

Neuropsychological and Rehabilitation Considerations for Language and Regional Diversity in Spain

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Abstract

The aim of this chapter is to present relevant cultural aspects that a neuropsychologist should take into account in order to provide adequate service to Spanish patients and their families. In the first section, there is an introduction to the Spanish culture, which is linked to small case studies that reflect its relevance from a neuropsychological point of view. Spain is culturally complex, with different regions that maintain their own traditions and languages. For Spaniards, social relationships and family are so important that patients may prioritize some rehabilitation goals against others in order to recover their social functioning. Likewise, the complex relationship between languages and education is presented, as well as the educational and socioeconomic level of the country. In the second section, the importance of social relationships and the role of the family in the neuropsychological assessment and rehabilitation, as well as the context in which the patient lives, are explored closely through RJ case. Finally, the chapter ends with a summary of the most relevant ideas to consider when assessing a Spanish patient.

Section I: Background Information

Terminology and Perspective

People from Spain may refer to themselves as Spaniards or identify with their region (e.g., Galician, Basque). In the United States, Latinx or Hispanic terms have been used. This is confusing for Spaniards because those terms refer to people who speak Spanish, independent of country of origin. Hispanic may refer to a person from Spain or Latin America. The term Latinx may be used either for a Spanish-speaking person, someone who lives in Latin America, or for an individual whose language is derived from Latin and who lives in Mediterranean countries.

Regarding us, Laiene is a Basque psychologist who works at the Universidad Pública de Navarra (UPNA). Her areas of interest include neuropsychology, brain injury, and bilingualism. Maria Jesus is a Murcian psychologist with a doctoral degree in Clinical Medicine, who is the Director at the Clínica Uner. Diego is a Colombian psychologist who obtained his doctoral degree in psychology in Spain. He is currently working at the UPNA, and his interest lies in methodology and its application to neuropsychology. Isabel, who has lived in the United States for more than 20 years, is a Colombian psychologist who specializes in pediatric neuropsychology. Juan Carlos is a Colombian neuropsychologist who has been living and working as a researcher in Spain since 2002.

Geography

Spain is located on the Iberian Peninsula in southwestern Europe, surrounded by the Cantabrian and Mediterranean seas and the Atlantic Ocean. Peninsular Spain shares borders with France and Andorra to the north and with Portugal to the west. Its territory consists of a large part of the Iberian Peninsula, the Canary and Balearic Islands, and the autonomous cities of Ceuta and Melilla. The country, with Madrid as its capital city, is divided into 17 autonomous communities and 2 autonomous cities, each with unique cultural characteristics.

History

Spain is a compendium of cultures: Iberians, Celts, Tartessians, Carthaginians, Visigoths, Romans, and Arabs have inhabited it, among others. Year 1492 was a key year when Columbus invaded America and the Catholic Monarchs expelled the Arabs from the peninsula. In 1512, Catholic Monarchs conquered the Kingdom of Navarre, unifying all the kingdoms in the peninsula and founding the basis of modern Spain. Therefore, its unitary state identity is fairly recent. After that, Spain established its empire in regions of America, Asia, Africa, and Europe until the 16th century, which marked the beginning of the progressive decline of Spain's political and economic power.

In 1936, General Franco launched an uprising aimed at overthrowing the country's democratically elected Spanish Republic; this marked the beginning of the Spanish Civil War. In 1937, Nazi planes bombed Guernica as a rehearsal for World War II. It is considered the first air-force attack against civilians, which was repeated again during World War II (e.g., Hiroshima). This inspired Picasso's famous painting, "Guernica." In 1939, Franco won the war and began his dictatorship with political control, banning of political parties, repealing autonomies, and imposing Catholicism. Franco died in 1975, and the transition to democracy began when Adolfo Suárez became president, the Amnesty Law was approved, political parties were legalized, and the first free democratic election took place. The constitution declares Spain as a constitutional monarchy, and from then, several right- and left-wing governments have followed throughout the years. A remarkable milestone was the entry of Spain in the European Union (EU) in 1986.

People

In this culturally complex country, its inhabitants differ per region. For instance, Maria Jesus is from the south, where the people are considered joyful, generous, etc., the prototype of a Spaniard. Laiene, however, is from the north, where the people are considered more reserved and serious. Despite generalizations, both Diego and Juan, who came from Colombia, could notice differences between these regions when they moved to Spain. There are also common features for most Spaniards who tend to be joyful, love sharing with family and friends, and enjoy activities outside the home. Our physical contact often draws foreigners' attention. For example, during her pre-doctoral stay in Toronto, Canada, Laiene shared a house with residents of different countries. Her closest person was her friend from Venezuela. When they got home, they would hug, chat and spend the day together while roommates were silently curious and suspected there was something more than just friendship between them. We needed to clarify that for Spaniards and Latin Americans, physical contact and social relationships are very important and may not necessarily imply love interest. During clinical work, Spaniard neuropsychologists may attend to that need of physical and social contact, especially with children and the elderly. Hugs and kisses, sharing stories, etc., can be a powerful, positive reinforcer that we have found works more effectively than material reinforcements in a testing setting.

Immigration and Relocation

Spain has traditionally been an emigrant country. At the end of the 19th century, there was a migratory flow toward America due to conflict and economic changes. During the Spanish civil war, a forced migration occurred for political and ideological reasons, with most Spaniards relocating to France, Mexico, Argentina or the United States. A third migratory flow occurred during the dictatorship, mainly to Latin America and Europe. The last big migration took place during the 2008–2014 economic crisis. Similar data was never recorded (see Figure 25.1) and was worrisome for many who saw how highly qualified young citizens migrated (and still do) for professional development opportunities. This phenomenon has been called "brain drain" with many psychology colleagues emigrating as they witnessed their research career stall in Spain.

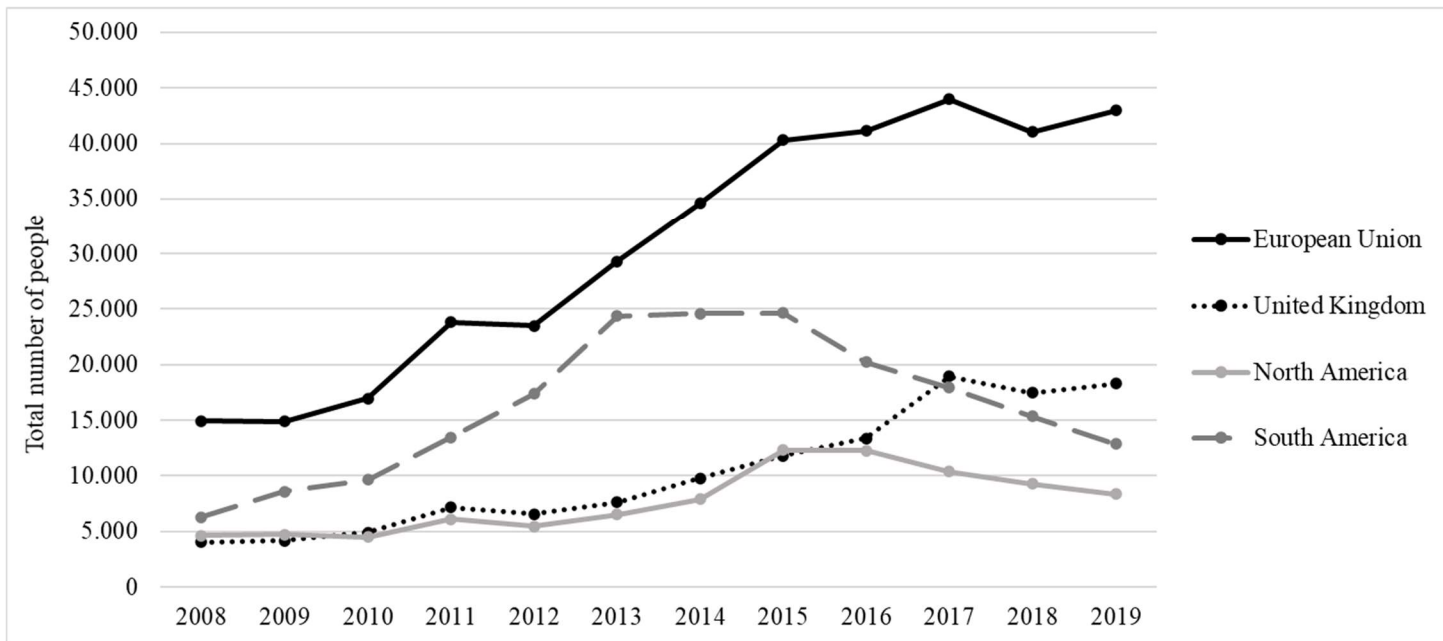


Figure 25.1 Spaniards migration flow abroad (2008–2019 period)

Source: Own compilation with data taken from the INE website: www.ine.es (1)

Spaniard Figures (Chapter 25)

Figure 25.1 There is a graph with total number of people on the y-axis and years on the x-axis. The y-axis ranges from 5,000 to 50,000. The x-axis ranges from 2008 to 2019. On the top, there is a line graph in blue for the European Union. Next is a line graph in green for South America. Next, there are overlapping black lines for North America and orange lines for the United Kingdom. The blue line is in the upward direction. The green line is a bell curve shape. The black and orange lines are flatter, with a slightly upward direction for the orange line in the year 2016.

Acculturation

Culture determines how we express symptomatology, attitudes, and adherence to treatment (2). Spaniards abroad may miss social relationships and food and time customs (in Spain, lunch and dinner are both very late). Likewise, when they return to Spain, they may suffer “cultural shock” if they find it difficult to readapt to local customs. Maria Jesus met a woman who, after suffering a stroke, decided to return to Spain for rehabilitation. She had gotten married at 23 and emigrated to Holland for work, where she built a family, learned Dutch, and adapted to the country. Upon return to Spain, she no longer liked to be hugged or touched as Spaniards do after becoming acculturated to Dutch values. Emigration circumstances (e.g., age, motives, alone/accompanied, with or without a work/study offer, mastering the language or not) and cultural experience (e.g., discrimination, identity crisis) can all impact outcomes (3, 4).

Language

Spanish is the official language, but co-official languages have recently begun to exist in some autonomous communities (Euskara or Basque, Catalan-Valencian-Balear, Galician, and Aranese). Laiene evaluated a man about 50–60 years old who shared that as a child, he attended a religious school where they recited daily prayers before class. He used to pray in his maternal language,

Euskara, but one day the teacher scolded him, saying “Speak Spanish to God; he doesn’t understand you in Euskara.” In fact, even today, you hear the expression “talk to me in Christian language” if somebody tries to speak in Euskara. At school, it was forbidden to speak in Euskara, and the child who did would receive a finger ring to, in turn, pass on to another child who also spoke in Euskara, thus avoiding punishment.

Therefore, it is important to evaluate the linguistic background and ask in which language the patient prefers to be evaluated. Laiene has encountered three unique situations related to language. First, there are individuals who master Spanish better than their regional language. They have usually been schooled in their regional language but do not use it daily, so they prefer to be evaluated in Spanish. Second, individuals that master their regional language better than Spanish. For instance, Laiene’s grandfather, whose mother tongue was Euskara, communicated worse in Spanish. When dementia was suspected, an evaluation conducted in Spanish did not provide reliable data on his cognitive profile due to his unique linguistic needs. Third, there are individuals who despite having a better command of the regional language, prefer to be evaluated in Spanish. Laiene observed this with Basque speakers older than 45–50 years old who will occasionally indicate their preference for an evaluation in Euskara but, as they start the evaluation, request changing to Spanish (see education section for further discussion). Luckily, today people can be schooled in their regional languages and are encouraged to learn foreign languages such as English. Therefore, Spaniards can easily be trilingual if they speak Spanish, a regional and a foreign language.

Finally, variations of Spanish exist that can make a difference when it comes to expressing emotions/feelings. For instance, “pena” is a Spanish word that in Spain means “sadness” but in Colombia means “shame.” Discrepancies exist also within Spain. The Spanish word “fatiga” means “tiredness” in the north, but in the south, it also means “shame.” The word “coraje” means “courage,” but in the Andalusia region, it also means annoyance/anger. There are also regional words that only residents understand (e.g., *alampar*, *coscoletas*). We have published guidelines for the administration and scoring of verbal fluency tests by taking into consideration the specific characteristics of the Spanish language (5).

Communication

Spain is a touristic country where social relationships are essential. Its inhabitants have developed a hospitable character and an open communication style, even with strangers. It is often customary to strike a conversation with strangers as you walk into a place. Silence may feel uncomfortable and avoiding exchanging words may be interpreted as having a lack of education. A direct, fast, loud, and imperative tone of talking, with the use of profanity may be misinterpreted by foreigners as a discussion or anger. However, those profane words may not always have a negative connotation. For instance, the word “*hostia*,” depending on the context, changes its meaning: “he/she has a bad *hostia*” (he/she is angry), “hostia! How come you’re here?” (surprise). Additionally, Spaniards use irony, sarcasm, and jokes that foreigners may find difficult to understand or even misinterpret when paying attention to the content but not the intonation. This can be a problem for patients who have trouble with pragmatics. Maria Jesus remembers a patient who, during rehabilitation, would insist on performing a task in a certain way despite being corrected. The patient lost his patience and addressed the issue using an idiomatic expression: “*pero ¿caes del burro o no?*” (do you fall off the donkey or not?; see Glossary for explanation) and the response was: “soy ingeniero y no tengo burros, vivo en una urbanización” (I’m an engineer and have no donkeys; I live in a community).

On occasion, we use a respectful/formal style of communication (“*usted/ustedes*,” formal “you” instead of “*tú/vosotros*,” informal “you”) with the elderly or certain professionals (e.g., doctors), though this is becoming less common. Visual contact is extremely important; not looking straight in the eye is considered bad education since it is interpreted as a lack of interest in the other person.

This is relevant in a healthcare context, where sometimes professionals take notes without engaging in enough visual contact. Therefore, attention must be paid to both verbal and nonverbal communication to fully understand the real meaning.

Education and Literacy

Education is compulsory up to the age of 16 years old. In 2019, most of the population had completed high school level (50.3%) education, with 29.9% completing college. A 13% of its population had completed primary education, while 5.3% did not complete it. Lastly, 1.5% were illiterate people (6). Many young people tend to be overqualified and turned down when applying for jobs. This, together with the economic crisis, has contributed to the “brain drain.” The rate of young people who neither study nor work (known as “*ni-ni*”) was higher than in the EU in 2017, and the school dropout rate before completing high school in 2018 was 17.9%, with regional discrepancies (see Figure 25.2). Premature dropout causes are multiple and complex. Here we list some factors to consider during the neuropsychological assessment: low academic motivation/interest, orientation toward a working life, unstructured families; profession, educational level and employment status of parents; belonging to an ethnic minority or being an immigrant, difficulties with Spanish, educational system unable to attend to the educational needs of students, etc. (7, 8).

Figure 25.2 School dropout rate

Source: Own compilation with data taken from the INE website: www.ine.es (9)

Figure 25.2 There is a graph with the y-axis showing 30 degrees north, 35 degrees north, and 40 degrees north. The x-axis shows 15 degrees west, 10 degrees west, 5 degrees west, and 0 degrees. There is a map shades of green in the upper right-hand corner. There is a legend with dark green for school dropout rate indicating less than 15%. Medium green indicates between 15% and 20%. Light green/gray indicates greater than 20%.

During Franco’s dictatorship, regional languages were prohibited and the vehicular language at school was Spanish. Today, there are different linguistic models in education that differ in the percentage of language exposure. This includes regional and foreign languages, following the EU educational policies.

We previously discussed the cases of those older than 45–50 years old who initially wanted to be evaluated in Euskara but then requested changing to Spanish. This is because despite speaking mostly Euskara on a daily basis and living in a Basque region, many of these individuals were taught in Spanish during school, so reading, writing, and arithmetic skills in Euskara tend to be low. In verbal fluency tests, we have noticed some avoid using Basque words that sound like Spanish (e.g., *kartoia-cartón*/cardboard). Since this test is a measure of executive functions, with this intentional behavior, participants spontaneously increase the task’s difficulty for themselves and take longer to complete them (5). Likewise, on verb fluency tasks, some people show trouble identifying and producing verbs in Euskara, despite not showing difficulties in Spanish. Therefore, it is essential to evaluate the influence of education, linguistic competence in various regional languages and Spanish, as well as the interaction between both to adequately interpret results and draw conclusions.

Socio-Economic Status

Socioeconomic status affects other areas that, directly or indirectly, influence brain and cognitive development (e.g., healthy nutrition, risk of social exclusion). In 2019, 25.3% of the population was at risk of poverty, and 4.7% suffered severe material deprivation (10). The Spanish economy is based mainly on the service sector (67.7% in 2018) (11), and the current COVID-19 pandemic has heavily

influenced its economy. During the lockdown, between March 14 and June 21, 2020, the non-essential economy came to a standstill. This increased the percentage of homes at risk of poverty/exclusion, and, unfortunately, the Clínica Uner witnessed this impact its patients. A 16-year-old patient who suffers 4–6 daily epileptic crises and needs caring for daily functioning lived alone with his mother, who was his main caregiver. The mother, who previously would take advantage of her son's schooling time to work, was laid off, so she had to choose between her child's rehabilitation or eating. They were unable to continue with the treatment and asked for guidelines/exercises they could do at home instead. Finally, it is worth noting that Spaniards tend to become independent later in life, often between the ages of 30–40. This is often because the ability to buy a home is prohibitive due to high costs and Spaniards have limited savings capacity due to low salaries and job instability.

Values and Customs

Knowing values and customs enables understanding patients' behaviors and reasons to prioritize some objectives over others. In general, social relationships are extremely important to Spaniards, especially with family and friends. Mealtime is not just to enjoy food but also to share. A traditional custom throughout Spain is to go out to have drinks and bites. The usual expression is "*potear o tapear*." Outdoor group activities are also important: sports, parties, nightlife, etc., and it's customary to value leisure and comfort time more than, say, the job. This could be important in a clinical context because some patients' main objective to recover might be their social life or leisure time rather than aspects that could be more relevant in other cultures (e.g., return to work).

Finally, the notion of time may vary when compared to other cultures. Spaniards are more relaxed and flexible with time and like to take rests (e.g., "*siesta*"). We may be late for gatherings with family or friends, which can be considered a lack of respect in other cultures. Often, however, we tend to be punctual when it comes to the professional environment or important appointments.

Gender and Sexuality

We conducted a study to evaluate the perception of health workers, including Spanish neuropsychologists, on the sexual activity of their patients with traumatic brain injuries. We discovered that, although most of them (96%) recognized sexuality was fundamental, only 36% approached the subject and 29% would only discuss it if the patient did first (12, 13). Reasons for not approaching the subject included patients not asking about it or not reporting problems and lack of professional training (13).

Sexuality is an important component of health that must be evaluated. Patients and their partners can be concerned about how their sex life will be affected by the brain injury and how to recover their sexual life. Sexual life has changed, from repression and the perception of sexuality for procreation to its opening and liberation, particularly for women. However, for patients to talk about it, there needs to be a good rapport; otherwise, they will say nothing or, in case they are asked, they may indicate not having any problems due to social desirability.

In the EU, Spain tends to be one of the most accepting of gender diversity and sexual orientation with progressive legislation (14). Nevertheless, the LGBT collective demands a state law because their rights vary by each community. For instance, the right to change one's name or gender can either require a report from a doctor or clinical psychologist depending on the community. "Conversion therapies" are only expressly prohibited in 4 of the 17 communities in Spain. Therefore, it is essential to know the autonomous community's current legislation to correctly advise the patient and their family about their rights, juridical and rehabilitation services, as well as LGBT associations

and institutions. Despite the progress, hate crimes are still being committed based on sexual orientation/identity.

Even though Spain is advancing toward an egalitarian relationship, traditional expressions of femininity/masculinity persist. For instance, many caregivers are women. Expressing emotions/feelings is more difficult for males. Sadly, violence against women exists, and despite increases in complaints, including those for aggression and sexual abuse, only a very small percentage of victims report it. It is already difficult for a healthy woman to complain, but it becomes even more difficult if she has a brain injury. Maria Jesus met a lady that lived with her partner who, after consuming alcohol, physically and psychologically assaulted her. As the suspicion of assault arise, the family was made aware, but they could not do anything because, since she was not incapacitated, and there were no evidence of assault, her decisions had to be respected. In Spain, anyone can call to 016 (Attention to victims of abuse due to gender violence) to file a complaint for gender assault, however, despite suspicion of assault, the Justice system will not value the complaint if the victim does not recognize the aggression. Only when someone witnesses the aggression, or conclusive evidence of assault exist (i.e., a bruise) the complaint will be valued by the Justice system, whether or not the victim recognizes the aggression. Therefore, to protect her, work was done toward awareness and decision-making to increase her autonomy and decision-making so that she could report the assault by herself.

Spirituality and Religion

Although no religious belief has state affiliation, the Catholic Church holds economic and educational benefits in Spain. For instance, it is compulsory to offer catholic religion as a school subject, and even taxes can subsidize the Church. Though each family voluntarily decides if they choose religion as a subject for their children. Therefore, it is not surprising that most of the citizens declare themselves Catholics.

In our experience, spirituality may have a great impact on patients and caregivers. Laiene remembers a 50-year-old woman, her husband's caregiver, a gentleman who had recently suffered a severe traumatic brain injury (TBI) and that, additionally, had been suffering from a psychiatric disorder for years. She once shared with Laiene that being a believer helped her overcome adversity. Maria Jesus treated an older woman who suffered a stroke who was a Jehovah's witness follower and loyal to her religion. She believed she was not supposed to follow any medical treatment, so showed no motivation for getting better. Her family tried to convince her to follow the treatment, but she refused until she finally passed away. Therefore, our recommendation, especially for religious individuals, is to value this dimension since spirituality can be an effective coping strategy to help patients and their families make sense of/give a meaning to the event.

Health Status

The public health system in Spain advocates citizens' constitutional right to health protection. It is known for social solidarity and is characterized by universally accessible and deconcentrated (distribution of health services throughout the territory to ensure easy access to the health care system in remote and main cities alike, reducing the concentration of health services in one location), decentralized, and primary care centered. Currently, there is only one health training program based on hospital rotation recognized by the ministry: Psychology Residency Program. This training is focused on clinical psychology, with variable training (depending on the hospital) in neuropsychology. Therefore, there is no public training program for other health fields of psychology, such as neuropsychology. In general, the public health system does not cover neuropsychological evaluations or rehabilitation services. Although, there are autonomous communities where patients may be referred to external centers to receive these services in a

subsidized manner (for an established time), as long as the service has been recommended by a doctor specializing in psychiatry, neurology, neurosurgery, or rehabilitation.

The Spanish population is aging due to low birth rates and high life expectancy. For those born in 2015, life expectancy was 80 years for men and 85 for women, while healthy life years were 67 for men and 66 for women, highlighting that Spaniards live around 16 years with some degree of functional limitation (15). Cardiovascular disease (including stroke) is the most prevalent health condition, followed by cancer (15). Lung disease, diabetes mellitus, and Alzheimer's disease are also prevalent (15). Finally, the SARS-CoV-2 pandemic hit Spain very hard, particularly for people over 60 years old, with neurological symptoms that could impact cognitive impairment (16).

Mental Health Views

Mental health diagnoses often carry stigma, shame, and isolation. Going to a psychologist/psychiatrist can be stigmatized or poorly understood (e.g., if you want to change, you should do it without needing help). Quite often, people go to their primary doctor describing physical symptomatology. When the doctor explains that the cause is psychological, many may resist accepting it and ask for a second opinion. Getting psychological treatment through the public health system can be frustrating since appointments are delayed and treatment time is limited.

Approaches to Neuropsychological Assessment

Neuropsychology was developed in Spain since the 1980s. Most professionals work in hospital environments and their patients (mostly with stroke, TBI, and dementia) are referred by neurologists (17). Neuropsychology training within undergraduate and postgraduate programs varies considerably. The Official College of Psychologists has a proprietary accreditation in Neuropsychology, which is not recognized by the Ministries of Education and Health. According to Spaniard neuropsychologists, significant problems that impact access to appropriate test instruments are their high cost and lack of normative data (17). Thus, test selection is often guided by adequate normative data availability (see Appendix 1 for a list of available measures). Due to lack of institutional recognition, the people, and even other professionals, may not fully understand the role of neuropsychologists.

During a neuropsychological assessment, it is advisable to explain the aim of the evaluation. Some people may be comfortable with being questioned about their cognition but be reticent to talk about their emotions. Therefore, it may help to also explain how brain injury can cause direct or indirect sequelae. For instance, family members may understand that apathy may be a brain injury symptom and not a sign of "laziness." It is also recommended to find out how the patient is feeling, how their life has changed, and his/her level of awareness related to their condition. Assessing social support, problems with social relationships, and integration into the community are also important. Additionally, objectives must be established. It is common for Spaniards to pay more attention to physical rehabilitation at the beginning because it enables mobility or because they see physical progress as being faster than cognitive-behavioral-emotional. It is also important to prepare patients (e.g., reminding them to bring glasses), ask them in what language they want to be evaluated, and let them know in advance that there will be tests that require reading and writing.

We also recommend reviewing the report verbally and in written format in front of a trusted person to ensure a proper understanding of the results and the treatment plan. It is recommended to talk to the rehabilitation team members and state who the reference person will be, so they feel confident knowing whom to contact throughout the rehabilitation process.

Section II: Case Study

Background

Reason for Referral

RJ was a 57-year-old patient referred to Clinica Uner by his neurologist for a neuropsychological assessment and rehabilitation due to a stroke (ictus) that occurred two months prior to his visit. A neuropsychological evaluation would first need to be conducted and then a rehabilitation program could be developed.

Behavioral Observations

RJ arrived with his wife and eldest son on time for his appointment. He was well-oriented, well-behaved, respectful, excited, and hopeful. Visual problems, such as diplopia, hemianopia, and difficulties calculating distances were observed. Poor balance and hemiplegia were noted. He used a wheelchair for mobility. A good rapport was established since he felt that he had finally found somebody who understood him and was going to help him. During the evaluation, he worked hard and appeared collaborative. RJ presented instances of verbiage and disorganized speech, which complicated the assessment, forcing the evaluator to be more directive. RJ exclaimed that he had never taken so many “exams.”

Presenting Concerns

RJ indicated that after his stroke since he could speak, he was expected to recover quickly and without any sequelae. However, after hospital discharge, he began to feel that things were moving too fast and he would easily become overwhelmed by the situation. He realized he needed to have things repeated. He observed that his friends yelled at him, and he couldn't understand why because he could hear them well. Once, while watching a movie, he realized he was crying, and he didn't understand why he couldn't control it. He was surprised because that had never happened before; he grew up with the idea that “men don't cry.” A certain degree of anosognosia was detected. Even though he was dependent for all basic and instrumental daily life activities, due to physical and cognitive sequelae, he mentioned he did not know why his family worried about him. There was also concern about his visuospatial functioning, hemianopia, and lack of initiative, egocentrism, and emotional lability.

Daily Functioning

Before the stroke, RJ was a very active man. He used to get up early to go for work until nighttime. His wife would take care of the housework, the kids, and the business paperwork. On Saturdays and Sundays, he would also get up early and go to work but would be back for the family meal. For him, feeling tired was normal because his job demanded great physical effort. After the stroke, his daily functioning changed. This was characterized by an overall lack of initiative and motivation. His wife helped him with his activities of daily living (i.e., bathing, dressing, meal preparation). Similarly, while his family prepared to leave the house, he would wait quietly until he was told it was time to go to rehab. Once in the center, he participated in rehabilitation sessions for three hours each day. At the end, he sat quietly, waiting for his family to pick him up. Upon his arrival home, he would sit and watch TV while his wife did all of the house chores and errands (i.e., cleaning, shopping).

Health History

RJ presented an ischemic stroke of the right middle and posterior cerebral artery, with right cerebral artery dissection (Figure 25.3). He did not report any history of prenatal or congenital health

problems. He was healthy and did not take any medications. He slept well, had healthy food, and consumed alcohol as a “social drinker.” He did not smoke and had never consumed drugs. His father died of a sudden heart attack and no other family pathologies were known. At the time, he was taking Keppra for epileptic seizures and acetylsalicylic acid for coagulation.

Figure 25.3 Ischemic stroke of the right middle and posterior cerebral artery

Figure 25.3 There are four images of a brain scan against a black background. The top left image shows a frontal section of the brain on the transverse plane, with a darkened area on the left lower middle portion of the brain. The top right image shows a sagittal section of the brain, with a large darkened area in the middle of the brain. The bottom left figure shows another sagittal section of the brain with a large darkened area in the middle of the brain. The lower right-sided figure shows a frontal section of the brain with a darkened area on the entire right hemisphere of the brain.

Educational History

RJ grew up in the town of Alicante and attended school because his mother forced him to do so. While studying, he helped his father with the family business during vacation time and on weekends. At the age of 14, he finished school and started to work in the family business. He did not continue studying. Following the tradition, he introduced his children to the family business.

Language Proficiency

While young, RJ spoke Spanish at home, but both at school and outside the home he spoke Valencian until the age of 20. In those days, Valencian was the language spoken in inland Alicante, but, as time went by in Alicante, Valencian has been gradually disappearing, while the use of Spanish has been growing. Testing was done in Spanish as he identified Spanish as his preferred language, as well as his primary language for reading and writing.

Cultural History

RJ lived south of Alicante, a rural area when compared to the north, which is an urban and cosmopolitan area. RJ is the eldest of three brothers, born into a humble family in an agricultural region. His birth was received with great joy since his father wanted to keep his last name (in Spain, it is customary for the son/daughter to use their father’s last name first) and have his son continue with the family business. Being the eldest son, as a male, he was in charge of the family. The family had no financial issues.

He considered himself to have been a good kid until adolescence, when he started being very naughty with girls, flirting with anyone. At the age of 18, he fell in love with his wife. They got married and she started collaborating with the family business. Shortly after having their first child, his father passed away. He was relieved that he had a son to ensure the continuation of his father’s last name. They followed the traditional family pattern, whereby RJ then became the head of the family and his wife supported the family goals.

RJ had a basic level of studies, he was not a regular reader and he did not have cultural hobbies (i.e., cinema, theater). However, he had great knowledge related to agriculture. This is important because this knowledge can be extended to other aspects of his life. In agriculture, you need to be flexible and patient since results are only appreciated at harvest time and do not always come out as expected; therefore, he learned to tolerate frustration.

Emotional Functioning

Emotional functioning was assessed through interviews with the patient and family. RJ did not report a history of any emotional disturbance or required any medication. After the stroke, he recognized he felt out of place and cried for no apparent reason. He worried about his family and felt like he was a burden to his family.

Test and Norm Selection

A flexible battery of tests was prepared to evaluate all cognitive functions, with particular attention to right hemisphere functions. All tests were administered in Spanish. Tools adapted with a Spanish context and appropriate norms are marked with an asterisk.

- 1 Diller-Weinberg Visual Cancellation Test (18)
- 2 Benton Right-Left Orientation, Judgment of Line Orientation, Facial Recognition Test, and Visual Form Discrimination (19)
- 3 Corsi Block Tapping (20)*
- 4 Brown–Peterson Task of Letters and Numbers (21)
- 5 Rey–Osterrieth complex figure test (22)*
- 6 The Five-Point Test (23)*
- 7 Wechsler memory scale-III: logic memory, verbal paired associates, faces, and Family Pictures subtest (24)*
- 8 Poppelreuter-Ghent’s overlapping figures test (25)
- 9 Hooper Visual Organization Test (26)
- 10 Clock Drawing Test (27)*
- 11 Picture Absurdities subtest of the Terman-Merrill Stanford-Revision of the Binet-Simon Intelligence Test (28)
- 12 The Mental State Examination (29)*
- 13 Trail Making Test (30)*
- 14 Phonological (M/R/P) and Semantic Verbal Fluency Test (Animals) (31)*
- 15 Stroop Color and Word Test (32)*
- 16 Wisconsin Card Sorting Test (33)*
- 17 Behavioral Assessment of the Dysexecutive Syndrome (34)

Test Results and Impressions

The results of the evaluation indicated that the following functions were impaired: information processing speed, temporal orientation, visual immediate and delayed memory, visuospatial, and visuoconstructive functions due to the hemianopia, as well as vigilance, selective and divided attention. Abstract reasoning and social judgment were slightly impaired, while executive functions (verbal fluency, planning, seriation, organization) were moderately impaired. These deficits accounted for his dependence on others for his daily activities. Verbal immediate and delayed memory, as well as verbal recognition, were normal-borderline. His understanding and verbal expression were adequate and helped understand why his family tended to minimize his cognitive sequelae (e.g., disorganization, lack of attention); RJ typically could express an excuse for his poor daily issues. Person and place orientation, calculation, ideational and ideomotor praxis were preserved. Finally, during the evaluation, anosognosia, disinhibition, mental rigidity/perseverance, disorganized speech, aprosodia, lack of initiative, egocentrism, confabulation, and emotional lability were observed. RJ’s neuropsychological profile indicated the right temporo-parietal junction was affected.

Feedback Session and Follow-Up

A family session was conducted to explain the results and establish the therapeutic objectives for RJ and his family. Also, RJ was referred to an optometrist in order to evaluate in depth his visual problems. As RJ was a hard-working family man, his rehabilitation goal focused on acquiring autonomy to continue his daily life independently. He began outpatient rehabilitation sessions with speech therapist, physiotherapist, occupational therapist, and neuropsychologist. He received rehabilitation services for three hours daily, for a total of 18 months. As part of his rehabilitation, professionals gave his family and friends recommendations in order to help him achieve rehabilitation goals. For example:

- Speak slowly and one by one
- During the time he was wheelchair bound, family or friends were encouraged to explain him where they were going and give him spatial directions (i.e., now we are going to cross the street). This helped reduce his anxiety and sometimes anger due to his feeling of lack of control over the situation.
- Support his hemianopia: e.g., when RJ began to walk, the family was requested to stand on his left of him during walks to force him to turn his head.
- Work on attention: when he was able to walk, family was encouraged to talk to him while walking because otherwise, he would remain silent.
- Given his tendency to perseverate, the family was told to respond as if it was the first time. If not, RJ responded defensively (e.g., do you see how angry you are with me?)
- Encourage autonomy: involve him in decision-making (e.g., shopping, children, business).
- Activities of daily living: follow the instructions given by the physiotherapists, such as when undressing, first start with the healthy side and continue with the affected side. Another example, give him the time he requires to shower, offering the steps but letting him do it himself. Before rehabilitation, the family used to shower him to do it faster.
- Socialization: avoid leaving him alone at home; invite him to return to socializing to prevent isolation and apathy.
- At the end of the day, help him remember how the day was, what events happened and in what order. This helped to temporarily guide events and organize his speech.
- Finally, the family was contacted with the association of relatives of people with acquired brain damage.

During one of the rehabilitation sessions, Maria Jesus was impacted by a comment of RJ, but, given its content, she did not initially believe it. He repeated the same comment the following day but, this time, through the way he was talking about it, the details provided, and the emotions he expressed, Maria Jesus began to wonder if were true. The reported fact was so intimate that Maria Jesus did not know how to verify the information with his wife. In a subsequent rehabilitation session, his wife, despite the fear of being judged and feeling embarrassed, acknowledged that, after receiving bad news, she could not follow the guidelines to help with her husband's rehabilitation. Maria Jesus suspected it may have been related to RJ's "confabulation" comment earlier. The wife said that another woman appeared in one of her visits to her husband in the hospital, and he acknowledged that he had been leading a double life with that woman. Due to his cognitive state, he was not able to maintain his double life in secret. His lack of inhibitory control pushed him to say what he thought without being aware of the emotional damage that could cause to his wife.

This had a significant impact on the family structure. Rehabilitation became more complicated after a deterioration in the wife's emotional state. She struggled with her husband's brain injury, her sense of responsibility for his care (in Spain, the responsibility of care tends to fall on women, even more in rural areas), and her concern about what their neighbors would say about her husband's affair and a possible separation. Moreover, she was now the head and breadwinner for her family. Treatment then needed to shift focus on helping her. Despite her hardships, RJ's wife managed to comply with her responsibilities, including helping her husband in his recovery. Moreover, she was also concerned about what her neighbors would think if she separated her husband, just when he had

suffered a brain injury. Members of the family also completed eight additional family intervention sessions, which presented a mixture of strategies from a cognitive-behavioral family therapy, including structural, narrative, and solution-focused family therapy (35). It is noteworthy that RJ's wife was only able to begin to rebuild her trust and take on the role of a caregiver after she viewed herself as a "widowed" lady who was taking care of a dependent person. That is, to avoid the gossip of the neighbors, in public, she behaved as RJ's wife and caretaker; however, in private, she assumed solely her caregiver role. This overall intervention helped maintain the family's coexistence.

By the end of his rehabilitation, RJ was autonomous for basic activities of daily living. Although sometimes he required supervision, he could stay alone at home while his wife was running errands. He was able to walk and improved his attention, memory, reasoning, temporal orientation, speech organization, as well as distance calculation. In addition, he got into the habit of looking sideways before crossing the street. It was also possible to reduce his egocentricity: he asked about other's emotions, did not centralize conversations toward him, respected turn taking, etc.

Section III: Lessons Learned

- Although Spaniards share many cultural characteristics, neuropsychologists should understand that Spain is a compendium of cultures and although Spanish is the official language, many people speak other languages.
- Spanish is the official language in Spain, but co-official languages exist in their autonomous communities (Euskara, Catalan-Valencian-Balear, Galician, and Aranese). When possible, neuropsychological evaluation should occur in the primary language of the individual, which may not be Spanish. When assessing bilingual people, it is advisable for the neuropsychologist to know both languages.
- Education is compulsory up to the age of 16 years old. In 2019, most of the population had completed high school-level education.
- Even though Spaniards share many similarities (language, religious traditions, etc.) with individuals from Latin-American countries, there are also huge sociocultural differences relevant for neuropsychological evaluation, for instance, linguistic preferences, quality of education, formalities with respect to the health care professional-patient interaction, folkloric beliefs regarding medicine and treatments.
- Spaniards are very family oriented, for this reason, it is very important to include family as part of the rehabilitation process.
- Social life is very important in Spain, and individuals spend much of their time outside of their homes interacting with others in public places. This aspect should be leveraged and highly considered as a key factor for the success of neuropsychological rehabilitation programs in this population.

Glossary

Alampar—that burns, craves something, that goes very fast.

Coscoletas—carrying someone on the back.

“Pero caes del burro o no?”—literally “do you fall off the donkey or not?” It means acknowledge that you have made a mistake that you have stubbornly persevered on.

Ni-ni—a person who does not work neither study. From the expression “*neither studies nor works.*”

Siesta—midday or afternoon nap.

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We are grateful for the confidence shown by RJ, his wife, and his children during recovery time. They learned to live with a brain injury and cope with any disagreements along the way with

respect, humility, and generosity. We continue to be in contact with this family and share the fight for Brain Damage.

References

1. Flujo de emigración con destino al extranjero por año, país de destino y nacionalidad (española/extranjera) (24303) [Internet]. INE. [cited 2020 Nov 29]. Available from: <https://www.ine.es/jaxiT3/Tabla.htm?t=24303&L=0>
2. Niemeier JP, Kaholokula JK, Arango-Lasprilla JC, Utsey SO. The Effects of Acculturation on Neuropsychological Rehabilitation of Ethnically Diverse Persons. *Multicultural Neurorehabilitation: Clinical Principles for Rehabilitation Professionals*. 2015;139.
3. Gasquoine PG. Variables moderating cultural and ethnic differences in neuropsychological assessment: The case of Hispanic Americans. *The Clinical Neuropsychologist*. 1999;13(3):376–83.
4. Manly JJ, Byrd DA, Touradji P, Stern Y. Acculturation, reading level, and neuropsychological test performance among African American elders. *Applied Neuropsychology*. 2004;11(1):37–46.
5. Olabarrieta-Landa L, Landa Torre E, López-Mugartza JC, Bialystok E, Arango-Lasprilla JC. Verbal fluency tests: Developing a new model of administration and scoring for Spanish language. *NeuroRehabilitation*. 2017 Apr 15;41(2):539–65.
6. Población de 16 y más años por nivel de formación alcanzado, sexo y comunidad autónoma. Porcentajes respecto del total de cada comunidad (6369) [Internet]. INE. [cited 2020 Nov 29]. Available from: <https://www.ine.es/jaxiT3/Tabla.htm?t=6369>
7. Romero Sánchez E, Hernández Pedreño M. Análisis de las causas endógenas y exógenas del abandono escolar temprano: una investigación cualitativa. *Educacion XX1*. 2019;22(1).
8. Fernández M, Mena L, Riviere J. *Fracaso y abandono escolar en España*. Barcelona: Obra Social, Fundación la Caixa; 2010.
9. España en cifras [Internet]. [cited 2020 Nov 29]; 2019. Available from: https://www.ine.es/prodyser/espa_cifras/2019/14/
10. Malgesini, G. (2020). *Poverty Watch 2020*. Madrid: European Anti-Poverty Network.
11. España en cifras [Internet]; 2020. INE. Available from https://www.ine.es/ss/Satellite?L=es_ES&c=INEPublicacion_C&cid=1259924856416&p=1254735110672&pagename=ProductosYServicios%2FPYSLayout¶m1=PYSDetalleGratuitas
12. Arango-Lasprilla JC, Olabarrieta-Landa L, Ertl MM, Stevens LF, Morlett-Paredes A, Andelic N, et al. Provider perceptions of the assessment and rehabilitation of sexual functioning after traumatic brain injury. *Brain Injury*. 2017 Jan 1;31(12):1605–11.
13. Arango-Lasprilla J, Olabarrieta-Landa L, Ertl M, Stevens L, Morlett-Paredes A, Andelic N, et al. Survey on international health professional training and attitudes on sexuality after traumatic brain injury. *Sexuality & Disability*. 2017 Dec 1;35(4):473–84.

14. Calvo K, Trujillo G. Fighting for love rights: Demands and strategies of the LGBT movement in Spain. *Sexualities: Studies in Culture and Society*. 2011;14(5):562–80.
15. Ministerio de Sanidad, Consumo y Bienestar Social—Portal Estadístico del SNS—Estadísticas y Estudios—Informes y Recopilaciones [Internet]. [cited 2020 Nov 29]. Available from: <https://www.mscbs.gob.es/estadEstudios/estadisticas/inforRecopilaciones/indicadoresSalud.htm>
16. Fotuhi M, Mian A, Meysami S, Raji CA. Neurobiology of COVID-19. *Journal of Alzheimer's Disease*. (Preprint):1–17.
17. Olabarrieta-Landa L, Caracuel A, Pérez-García M, Panyavin I, Morlett-Paredes A, Arango-Lasprilla JC. The profession of neuropsychology in Spain: Results of a national survey. *The Clinical Neuropsychologist*. 2016;30(8):1335–55.
18. Diller L, Ben-Yishaym Y, Gerstamn LJ, Goodkin R, Gordon W, Weinberg J. *Studies of cognition and rehabilitation in hemiplegia. Rehabilitation monograph N° 50*. New York: New York University Medical Center; 1974.
19. Benton AL, Abigail B, Sivan AB, Hamsher KD, Varney NR, Spreen O. *Contributions to neuropsychological assessment: A clinical manual*. USA: Oxford University Press; 1994.
20. Corsi PM. Human memory and the medial temporal region of the brain. *Dissertation Abstracts International*. 1972;34(02);891B. (University Microfilms No. AAI05–77717).
21. Peterson L, Peterson M. Short-term retention of individual verbal items. *Journal of Experimental Psychology*. 1959;58(3):193–8.
22. Rey A. *Test de Copia de una Figura Compleja—Edición Revisada* (De la Cruz M. adaptadores). Madrid: TEA Ediciones; 2012.
23. Sedó M. *Test de Los Cinco Dígitos*. Madrid: TEA Ediciones; 2007.
24. Wechsler D. *WMS-III, Escala de Memoria de Weschsler-III.: Manual técnico y de interpretación—Edición Revisada* (Pereña J, Seisdedos N, Corral S, Arribas D, Santamaría P, Sueiro M). Madrid: TEA Ediciones; 2004.
25. Poppelreuter W. Disturbances of lower and higher visual capacities caused by occipital damage. Oxford (UK): Clarendon (trans. Zhil J, Weiskranz L, de Die psychischen Schädigungeng durch Kopfschuss im Kriege 1914–1916. Leipzig: Voss; 1917); 1990.
26. Hooper HE. *Hooper visual organization test manual*. Los Angeles (CA): Western Psychological Services; 1983.
27. Cacho J, García-García R, Arcaya J, Gay J, Guerrero-Peral AL, Gómez-Sánchez JC, et al. El test del reloj en ancianos sanos. *Revista de neurología*. 1996;24:1525–8.
28. Roid GH. *Stanford-Binet Intelligence Scales* (5th ed.). Itasca (IL): Riverside Publishing Co; 2003.
29. Lobo A, Saz P, Marcos G, GT Z. *MMSE: Examen cognoscitivo mini-mental*. Madrid: Tea Ediciones; 2002.

30. Reitan RM. Trail Making Test: Manual for administration and scoring. Tucson (AZ): Reitan Neuropsychology Laboratory; 1992.
31. Benton A, Hamsher KS. *Multilingual aphasia examination*. Iowa City (IA): University of Iowa; 1989.
32. Golden CJ. *STROOP. Test de Colores y Palabras—Edición Revisada* (Ruiz-Fernández B., Luque T. y Sánchez-Sánchez, F.. adaptadores). Madrid: TEA Ediciones; 2020.
33. Heaton RK, Chelune GJ, Talley JL, Kay GG, Curtiss G. *Test de clasificación de tarjetas de Wisconsin—Edición Revisada* (De la Cruz M. adaptadores). Madrid: TEA Ediciones; 2001.
34. Wilson B, Alderman N, Burgess P, et al. *Behavioural assessment of the dysexecutive syndrome (BADS). Manual*. London: Harcourt Assessment; 1996.
35. Flores Stevens L, Lehan T, Segura Durán MA, Olivera Plaza SL, Arango-Lasprilla JC. Pilot study of a newly developed intervention for families facing serious injury. *Topics in Spinal Cord Injury Rehabilitation*. 2016 Jan 1;22(1).

Spaniard (Authors: Olabarrieta, López, Wongvalle, Rivera, and Lasprilla)

List of community-specific Spanish norms available:

<i>Year</i>	<i>Authors</i>	<i>Test</i>	<i>Population</i>	<i>Age</i>	<i>Education</i>	<i>Methodology</i>
2004	Campo & Morales (2004) ¹	Verbal Selective Reminding Test	Healthy	18–59 years	6–8 years, 9–12 years, and 13 or more years	Mean and standard deviation
2004	Ser Quijano et al. ²	Short Portable Mental Status Questionnaire Mini Mental State Examination Benton Orientation Test Bell Test Verbal fluency Clock Drawing Test Trail Making Test Free and Cued Figures Recall Logic Memory Naming, Incidental Recall Delayed Recall Similarities	Home dwelling elderly	71–99 years	Illiterate No study Incomplete primary education At least primary education	Mean and standard deviation

		IQCODE Questionnaire of Jorm				
2007	Periáñez et al. ³	Trail Making Test	Traumatic brain injury, schizophrenia, and normal ageing	15–80 years	2–19 years	Mean and standard deviation Percentile
2008	Nieto et al. ⁴	Phonemic (F, A, M) and semantic (animals)	Healthy	6–11 years		Mean and standard deviation
2009	Choca et al. ⁵	Spanish WAIS-III	Healthy	16–94 years	did not complete primary school or <8 years of education, primary school, secondary school, and a university degree	Regression Models
2009	Peña-Casanova et al. ⁶	Rey–Osterrieth Complex Figure (Copy and Memory), and Free and Cued Selective Reminding Test	Healthy	50–94 years	0–20 years	Regression Models
2009	Peña-Casanova et al. ⁷	Visual Object and Space Perception Battery-Abbreviated, and Judgment of Line Orientation	Healthy	50–94 years	0–20 years	Regression Models
2009	Peña-Casanova et al. ⁸	Boston Naming Test and Token Test	Healthy	50–94 years	0–20 years	Regression Models
2009	Peña-Casanova et al. ⁹	Stroop Color-Word Interference Test and the Tower of London-Drexel	Healthy	50–94 years	0–20 years	Regression Models
2009	Peña-Casanova et al. ¹⁰	Verbal fluency tests: animals, fruits, vegetables, and kitchen tools categories. Letters P, M, and R. ELF tasks	Healthy	50–94 years	0–20 years	Regression Models

2009	Peña-Casanova et al. ¹¹	Verbal span, visuospatial span, letter and number sequencing, trail making test, and symbol digit modalities test	Healthy	50–94 years	0–20 years	Regression Models
2010	Morales et al. ¹²	Spanish Version of the Verbal Selective Reminding Test	Healthy	15–93 years	Low, average, and high education	Regression Models
2011	Quintana et al. ¹³	Abbreviated Barcelona Test	Healthy	50–94 years	0–20 years	Regression Models
2012	Aranciva et al. ¹⁴	Norms for the Boston Naming Test and the Token Test	Healthy	18–49 years	8–20 years	Regression Models
2012	Cancela et al. ¹⁵	Symbol Digit Modalities Test	Home care residents	>55 years	Primary, secondary, university	Regression Models
2012	Tamayo et al. ¹⁶	Span verbal, span visuospatial, letter-number sequencing, trail making test and symbol digit modalities test	Healthy	18–49 years	8–20 years	Regression Models
2013	Calvo et al. ¹⁷	Visual Object and Space Perception Battery and Judgment of Line Orientation Tests	Healthy	18–49 years	8–20 years	Regression Models
2013	Casals-Coll et al. ¹⁸	Verbal fluency tests: animals, fruits, vegetables, and kitchen tools categories. Letters P, M, and R. ELF tasks	Healthy	18–49 years	8–20 years	Regression Models
2013	Llinàs-Reglà et al. ¹⁹	Stroop Color and Word Test	Healthy	35–74 years	Low (up to 8 years); average (8–12 years); high (>12 years of education)	Regression Models
2013	Ortiz Marqués et al. ²⁰	Spanish Version of the Rey Auditory-Verbal Learning Test	Healthy	61–95 years	≤4 to ≥12 years	Percentile, Scale Score
2013	Palomo et al. ²¹	Rey-Osterrieth Complex Figure (copy and memory) and Free and Cued Selective Reminding Test	Healthy	18–49 years	8–20 years	Regression Models

2013	Rognoni et al. ²²	Stroop Color-Word Interference and Tower of London-Drexel University Tests	Healthy	18–49 years	8–20 years	Regression Models
2014	Casals-Coll ²³	BNT Short-Form	Healthy	50–94 years	0–20 years	Regression Models
2015	Aizpurua & Lizaso ²⁴	Semantic verbal fluency: 20 semantic categories	Healthy	Younger 17–29 Older adults 55–81	Younger: Mean = 12.0 (SD = 1.0) years Older: Mean = 12.2 (SD = 3.0)	Mean and standard deviation
2015	Alegret et al. ²⁵	Spanish Version of the Face Name Associative Memory Exam (S-FNAME)	Cognitively normal	50–84 years	Elementary, high school, and Bachelor's degree	Mean and standard deviation
2015	Del Pino et al. ²⁶	Taylor Complex Figure Test	Healthy	18–90	0–20 years	Regression Models
2016	Contador et al. ²⁷	37 item Version of the Mini-Mental State Examination	Healthy	67–98 years	Illiterate, read & write, primary school, secondary, or higher	Mean and standard deviation Percentiles
2016	Contador et al. ²⁸	Semantic verbal fluency: animals and fruits categories	Healthy	67–98 years	Illiterate, read & write, primary school, secondary, or higher	Mean and standard deviation Percentiles
2016	Del Pino et al. ²⁹	Modified Wisconsin Card Sorting Test	Healthy	18–90	0–20 years	Regression Models
2016	Nieto et al. ³⁰	Addenbrooke's Cognitive Examination-Revised	Healthy	48–89 years	≤3 to ≥13 years	Regression Models
2016	Ojeda et al. ³¹	Montreal Cognitive Assessment Test	Healthy	18–90	0–20 years	Regression Models

2016	Peña ³²	The Salthouse Perceptual Comparison Test	Healthy	18–90	0–20 years	Regression Models
2016	Pérez-Pérez et al. ³³	The Hayling Test	Healthy	19–99 years	0–18 years	Regression Models
2017	Arango-Lasprilla et al. ³⁴	Rey–Osterrieth Complex Figure—copy and immediate recall (3 minutes)	Healthy	6–17 years	Mean Parents Education 0–26 years	Regression Models
2017	Arango-Lasprilla et al. ³⁵	Modified Wisconsin Card Sorting Test (M-WCST)	Healthy	6–17 years	Mean Parents Education 0–26 years	Regression Models
2017	Arango-Lasprilla et al. ³⁶	Trail Making Test	Healthy	6–17 years	Mean Parents Education 0–26 years	Regression Models
2017	Arango-Lasprilla et al. ³⁷	Symbol Digit Modalities Test	Healthy	6–17 years	Mean Parents Education 0–26 years	Regression Models
2017	Olabarrieta-Landa et al. ³⁸	Peabody Picture Vocabulary Test-III	Healthy	6–17 years	Mean Parents Education 0–26 years	Regression Models
2017	Olabarrieta-Landa et al. ³⁹	Verbal fluency tests: animals and fruits, categories. Letters F, A, and S	Healthy	6–17 years	Mean Parents Education 0–26 years	Regression Models
2017	Olabarrieta-Landa et al. ⁴⁰	Shortened Version of the Token Test	Healthy	6–17 years	Mean Parents Education 0–26 years	Regression Models
2017	Rivera et al. ⁴¹	Stroop Color-Word Interference Test	Healthy	6–17 years	Mean Parents Education 0–26 years	Regression Models
2017	Rivera et al. ⁴²	Learning and Verbal Memory Test (TAMV-I)	Healthy	6–17 years	Mean Parents Education 0–26 years	Regression Models

2017	Rivera et al. ⁴³	Concentration Endurance Test (d2)	Healthy	6–17 years	Mean Parents Education 0–26 years	Regression Models
2017	Contador et al. ⁴⁴	Story and Six-Object Memory Recall Tests	Healthy	67–98 years	Educational level: illiterate, read & write primary school, secondary, or higher	Mean and standard deviation Percentiles
2017	Duque et al. ⁴⁵	Selective Reminding Test Symbol Digit Modalities Test Verbal fluency (letter P; no letter E) Paced Auditory Serial Attention Test	Healthy	16–60 years	Educational level: basic, average, and advanced studies	Regression Models
2018	Grau-Guinea et al. ⁴⁶	B of the Spanish-language Free and Cued Selective Reminding Test	Healthy	18–90	0–20 years	Regression Models
2019	Ladera et al. ⁴⁷	The 5 Objects Test	Healthy	15–95	2–17	Mean and standard deviation Percentiles
2019	Muñoz-Machicao et al. ⁴⁸	Visual Memory Test based on Snodgrass Pictures (VMT-SP)	Healthy Learning disabilities	7–14 years		Mean and standard deviation
2020	Bonete López et al. ⁴⁹	Abbreviated-revised Barcelona	Healthy	55–83 years	0–16	Regression Models
2020	Lara et al. ⁵⁰	Episodic Memory and Verbal Fluency Tasks	Non-institutionalized adults	Mean = 66.3 (SD = 10.4)	Mean = 9.9 (SD = 6.1)	Regression Models

2020	Muntal et al. ⁵¹	Repeatable Battery for the Assessment of Neuropsychological Status (RBANS)	Healthy	20–89 years	≤5 to ≥16 years	Regression Models
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References

1. Campo P, Morales M. Normative data and reliability for a Spanish version of the verbal Selective Reminding Test. *Archives of Clinical Neuropsychology*. 2004 Jan 1;19(3):421–35.
2. Ser Quijano T del, García de Yébenes MJ, Sánchez Sánchez F, Frades Payo B, Rodríguez Laso Á, Bartolomé Martínez MP, et al. Evaluación cognitiva del anciano. Datos normativos de una muestra poblacional española de más de 70 años. *Medicina Clinica*. 2004 Jan 1;122(19):727–40.
3. Periañez JA, Ríos-Lago M, Rodríguez-Sánchez JM, Adrover-Roig D, Sánchez-Cubillo I, Crespo-Facorro B, et al. Trail Making Test in traumatic brain injury, schizophrenia, and normal ageing: sample comparisons and normative data. *Arch Clin Neuropsychol*. 2007 Jan 1;22(4):433–47.
4. Nieto A, Galtier I, Barroso J, Espinosa G. Verbal fluency in school-aged Spanish children: normative data and analysis of clustering and switching strategies. *Revista de neurologia*. 2008 Jan;46(1):2–6.
5. Choca JP, Krueger KR, De la Torre GG, Corral S, Garside D. Demographic Adjustments for the Spanish Version of the WAIS-III. *Arch Clin Neuropsychol*. 2009 Sep;24(6):619–29.
6. Peña-Casanova J, Gramunt-Fombuena N, Quiñones-Úbeda S, Sánchez-Benavides G, Aguilar M, Badenes D, et al. Spanish Multicenter Normative Studies (NEURONORMA Project): norms for the Rey–Osterrieth Complex Figure (Copy and Memory), and Free and Cued Selective Reminding Test. *Arch Clin Neuropsychol*. 2009 Jun;24(4):371–93.
7. Peña-Casanova J, Quintana-Aparicio M, Quiñones-Úbeda S, Aguilar M, Molinuevo JL, Serradell M, et al. Spanish Multicenter Normative Studies (NEURONORMA project): norms for the visual object and space perception battery-abbreviated, and judgment of line orientation. *Arch Clin Neuropsychol*. 2009 Jun;24(4):355–70.

8. Peña-Casanova J, Quiñones-Úbeda S, Gramunt-Fombuena N, Aguilar M, Casas L, Molinuevo JL, et al. Spanish Multicenter Normative Studies (NEURONORMA project): norms for Boston naming test and Token test. *Arch Clin Neuropsychol*. 2009 Jun;24(4):343–54.
9. Peña-Casanova J, Quiñones-Úbeda S, Gramunt-Fombuena N, Quintana M, Aguilar M, Molinuevo JL, et al. Spanish Multicenter Normative Studies (NEURONORMA project): norms for the Stroop Color-Word Interference Test and the Tower of London-Drexel. *Arch Clin Neuropsychol*. 2009 Jun;24(4):413–29.
10. Peña-Casanova J, Quiñones-Úbeda S, Gramunt-Fombuena N, Quintana-Aparicio M, Aguilar M, Badenes D, et al. Spanish Multicenter Normative Studies (NEURONORMA Project): norms for Verbal Fluency Tests. *Arch Clin Neuropsychol*. 2009 Jun;24(4):395–411.
11. Peña-Casanova J, Quiñones-Úbeda S, Quintana-Aparicio M, Aguilar M, Badenes D, Molinuevo JL, et al. Spanish Multicenter Normative Studies (NEURONORMA project): norms for verbal span, visuospatial span, letter and number sequencing, trail making test, and symbol digit modalities test. *Arch Clin Neuropsychol*. 2009 Jun;24(4):321–41.
12. Morales M, Campo P, Fernández A, Moreno D, Yáñez J, Sañudo I. Normative data for a six-trial administration of a Spanish version of the Verbal Selective Reminding Test. *Arch Clin Neuropsychol*. 2010 Dec;25(8):745–61.
13. Quintana M, Peña-Casanova J, Sánchez-Benavides G, Langohr K, Manero RM, Aguilar M, et al. Spanish Multicenter Normative Studies (Neuronorma Project): norms for the Abbreviated Barcelona Test. *Arch Clin Neuropsychol*. 2011 Mar;26(2):144–57.
14. Aranciva F, Casals-Coll M, Sánchez-Benavides G, Quintana M, Manero RM, Rognoni T, et al. Estudios normativos españoles en población adulta joven (Proyecto NEURONORMA jóvenes): normas para el Boston Naming Test y el Token Test. *Neurología*. 2012 Sep 1;27(7):394–9.
15. Cancela JM, Ayán C, Varela S. Valores normativos del “Symbol Digit Modalities Test” de aplicación en poblaciones españolas residentes en geriátricos: un estudio piloto. *Actas Espanolas de Psiquiatria*. 2012 Dec 11;40(6):299–303.
16. Tamayo F, Casals-Coll M, Sánchez-Benavides G, Quintana M, Manero RM, Rognoni T, et al. Estudios normativos españoles en población adulta joven (Proyecto NEURONORMA jóvenes): normas para las pruebas span verbal, span visuoespacial, Letter-Number Sequencing, Trail Making Test y Symbol Digit Modalities Test. *Neurología*. 2012 Jul 1;27(6):319–29.

17. Calvo L, Casals-Coll M, Sánchez-Benavides G, Quintana M, Manero RM, Rognoni T, et al. Estudios normativos españoles en población adulta joven (proyecto NEURONORMA jóvenes): normas para las pruebas Visual Object and Space Perception Battery y Judgment of Line Orientation. *Neurología*. 2013 Apr 1;28(3):153–9.
18. Casals-Coll M, Sánchez-Benavides G, Quintana M, Manero RM, Rognoni T, Calvo L, et al. Estudios normativos españoles en población adulta joven (proyecto NEURONORMA jóvenes): normas para los test de fluencia verbal. *Neurología*. 2013 Jan 1;28(1):33–40.
19. Llinàs-Reglà J, Vilalta-Franch J, López-Pousa S, Calvó-Perxas L, Garre-Olmo J. Demographically adjusted norms for Catalan older adults on the Stroop Color and Word Test. *Arch Clin Neuropsychol*. 2013 May;28(3):282–96.
20. Marqués NO, Caro IA, Valiente JMU, Rodríguez SM. Normative data for a Spanish version of the Rey Auditory-Verbal Learning Test in older people. *Span J Psychol*. 2013 Jul 19;16.
21. Palomo R, Casals-Coll M, Sánchez-Benavides G, Quintana M, Manero RM, Rognoni T, et al. Estudios normativos españoles en población adulta joven (proyecto NEURONORMA jóvenes): normas para las pruebas Rey-Osterrieth Complex Figure (copia y memoria) y Free and Cued Selective Reminding Test. *Neurología*. 2013 May 1;28(4):226–35.
22. Rognoni T, Casals-Coll M, Sánchez-Benavides G, Quintana M, Manero RM, Calvo L, et al. Estudios normativos españoles en población adulta joven (proyecto NEURONORMA jóvenes): normas para las pruebas Stroop Color-Word Interference Test y Tower of London-Drexel University. *Neurología*. 2013 Mar 1;28(2):73–80.
23. Casals-Coll M, Sánchez-Benavides G, Meza-Cavazos S, Manero RM, Aguilar M, Badenes D, et al. Spanish Multicenter Normative Studies (NEURONORMA Project): normative data and equivalence of four bnt short-form versions. *Arch Clin Neuropsychol*. 2014 Feb;29(1):60–74.
24. Aizpurua A, Lizaso I. Datos normativos para respuestas a categorías semánticas en castellano en adultos jóvenes y mayores. *Psicológica*. 2015;36(2):205–63.
25. Alegret M, Valero S, Ortega G, Espinosa A, Sanabria A, Hernández I, et al. Validation of the Spanish Version of the Face Name Associative Memory Exam (S-FNAME) in cognitively normal older individuals. *Arch Clin Neuropsychol*. 2015 Nov;30(7):712–20.

26. del Pino R, Peña J, Ibarretxe-Bilbao N, Schretlen DJ, Ojeda N. Taylor Complex Figure test: administration and correction according to a normalization and standardization process in Spanish population. *Revista de neurologia*. 2015 Nov 1;61(9):395–404.
27. Contador I, Bermejo-Pareja F, Fernández-Calvo B, Boycheva E, Tapias E, Llamas S, et al. The 37 item Version of the Mini-Mental State Examination: normative data in a population-based cohort of older spanish adults (NEDICES). *Arch Clin Neuropsychol*. 2016 May;31(3):263–72.
28. Contador I, Almondes K, Fernández-Calvo B, Boycheva E, Puertas-Martín V, Benito-León J, et al. Semantic Verbal Fluency: normative data in older Spanish adults from NEDICES population-based cohort. *Arch Clin Neuropsychol*. 2016 Dec;31(8):954–62.
29. del Pino R, Peña J, Ibarretxe-Bilbao N, Schretlen DJ, Ojeda N. Modified Wisconsin Card Sorting Test: standardization and norms of the test for a population sample in Spain. *Revista de neurologia*. 2016 Mar 1;62(5):193–202.
30. Nieto A, Galtier I, Hernández E, Velasco P, Barroso J. Addenbrooke’s Cognitive Examination-revised: effects of education and age. Normative data for the Spanish speaking population. *Arch Clin Neuropsychol*. 2016 Nov;31(7):811–8.
31. Ojeda N, Del Pino R, Ibarretxe-Bilbao N, Schretlen DJ, Pena J. Montreal Cognitive Assessment Test: normalization and standardization for Spanish population. *Revista de neurologia*. 2016 Dec 1;63(11):488–96.
32. Peña J, del Pino R, Ibarretxe-Bilbao N, Schretlen DJ, Ojeda N. The Salthouse Perceptual Comparison Test: normalization and standardization for Spanish population. *Revista de neurologia*. 2016 Jan 1;62(1):13–22.
33. Pérez-Pérez A, Matias-Guiu JA, Cáceres-Guillén I, Rognoni T, Valles-Salgado M, Fernández-Matarrubia M, et al. The Hayling Test: development and normalization of the Spanish version. *Arch Clin Neuropsychol*. 2016 Aug;31(5):411–9.
34. Arango-Lasprilla JC, Rivera D, Ertl MM, Muñoz Mancilla JM, García-Guerrero CE, Rodríguez-Irizarry W, et al. Rey–Osterrieth Complex Figure—copy and immediate recall (3 minutes): normative data for Spanish-speaking pediatric populations. *NeuroRehabilitation*. 2017;41(3):593–603.
35. Arango-Lasprilla JC, Rivera D, Nicholls E, Aguayo Arelis A, García de la Cadena C, Peñalver Guia AI, et al. Modified Wisconsin Card Sorting Test (M-WCST): normative data for Spanish-speaking pediatric population. *NeuroRehabilitation*. 2017;41(3):617–26.

36. Arango-Lasprilla JC, Rivera D, Ramos-Usuga D, Vergara-Moragues E, Montero-López E, Adana Díaz LA, et al. Trail Making Test: normative data for the Latin American Spanish-speaking pediatric population. *NeuroRehabilitation*. 2017;41(3):627–37.
37. Arango-Lasprilla JC, Rivera D, Trapp S, Jiménez-Pérez C, Hernández Carrillo CL, Pohlenz Amador S, et al. Symbol Digit Modalities Test: normative data for Spanish-speaking pediatric population. *NeuroRehabilitation*. 2017;41(3):639–47.
38. Olabarrieta-Landa L, Rivera D, Ibáñez-Alfonso JA, Albaladejo-Blázquez N, Martín-Lobo P, Delgado-Mejía ID, et al. Peabody Picture Vocabulary Test-III: normative data for Spanish-speaking pediatric population. *NeuroRehabilitation*. 2017;41(3):687–94.
39. Olabarrieta-Landa L, Rivera D, Lara L, Rute-Pérez S, Rodríguez-Lorenzana A, Galarza-del-Angel J, et al. Verbal fluency tests: normative data for Spanish-speaking pediatric population. *NeuroRehabilitation*. 2017;41(3):673–86.
40. Olabarrieta-Landa L, Rivera D, Rodríguez-Lorenzana A, Pohlenz Amador S, García-Guerrero CE, Padilla-López A, et al. Shortened Version of the Token Test: normative data for Spanish-speaking pediatric population. *NeuroRehabilitation*. 2017;41(3):649–59.
41. Rivera D, Morlett-Paredes A, Peñalver Guia AI, Irías Escher MJ, Soto-Añari M, Aguayo Arelis A, et al. Stroop Color-Word Interference Test: normative data for Spanish-speaking pediatric population. *NeuroRehabilitation*. 2017;41(3):605–16.
42. Rivera D, Olabarrieta-Landa L, Rabago Barajas BV, Irías Escher MJ, Saracosti Schwartzman M, Ferrer-Cascales R, et al. Newly developed Learning and Verbal Memory Test (TAMV-I): normative data for Spanish-speaking pediatric population. *NeuroRehabilitation*. 2017;41(3):695–706.
43. Rivera D, Salinas C, Ramos-Usuga D, Delgado-Mejía ID, Vasallo Key Y, Hernández Agurcia GP, et al. Concentration Endurance Test (d2): normative data for Spanish-speaking pediatric population. *NeuroRehabilitation*. 2017;41(3):661–71.
44. Contador I, Fernández-Calvo B, Boycheva E, Rueda L, Bermejo-Pareja F. Normative data of the Story and Six-Object Memory Recall Tests in older Spanish adults: NEDICES population-based cohort. *Arch Clin Neuropsychol*. 2017 Dec;32(8):992–1000.
45. Duque P, Oltra-Cucarella J, Fernandez O, Sepulcre J, Grupo de Estudio de la Bateria Neuropsicologica Breve En la Esclerosis Multiple G de E de la BNBE la EM. Brief neuropsychological battery for multiple sclerosis. normative data stratified by age and educational level. *Revista de neurologia*. 2017 Feb 1;64(3):97–104.

46. Grau-Guinea L, Pérez-Enríquez C, García-Escobar G, Arrondo-Elizarán C, Pereira-Cutiño B, Florido-Santiago M, et al. Desarrollo, estudio de equivalencia y datos normativos de la versión española B del Free and Cued Selective Reminding Test. *Neurología* [Internet]. 2018 Jan 1.
47. Ladera V, Perea MV, García R, Prieto G, Delgado AR. The 5 Objects Test: normative data from a Spanish community sample. *NeuroRehabilitation*. 2019;44(3):451–6.
48. Muñoz-Machicao JA, Fernández-Alcántara M, Correa-Delgado C, González-Ramírez AR, Pérez García M, Laynez-Rubio C. Visual Memory Test based on Snodgrass Pictures (VMT-SP): a New Neuropsychological Measure of Visual Memory on Children with Learning Disabilities. *Universitas Psychologica*. 2019 Mar;18(2):1–15.
49. Bonete López B, Oltra-Cucarella J, Lorente Martínez R, Sitges Maciá E. Datos normativos del test Barcelona revisado-abreviado para personas mayores cognitivamente activas. *Revista Espanola de Geriatria y Gerontologia*. 2020 May 1;55(3):137–46.
50. Lara E, Miret M, Sanchez-Niubo A, Haro JM, Koskinen S, Leonardi M, et al. Episodic Memory and Verbal Fluency Tasks: normative data from nine nationally representative samples. *J Int Neuropsychol Soc*. 2020 Aug 7;1–10.
51. Muntal S, Doval E, Badenes D, Casas-Hernanz L, Cerulla N, Calzado N, et al. Nuevos datos normativos de la versión española de la Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) forma A. *Neurología*. 2020 Jun 1;35(5):303–10.