the early twentieth century and slowly progressed until the 1960s when the first organized research groups were created. Since then, a substantial and steady progress followed. However, more training opportunities and a better regulation of the discipline are needed. No similar studies have been conducted in the past, thus becoming one of the first to describe the development of neuropsychology in Argentina.

ARTICLE HISTORY

Received 5 November 2015
Accepted 27 May 2016

KEYWORDS

History; neuropsychology;
Argentina; practice;
development

Introduction

This paper will attempt to provide a description of the history, current conditions, and future perspectives of neuropsychology in Argentina. This is not a comprehensive study, but rather a summary of the issues that exist in the field, with the purpose of offering the reader a compact view of the field in the country.

Although it was difficult to track down some older materials like books and papers in order to establish the starting point for neuropsychology in Argentina, the first traceable publications in the area seemed to appear in the early twentieth century. Having considered the fields' scientific publications produced in Argentina, two main periods were distinguished: from the early twentieth century to the 1960s, and from the early 1960s until today.

The first period was mainly characterized by the publication of a few essays and scientific articles produced by neurologists, mostly devoted to the study of language. Although during the first decades of the century psychology in Argentina was highly influenced by physiological psychology, neuropsychology did not stem from it but from neurology. From the first decades of the twentieth century, where the earliest neuropsychological writings appeared, to the mid-80s, the neuropsychology field in Argentina was dominated by neurologists.

The early psychological studies were performed within the field of experimental psychology. Horacio G. Piñero, one of the first Argentinian professionals who worked in the field of psychology, expressed his view of psychology as a discipline highly influenced by biological processes: '...is then natural and biological psychology what has appealed us ...'; '... today the psychogenetic skills of the child are considered as a function of the brain ...' (Piñero, 1903). The first generation of experimental psychologists (Victor Mercante, Horacio Piñero, José Ingenieros and Alfredo Calcagno, among the most remarkable) in Argentina were active from the late nineteenth century until the 1920s. Although they cannot be considered neuropsychologists, they made a remarkable effort to link the psychological processes with brain functioning. They had a clear biopsychological conception of the field.

José Ingenieros, a physician famous for his sociological writings, who worked at the Department of Nervous Diseases at the University of Buenos Aires, published a book in French on amusias in 1907 (Ingenieros, 1907). By the end of the nineteenth century and early twentieth century, amusias seemed to be a topic of high interest to neurologists, not only in Argentina but also in other parts of the world. Benton reported that, most of the currently recognized forms of amusia had been described by then (Benton, 2000a). Ingenieros was knowledgeable of the contemporary scientific literature of the time. He cites the articles of the leading figures on the topic such as Edgren, Brazier and Oppenheim. He later published *Psicología Genética* (Genetic Psychology) (Ingenieros, 1911), which was, very likely, the first book published by an Argentinian author that attempted to link biology and psychology.¹ A few years later, Argentinian psychologists published a monograph showing the design of a 'mental recorder' (registrador mental) based on publications by Wundt (Mo & Alberti, 1922). With this device, they purportedly measured different cognitive abilities such as memory, creative imagination and observation, attention, time estimation, judgment and reasoning. In a sense, this device might be considered among the precursors of neuropsychological testing in Argentina.

Most of the psychological work done by Argentinian psychologists during this period was heavily based on the theories of European researchers, mostly French, as can be observed, for example, in the writings by Piñero (1903) and Ingenieros (1907, 1911). The influence of the studies by Ramón y Cajal in Spain was apparent. However, it seems that North American neuropsychology did not influence Argentinian psychologists. At the time, European and North American neuropsychologists were mostly concerned with the localization of functions in the brain. Yet, in Argentina there was not a proper neuropsychological field, but rather a biological psychology. Argentinian neurology was also far from neuropsychology and mostly concerned with neuropsychiatry, and neuropathology (Somoza & Gualtieri, 1998).

Curiously, one of the most important Argentinian neuropsychological contributions of all times came from an ophthalmologist. In 1903, Otto Wernicke, reported in *Revista de la Sociedad Médica Argentina* one of the first cases of dyslexia described ever (Benton, 2002b). Wernicke described two patients who were the first cases of dyslexia described in a language



Figure 1. Dr José Ingenieros. One of the pioneers of neuropsychology in Argentina.

other than English. He assumed that the disorder had a neurological basis resulting from a lesion in the central nervous system (Wernicke, 1904).²

Although the production of scientific information by Argentinian psychologists was probably not highly influential outside of Argentina, their work received considerable attention, especially in Europe. Ingenieros, unquestionably the most outstanding figure among them, was acknowledged in France and Germany. His book *Principios de Psicología Biológica* was published in French (1914) and German (1922). However, his works were never translated into English, which is probably one of the reasons why he is mostly unknown to the English-speaking neuropsychologists. The ignorance about remarkable scientific neuropsychological contributions because they were not published in English, is a fate shared by others. For example, Giambattista Vico, an Italian philosopher and historian, had described in 1744 a case of language dissociation, however, this finding was unknown to most of the neuropsychological community and language dissociation was 're-discovered' in the 1960s by Boston neuropsychologists (Traykov & Boller, 1997). The importance of Ingeniero's book, and the concepts expressed in it is such, that Triarhou and del Cerro (2006) affirmed that 'the neuronal basis of behavior instigated by Ingenieros is thus in line with the modern foundations of Behavioral Neuroscience' (p. 183) (Figure 1).

Unfortunately, this empiricist approach declined significantly in the 1920s, displaced by the emerging mentalist approaches. Some authors have hypothesized that this was probably the result of the raise of fascist political movements in the region, which affected universities; and the lack of development of psychology departments within the universities (Lorez Arnaiz, Darín, Rugna, & Giuliano, 1997).

A particular characteristic of the history of neuropsychology in Argentina is that the limited neuropsychological publications over the next decades were primarily devoted to the study of language. Natural language functioning, aphasias and dyslexia dominated most of

the publications. Interestingly, it was not until the late 80s when other abilities/disorders related to memory, calculation, reasoning, and attention started to concern researchers. Also, a distinctive characteristic of this period was the focus on the anatomo-clinical and theoretical nature of publications. Most books were monographs focusing on either the description of cases analyzed with concepts provided by contemporary theories, or descriptions of said contemporary theories. The null references to psychometric data are certainly a reflection of the poor background of those neurologists in statistics and psychometrics. Unfortunately, psychology in Argentina was unable to provide help on this issue, since it was dominated by an anti-empiricist stream (Klappenbach, 2006). This tendency continued until the 1990s when some neurologists, who had studied abroad, started to place more value on psychometric testing.

In 1923, Aníbal Ponce, a disciple of Ingenieros published a monograph on frontal lobe rehabilitation (Ponce, 1956). In this paper, Ponce discusses von Monakow's concept of diaschisis (von Monakow, 1914). Based on his readings of Leonardo Bianchi, the renowned Italian neurologist, he supported the idea that frontal lobes were the main region involved in volition, affection, and abstract thought. This demonstrates that at the time Argentinian neurologists were aware of the development of the discipline in the rest of the world.

A prominent neurologist and author, Vicente Dimitri, is known to have influenced the field of neuropsychology between the 1920s and 1940s, with major contributions such as his book *Afasias: estudio anatomoclínico* (Aphasias: anatomo-clinical study) (Dimitri, 1933), and his research on apraxias, which led to another milestone in the neuropsychological literature of the time. A disciple of Dimitri, Marcos Victoria, wrote a book on apraxia, called *Teoría de las apraxias* (Apraxias theory) (Victoria, 1940), which was later cited by well-known neurologist Norman Geschwind (Geschwind, 1974, p. 65). During these decades neuropsychology in the rest of the world was moving to a 'holistic approach' era (Cubelli, 2005). Aphasia was a dominant topic, but the approach to it had changed from localizationist to holistic. The latter stated that aphasia was a unitary disorder varying only in its severity across different patients. The idea of selective impairment of different components of language was rejected. Nonetheless, it seems that at least some Argentinian authors were more appealed by the localizationist models, as they based their works on theories from Déjerine, Broca, and Wernicke. For instance, Dimitri who was a disciple of Déjerine, supported classical theories of language through the description of a series of aphasic patients and clearly questioned the holistic approach endorsed by Pierre Marie in his book.

Juan Cuatrecasas and Julio Bernaldo de Quirós were other prominent figures who began to publish in the 1940s, especially in the language and dyslexia fields (Bernaldo de Quirós, 1959, 1965; Cuatrecasas, 1940). Unfortunately, their legacy is mostly ignored by the Argentinian neuropsychologists. During this period, in other parts of the world, neuropsychology was going through what has been called the 'experimental studies' era (Cubelli, 2005). This period was characterized by the use of the methodology of experimental psychology such as statistical analyses, group studies and standardized testing batteries, for the study of neuropsychological phenomena. Although authors such as Bernaldo de Quirós were in agreement with the contemporary approach, most of the Argentinian publications of this time were basically theoretical.

Despite all the history, the origins of organized efforts to study neuropsychological matters can be dated in the early 60s, when the first research group of neuropsychology was developed, marking the beginning of the second period of neuropsychology in Argentina.

This group, directed by neurologist Juan E. Azcoaga, was mainly dedicated to the study of learning mechanisms and language disorders (Figure 2). However, as with most previous authors their approach was mainly theoretical and little empirical research was published. This group was part of the Department of Psychology within the Faculty of Humanities and Literature at the University of Buenos Aires (UBA). Books such as *Aprendizaje fisiológico y aprendizaje pedagógico* (Physiological learning and pedagogic learning) (Azcoaga, 1971), *Alteraciones del Lenguaje en el Niño* (Language Disorders in the Child) (Azcoaga, Derman, & Frutos, 1971), and *Trastornos del Lenguaje* (Language disorders) resulted from that research. These studies were partially based on neuropsychological syndromes described by classical authors such as Broca, Wernicke, Jackson, and Marie. However, Azcoaga's analyses of neuropsychological symptoms were derived from categories proposed by Ivan Pavlov. Based on Pavlovian concepts he proposed the existence of 'analyzers' for language, gnosis and praxis. In his theory, these analyzers were the basis of superior brain functions. He was influenced by Vigostky on regards to ontogenic issues and thought-language relationships. According to Ardila, one of the reasons why Soviet neuropsychologists had a strong influence, not only in Argentina but also in other Spanish-speaking countries in Latin America, was due to the translation of their books in the 1970s and 1980s, while books by North American and western European authors had not been translated (Ardila, 1999).

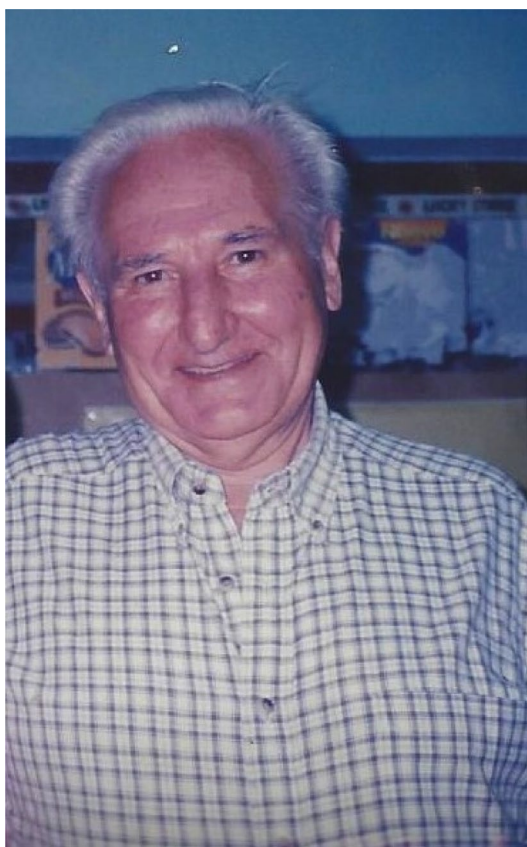


Figure 2. Dr Juan E. Azcoaga. Leading figure in the development of Argentinian neuropsychology.

Around this time, North American and European neuropsychology were moving to a 'cognitive approach' period (Cubelli, 2005). During this phase, according to Cubelli (2005), 'neuropsychology was assumed to be a branch of cognitive psychology, its aim being to provide empirical facts to be compared with data coming from experimental studies with neurologically intact individuals' (p. 272). As described, Argentinian neuropsychology was very far from this theoretical line and much closer to Soviet neuropsychology, although still under the influence of classical authors.

A shift in the scientific paradigm of the neuropsychology in Argentina was observed in the mid-1980s and early 1990s with the influence of neurologists trained in Europe and the United States. These neurologists brought a more empirical approach to the local neuropsychology, resulting in new research and clinical methods. Test administration became more frequent and research was based on group studies rather than single case descriptions. Concomitantly, the cognitive process paradigm introduced in Argentina by European researchers such as Andre Roch Lecours, Jean Luc Nespoulous, and Xavier Seron in some local scientific meetings in the late 80s, had begun to inspire Argentinian neuropsychologists.

A series of events characterized the quantitative and qualitative expansion of neuropsychological activities in Argentina during this period. For example, since its foundation in 1987, the Sociedad de Neuropsicología de Argentina (SONEPSA, Argentinian Neuropsychological Society) has been a more theoretically heterogeneous organization with many professionals who are quantitatively and cognitively oriented. This new organization also includes psychologists as well as speech pathologists. Nevertheless, the most important scientific production was still the result of the work of neurologists. In the late 80s, Neurologists Marcelo Berthier, Ramón Leiguarda and Sergio Starkstein produced a series of papers describing cases of neuropsychological syndromes related to specific lesions (Berthier, Starkstein, & Leiguarda, 1987, 1988; Starkstein, Berthier, & Leiguarda, 1988).

In 1989, the Sociedad Latino Americana de Neuropsicología (SLAN) (Latin American Neuropsychological Society) was founded in Buenos Aires with the purpose of gathering neuropsychological researchers and practitioners from Latin America. This society is still active and publishes the journal *Neuropsicología Latinoamericana* (Latin American Neuropsychology) (Figure 3).

In 1990, neurologist Aldo Ferreres published what is probably the first neuropsychological paper with a cognitive/quantitative approach produced in Argentina. His paper 'Phonematic alterations in anarthric and Broca's aphasic patients speaking Argentine Spanish' was published in the Journal of Neurolinguistics, and describes the phonemic production of 11 aphasic patients (Ferreres, 1990).

Despite all the progress, neuropsychological assessment and rehabilitation services were still very poor. Puente & Tobal even asserted that neuropsychological services in Argentina were 'almost inexistent' (Puente & Tobal, 1991). The first neuropsychological rehabilitation services were developed in the late 1980s and early 1990s in Buenos Aires.

Another important event in the field of neuropsychology was the foundation of *Revista Argentina de Neuropsicología* (Argentinian Journal of Neuropsychology), which was created in 2003. This is an online journal dedicated to the publication of neuropsychological research studies in the region. It is peer-reviewed and releases two issues per year.

The next milestone in Argentinian neuropsychology was SONEPSA's meeting jointly held with the mid-year International Neuropsychological Society (INS) conference in 2008. With



Figure 3. Picture of the professional group participating in the foundation of the Latin American Neuropsychological Society in 1989 in Buenos Aires.

more than 1,000 attendees, this meeting represented one of the largest mid-year meetings of INS.

Currently, neuropsychology in Argentina is evolving with very active research and clinical groups working on different topics such as dementia (Russo et al., 2014), social cognition (Baez et al., 2015; Ibañez & Manes, 2012), language disorders (Labos, Zabala, Atlasovich, & Ferreiro, 2003; Ruiz, 2000), reading disorders (Abusamra, Ferreres, Raiter, de Beni, & Cornoldi, 2010; Etchepareborda, 2002), brain imaging (Marino, Redondo, Luna, Sanchez, & Foa Torres, 2014), mild cognitive impairment (Harris et al., 2015), or neuropsychological test development (Fernández, 2013), just to mention a few.

Since the late 1980s Argentinian neuropsychology has been aligned with the development of the discipline in North America and Europe. Current research and clinical practice is characterized by modern theoretical and methodological approaches. Although its development was slower than in other regions of the world, its presence shows a discipline in full expansion and integrated into the current world trends of the field. The ongoing publication of scientific articles developed in Argentina, in renowned neuropsychological journals, are proof of this.

Training in neuropsychology

Undergraduate programs offer neuropsychology courses in many universities across the country, however, postgraduate training is only taught in the major cities of Argentina such

as Buenos Aires, Córdoba, and Rosario. A brief description of the current situation of graduate training in neuropsychology in Argentina is depicted below.

Postgraduate training

Systematic graduate training in neuropsychology in Argentina began in the 1970s, outside of the state universities because national universities were lead by the military government that ruled the country during those years. The pioneer institution was *Asociación para la Investigación Neuropsicológica* (APINEP, Neuropsychological Research Association) run by Juan E. Azcoaga. This institution regularly offered seminars on language and learning disorders, with students from Argentina and other countries. In 1984, a year after the return of the democracy in Argentina, graduate and undergraduate courses were offered in state universities, mainly in Buenos Aires, Córdoba, and Rosario. Currently, besides APINEP there are other governmental and non-governmental institutions (NGO) offering neuropsychology postgraduate training. These organizations, mostly related to psychology and speech pathology, are located in the city of Buenos Aires, different towns in the province of Buenos Aires and the city of Rosario.

During the first years, courses focused on classic adult neuropsychology issues such as aphasia, agnosia and apraxia. In child neuropsychology, courses were related to developmental language disorders and learning disorders such as dyslexia, dysgraphia, and dyscalculia. Accordingly, the majority of the students were speech pathologists and just a few of them were psychologists, physicians, and educational psychologists.³ The attendance of psychologist students increased as neuropsychology courses were being offered in psychology faculties among the main universities, and neuropsychology began to be acknowledged as a scientific and clinical discipline. Recently, occupational therapists have started attending these courses, and choosing an officially recognized training in neuropsychology is valuable among professionals (See official training below).

Formal recognition of neuropsychological training

In 1995, the Superior Education Law (# 24512) (Ministerio de Cultura y Educación. Secretaría de Políticas Universitarias, 1997) established that postgraduate certifications can only be issued by universities and each postgraduate program (specialization, Masters or PhD) must meet the quality standards established by the National Evaluation and Certification Commission (CONEAU, for its acronym in Spanish). This organization is under the jurisdiction of the Ministry of Education and regularly publishes a catalog containing the certified postgraduate programs in Argentina. In the last edition of this catalog recognizes only two certified neuropsychology programs, with the oldest being the Specialized Program in Clinical Neuropsychology, taught since 1997 by the Faculty of Psychology at the University of Buenos Aires, Argentina (a state university). This program offers training in clinical neuropsychology and totalizes 650 h divided among general classes (530) and supervised practice (120). The program only receives psychologists, speech therapists, physicians, and occupational therapists, granting a certification on 'Neuropsychology's Specialist'. The other certified training is the PhD program in Psychology, offered by Maimónides University, a private institution located in Buenos Aires. Since 2005, this program has been oriented to applied cognitive neuroscience and offers the title of 'PhD in Psychology with Training in Applied Cognitive

Neuroscience'. This program involves the completion of 1,210 h distributed among general PhD classes (580), specific courses and workshops (250), practical training (180), and specific research dissertation bibliography studies (200). Currently, there are two other programs in private institutions in Buenos Aires holding a temporary official certification.

The practice of neuropsychology in Argentina

The practice of neuropsychology in Argentina is rather unregulated. After graduating in Psychology, Medicine, Speech Pathology, or Educational Psychology (Psicopedagogía), professionals are entitled to work as a neuropsychologist. Although, as described above, there are a few institutions that certify official training, professionals are allowed to practice neuropsychology without certification. Professionals have to pay from their own money for training and certification, and although the cost of the courses varies, it is usually affordable. These courses tend to be only theoretical with only a few of them offering clinical training. It is not uncommon for professionals to work ad-honorem in public or private hospitals and clinics to gain clinical experience in the field. Coverage by medical insurances does not require an official certification to pay for the neuropsychologist's services.

Due to the unregulated character of the practice of neuropsychology in Argentina and the scarce statistical data collected about it, we decided to conduct a research study to investigate the current status of the practice of neuropsychology in Argentina, by inquiring about their daily work among professionals in this field.

Method

Participants

Respondents were 146 individuals, of these, 11 reported not having a bachelor's degree, resulting in a final sample of 135 individuals that met all inclusion criteria for analyses. Participants in the study were self-identified as psychologists or other health professionals who worked in the field of neuropsychology from Argentina, South America. Inclusion criteria for analyses were: (1) reported having at least a Bachelor's degree in psychology; (2) reported currently living in Argentina; (3) and considered themselves to be a neuropsychologist and/or to be performing at least some of the activities related to neuropsychology (i.e. assessment, diagnosis, treatment, teaching, or research) over the past year.

Although there is not data on how many Argentinian neuropsychologists or professionals are working in the field, the representativeness of the sample can be roughly estimated by the amount of professionals attending the bi-annual national neuropsychological conference, which is around 800 people. Thus, 135 individuals can be considered a representative sample. This survey is part of an international survey distributed to neuropsychologists in 39 countries in five continents (Arango-Lasprilla, Stevens, Morlett Paredes, Ardila, & Rivera, 2016; Panyavin, Goldberg-Looney, Rivera, Perrin, & Arango-Lasprilla, 2015).

Measures

A comprehensive review of the literature was completed and seven areas of interest were identified: (1) professional training, (2) current work situation, (3) evaluation and diagnosis,

(4) rehabilitation, (5) teaching and research, and (7) ethics in the workplace. Questions included in the survey were created to address each of the seven areas. The survey was sent to a group of professionals in neuropsychology from Argentina to ensure the questions included were adapted to their cultural and linguistic context. After incorporating the professionals' comments, the survey was comprised of 64 questions. A group of five neuropsychologists finalized the survey in order to ensure accuracy, validity, and proper operation of the survey prior to distribution.

Procedure

Given approval by the ethics committee from the University of Deusto, recruitment started out by sending an email to several Argentinian organizations in neuropsychology to participate in the study. The email included detailed information about the study and the hyperlink to the online survey, in addition to a request for their assistance in recruiting other neuropsychology professionals as participants in the study. Data collection was conducted from 26 May 2015 to 11 September 2015.

Statistical analysis

After data collection concluded, the database was transferred from the online server system and analyses were conducted using SPSS 23.0 (IBM Corp., Armonk, NY).

Results

The majority of participants in the study were female with 87% ($n = 117$) and the mean age was 39.82 years (range 24–64 years). As regards the profession of the participants ($n = 129$) the distribution is as follows: 67.4% ($n = 87$) psychologists, 12.4% ($n = 16$) speech pathologists, 10.9% ($n = 14$) educational psychologists, 3.9% ($n = 5$) physicians, 2.3% ($n = 3$) occupational therapist, 2.3% ($n = 3$) teachers, and 0.8% ($n = 1$) linguist. From 116 participants that answered this question, the majority reported their neuropsychological work took place in private practice (25.9%, $n = 30$), in a hospital setting (20.7%, $n = 24$), or in a rehabilitation center for profit (15.5%, $n = 18$). In addition, participants' average number of years of experience in neuropsychology was 8.8 (range 1–38) and worked an average of 24.8 h a week in activities related to neuropsychology. Regarding geographic distribution most of the participants lived in two provinces: Buenos Aires (73%, $n = 98$) and Córdoba (21%, $n = 28$), followed by Jujuy (2%, $n = 3$). The remaining were distributed among five other provinces with less than 1% each one (Mendoza, Santa Cruz, Santa Fé, La Pampa and Neuquén). Participants ($n = 86$) reported a mean monthly salary of $\$2,860.74 \pm 5.28$, with a range from a minimum of $\$80$ to a maximum of $\$30,000$.

Professional training

From 135 participants, 79% ($n = 106$) reported having received training in neuropsychology during their graduate studies (specialization, master's, or doctorate), with 52.7% ($n = 68$) from 129 that responded to this question assessing the training received in neuropsychology as 'very good', followed by 25.6% ($n = 33$) as 'excellent', 16.3% ($n = 21$) as good, 3.1% ($n = 4$)

Table 1. Most common barriers for the development of neuropsychology in Argentina.

| | Frequency | Percentage |
|--|-----------|------------|
| Lack of clinical training programs | 52 | 39 |
| Lack of access to neuropsychological testing | 49 | 36 |
| Lack of academic training programs | 48 | 36 |
| Unwillingness to cooperate among professionals | 42 | 31 |
| I do not think there are barriers | 24 | 18 |
| Lack of access to literature/libraries | 22 | 16 |
| Lack of professional leaders in the area | 18 | 13 |
| Lack of other professional resources | 14 | 10 |
| Lack of technology/computers | 6 | 4 |
| Lack of Internet | 1 | 1 |

Notes: Multiple response options available, responses do not add up to 100%. Percentages are calculated out of total $n = 135$.

as 'acceptable' and 2.3% ($n = 3$) as 'poor'. In relation to the clinical supervision of the participants during training in neuropsychology, 46.1% ($n = 59$) from 128 respondents assessed their clinical training as 'very good', followed by 21.1% ($n = 27$) as 'good', 14.8% ($n = 19$), as excellent, and 6.3% ($n = 8$), respectively, as acceptable and poor. It is important to note 5.5% ($n = 7$) of participants did not receive any clinical training in neuropsychology.

In terms of official certifications allowing neuropsychologist to practice in their country, 36.4% ($n = 47$) out of 129 participants that responded to this question reported not having an official certification to act as neuropsychologists because such certification does not exist in their country, 29.5% ($n = 38$) reported not having a certification even though a certification exists in their country, and 17.8% ($n = 23$) reported having an official certification. Another 16.3% ($n = 21$) stated not having a certificate and were not aware if such certification existed. Yet, out of 66 participants that answered this question, 92.4% ($n = 61$) reported that if such certification existed, they would want to obtain it.

When asked participants what degree a professional should have in order to practice as a clinical neuropsychologist, medical neuropsychologist, speech therapist, or other professional in the area of neuropsychology, 61.5% ($n = 75$) out of 122 respondents, reported a need to have a degree in psychology, whereas 38.5% ($n = 47$) did not think a degree in psychology was needed in order to practice.

Lastly, in terms of the most important barriers for the development of neuropsychology in Argentina, the majority of participants with 39% ($n = 52$) indicated a lack of clinical training programs, 36% ($n = 49$) indicated a lack of access to neuropsychological tests, and 31% ($n = 42$) indicated a lack of academic training programs (see Table 1 for additional barriers).

Current work situation

In regards to work status, 50.8% ($n = 60$) from 118 participants that responded to this question reported being employed full time, 43.2% ($n = 51$) reported part time status, 5.1% ($n = 6$) reported unemployment, and 8% ($n = 1$) reported being retired. According to 116 participants, 25.9% reported doing activities related to neuropsychology at a private practice, followed by 20.7% ($n = 24$) at a hospital and 15.5% ($n = 18$) at a profit rehabilitation center, 14.7% ($n = 17$) at a private clinic, 7.8% ($n = 9$) at a medical center, 6.9% ($n = 8$) reported other

locations, 4.3% (*n* = 5) at a university, 2.6% (*n* = 3) at a nonprofit rehabilitation center and 1.7% (*n* = 2) reported doing work related to neuropsychology in a school system.

The average length of time reported spent working in the field of neuropsychology was 8.8 years, according to 85% (*n* = 115) of the respondents in the survey, with an average of 24.8 h per week, as stated by 78% (*n* = 105) of the respondents to this question. Regarding the satisfaction with their salary as neuropsychologist, which was measured using a scale from 1 to 10, where 1 was ‘dissatisfied’ and 10 was ‘satisfied’, 84% (*n* = 114) of the participants reported an average of 5.2 in satisfaction; and in relation to their work as neuropsychologists, participants reported an average of 8.1.

Evaluation

In regards to neuropsychological evaluations, 91% (*n* = 107) of the participants reported having performed neuropsychological evaluations over the past year. The majority of them reported having conducted neuropsychological assessments on an average of 15 patients per month (81.3%, *n* = 87), and taking an average of 6 h to assess, qualify, and write the interpretation of the results.

With reference to the instruments used to evaluate neuropsychological assessments, 58.4% (*n* = 52) of the 89 respondents reported using flexible batteries, 36% (*n* = 32) used personalized/flexible batteries, and 5.6% (*n* = 5) used standardized batteries. The utmost used instruments by neuropsychologist were the TMT A&B (Trail Making Test A&B) with 64% (*n* = 68), the RAVLT with 61% (*n* = 65) and the WAIS with 60% (*n* = 64). For a complete list of the most commonly used neuropsychological tests, please see Table 2.

From a multiple response question with 107 respondents, the majority stated having used normative data from their own country to score neuropsychological assessments (73%, *n* = 78), followed by normative data from another country (58%, *n* = 62), custom procedures through clinical practice (8%, *n* = 9), raw scores without comparing their patients to a normative data (3%, *n* = 3), and other type of procedures to score the tests (1%, *n* = 1).

Table 2. List of the 20 most used neuropsychological instruments by neuropsychologists in Argentina.

| | Frequency | Percentage |
|---|-----------|------------|
| TMT A&B (Trail Making Test A&B) | 68 | 64 |
| RAVLT (Rey Auditory Verbal Learning Test) | 65 | 61 |
| WAIS (Wechsler Adult Intelligence Scale) | 64 | 60 |
| Stroop Test (Stroop Neuropsychological Screening Test) | 63 | 59 |
| MMSE (Mini-Mental State Examination) | 58 | 54 |
| WCST (Wisconsin Card Sorting Test) | 54 | 50 |
| Clock Drawing Test | 54 | 50 |
| ROCFT (Rey–Osterrieth Complex Figure Task) | 52 | 49 |
| BNT (Boston Naming test) | 48 | 45 |
| WISC (Wechsler Intelligence Scale for Children) | 45 | 42 |
| SDMT (Symbol Digit Modalities Test) | 42 | 39 |
| WIPPSI (Wechsler Intelligence Scale for preschool) | 37 | 35 |
| WMS (Wechsler Memory Scale) | 34 | 32 |
| D2 Test (Concentration Endurance Test) | 29 | 27 |
| Token (Token test) | 28 | 26 |
| Other | 26 | 24 |
| DRS (Mattis Dementia Rating Scale) | 23 | 21 |
| NEUROPSI (Brief Neuropsychological Evaluation in Spanish) | 17 | 16 |
| Bender (Bender visual-motor Gestalt Test) | 17 | 16 |
| CVLT (Verbal Learning Test California) | 16 | 15 |

Note: Multiple response options available, responses do not add up to 100%. Percentages are calculated out of total *n* = 107.

Table 3. Main problems with neuropsychological instruments.

| | Frequency | Percentage |
|---|-----------|------------|
| Lack normative data for my country | 69 | 64 |
| Too costly/expensive | 64 | 60 |
| Not adapted to my culture | 53 | 50 |
| Are often not applicable because my patients cannot read or write | 31 | 29 |
| Aimed at individuals with high levels of education | 31 | 29 |
| Not translated to my language | 25 | 23 |
| Do not have good psychometric properties | 11 | 10 |
| Take a long time to administer | 9 | 8 |
| There are no problems with the instruments that I use | 5 | 5 |
| Too complicated to administer and/or score | 2 | 2 |
| Other | 1 | 1 |

Notes: Multiple response options available, responses do not add up to 100%. Percentages are calculated out of total $n = 107$.

On the other hand, the majority of participants (51%, $n = 55$) indicated having obtained neuropsychological instruments directly from the publisher, while 50% ($n = 53$) reported making photocopies or reproducing the instruments, followed by 48% ($n = 51$) that reported borrowing them from colleagues, 32% ($n = 34$) reported downloading them from the Internet, 18% ($n = 19$) reported borrowing them from libraries or laboratories, 15% ($n = 16$) reported requesting them from the authors, and lastly 2% ($n = 2$) of the participants reported other methods for obtaining the instruments.

When asked about the problems with neuropsychological instruments, 64% ($n = 69$) reported a concern with the lack of normative data from their own country, followed by 60% ($n = 64$) reporting the instruments are too expensive to buy and 50% ($n = 53$) reporting the neuropsychological instruments are not adapted to their culture. For a list of the main problems in obtaining neuropsychological instruments, see Table 3.

The population that most frequently undertook neuropsychological evaluations were individuals with stroke/vascular problems (36%, $n = 38$), followed by individuals with

Table 4. List of groups of patients assessed more frequently by Argentinian neuropsychologists.

| | Frequency | Percentage |
|----------------------------------|-----------|------------|
| Stroke/vascular | 38 | 36 |
| Dementia | 32 | 30 |
| ADHD | 25 | 23 |
| Depression | 23 | 21 |
| Seizure disorders | 22 | 21 |
| Traumatic brain injury | 21 | 20 |
| Anxiety disorders | 20 | 19 |
| Pervasive Developmental Disorder | 19 | 18 |
| Learning problems | 18 | 17 |
| Mental retardation | 17 | 16 |
| Movement disorders | 16 | 15 |
| CNS tumor | 11 | 10 |
| Bipolar disorders | 9 | 8 |
| Schizophrenia | 7 | 7 |
| AIDS | 5 | 5 |
| Personality disorders | 5 | 5 |
| Multiple sclerosis | 5 | 5 |
| Substance abuse | 4 | 4 |
| Toxic/metabolic | 3 | 3 |
| Other | 1 | 1 |

Note: Multiple response options available, responses do not add up to 100%. Percentages are calculated out of total $n = 107$.

Table 5. Reasons for consultation.

| | Frequency | Percentage |
|--|-----------|------------|
| Diagnostic | 78 | 73 |
| Rehabilitation/treatment | 64 | 60 |
| Pre and post medical intervention evaluation | 21 | 20 |
| Educational plan design | 21 | 20 |
| Establish baseline scores for monitoring | 18 | 17 |
| Assess the patient's level of independence | 14 | 13 |
| Assess the ability to work | 8 | 7 |
| Other(s) | 2 | 2 |
| Forensic consultation | 2 | 2 |

Note: Multiple response options available, responses do not add up to 100%. Percentages are calculated out of total $n = 107$.

dementia with (30% $n = 32$), and ADHD (23%, $n = 25$). For a list of patients that most frequently undergo neuropsychological evaluation, see Table 4.

The three primary reasons for consultation were the determination of diagnosis with 73% ($n = 78$), rehabilitation and treatment with 60% ($n = 64$) and pre- and post-medical intervention evaluation with 20% ($n = 21$). For the list of other reasons for consultation, see Table 5.

The most common sources of referral for patients came from neurology with 73% ($n = 78$), followed by 61% ($n = 65$) from psychiatry and 49% ($n = 52$) from psychology. For a complete list of referral sources, see Table 6.

Figure 4 shows the professional time spent with specific age groups. As can be seen the majority of the participants reported to work mostly with adults and elderly.

The neuropsychological domains that are always addressed during neuropsychological evaluations are attention with 72% ($n = 77$), followed by verbal memory with 69% ($n = 74$) and executive functions with 68% ($n = 73$). For a complete list of other neuropsychological domains most frequently addressed in a neuropsychological evaluation, see Table 7.

Table 6. Referral sources of patients attending neuropsychology services.

| | Frequency | Percentage |
|---------------------------------|-----------|------------|
| Neurology | 78 | 73 |
| Psychiatry | 65 | 61 |
| Psychology | 52 | 49 |
| Self-referral | 49 | 46 |
| School system | 34 | 32 |
| Professionals in rehabilitation | 32 | 30 |
| Neurosurgery | 29 | 27 |
| Pediatrics | 28 | 26 |
| Geriatrics | 25 | 23 |
| Family (general medicine) | 21 | 20 |
| Friends | 10 | 9 |
| Internal medicine | 8 | 7 |
| Alcohol/drug facilities | 6 | 6 |
| Occupational Medicine | 5 | 5 |
| Law/attorney | 5 | 5 |
| Cardiology | 5 | 5 |
| Other | 4 | 4 |
| Physical Medicine | 4 | 4 |
| Orthopedics | 1 | 1 |
| Insurance company | 1 | 1 |

Notes: Multiple response options available, responses do not add up to 100%. Percentages are calculated out of total $n = 107$.

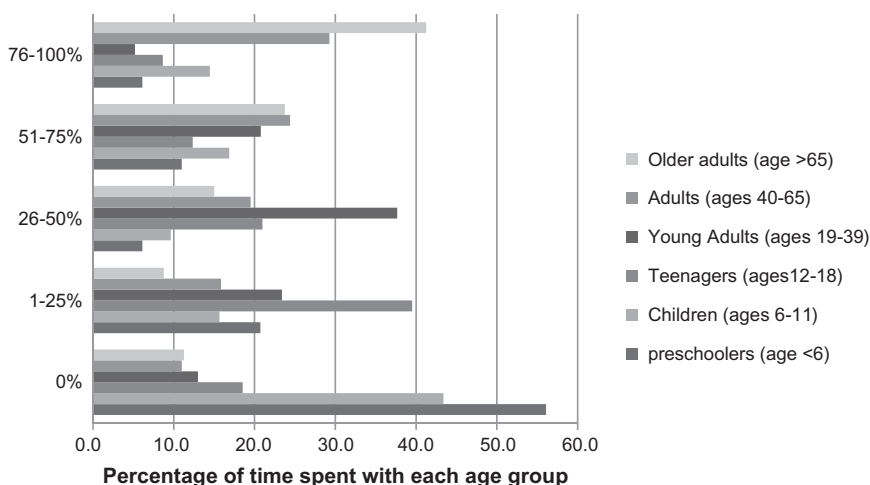


Figure 4. Professional time spent with specific age groups.

Table 7. Frequency with which the following cognitive domains are always evaluated during neuropsychological assessments.

| | Frequency | Percentage |
|-----------------------|-----------|------------|
| Attention | 77 | 90 |
| Verbal memory | 74 | 86 |
| Executive functions | 73 | 89 |
| Visual-spatial skills | 68 | 77 |
| Nonverbal memory | 68 | 76 |
| Language | 61 | 68 |
| Constructional skills | 59 | 67 |
| Intelligence | 35 | 41 |
| Motor abilities | 28 | 33 |
| Academic abilities | 21 | 25 |
| Auditory perception | 16 | 19 |
| Tactile perception | 7 | 9 |

Note: Multiple response options available, responses do not add up to 100%.

Rehabilitation

Among 103 participants, 80.6% ($n = 83$) stated having worked doing neuropsychological rehabilitation during the past year. Neuropsychologists reported having offered neuropsychological rehabilitation services, like intervention and psychotherapy to approximately 16.3 patients per month, with an average of 12.8 h per week. The most common type of treatment provided by 76 individuals that answered this question was individual therapy with 57.9% ($n = 44$), followed by mixed therapy (individual and group therapy) with 38.2% ($n = 29$), and group therapy with 3.9% ($n = 3$). In addition, the majority of rehabilitation services are provided to individuals diagnosed with dementia (49%, $n = 50$), followed by stroke/vascular diagnoses (43%, $n = 44$) and TBI (40%, $n = 41$). For a list of other diagnostic groups for neuropsychological rehabilitation treatment see Table 8.

The majority of participants indicated attention as the area where most of their neuropsychological rehabilitation treatment is performed (73%, $n = 75$), followed by executive

Table 8. Diagnostic groups for neuropsychological rehabilitation treatment.

| | Frequency | Percentage |
|--|-----------|------------|
| Dementia | 50 | 49 |
| Stroke/vascular traumatic brain injury | 44 | 43 |
| Traumatic brain injury | 41 | 40 |
| Learning disabilities | 34 | 33 |
| ADHD | 31 | 30 |
| Mental retardation | 30 | 29 |
| Pervasive Developmental Disorder | 24 | 23 |
| Seizure disorders | 21 | 20 |
| Anxiety disorders | 17 | 17 |
| Depression | 16 | 16 |
| Movement disorders | 14 | 14 |
| Multiple sclerosis | 13 | 13 |
| Schizophrenia | 11 | 11 |
| CNS tumor | 10 | 10 |
| Bipolar disorders | 8 | 8 |
| Substance abuse | 5 | 5 |
| Personality disorders | 4 | 4 |
| AIDS | 3 | 3 |
| Other | 2 | 2 |
| Toxic/metabolic | 1 | 1 |
| Pain | 1 | 1 |

Notes: Multiple response options available, responses do not add up to 100%. Percentages are calculated out of total $n = 103$.

Table 9. Areas of rehabilitation performance.

| | Frequency | Percentages |
|---|-----------|-------------|
| Attention/concentration | 75 | 73 |
| Executive functioning | 74 | 72 |
| Memory | 66 | 64 |
| Language | 50 | 49 |
| Visuospatial and/or constructional skills | 47 | 46 |
| Emotional and/or behavioral problems | 47 | 46 |
| Autonomy and independence | 45 | 44 |
| Raise awareness of the disease | 35 | 34 |
| Family functioning | 32 | 31 |
| Return to work | 22 | 21 |
| Motor skills | 21 | 20 |
| Sexuality | 2 | 2 |

Notes: Multiple response options available, responses do not add up to 100%. Percentages are calculated out of total $n = 103$.

functioning (72%, $n = 74$) and memory (64%, $n = 66$). For a list of other areas where neuropsychologist perform rehabilitation treatment, see Table 9.

Teaching

Regarding teaching, 53.6% ($n = 52$) out of 97 individuals reported having worked as professors of neuropsychology in the past year. Out of the 51.5% ($n = 50$) of participants that answered this question, half of them reported teaching in private institutions (50%, $n = 25$), followed by 28% ($n = 14$) in public institutions, and 22% ($n = 11$) at both, private and public institutions. The majority of participants indicated having taught neuropsychology courses at undergraduate level with 67% ($n = 35$), followed by 52% ($n = 27$) at specialization one-year programs, 12% ($n = 6$) at doctoral levels, and 10% ($n = 5$) at a master's level. In addition, from

52 respondents, the majority reported having directed theses or dissertations related to neuropsychology at undergraduate level (42%, $n = 22$), at specialization (23%, $n = 12$), and at a master's (13%, $n = 7$) and doctorate level (13%, $n = 7$). The 98% of the participants that answered this question ($n = 51$), 7.7 was the average degree of satisfaction with their role as professors in the field of neuropsychology (using a scale where 0 is 'not satisfied' and 10 is 'very satisfied').

Research

During the past year, 56.3% of individuals ($n = 54$) from 96 participants reported having conducted research in the area of Neuropsychology. Out of 50 of researchers that answered this question, 80% ($n = 40$) reported the institutions where they work have an ethics committee, while 20% ($n = 10$) did not. In addition, out of 52 respondents, 82.7% ($n = 43$) always obtained ethics approval prior to commencing a research project, while 17.3% ($n = 9$) did not. All 52 (100%) participants that answered this question reported obtaining consent from their participants when developing a neuropsychological study.

From a total of 52 participants, 80.8% ($n = 42$) reported having received research training during their clinical or educational training, 51.9% ($n = 27$) reported never received grant funding to conduct research, and 63.5% ($n = 33$) reported not having sufficient resources and materials to conduct neuropsychological research. Half of the participants (50%, $n = 26$) that answered this question stated conducting their own statistical analysis when performing neuropsychological research, while the other half (50%, $n = 26$) reported not conducting the analyses themselves. The most common statistical software and statistical analyses reported with a medium level of proficiency were Excel (41%, $n = 22$) and SPSS (39%, $n = 21$). In addition, no level of proficiency in *R* (48%, $n = 26$), MATLAB (48%, $n = 26$), STATA (44%, $n = 24$), SAS (48%, $n = 26$), and Epi Info (44%, $n = 24$) was reported.

Discussion

In order to examine the differences in the practice of neuropsychology between different geographical/cultural regions, this section will compare our results with those of a very similar study carried out in the U.S.A and Canada (Rabin, Barr, & Burton, 2005).

A general examination of the sample shows that 87% of the respondents were women neuropsychologists, living in major cities such as Buenos Aires and Córdoba. This differs from the situation of neuropsychologists in the U.S.A and Canada (Rabin et al., 2005) where only 40% were women. Besides, respondents in this research were in average 10 years younger than those on the U.S.A/Canada study. An explanation to the age difference is most likely due to the shorter training time of the neuropsychology courses in Argentina.

The majority of neuropsychologists in this study work in private settings, either offices or hospitals and other private health centers. This is similar to that of Rabin et al., where most neuropsychologists work in private settings in both U.S.A and Canada. The reason for this is probably the long periods of time required for neuropsychological assessments and rehabilitation, which makes difficult to afford them by public services.

Data about the salary can only be considered a rough estimation. First, the dollar exchange rate has been very fluctuating in Argentina during the time when this survey was completed. Second, the very large range of salary encountered leads to think that, although the

participants were asked to report their mean monthly salary in U.S.A dollars, they might have reported their incomes in Argentinian pesos. However, it stands out that neuropsychology is not a well-paid profession in Argentina.

In terms of training, the majority refers having received postgraduate training in neuropsychology, although a small percentage has an official certification. It was also revealed the lack of acknowledgment about the existence of official training, while others cannot have access to it due to the distance, considering that the two officially recognized programs are in Buenos Aires, Argentina. While 61.5% of the participants agreed that a degree in psychology is necessary, the official programs allow the training of physicians, speech therapists, and occupational therapists. This creates certain confusion as, except for psychology, the rest of the therapeutic fields have little or no training in psychometrics or psychopathology. To the contrary, the results from Rabin et al. revealed that the majority of their respondents had a degree in psychology. Overall, respondents of the current survey in Argentina showed a high percentage of satisfaction with their academic and clinical training.

As for the barriers for the development of neuropsychology in Argentina, most participants indicated the lack of training programs (clinical or academic) as the most important factor. Therefore, if there is great interest for training opportunities, why there are so few programs? Perhaps one of the reasons to explain this is the difficulty that many postgraduate training programs have in Argentina to sustain over time. In addition, most professionals are already working and do not have the time required to complete the training. Another important factor that keeps Argentinian neuropsychology stagnant is the lack of access to neuropsychological tests, indicating that many of the tests used in other countries are not available in Argentina, i.e. the Category Test (DeFilippis & McCampbell, 1979, 1991, 1997). Importing these tests to Argentina is a costly process since they are distributed by foreign publishers. Such is the case of the Wisconsin Card Sorting Test, which is distributed by a Spanish publisher, with an office in Buenos Aires, impairing access to those professionals living in far away regions. Moreover, since there is no Argentinian adaptation of many of them there is no guarantee about their utility. Although many tests have been adapted there are not commercially available versions of these adaptations and it is hard for the neuropsychologist to gather all the information from the adaptation of each test. The next most important barrier to the development of the neuropsychology in Argentina identified by the respondents is the 'unwillingness to cooperate among professionals'. Although the point deserves a deep investigation on itself, it allows the following assumption: an individualistic approach to the discipline by professionals in the field, probably sustained by the unregulated nature of the neuropsychology field and the difficult access to materials, where each individual is compelled to develop his/her own training and practice, potentially avoiding to cooperate with their colleagues. Thus, access to training and the elements of work is so difficult, that individuals may feel little prone to share them.

In reference to the work hours, only half of the participants reported being full-time employed as neuropsychologists, which indicates that the other half do not account their practice in neuropsychology as the primary source of income. This is a reason frequently mentioned under the 'Other' category in the answers about the barriers for the development of the discipline. In general, health professionals in Argentina are in a low-income rank. Half the subjects showed satisfaction with their salary, average, 5.2, with a median of 5. Further, data showed that subjects who scored above 5 were mainly among the full-time employed neuropsychologists, while those who scored below 5 were among the part-time category.

In the contrary, when asked about the level of satisfaction with their job as neuropsychologists, the majority demonstrated a high level of satisfaction, with a median of 8. Correspondingly, the correlation between salary vs. job satisfaction, although significant, is very low ($r = .19$). In summary, among neuropsychologists, satisfaction level seem to be based on the job itself rather than on the financial reward.

In this study, the high percentage of individuals who performed diagnostic neuropsychological evaluations during the last year is showing that most of them do clinical work. According to this data, on average, an Argentinian neuropsychologist dedicates 90 h per month to assessment. However, the variability is high with many neuropsychologists dedicating most of their time to assessment. As per the battery approach used for the assessment it is apparent that the majority use flexible batteries. This phenomenon is probably a consequence of the late development of Argentinian neuropsychology, thus approaches such as the Halstead-Reitan fixed battery were outdated by the time that psychometric testing in the country was more frequently used in the evaluation process. Coincidentally, in the Rabin et al. study (U.S.A/Canada), subjects also admitted to using flexible batteries, denoting that this might be a global tendency in neuropsychological assessment. Most of the tests used reveal, as described above, the dynamics of geographical distribution and test adaptation to be used in Argentina. Correspondingly, some widely used tests in other world regions are not common here such as the Delis-Kaplan Executive Function System (D-KEFS) (Delis, Kaplan, & Kramer, 2001), the Paced Auditory Serial Addition Task (PASAT) (Gronwall, 1977), or the California Verbal Learning Test-II (Delis, Kramer, Kaplan, & Ober, 2000). Notably, some of the tests frequently mentioned in the 'other' category were the Addenbrooke's Cognitive Examination-R (Torralva et al., 2011), *Batería para el Análisis de los Déficits Afásicos* (BADA) (Ferrerres et al., 1998), and Ineco Frontal System (Torralva, Roca, Gleichgerrcht, Lopez, & Manes, 2009). Surprisingly, the Boston Naming Test is widely used despite its serious validity flaws when applied to a local population (Fernandez & Fulbright, 2015).

As per the age of the clients, results demonstrated that these are mostly adults with a few neuropsychologists dedicating their practice to preschoolers, school age children and adolescents. The child population is probably assisted by educational psychologists who, curiously, are not officially allowed to be trained in neuropsychology.

In reference to test norms, a considerable percentage of subjects admitted to using normative data from other countries (58%), which reveals the lack of normative data in Argentina.

Making photocopies of tests is a very frequent practice in Argentina, which contributes to hinder publisher's willingness to adapt and distribute their tests in this country. The rationale for this practice is based on participants' complaints (60%) on the high cost of the tests, followed by 50% of the answers that made reference to neuropsychological instruments not being adapted to their culture. This creates a vicious circle: publishers do not adapt the tests because they cannot sell them, and they are not sold because they are not adapted. A reasonable solution should be found in order to make the business profitable for publishers, but the tests affordable for consumers.

The type of patient most frequently assessed by Argentinian neuropsychologists is evenly distributed among diagnosis. It stands out the very low percentage of assessment of psychiatric patients such as those with schizophrenia, bipolar disorders, personality disorders, and substance abuse.

Regarding the reasons for consultation is remarkable how low the percentage of people referred for forensic consultation is (2%). This depicts a situation that is very different to that

of other countries such as the U.S.A where forensic neuropsychology is a very well-developed field. For example, in the study by Rabin et al., 68.3% of the neuropsychologists reported that they received referrals from attorneys. These results are consistent with those exhibited in Table 6, which shows that attorneys and insurance companies in Argentina do not routinely refer clients to neuropsychologist. The remaining of the referral sources are in agreement with the expectations since most of the patients are referred by neurologists, psychiatrists, and psychologists. Surprisingly, 46% of the respondents declared that their patients were self-referred, suggesting that a certain portion of the population is probably identifying neuropsychologists as independent practitioners.

The present study also revealed that a large number (80.6%) of neuropsychologists were dedicated to the rehabilitation practice. Notably, this differs from the Rabin et al. study, where only 38.3% admitted to working with rehabilitating patients. Another interesting aspect of rehabilitation services in Argentina is that despite the cost, it is delivered individually with a small number of professionals offering group practices. The reasons for this should be further explored. It is also noteworthy that most of the patients in rehabilitation are demented, which is unexpected since the potential success of neuropsychological rehabilitation in these patients is rather limited (Farina et al., 2002; Fernández, Manoilloff, & Monti, 2006). Paradoxically, only 40% of the participants in the current study admitted to working with traumatic brain injury patients, which is probably the most common population found in rehabilitation centers (Sohlberg & Mateer, 2001).

In the present study, about a third of the participants reported working as neuropsychology teachers, and mostly in private institutions, suggesting that neuropsychology is generally taught in private institutions. In general, they reported feeling satisfied with teaching.

Another result worth mentioning is that near 20% of respondents reported doing research at the time of the study, despite never having received research training. Even more striking is the fact that around 52% of the participants never received any research funding, meaning they work in research with neither monetary retribution nor funds for the development of the investigation. This is a matter of concern since this clearly limits the research that can be done and the quality of their findings. For instance, without any funding, there are few possibilities of running brain imaging studies.

In summary, neuropsychology in Argentina slowly progressed from neurology since its beginnings in the early twentieth century until the 1960s. Since then its growth has been substantial, and leading to the establishment of numerous clinical and research institutions. Currently, women psychologists are the majority practicing neuropsychology, generally located in the major cities in the country. The professional practice is mostly unregulated and about half of the total number of neuropsychologists cannot live from their work on this field. More research is necessary regarding test adaptation and distribution. Unexpected findings from this study were the high percentages of demented patients in rehabilitation, and the number of professionals in the field doing research without funding or monetary retribution. Sub-specialties such as forensic neuropsychology or neuropsychology of HIV are underdeveloped. Besides, postgraduate programs should be increased and more evenly distributed across the country.

The future of Argentinian neuropsychology

The results of this study show a clear status of the present situation of the discipline in Argentina and what is needed for a successful future. Of the most important issues to tackle is regulating the field by establishing the criteria of competencies needed to practice neuropsychology, i.e. degree, training, hours of supervised clinical practice, and certifications obtained. A professional association that sets the guidelines for the practice of neuropsychology might be a suitable option. Concomitantly, there should be an increase of training opportunities. It would not be either useful or fair to regulate the field without offering the possibility to obtain the necessary training. This is a problem with a difficult solution as it seems that programs do not survive over time because of financial problems caused by the high dropout rate of students. A potential solution could be making the programs more accessible by increasing the number and location of training. Also, by offering financial aid or scholarships in neuropsychology, allowing students to dedicate full time to their training.

More research is needed in regards to test adaptation and availability in the country. Although, great progress has been done since the 1990s this more work is need it. For instance, areas such as memory do not count with enough adapted tests. The use of foreign normative data is quite inappropriate (Fernández & Marcopulos, 2008), as well as the use of tests without a proper adaptations. Even when many tests have been adapted, information is not easily available for users. An interesting effort was made with the publication of *Evaluación neuropsicológica de adultos* (Neuropsychological evaluation of adults) (Burin, Drake, & Harris, 2007), which compiles information on many neuropsychological tests and their adaptations. However, the authors did not included normative data, thus leaving readers on their own when searching for these data. Recently, normative data tailored to the demographic characteristics (age, educational level, and gender) of the Argentinian population have been published for ten neuropsychological tests, such as: The Trail Making Test (TMT, Arango-Lasprilla, Rivera, Aguayo, et al., 2015), Hopkins Verbal Learning Test-Revised (HVLt-R, Arango-Lasprilla, Rivera, Garza, et al., 2015), Modified Wisconsin Card Sorting Test (M-WCST, Arango-Lasprilla, Rivera, Longoni, et al., 2015), Symbol Digit Modalities Test (Arango-Lasprilla, Rivera, Rodríguez, et al., 2015), Verbal Fluency Tests (Olabarrieta-Landa, Rivera, Galarza, et al., 2015), Standard form of the Boston Naming Test (Olabarrieta-Landa, Rivera, Morlett, et al., 2015), Brief Test of Attention (Rivera, Perrin, Aliaga, et al., 2015) Rey-Osterrieth Complex Figure (Rivera, Perrin, Morlett-Paredes, et al., 2015), Stroop Color-Word Interference Test (Rivera, Perrin, Stevens, et al., 2015), and Test of Memory Malingering (TOMM, Rivera, Perrin, Weiler, et al., 2015).

Finally, obtaining more funding for research is another goal to be reached. In this study, only 54 out of 135 respondents reported having done research during the last year. However, it is not clear how many people are properly trained to do research and how to obtain funding to support it. Beyond the different contributions that can be made in the different subfields of basic research in neuropsychology, it is evident the need for applied research, particularly regarding the development of diagnostic and rehabilitation tools. Only if there are adequate instruments to gather information, basic research and clinical work are possible. For instance, currently there are not properly validated neuropsychological tests for preschoolers in Argentina, which makes impossible to test hypotheses of executive functioning in infants. Moreover, how can we study the influence of education on cognition when many of the

current tests are not adequate to evaluate people with low education? Therefore, by boosting applied research, the whole neuropsychology field will benefit. Addressing this as a goal implies more research training and discussions on the areas of neuropsychology to be developed.

In conclusion, this study describes and provides a clear perspective of the challenges to be faced to improve neuropsychology in Argentina. After decades of slow development, the field of neuropsychology in Argentina has progressed substantially in the last 25 years. Nevertheless, the field still faces important challenges to be accomplished in order to fully develop as a scientific and applied discipline.

Notes

1. This book was later published as *Principios de Psicología Biológica* (Principles of biological psychology) in Spain and France (1913); and *Principios de Psicología* (Principles of psychology), in Argentina and Germany (1919).
2. Although Wernicke originally published his article in 1903, the authors of this paper only had access to a later reproduction of it appeared in *Anales de oftalmología*, published in 1904.
3. In Argentina, there is a degree in 'psicopedagogía' which encompasses studies in pedagogy and psychology as well. Since there is not an equivalent term in English in this paper 'psicopedagogos' will be referred as 'educational psychologists'. However, it must be emphasized that educational psychologists in Argentina are *psychologists* specialized in educational matters.

Disclosure statement

No potential conflict of interest was reported by the authors.

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