The profession of neuropsychology in Spain: results of a national survey

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ABSTRACT

Objective: To examine the current status of professional neuropsychology in Spain, with particular focus on the areas of professional training, current work situation, evaluation and diagnostic practice, rehabilitation, teaching, and research. Methods: Three hundred and thirty-nine self-identified professionals in neuropsychology from Spain completed an online survey between July and December of 2013. Respondents had an average age of 35.8 years and 77% were women. Results: Ninety-seven percent of the respondents identified as psychologists; 82% of the sample had a master’s degree, and 33% a doctoral degree. The majority (91%) received their neuropsychological training at a graduate level; 88% engaged in neuropsychological evaluation, 59% in rehabilitation, 50% in research, and 40% in teaching. Average number of hours per week dedicated to work in neuropsychology was 29.7, with 28% of the respondents reporting working in hospitals, 17% in not-for-profit rehabilitation centers, 15% in universities, and 14% in private clinics. Clinicians primarily work with individuals with stroke, traumatic brain injury, and dementia. The top perceived barriers to development of neuropsychology in Spain included lack of clinical and academic training opportunities, and negative attitude toward professional collaboration. Conclusions: The field of neuropsychology in Spain is young and rapidly growing. There is a need to regulate professional neuropsychology, improve graduate curricula, enhance existing clinical training, develop professional certification programs, validate and create normative data for existing neuropsychological tests, and create new, culturally relevant instruments.

Introduction

Neuropsychology is a field of specialization within psychology that studies brain–behavior relationships and attempts to explain the way in which the activity of the brain is expressed in observable behavior (Beaumont, 2008, p. 3). The development of neuropsychology began
with description of first clinical cases by Broca in 1861 (Kolb & Whishaw, 2015), but it was not until the twentieth century that the first approaches emerged to help develop the discipline (Hartlage & Long, 2009).

One of the early pioneers in the history of neuropsychology in Spain was Luis Simarro (1851–1921) (Carpintero, 2014). He was a neurologist with a specialty in neuropsychiatry who developed a systematic approach to the evaluation of sensory, motor, cognitive, and emotional symptoms. His medico-legal reports were held in higher esteem than those of his mentor, Jean-Martin Charcot (Campos-Bueno, 2002; García, 2009). Simarro was the first professor of Experimental Psychology at the Complutense University of Madrid, where he expanded current thinking at the time about the role of physical and neuropsychological symptoms in diagnosing diseases of the nervous system (Bandrés, Campos, & Llavona, 1989). One of his students, Gonzalo Rodríguez Lafora (1886–1971), was the first to describe the fatal autosomal recessive genetic disorder common to southern European countries known as progressive myoclonic epilepsy or ‘Lafora disease’ (Bauermeister & Barkley, 2010).

Another important figure in the history of neuropsychology in Spain is Lluis Barraquer i Bordás (1923–2010). He was a third-generation neurologist from a distinguished family famous for implementing and promoting neuropsychology in Catalonia. He focused on language functioning, and then extended his work to encompass the understanding and treatment of other cognitive problems and emotional issues caused by pathologies affecting the nervous system (Junqué Plaja & Vendrell Gómez, 2011). Lluis Barraquer founded Spain’s first neuropsychological association, the Catalan Society of Neuropsychology, in Barcelona in 1979. Jordi Peña Casanova is a co-founder of the association. He is a neurologist by training who translated some of Luria’s textbooks into Spanish, and therefore is well-known for disseminating the Lurian approach to the integration of higher mental functions throughout the Spanish-speaking world. In 1988, he created the first master’s program in the field – in Neuropsychology and Behavioral Neurology – at the University of Barcelona. His other accomplishments include the development of the multi-domain neuropsychological assessment battery ‘Test Barcelona’ (Peña-Casanova, 1991) and the large-scale study to establish normative neuropsychological data for Spanish adults, project NEURONORMA (Peña-Casanova, Gramunt-Fombuena, et al., 2009).

With the creation of formalized postgraduate programs and Spanish language tests, in the 1990s, the field continued to expand. Many academic events (congresses, symposia, and conferences) were organized, other master’s-level programs began at various universities around the country, and new local/regional professional associations were founded. In 2007, a number of regional neuropsychology societies came together to form the Spanish Federation of Neuropsychology (FANPSE, www.fanpse.org). Currently, the FANPSE represents 12 regional neuropsychology societies (from the Autonomous Communities of Andalusia, Aragon, Asturias, Castile and Leon, Canary Islands, Cantabria, Catalonia, Valencia, Galicia, Madrid, Murcia, and the Basque Country-Navarra), belongs to the Federation of European Societies of Neuropsychology (ENS), and each year organizes the National Congress of Neuropsychology. Its membership includes more than 1100 Spanish professionals. That same year, a group of professionals created the Clinical Neuropsychology Consortium, which was composed of three separate associations that later fused in 2013. Today, the consortium consists of 120 members.

In recent years, professionals in neuropsychology have witnessed important advances in the field, and an interest in the field by psychology professionals has greatly increased.
However, to date, there is no accreditation for neuropsychologists or neuropsychology training programs that is recognized by the Spanish Government. The Spanish Ministry of Education does provide accreditation for clinical psychology training programs. Prior to 2010, university students who wanted to become clinical psychologists enrolled in five-year bachelor’s degree programs. These programs were not based on general liberal arts curricula like in the United States. All of the students’ classes were directly related to psychology. In these programs, 90 h of training (either in the areas of clinical, occupational, and/or educational psychology) were also a requirement. Upon graduation, these students were considered qualified to open a clinical practice and could join the National Association of Psychologists. However, if a psychologist wanted to obtain an official position providing care in the context of the Spanish national health care system, they had to study for and score high on a national exam and then complete four years of clinical internship at designated sites primarily within the health care system itself.

In the past five years, as European educational institutions try to homogenize their curricula as part of Plan Bologna which requires a three-year bachelor’s degree program in psychology across all European countries, university undergraduate programs in psychology in Spain have become four-year degrees in which all of the students’ credits are related to the study, practice, or research in psychology. Most programs still require 180 h (18 credit hours according to Plan Bologna) of shadowing a clinical psychologist. This shortened program of study has resulted in two options to become a practicing psychologist in Spain after graduation: (1) intern in the national health care system as described above or (2) complete a two-year master’s program accredited by the Spanish Ministry of Education as an official program for health psychologists that requires at least 300 supervised hours in centers that usually are not part of the national health care system. According to the Spanish Ministry of Education, psychologists who have interned in the national health care system can perform all types of specialized psychological assessments and interventions, while those who choose to complete a master’s degree can only perform ‘general’ functions as a health psychologist. As of the writing of this article, there is still considerable controversy concerning the distinction between general and specialized activities (Carrobles, 2014).

The extensiveness of training in neuropsychology within these programs may vary considerably. All undergraduate programs require at least one mandatory class in neuropsychology. Depending on the program, mentored clinical neuropsychology and research opportunities may be available. Those who want to become practicing neuropsychologists have to choose one of the two options described in the prior paragraph. In order to specialize in clinical neuropsychology, clinical psychologists might opt to obtain a postgraduate specialization (one, two, or three years) in specific areas within the field. If they are interested in working in academia to teach and conduct research, then they would complete a doctoral degree. Prior to 2011, each type of degree was generally independent of the others. However, now it is a requirement to have master’s-level postgraduate studies (completion of 60 credits in 1 year or 90 in 2 years) to obtain a doctoral degree.

In the past year, the National Association of Psychologists in Spain approved their own accreditation – an ‘Expert in Clinical Neuropsychology’ – to recognize those psychologists who can demonstrate (1) 4000 supervised hours in clinical neuropsychology and (2) 500 h of theory (e.g. evidenced by a master’s degree in the field or sub-field). There is also a grandfather clause that states that veteran neuropsychologists who have worked the equivalent of six years full-time in the field of clinical neuropsychology can also be considered an ‘Expert
in Clinical Neuropsychology’. It is important to reiterate that the Spanish Ministries of Education and Health do not recognize or accredit neuropsychology as a specialty practice within the field of psychology. The presence of clinical psychologists performing neuropsychological functions in public hospitals is restricted to only those who scored high on the national exam and completed the four-year internship.

Unlike Spain, professional training in neuropsychology in English-speaking countries (e.g. the United States) is regulated and officially recognized. Therefore, guidelines for training as a clinical neuropsychologist are well established. In several of these countries, survey studies on the practice of clinical neuropsychology are periodically conducted (Sweet, Nelson, & Moberg, 2006; Sweet, Peck III, Abramowitz, & Etzweiler, 2002). These studies have been instrumental in not only exploring the state of the profession and its evolution across time (Sweet, Meyer, Nelson, & Moberg, 2011), but also in uncovering specific aspects, such as professional practices in forensic neuropsychology (Heilbronner, 2004), working with minority populations (Elbulok-Charcape, Rabin, Spadaccini, & Barr, 2014), the use of assessment instruments (Rabin, Barr, & Burton, 2005), and the use of computerized neuropsychological tests (Rabin et al., 2014).

As described above, the state of clinical neuropsychology in Spain is quite complex, and to date, there have not been any studies on the current state of neuropsychology in the country. Many aspects of neuropsychological practice in Spain, such as training background, work setting, average salary and satisfaction, use of neuropsychological instruments, and patient groups attended, are not presently known. Such information would be very useful in order to understand the current state of neuropsychology in Spain and to detect possible strengths and weaknesses in the education and practice, as well as to plan the future of the profession.

Therefore, the aim of the current study is to assess the state of neuropsychology in Spain, with a particular focus on the areas of professional training, current work situation, evaluation and diagnostic practice, rehabilitation, teaching, and research.

**Method**

**Participants**

Participants in the study were self-identified psychologists or other health professionals who worked in the field of neuropsychology in Spain. Inclusion criteria were: (1) having at least a bachelor’s degree in psychology or related areas; (2) currently living in Spain; (3) considering 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; and (4) having completed the sociodemographic questions.

Data from 367 individuals were collected. Of these, seven reported not having at least a bachelor’s degree, and six reported not considering themselves to be a neuropsychologist or performing at least some of the activities related to the area. Further, 15 participants failed to answer the sociodemographic questions, and were also removed from the analyses. This resulted in a final sample of 339 individuals who met all inclusion criteria. The majority of participants were female (77%, n = 261) and the mean age was 35.8 years (range 22–73 years). Participants’ average number of years of experience in neuropsychology was 7.9 (range 0–35) and the majority reported conducting their neuropsychological work in hospital systems.
Three hundred and thirty-four participants answered the question about their geographical location within Spain, with the majority indicating living in the Autonomous Communities of Andalusia (25.1%, \( n = 84 \)), Catalonia (22.5%, \( n = 75 \)), Madrid (20.4%, \( n = 68 \)), Valencia (12.9%, \( n = 43 \)), and the Basque Country (6%, \( n = 20 \)). For the full geographic representation of participants, please see Table 1.

### Measures

A group of professional researchers from Spain developed the survey utilized in this study using the following procedure. (See Supplemental Material) First, a comprehensive review of the literature was conducted to recognize the eight areas of interest. Questions were composed of demographic information, professional training, current work situation, evaluation and diagnosis, rehabilitation, teaching, research, and ethics in the workplace. Then, the survey was sent to a group of experts in neuropsychology to ensure the questions were adapted to the cultural and linguistic contexts from Spain, as well as to ensure the cultural applicability and value of the questions.

Once the experts’ observations were integrated, the survey was comprised of 64 questions that were entered into an online survey platform (www.surveymonkey.com). A pilot study was conducted to ensure accuracy, validity, and proper operation of the online survey. The survey was designed to allow most items to be completed or skipped at the participants’ discretion, which led to varying sample sizes across different questions. Additionally, the survey employed ‘skip logic,’ such that only those individuals who indicated having worked in neuropsychological assessment/evaluation, rehabilitation/treatment, etc., during the past year were presented questions corresponding to these areas of neuropsychology practice. This national survey was part of an international survey distributed to neuropsychologists in 39 countries on five continents (Arango-Lasprilla et al., 2015; Arango-Lasprilla, Stevens, Morlett-Paredes, Ardila, & Rivera, in press; Fonseca-Aguilar et al., 2015).

| Autonomous Community       | Frequency | Percent |
|----------------------------|-----------|---------|
| Andalusia                  | 84        | 25.1    |
| Catalonia                  | 75        | 22.5    |
| Madrid                     | 68        | 20.4    |
| Valencia                   | 43        | 12.9    |
| Basque Country             | 20        | 6.0     |
| Castille-Leon              | 8         | 2.4     |
| Asturias                   | 7         | 2.1     |
| Balearic Islands           | 6         | 1.8     |
| Castille-la Mancha         | 6         | 1.8     |
| Aragon                     | 3         | 0.9     |
| Canary Islands             | 2         | 0.6     |
| Extremadura                | 2         | 0.6     |
| Galicia                    | 2         | 0.6     |
| La Rioja                   | 2         | 0.6     |
| Murcia                     | 2         | 0.6     |
| Navarra                    | 2         | 0.6     |
| Cantabria                  | 1         | 0.3     |
| Melilla                    | 1         | 0.3     |
| Total                      | 334       | 100.0   |
**Procedure**

Once the study was approved by the ethics committee of the University of Deusto, recruitment was conducted by sending an email inviting participation from neuropsychology professionals across several professional organizations in Spain (e.g. Neuropsychology Association of Andalusia and Neuropsychology Association of Madrid) with the study details, hyperlink to the online survey, and a request for their assistance in recruiting other neuropsychology professionals as participants. No incentive was offered for participation in the study. Data collection was conducted from July of 2013 to February of 2014.

**Statistical analysis**

Upon the conclusion of data collection, the database was downloaded from the Survey Monkey server and analyses were conducted using SPSS 22.0 (IBM Corp., Armonk, NY). Due to the descriptive nature of this study, analyses of measures of central tendency and frequency distributions were carried out.

**Results**

The results will be divided into the following sections: (1) professional training, (2) current work situation, (3) evaluation, (4) rehabilitation, (5) teaching, and (6) research. For the present study, the section in ethics was excluded from the analysis since those are the focus of another article.

**Professional training**

The majority of participants (82.3%, \( n = 279 \)) reported having master’s degrees, while only about a third (32.7%, \( n = 111 \)) reported having a doctorate. Nearly a quarter of the participants (24.5%, \( n = 83 \)) reported having earned both a master’s and a doctoral degree. It is important to note that prior to 2011, it was not necessary in Spain to obtain a master’s degree as part of the doctoral degree program. The two degrees were generally independent. The vast majority self-identified as psychologists (97.3%, \( n = 330 \)), with the remaining nine participants endorsing that they are medical doctors (\( n = 3 \)), speech/language pathologists (\( n = 2 \)), occupational therapist and educator (each \( n = 1 \)), and ‘other’ (\( n = 2 \)).

In the domain of professional training, most participants (90.6%, \( n = 307 \)) reported having received the majority of training in neuropsychology during their graduate studies (master’s or doctorate), 21.5% (\( n = 73 \)) during undergraduate studies, and 7.7% (\( n = 26 \)) as postdoctoral fellows. When asked how they assessed the training they received in neuropsychology, 13.6% (\( n = 46 \)) rated it as ‘excellent’, 38.1% (\( n = 129 \)) reported their training as ‘very good’ (please see Figure 1).

In terms of clinical supervision during their training in neuropsychology, about a third of the participants assessed it as either ‘very good’ or ‘good’ (30.4%, \( n = 102 \), and 28%, \( n = 94 \), respectively), while fewer (14.3%, \( n = 48 \)) rated it as ‘excellent’, and another 12.2% (\( n = 41 \)) as ‘fair’ (please see Figure 2).

In regard to belonging to professional neuropsychological associations, nearly half of the participants (47.5%, \( n = 161 \)) indicated being members of the FANPSE, 28% (\( n = 95 \)) indicated
not belonging to any organizations, while 31.6% \( (n = 107) \) endorsed belonging to ‘other associations’. Additionally, 9.7% of the participants \( (n = 33) \) indicated belonging to the International Neuropsychological Society, 6.2% \( (n = 21) \) to Federation of European Neuropsychological Societies, 1.8% \( (n = 6) \) to the National Academy of Neuropsychology, and finally 0.9% \( (n = 3) \) to Latin-American Society of Neuropsychology (SLAN).

Finally, when asked about the most important barriers for the development of neuropsychology in Spain, nearly half of the participants indicated a lack of clinical training opportunities \( (47.5\%, n = 161) \), and a lack of willingness to collaborate between professionals \( (46\%, n = 156) \), while a third \( (34.8\%, n = 118) \) indicated a lack of academic training programs, and a fifth \( (21.5\%, n = 73) \) reported lack of access to neuropsychological instruments as principal barriers. (See Table 2 for additional barriers).

![Figure 1. Participants' rating of the training received in neuropsychology \( (n = 339) \).](image1)

![Figure 2. Participants' rating of clinical supervision received during neuropsychology training \( (n = 336) \).](image2)

### Table 2. Barriers for the development of neuropsychology in Spain.

| Barriers                                      | Frequency | Percentage |
|-----------------------------------------------|-----------|------------|
| Lack of clinical training opportunities       | 161       | 47.5       |
| Lack of willingness to collaborate between professionals | 156       | 46.0       |
| Lack of academic training programs           | 118       | 34.8       |
| Lack of access to neuropsychological instruments | 73        | 21.5       |
| Lack of professional leaders in the field    | 71        | 20.9       |
| There are no barriers                        | 22        | 6.5        |
| Lack of access to literature/libraries       | 19        | 5.6        |
| Lack of access to technology/computers       | 5         | 1.5        |
| Lack of access to the Internet               | 0         | 0          |

Notes: Multiple response options available, responses do not add up to 100%. Percentages are calculated out of total \( n = 339 \).
Current work situation

As for the employment status, a little over half of the participants (51.4%, n = 169 of 329) reported being employed full-time, about a third (32.8%, n = 108) reported working part-time, while another 14.3% (n = 47) reported being unemployed, and 1.5% (n = 5) reported being retired. The majority of participants reported performing activities related to neuropsychology at a hospital system (28.5%, n = 90 of 316 who answered the question), at a non-profit rehabilitation facility (17.1%, n = 54), college/university (14.6%, n = 46), or at a private clinic (13.6%, n = 43) (see Table 3).

The average length of time spent working in the area of neuropsychology was 7.9 years (mode = 10 years, range 0–35, n = 319), with an average of 29.7 h per week reportedly devoted to neuropsychology work (n = 305, after removing values of ‘0’ or greater than 100, which removed 8 data points). The reported average monthly income (after removing responses of ‘0’ and outliers who reported income over 4,000 Euros monthly) was €1,402.54 (Euros). Finally, regarding satisfaction with salary, which was measured with a 1–10 scale (with 1 being ‘not at all satisfied’ and 10 ‘completely satisfied’), the average satisfaction was 4.7 (SD = 2.5; n = 292), and average satisfaction with their work as neuropsychologist was 7.7 (SD = 1.9; n = 301).

Evaluation

The vast majority of participants (88.5% of the total sample, n = 300) reported performing neuropsychological assessments over the past year. Respondents (n = 244) conducted neuropsychological assessments with an average of 17.8 patients per month, and spent an average of 6.7 h (mode = 3, IQR = 3–8 h) on assessment, scoring, interpretation of results, and report writing.

Regarding the main criteria when selecting tests for neuropsychological assessment, half of those who engage in neuropsychological assessment (49.8%, n = 126 of 253) use personalized/flexible batteries, followed by 40.3% (n = 102) who use flexible batteries, and 9.9% (n = 25) use standardized batteries. From a list of 50 commonly used neuropsychological assessment instruments, Table 4 presents those 20 that were the most regularly used. As observed, the Stroop test is the most used (70%, n = 211), followed by the WAIS (64%, n = 193) and the Trail Making Tests (60%, n = 180).

On a question which asked about scoring procedure(s) employed for the majority of neuropsychological tests (which allowed for multiple response options), participants

| Table 3. Distribution of types of settings where the majority of activities related to neuropsychology are performed. |
|---------------------------------------------------------------|
| **Type of Setting**                                          | **Frequency** | **%**  |
| Hospital system                                              | 90            | 28.5   |
| Non-profit rehabilitation facility                           | 54            | 17.1   |
| College or university                                        | 46            | 14.6   |
| Private clinic                                               | 43            | 13.6   |
| Private practice                                             | 28            | 8.9    |
| Other                                                        | 24            | 7.6    |
| For profit rehabilitation facility                           | 19            | 6.0    |
| Medical school                                               | 10            | 3.2    |
| School system (elementary/middle/high school)                | 2             | .6     |
| Total                                                        | 316           | 100    |
indicated the most common procedure (76%, n = 227 out of 300) used for scoring neuropsychological tests was using normative data from their country, followed by using normative data from another country (29%, n = 88), and by using personalized procedures developed through clinical practice (20%, n = 60). Additionally, 9.6% of the participants (n = 29) indicated they use raw scores without comparing their patients’ scores to a normative population as part of their scoring procedures.

As for the method of obtaining the neuropsychological instruments (a question with multiple response options), 58% (n = 174 of 300) indicated purchasing them from the publisher, while 39% (n = 118) responded they make photocopies/reproductions of tests, 36% (n = 107) borrow them from colleagues, 31% (n = 92) loan instruments from libraries, and 29% (n = 86) download the instruments from the Internet. Fewer participants, 8% (n = 24), indicated they request instruments directly from the author.

Among perceived problems with neuropsychological instruments reported by the participants, the most frequent categories were that instruments are too costly/expensive (58%, n = 174) and the lack of normative data for their country (49%, n = 146; more problems are outlined in Table 5).

Among the patient populations that most frequently undergo neuropsychological evaluation were individuals with stroke/vascular diagnoses (34%, n = 103), traumatic brain injury (23%, n = 69), and dementia (22%, n = 66; see Table 6 for more).

The three primary reasons for consultation were determination of diagnosis (61%, n = 184 of 300 participants), rehabilitation and treatment, and planning (57%, n = 172), and to establish baseline of function for subsequent testing (25%, n = 74). Participants indicated that most of their patients were referred from neurology (62%), self-referral (41%), and psychiatry (38%). The other referral sources are presented in Table 7.

Table 4. List of the 20 most used neuropsychological instruments by neuropsychologists in Spain (out of a total n = 300).

| Instrument                                      | Frequency | Percentage |
|-------------------------------------------------|-----------|------------|
| Stroop Test (Stroop Neuropsychological Screening Test) | 211       | 70         |
| WAIS (Wechsler Adult Intelligence Scale)         | 193       | 64         |
| TMT A&B (Trail Making Test A&B)                  | 180       | 60         |
| BNT (Boston Naming Test)                         | 170       | 57         |
| Barcelona (Test de Barcelona)                    | 149       | 50         |
| Clock Drawing Test                               | 147       | 49         |
| MMSE (Mini-Mental State Examination)             | 146       | 49         |
| WMS (Wechsler Memory Scale)                      | 142       | 47         |
| ROCFT (Rey–Osterrieth Complex Figure Task)       | 132       | 44         |
| WCST (Wisconsin Card Sorting Test)               | 131       | 44         |
| Token (Token Test)                               | 130       | 43         |
| TAVEC (Test de Aprendizaje Verbal España Complutense) | 129       | 43         |
| SDMT (Symbol Digit Modalities Test)              | 111       | 37         |
| WISC (Wechsler Intelligence Scale for Children)  | 105       | 35         |
| BADS (Behavioral Assessment of the Dysexecutive Syndrome) | 102   | 34         |
| RAVLT (Rey Auditory Verbal Learning Test)        | 99        | 33         |
| CPT (Continuous Performance Task)                | 84        | 28         |
| D2 Test (Concentration Endurance Test)           | 80        | 27         |
| BDAE (Boston Diagnostic Aphasia Examination)     | 78        | 26         |
| JLO (Benton Judgment of Line Orientation Test)   | 78        | 26         |

Notes: Multiple response options available, responses do not add up to 100%. Percentages are calculated out of total n = 300.
Finally, Table 8 presents the neuropsychological domains that are most frequently addressed during neuropsychological evaluations. The majority of the abilities/skills that are always evaluated are attention (72%), executive functions (70%), and verbal memory (65%).

**Rehabilitation**

One hundred and ninety-nine individuals (58.7% of the entire sample $n = 339$) reported having worked in neuropsychological rehabilitation during the past year. Of these survey participants, 180 individuals indicated that they provided services to, on average, 19.4 patients per month (IQR = 6–25), with an average of 16.6 h per week devoted to therapy. A half of the participants who engage in rehabilitation (50%, $n = 92$ of 184) indicated they provided mixed (individual and group) therapy the most frequently, followed by individual therapy (37.5%, $n = 69$) and group therapy only (12.5%, $n = 23$).
The majority of rehabilitation services however are for individuals with stroke/vascular diagnoses (64%) and traumatic brain injury (58%) (please see Table 9). The areas of attention and concentration (91%), executive functioning (90%), and memory (85%) are those most involved in rehabilitation (see Table 10).

Table 7. Referral sources of patients attending neuropsychology services.

| Source                          | Frequency | Percentage |
|---------------------------------|-----------|------------|
| Neurology                       | 186       | 62         |
| Self-referral                   | 122       | 41         |
| Psychiatry                      | 113       | 38         |
| Psychology                      | 103       | 34         |
| Neurosurgery                    | 87        | 29         |
| Rehabilitation                  | 82        | 27         |
| Geriatrics                      | 72        | 24         |
| School system                   | 63        | 21         |
| Friends                         | 57        | 19         |
| Pediatrics                      | 51        | 17         |
| Family (general medicine)       | 50        | 17         |
| Insurance company               | 48        | 16         |
| Internal medicine               | 47        | 16         |
| Law (attorney)                  | 26        | 9          |
| Alcohol/drug facilities         | 23        | 8          |
| Other                           | 21        | 7          |
| Cardiology                      | 16        | 5          |
| Psychiatry                      | 5         | 2          |
| Occupational medicine           | 4         | 1          |
| Orthopedics                     | 2         | 1          |

Notes: Multiple response options available, responses do not add up to 100%. Percentages are calculated out of total \( n = 300 \).

Table 8. Frequency with which the following cognitive domains are always evaluated during neuropsychological assessments.

| Domain                      | Frequency | Percentage |
|-----------------------------|-----------|------------|
| Attention                   | 215       | 72         |
| Executive functions         | 211       | 70         |
| Verbal memory               | 194       | 65         |
| Language                    | 163       | 54         |
| Non-verbal memory           | 157       | 52         |
| Visuospatial skills         | 153       | 51         |
| Construction                | 137       | 46         |
| Intelligence                | 87        | 29         |
| Motor skills                | 73        | 24         |
| Auditory perception         | 54        | 18         |
| Achievement                 | 47        | 16         |
| Tactile perception          | 25        | 8          |

Notes: Multiple response options available, responses do not add up to 100%. Percentages are calculated out of total \( n = 300 \).

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The majority of those who indicated working in neurorehabilitation (81%, \( n = 162 \) of 199) reported the use of personal computers (PC, Mac, etc.) as the technological tool most used during rehabilitation. This was followed by iPads/tablets (35%, \( n = 69 \)), and mobile/smart phones (24%, \( n = 47 \)). Fewer participants endorsed the use of neurofeedback (7%, \( n = 13 \)) and virtual reality (5%, \( n = 10 \)) in neurorehabilitation, with only two individuals (1%) indicating the use of neuromodulation techniques such as transcranial magnetic and direct current stimulation.
One hundred and thirty-five individuals (39.8% of the entire sample of 339) reported engaging in teaching activities related to neuropsychology in the past year. Of those who engaged in teaching activities, the majority (37%, n = 50) reported working as professors/instructors in neuropsychology in public institutions, while about a third (31.9%, n = 43) reported working in private institutions, and nearly a quarter (23.7%, n = 32) in both. The majority (62.2%, n = 84) indicated having taught courses in neuropsychology at master’s level, followed by undergraduate level (43%, n = 58), one-year, postgraduate specializations (31.1%, n = 42), and doctorate level (14.8%, n = 20). About a third of the participants (34.1%, n = 46) reported having directed theses or dissertations within topics of neuropsychology at master’s level,
followed by undergraduate level (22.2%, n = 30), doctorate (20%, n = 27), and one-year, postgraduate ‘specializations’ (11.1%, n = 15). One hundred and thirty-four participants rated their satisfaction with their role as professors in the area of neuropsychology as satisfied (using a scale of 1–10 (with 1 being ‘not at all satisfied’, and 10 ‘completely satisfied’), with an average score of 7.5.

**Research**

From a total of 272 individuals who responded to the questions on research, 169 (49.9% of the total sample) indicated having conducted research in the area of neuropsychology in the last year. Eighty-four percent (84.1%, n = 138) of those who reported working in research indicated they have received research training during their clinical training/education. Regarding ethics considerations, 78.1% (n = 132) of the participants reported having an ethics committee at their institution, 81.7% (n = 138) of them always sought ethics approval prior to starting a research project, and 95.3% (n = 161) reported they obtain informed consent from their participants.

One hundred and sixty-three individuals answered the question about grant funding, with 50.3% (n = 85) reporting having received grant funding for research. Additionally, nearly half (53.1%, n = 86 of 162) of the participants reported having sufficient resources and material to conduct neuropsychological research. Importantly, the other half (46.9%, n = 76) reported not having sufficient resources and material to conduct neuropsychological research.

One hundred and sixty-two individuals who engage in neuropsychology research answered the question about conducting their own statistical analyses when performing research, with 56.2% of these (n = 91) answering in the affirmative, and 43.8% (n = 71) indicating they do not conduct their own statistical analyses.

**Discussion**

The results of the present study provide data about the current practice of neuropsychology in Spain, and specifically in the areas of professional training, current work situation, neuropsychological assessment and diagnosis, rehabilitation, teaching, and research. Results indicate that professionals who engage in neuropsychological work in Spain are primarily women, under 40 years of age, who work in hospital or non-profit rehabilitation settings, and about half are employed full-time. The majority tends to reside in the regions of Andalusia, Catalonia, Madrid, and Valencia. The majority engages in neuropsychological assessment/evaluation, over half in neurorehabilitation, with smaller proportion reporting having worked in neuropsychology teaching and research.

**Professional training**

Overall, professionals indicated that they have received the majority of their neuropsychology training on a graduate level. In Spain, the majority of academic training programs in neuropsychology are offered on the master’s level, and are primarily situated in the Autonomous Communities of Madrid, Catalonia, and Andalusia. Even though the majority of programs are located in these geographic areas, participants rated the lack of academic
and clinical training opportunities and the lack of willingness to collaborate between professionals as some of the most important barriers to the development of neuropsychology in Spain. Some ways to address these barriers might include: (a) increase regulation of the profession and its training programs, (b) offer recognition by a national governmental body, (c) provide funding opportunities for multi-center research studies in which professionals are incentivized to collaborate, (d) facilitate student exchanges in which they conduct practica or research stays in institutions in different regions of the country, and (e) conduct additional research to understand the systemic barriers within the national health care and educational systems that hinder the existence and/or creation of positions for clinical neuropsychologists.

Additionally, while the training received in neuropsychology was largely rated as adequate (‘good’ or ‘very good’), the quality of clinical supervision received during neuropsychology training was rated as ‘poor’ twice as frequently; some participants even indicated having received no supervision. This suggests the need to strengthen the collaboration between academic training centers and their respective clinical practicum sites in order to make sure that the practical clinical experience which their students receive is of high quality in terms of experience and supervision. This would require more opportunities to have direct clinical contact with patient populations in the context of neuropsychological assessment and rehabilitation, as well as individual contact between students and supervisors (both academically and clinically) who have specific training and experience in clinical neuropsychology.

**Current work situation**

While half of the sample reported working full time, nearly one in seven participants (14.3%) reported being unemployed. This relatively high percentage may be a reflection of the overall economic situation in Spain, where unemployment rate in the general population is 22.4% (Instituto Nacional de Estadística [INE], 2015a). Another possible explanation for this high rate of unemployment could be the status of neuropsychology in the country as a relatively young, not well-recognized field, which results in few available positions in places where neuropsychologists usually work (hospitals, clinics, rehabilitation centers, etc.). Additionally, where such positions are available, there is usually a high degree of competition between psychologists with clinical training in neuropsychology and psychologists with specialty in clinical psychology who are allowed to perform the same tasks due to lack of regulation of neuropsychology as a field.

Additionally, the average salary reported by the participants was below the salary of €1,681.80 established for psychologists by the Ministry of Employment and Social Security (Boletín Oficial del Estado, 2015a). This is consistent with the finding that the satisfaction with the salary in the current sample was lower than job satisfaction. This pattern of results was also described by Sweet et al. (2011), who reported a discrepancy between salary and job satisfaction of similar magnitude in postdoctoral neuropsychology residents in the United States. This average salary reported by the participants in Spain is also similar to that found in other countries where the profession of neuropsychology is not yet officially recognized or regulated (e.g. Mexico, Colombia) (Arango-Lasprilla & Rivera, 2015; Fonseca-Aguilar et al., 2015).
**Evaluation**

Patient groups most frequently assessed by the participants in the present study were individuals with neurological conditions (i.e. stroke, TBI, and/or dementia). This is not surprising since Spain is a country with a rapidly aging population, predicted to be the world’s oldest by 2050 (Instituto Nacional de Estadística [INE], 2014). Additionally, at present, cerebrovascular diseases and Alzheimer’s disease are the first and fourth most common causes of death in Spain, respectively (Instituto Nacional de Estadística [INE], 2015b). Consequently, the most frequent patient referral source was neurology; this finding is also in common with that reported by Sweet et al. (2006, 2011).

The most used instruments for neuropsychological evaluation reported in this study (the Stroop, WAIS, TMT A and B, and the Boston Naming Test) have established normative data for Spain (Alegret et al., 2012; del Ser Quijano et al., 2004; Peña-Casanova et al., 2012; Peña-Casanova, Quiñones-Úbeda, Gramunt-Fombuena, Aguilar, et al., 2009; Peña-Casanova, Quiñones-Úbeda, Gramunt-Fombuena, Quintana, et al., 2009; Peña-Casanova, Quiñones-Úbeda, Quintana-Aparicio, et al., 2009; Rami et al., 2008; Rami, Serradell, Bosch, Villar, & Molinuevo, 2007). However, in regard to perceived problems with neuropsychological instruments, nearly half of the participants indicated there is a lack of normative data for Spain, and in terms of using scoring procedures, nearly one in three indicated using normative data from another country.

There could be several reasons for these problems. Spain is a diverse country with many linguistic, cultural, and socioeconomic differences. While a great deal of progress has been made in creating normative data for neuropsychological instruments in Spain, some challenges still remain. A number of normative studies were conducted in specific geographic regions with specific populations of the country, which could limit their generalizability and applicability to other patient groups, such as children, the elderly/oldest, bilinguals, those with low educational levels, and the illiterate. Finally, though normative data for Spain have been published primarily in prestigious international peer-reviewed journals (e.g. Peña-Casanova, Quiñones-Úbeda, Gramunt-Fombuena, Aguilar, et al., 2009), they tend to be located behind a paywall, thus limiting access for those professionals who lack institutional subscription to publication databases. Further, these articles tend to be written in English, which may also limit their accessibility to those neuropsychologists who lack the requisite language proficiency in order to comprehend and put into action these published results since Spain has been rapidly improving its overall level of English proficiency, though still has much room for improvement (Education First, 2014).

**Rehabilitation**

Over half of the respondents indicated they engaged in neuropsychological rehabilitation in the past year. This indicates the work of neurorehabilitation is more likely to be undertaken by neuropsychologists in Spain compared to those in the U.S.A. (Sweet et al., 2011). Additionally, the most frequently endorsed modality for rehabilitation was that of mixed (i.e. group and individual) setting, suggesting the need for a more versatile training profile to be able to conduct both types of rehabilitation successfully. Perhaps this could be due to increased pressure by the institutions for neuropsychologists to engage in multiple lines of work, such as evaluation and rehabilitation (perhaps as a cost-cutting measure), since their
role is not well established and delineated, further suggesting the need for regulation of the profession.

The most frequently addressed domains of functioning in rehabilitation were attention/concentration and executive functions, while among the least frequently endorsed categories were returning to work and sexual adjustment problems. It appears that neuropsychologists continue to focus their rehabilitation efforts on aspects of cognitive functioning, at the expense of those functional domains which are most important for the patients, such as returning to full employment, social, and sexual life (Wilson, 2004).

Interestingly, a large proportion of the respondents indicated the use of personal computers, and to a lesser extent tablets and smart phones, in the process of rehabilitation. This appears consistent with a recent call to develop novel evaluation techniques which reflect present-day living conditions (Ardila, 2013). Neurofeedback, virtual reality, and neuromodulation use was endorsed by only a few professionals, even though this is a thriving area of research and development in neuroscience (Trincado-Alonso et al., 2014). While present results do not reveal the details of the use of the above techniques, with greater reliance on new technologies in recent years, their evolution and adaptation by neuropsychology professionals warrant further investigation in the future.

Teaching

Of all the areas of neuropsychology work, the lowest percentage of involvement indicated by the participants was in teaching. While the majority of those who taught courses in neuropsychology in the past year reported having worked in public institutions, nearly a quarter responded that they have done so in both the public and private settings. Most of teaching duties took place at the postgraduate (i.e. master’s and specialization) level, and overall level of satisfaction with their teaching role in neuropsychology was commensurate with satisfaction with neuropsychology work in general.

Much like the profession of neuropsychology in Spain, the state of higher education in the country is undergoing rapid development and changes, which include recent budget cuts, the implementation of European Union-wide Bologna Plan, and newly proposed educational reforms (Boletín Oficial del Estado, 2015b, 2015c; Martínez, 2012). As such, the area of teaching in neuropsychology in Spain presents a ripe area for research since a large number of important factors related to its practice are still unknown. Such factors include whether these instructors served as adjunct or full-time professors, what course content and modality (online vs. in person) used, or how this new legislation will impact both the professors and students of neuropsychology in the future.

Research

Nearly half of all participants indicated they engaged in neuropsychology research in the past year. Though Spanish scientific productivity has been increasing (SCImago Journal and Country Rank, 2015), and over half of the sample reported having obtained funding for their research projects, there is a large group of professionals who have not received any funding for their research. Though the exact reasons for this cannot be uncovered by the present survey, this could be related to the weak economic situation in the country and recent budget cuts to research funding (Instituto Nacional de Estadistica [INE], 2015c). These cuts have had
an unfortunate effect of driving many Spanish researchers to look for employment abroad, with those who leave not likely to return back to their home country (Aceituno, 2014). Additionally, Spanish researchers who work in Spain indicate significantly lower satisfaction with research funding received, compared to those Spaniards who work abroad (38 and 87%, respectively, Aceituno, 2014).

With the economic burden of mental and brain disorders in Europe presenting a significant challenge, more funding for research (basic, applied, and the teaching of) in these areas is sorely needed (Wykes et al., 2015). Scientific output by neuropsychology professionals is often used for the purposes of obtaining employment, promotions, or further grant funding. Increase in high-impact publications by Spanish researchers may have a positive impact on greater funding opportunities from the government or other financial institutions.

**Implications**

The results of the present study have a number of important implications for development and growth of neuropsychology in Spain. As indicated by participants, it is essential to improve current academic and clinical training programs, and also increase the number of quality training opportunities and programs around the country. On the other hand, it is also important to carry out further studies aimed at obtaining normative data for underserved populations such as children, bilinguals, and older individuals. Finally, in order to regulate the profession, it would be important to standardize the academic and clinical training criteria to be considered a clinical neuropsychology professional; important advances in this direction have already been carried out by the FANPSE. The ultimate goal of this process would be to be recognized as a profession by the Ministries of Health and Education and the creation of official professional certification in clinical neuropsychology.

**Limitations**

In order to take part in the study, participants had to access the survey via a hyperlink distributed electronically via professional channels. Therefore, individuals who practice neuropsychology in Spain but who do not engage with professional societies or networks, do not have their email on list serves or mailing lists, or do not use electronic means of communication are likely to be underrepresented in this study. Given the self-report nature of the survey, it is not possible to completely control for bias or social desirability in participants’ answers. Additionally, this survey did not address certain topics of interest to neuropsychology profession, such as forensic work, private practice, engagement with insurance companies/reimbursement, issues of accreditation and continuing education, and others. All of these topics present fertile areas for future research, with current findings serving as a foundation. However, this is the largest sample of neuropsychologists surveyed in Spain to date, which creates a baseline for subsequent survey results if they are to be repeated/replicated in the future.

**Conclusion**

This study is the first to describe the characteristics of individuals engaged in the practice of neuropsychology in Spain. Neuropsychology is a relatively young field, populated by
professionals who are also relatively young. The majority of individuals who engage in neuropsychological work in Spain are women, under 40 years of age, who work in hospital and rehabilitation settings in major population centers of the country (i.e. Madrid, Barcelona, Seville, and Valencia), and report satisfaction with their jobs, but not their salaries. They identified a number of barriers which impede the development of neuropsychology in their country, the most frequent among which were lack of clinical and academic training opportunities, lack of professional leaders in the field, and willingness to collaborate between professionals, as well as lack of access to neuropsychological instruments. Most of the neuropsychologists in the present study engaged in neuropsychological assessment/evaluation and over half in neurorehabilitation, primarily with adult neurological patients. Those who engage in neuropsychological evaluations reported the lack of normative data for Spain and the high cost of tests as some of the main problems with the instruments they use. A smaller proportion reported having worked in neuropsychology teaching and research, tending to serve as professors in public and private institutions, mainly on master's level. About half of those who engaged in research in the past year reported having received grant funding, having sufficient resources and materials to conduct research, and conducting their own research analyses.

This study represents the first step in understanding current status of the neuropsychology profession in the context of numerous economic, legislative, and educational changes in the country. Future studies can build upon this effort in order to provide more in-depth analyses and to describe the development and growth of neuropsychology in Spain over time.

Disclosure statement
No potential conflict of interest was reported by the authors.

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