

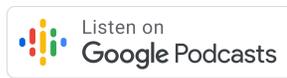


# 82| Neuropsychological Norms for Spanish-Speaking People in the U.S. – With Dr. Maria Marquine

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**Speakers:** Maria Marquine, John Bellone, Ryan Van Patten

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**Intro Music** 00:00



**John Bellone** 00:17

Welcome, everyone, to Navigating Neuropsychology: A voyage into the depths of the brain and behavior, brought to you by INS. I'm John Bellone...

**Ryan Van Patten 00:26**



...and I'm Ryan Van Patten. In today's episode, we speak with Dr. Maria Marquine about neuropsychological norms for Spanish-speaking people who live in the U.S. Maria is an Associate Professor in the Department of Psychiatry at UC San Diego. Part of her research program has involved work on the NP-NUMBRS project. NP-NUMBRS is an acronym that stands for Neuropsychological Norms for the U.S.-Mexico Border Region in Spanish. We discuss NP-NUMBRS in detail with her in the upcoming conversation, including practical advice for clinicians who would like to use these norms in daily practice with Spanish-speaking patients.

**John Bellone 01:09**



Before we give you our discussion with Maria, I want to make a quick announcement. Thanks to the tremendous help from Dr. Cathy Longa. We have recently made good progress on creating, editing, and uploading transcripts of multiple NavNeuro episodes. For example, all of the clinical case episodes, many of the rare syndromes episodes, and most trainee focused episodes now include transcripts that can be found for free on each episode's individual web page at [navneuro.com](http://navneuro.com). Transcripts have multiple advantages for podcasts, including being more accessible for people in the deaf community, for people who are hard of hearing, and when English is a person's second language. There are also timestamps. All language is searchable, so viewers can use the find or Control+F (Ctrl+F) function to locate a word or topic of interest. And the transcripts can be downloaded and shared with people who might prefer not to listen to podcasts. A transcript for this episode with Maria is also now available. Although all of our transcripts are currently in English, we will work on getting this episode's transcript translated to Spanish in the future. We would also like for all of the NavNeuro transcripts to be available in multiple languages, so it can be accessible to as many people as possible. And we'll continue to work on that effort.

**Ryan Van Patten 02:37**



One final announcement. As I mentioned earlier, a large portion of our conversation with Maria relates to the NP-NUMBRS project and you can find the relevant papers in the journal, *The Clinical Neuropsychologist*, Volume 35, Issue 2. We reference these papers and include links to the norms, calculator, the transcript, and other relevant resources in our show notes at [navneuro.com/82](http://navneuro.com/82).

And, now, we give you our conversation with Maria.



**Transition Music** 03:07



**John Bellone** 03:17

Maria, welcome to NavNeuro. We are very excited to have you on the show.



**Maria Marquine** 03:21

Thank you. I'm very excited to be here.

**John Bellone** 03:23



I would like to start by asking you about some terminology. So, there are a variety of terms used to describe the heterogeneous groups of people from Mexico, South and Central America, the Caribbean, other Spanish-speaking cultures - words such as Hispanic, or Latino, Latina, Latinx, others. Some people, understandably, prefer to use their country of origin, such as Chilean, rather than a broader term like Hispanic or Latino. When talking about this diverse community of people, what terminology do you prefer?

**Maria Marquine** 03:57



Yeah, so, thank you for that question. I, personally, don't have a strong preference myself. I identify as Latina, but mostly Uruguayan, based on my country of origin. But, when giving presentations or my work or presenting in a new forum, my preference is to use the term that I believe the audience might prefer. I think there are different aspects of the different terms that people feel sometimes strongly about why they should or should not be used. I try to honor that as much as I can. So, for example, when I'm teaching undergraduate students, I might use Latinx. When I'm giving a committee presentation for older Hispanics, I will use Hispanic because that's typically what people prefer. Obviously that doesn't mean that everybody in the audience would prefer that. So, that's what I do when I give oral presentations in some way. In my written work, or any work that I present in writing, I typically, first, present all the different terms and then I'll say, "From now on, I'm going to use this term," just so that I don't have to use all the different terms every time given all the multiple terms that people prefer. When choosing what's going to be that term that I'm going to use in that paper, I typically run it by co-authors and see if anybody has a strong preference or not, and then we take it from there. We just make a decision and we stick with that. So, basically, I don't have a strong preference. I think they all should be acknowledged and respected. That's how I see it.



**Ryan Van Patten** 05:36

Great. Do you have a preference in this conversation for which term we use?



**Maria Marquine** 05:41

Not really. Whichever you'd like. You'll see me that sometimes I use one and then another, because I really use them interchangeably for the most part. I think also, as you know, a lot of what we're going to be talking about has to do with Spanish-speakers in the U.S., and that's a subgroup of Hispanic, Latino, Latina, Latinx. We can just refer to Spanish-speakers.



**Ryan Van Patten** 06:02

Sure. Yeah, that sounds great. So, there's a lot of diversity within the Spanish-speaking community within the U.S. and across the world. But, what are a few shared aspects of this culture that might be relevant to neuropsychologists?



**Maria Marquine** 06:17

So, I think one that is important, and probably very obvious to a lot of people, is the shared Spanish language. With that, I don't mean that every Hispanic-Latino speaks Spanish, of course. But, we do have a close connection to that language in one way or another, regardless of whether we are fluent or not in that language. So, as you know, Hispanic refers to coming from Spanish-speaking nations around the world. So if somebody is identifying as Hispanic-Latino, in general, they have a connection. Obviously, there are some people coming from some Latino countries, like Brazil, that don't speak Spanish. But, in general, there is a strong connection to the Spanish language. I think that's very, of course, relevant to neuropsychological testing and assessment and, you know, evaluation in general. About 70% of Hispanics in the U.S. speak Spanish at home, and that's nearly 40 million people in the U.S. That's a huge, huge number. It's always mind-blowing to me. I come from a country where we're 3 million people. So, 40 million? It's, like, [laughs] - it's 10 times the size of my county. In any case, I think that's one important aspect to consider.

I think the other one is the history of immigration, that also comes close to the Hispanic-Latino culture. Again, it doesn't mean that all of the Latinos will be immigrants but there is a close connection to that experience, whether it is family members or close others. I think that's another important aspect to consider in neuropsychological testing because, as we know, when we perform a neuropsychological test or do a neuropsychological evaluation, that's a behavior that a person is engaging in and that's going to be molded by your culture. The fact

that you're so close to that immigrant experience, it's going to be molded by that. So I think that's another important aspect.

Then there are more empirical questions. I don't know whether they're important for neuropsychological testing, *per se*, but I think they're relevant to a neuropsychological evaluation. Those are those shared cultures - like the emphasis on family, on social relationships, what we call *personalismo*. Like the importance of respect towards one another, of being humble. A lot of different things that I think are very important for neuropsychologists to understand, and understand well, because they can impact being able to establish rapport. Who shows up to the evaluation? Who do we give feedback of our neuropsychological findings to? Probably not just a single individual, but most likely, for a lot of Hispanics, a group of family members. So, aspects like that. We can go into the specifics of how it could impact, but, I think in general, I would say these are all aspects of the Hispanic culture that I think are really important to understand and consider when performing a neuropsychological evaluation.

**John Bellone 09:17**



Great. In spite of the large Spanish-speaking population, there have been few normative data offered for neuropsych tests that I'm aware of. In addition to the NP-NUMBRS project, which we're going to talk about in just a couple of minutes, what norms are available for Spanish-speaking adults in the U.S.?

**Maria Marquine 09:38**



Great question. Actually, that's what we started with for the NP-NUMBRS project. So we, as you know, published a series of papers on a special issue of *The Clinical Neuropsychologist* as part of this team effort. One of the first papers - I believe it's the second one or even the first one - we did was a literature review of what were the Spanish-speaking batteries that already existed. Spanish-speaking tests with norms available in the U.S. That paper is by Dr. Morlett Paredes, and as part of that issue, she discusses that. We provide a discussion of the six main batteries of tests - we say seven, but one comes from the same research group - and then there are individual tests that have been normed as well. But, in terms of batteries that have been co-normed, there's a relatively small number. It might sound like a lot - six, and well, that's not bad - but, when you really go and look at it, there's such diversity within the Latino culture. Some of the batteries are only for older adults, some are only for some sort of group, and some batteries are more comprehensive than others. So, I think that would be a paper that really would go into the details of that. I'm happy to discuss them more, but that's a good resource for the audience to

go and look and see what's available for Spanish-speakers in the U.S. There's obviously other norms for Spanish-speakers in other countries as well. But when it comes to the U.S., that's a good resource, I think.



**Ryan Van Patten** 11:10

You mentioned co-normed batteries for use in U.S. Spanish-speakers. Remind us why it's so important for us to use co-normed batteries instead of simply relying on individual tests, each of which has its own normative data set for a single patient.



**Maria Marquine** 11:26

I'm glad you're bringing it up because I think this is one of the very important things in doing neuropsychological evaluations and developing tests that sometimes are overlooked, but are very, very important. Basically, as you know, co-norming involves generating norms, or normative data, for a neuropsychological test battery - so a group of tests, within the same population, at the same point in time. What that allows you to do is to analyze an individual's cognitive profile directly comparing across different cognitive domains. So, one test against the other based on the same reference group. That is extremely important because it improves diagnostic accuracy - instead of comparing each score of a person to a different set of normative standards or reference groups - especially, I think, within such a heterogeneous population as Hispanics in the U.S. That's going to be very, very important. It also allows you to create summary scores of different tests, knowing that they're all coming from the same reference group in a more robust, psychometrically robust, way.



**Ryan Van Patten** 12:42

That makes a lot of sense. One way that I think about the importance of a co-normed battery is to think about what happens when we don't co-norm. Specifically, there are good examples of having a raw score of X on a particular test, and then looking at what the z-score and percentile would be based on different norms. You know, so use normative set A, normative set B, and normative set C. One might say average, low average, or below average. And so, obviously, if we are using different norms for different tests, we can't be confident in this person's overall cognitive profile. We need a co-normed battery with strong norms across all different tests, and then to use that full co-normed battery for our individual patient whenever possible.



**Maria Marquine** 13:29

Yeah, absolutely.



**John Bellone** 13:30

We're getting Ryan on his soapbox about reducing the different normative data sets and batteries.



**Ryan Van Patten** 13:36

[laughs]

**John Bellone** 13:36

Let's not get him going too far on that. [laughs] I agree with you, of course.



Maria, can you talk about some of the problems that might arise if we use norms that are not appropriate for the patient that we're assessing and how population-specific norms might be able to remedy those problems?

**Maria Marquine** 13:56

I think that the main problem is basically mis-classification of neurocognitive impairment as an index of acquired brain dysfunction. I think when we use normative data sets that are not intended for that population, we might not actually be picking up true brain impairment that are shown by our tests. Normative data are really most important when the goal is to use neuropsychological tests to identify acquired brain dysfunction. So, as much as I obviously think norms are a very important tool, they're not as needed in many different situations in neuropsychological testing. Depending on what the goal of the evaluation is, they might be less important. But, when we're trying to use neuropsychological tests to identify acquired brain dysfunction, that's when they become so important. And the reason why is because, as I mentioned prior, when somebody takes neuropsychological tests, this is a behavior and all behavior, we know, is impacted by culture and by a number of different factors that are not only an indication of brain dysfunction. With our neuropsychological tests, we're trying to see, basically, what's going on in the brain, right? Is there something that's not functioning as it should? So that's what the norms allow you to do. To take out the impact of some of these other factors that might impact the behavior of doing a neuropsychological test, but are really not indications of brain dysfunction per se.



So, if we gave neuropsychological tests to everybody, at different points in time, and we have premorbid estimates, you know, premorbid tests of people before they had a neurological injury, I mean, the best thing would be to compare themselves to themselves, right? That's the best thing to see if there's been a change, if there's been an impact to somebody's brain function. But, in most cases, we don't have

that. You know, we have a patient come to us and we have to make a determination as to whether there is a brain insult and what that might be. If there is an impairment, what it might be coming from. That's where norms become so important. Because they allow you to take away, or control, for this effect - the systematic effect of other factors that are not indicative of brain dysfunction.

**John Bellone** 16:25



Yeah, we're interpreting, not the raw score, but how the person performed in relation to how we would expect them to perform on that type of test for their age, for their education, for different factors.

**Maria Marquine** 16:38



Yeah, exactly. That's how we do it. We know that age, education, and sex have consistently been shown as person-level factors that impact how one performs in the tests. It's still not extremely clear why or what are the mechanisms, but we know that they impact test performance, again, over and above whether it's a brain dysfunction or not. We also know - and this is also something that I think, in general, is overlooked - is that the way that these person-variables impact performance varies from one culture to another. So, if you look at the different sets of normative data that have reported the effects of these basic demographics on neuropsychological test performance, it's not always the same. It's not always to the same degree. And, again, we don't completely understand why. One of my leading hypotheses is because they are capturing the effect of a lot of cultural things that are happening - again, behavior. And when that interacts with other factors, unmeasured factors, they impact performance in a different way. So, related to that, is when we're doing normative adjustments in a specific population that are adjusted for these demographics, we can adjust for these demographics. But also, when we're doing it for a specific group of people, we're trying to account for all of these other factors that are not measured but that we know might impact test performance. And, again, it doesn't tell us anything about why that might be or what those factors are, but it does allow us to adjust for those factors in some way.

**John Bellone** 18:23



Try to get as close to our patient as we can in terms of what we would expect for that person.

**Maria Marquine** 18:28



Exactly.

**Ryan Van Patten** 18:28

Apples to apples comparison. Yeah.



Now, I think, we set the groundwork pretty well. So let's move into the NP-NUMBRS project. That's an acronym, which means Neuropsychological Norms for the U.S.-Mexico Border Region in Spanish. So what was the overall aim and purpose of the project? And how is it unique?

**Maria Marquine** 18:49

Yeah, sure. Maybe before I go into a little bit of details on the projects, I'd like to start by acknowledging that this is really a team work. It started years before I started, before I even knew that neuropsychology existed. So, you know, I cannot take credit for this at all. This work was started by Dr. Robert Heaton and Dr. Lidia Artiola, they were the ones that initially developed the project and were very involved in the data collection for this project. Along with Mariana Cherner, Monica Rivera Mindt, Paola Suarez, and many others as you can tell by the diverse and large group of co-authors in the different papers. So this is really a team effort.



By the time I came into the project, the data had been collected. It really became a core thing that I wanted to get done. You know, a project very close and dear to my heart that I wanted to get done. Part of the reason why is because of my realization, or my awareness, of the limited tools that us, Spanish-speaking neuropsychologists, had. That actually made me make a career move from being a full-time clinician to being a researcher. So it was in the context of my clinical work. Initially, I worked at Rush University Medical Center as a clinical neuropsychologist. A huge part of why I decided to move to research was because, as a clinician, a lot of my patients were Spanish-speakers and I realized we just didn't have the tools to do an assessment.

So, again, I want to start by highlighting that a lot of people were involved in this project. And while it is true, that, you know, I tried to push it forward to the finish line and took a deep dive into the data, this is really a group effort. So, yeah. With that, I know you had a question... [laughs]



**Ryan Van Patten** 21:01

[laughs]

**Maria Marquine** 21:01

It was not that one. I think it had to do with what was the overall purpose of the norms? [laughs] I guess it is related to that.



I think our purpose was really to try to create, try to give neuropsychologists and neuropsychology, a set of tools that could increase diagnostic accuracy within a Spanish-speaking population. We wanted to provide normative data on a co-normed, comprehensive battery of neurocognitive tests primarily for Spanish-speaking adults living in the region of the country that I'm in right now, which is the U.S.-Mexico border region, while incorporating a wide age range and wide levels of education within that normative set. So that was the main goal of the norms.



**John Bellone** 21:53

Can you talk a little bit about the study methodology?

**Maria Marquine** 21:58

Yeah, sure. We included 254 adults that were living in the U.S.-Mexico border region of California, in San Diego primarily, and Arizona, Tucson. We had two cohorts. One, the data were first collected between 1998 and 2000. And the second cohort - different sets of people, so these are not longitudinal data but a different set of people - the data were collected in 2006 and 2009. This was a function primarily of funding and being able to get the resources that were needed to collect this data. That's not a minor undertaking. We included both men and women between the ages of 19 and 60, who were primarily Spanish-speakers. And we did pretty thorough assessments of whether, in fact, people were primarily Spanish-speaking.



I can even give you more details about that if you'd like in a minute. They had to reside in the U.S., at least for part of the time in, the majority of their time. As you might know, here in this border region, the border is fluid. You know, people are going to one country and the next, but people in our sets of norms were living in the U.S. at least for a majority of their time. We had pretty strict exclusion criteria and we screened for those - like central nervous system disorder or other medical conditions that might impact brain performance, serious psychiatric conditions, like psychosis, bipolar disorder, severe depression, substance dependence. We also looked at less serious conditions like hypertension, metabolic disorders, and made a determination on a case-by-case basis as to whether people should be excluded or not on the basis of these factors. People who did not have Spanish as their, say, strongest language were also excluded. We did include people who were bilingual. But if English was their strongest language, they were not included in the study.

Participants were recruited from the community - we had flyers, presentations, and so forth. So that's the sample per se.

The battery itself covered several domains - verbal fluency, speed of information processing, attention, working memory, executive function, learning and memory, visual spatial skills, and fine motor skills. We tried to include more than one test per domain, which can be important for diagnostics, as well as for strengthening a diagnosis. So for most of the domains, we had more than one test. Then we administered these tests via bilingual staff that also had Spanish as their strongest language. You know, typical setting of an individual, one-on-one, room without distractions and so forth. We developed the normative data from polynomial equations, which basically allows us to consider both linear and nonlinear effects of demographic factors that are continuous. So for age and education, we're able to look at and account for different sorts of relationships of the data with test performance. So those are some of the highlights.

I think another part of the methodology that I think it's important, and again, I think it was very forward-thinking when the data were collected, is that the cohorts are pretty well-characterized in terms of their sociocultural factors. While now, a few years later, we might want to collect things that we didn't think of at the time, it is a very well-characterized cohort and I think that's the strength of this project. And, it's pretty unique, I think, given what's available in other normative studies that I think we can incorporate, really, in a very systematic way, sociocultural factors into the development of the norms. There were a number of different issues. One of them being that those data were not collected on absolutely everybody, and were a little bit spotty. We didn't want to limit the psychometric robustness of our norms by trying to incorporate them. But I think some of our findings on those will really open the door to future studies, and maybe how to best incorporate those in the future. So, in any case, I'm digressing a little bit from your question, but I think that's another aspect of the methodology that I wanted to make sure it comes across.

Then a couple of other things related to the methodology, and also, maybe what makes our project a little unique in some ways, is that we try to provide some helpful tools for people to be able to use this data, without making it too hard. So some of the things that we did is, one, have an online calculator. It's basically an Excel sheet that has all the formulas and you just enter the basic demographics and the raw scores, and people can get the T-score, to make it easy to use. Again, having practiced as a clinician full-time before, I remember trying to plug in those formulas that I saw on papers into my own Excel and trying to figure out - did I do it

quite right, or did I miss, you know, one parenthesis and therefore the formula is not gonna work? [laughs]



**Ryan Van Patten** 27:32

[laughs]

**Maria Marquine** 27:33

I've been there. I did it when I was a clinician. I've actually contacted the authors to make sure, "Did I do it right?" [laughs] So I didn't want that, you know. I didn't want to put the burden on clinicians that are busy. I mean, we're all busy, but it's part of our job to provide tools that people can use. So that was one of the things.

Then another thing that we did is we included a table. So each paper on the different sets of tests have a methodology section, but there's one methodology paper led by Dr. Cherner and myself that's an overall methodology on the study. I think, for people who are really interested in delving into the methodology, that's the paper to go to. It's also part of the special issue in *The Clinical Neuropsychologist*.



So, in that paper, we present a table that helps standardize the assignments of years of education for Spanish-speakers, which a lot of them had the education outside of the U.S. I had also seen how sometimes it's not clear and years of education are not assigned well. So just as a simple example, in Spanish we call *bachillerato*, which, you know, people would think, "Oh, it translates to bachelor's". It actually means a different thing. So, *bachillerato* is 12 years of education. It's graduating high school in most Latin American countries, but here, in the U.S., it's graduating from college. So, even for bilingual people in interviews being done in a different language, and especially if you don't understand, they say, "Oh, yeah, I have a Bachelor's" because it's *bachillerato*. Especially when you don't translate or interpret it well, but that's not graduating from college. So we provide another tool like that, with that table, that I think could be really helpful. I think for the audience, if you haven't seen that, I think it's a great tool.

**Ryan Van Patten** 29:33



Yeah, thank you for the summary. We have several follow up questions, we can dive a little deeper on aspects of the methodology. So 254 healthy, Spanish-speaking adults residing in the U.S. comprised the sample. You referenced the recruitment strategies. Based on my reading, they sounded strong - a strong community relationship, flyers, presentations given in these communities in California and Arizona. Can you say more about the recruitment strategy?

Because, of course, who these people are, who the sample is comprised of and it's representativeness, matters a lot in normative studies.



**Maria Marquine** 30:14

Yeah, absolutely. I mean, I can tell you as much as I know. As I said, I was not involved in those initial efforts when the data were collected.



**Ryan Van Patten** 30:21

Right.

**Maria Marquine** 30:21

So I'm sure that there are people in the team that can speak much more about that, and the kind of intricacies of that. But, what I can say, is that the norms here in San Diego were developed - the group that developed them were housed and the participants were housed - within the HIV Neurobehavioral Research Program, or HNRP, here at UCSD which has the participant accrual and retention team.



Obviously, it's focused on HIV, but we include, in our studies, people that do not have HIV, which were people that were represented in the normative sample here. They have a participant accrual and retention team that has been active in the Latino community for many, many, many years. It involves a number of different people that are out in the field, and have these connections to important leaders in the community. I think all of that really facilitated getting a sample that, of course, is not a population-based study, obviously, but that we think we're able to capture people of different years of education and of different age ranges.



**John Bellone** 31:48

Regarding the education piece, I saw that the average was 6 to 7 years. Was that right?

**Maria Marquine** 31:54



Yes, I believe so. I can take a look and give you the specific number, I don't have it from the top of my head. I know that there was an effort to recruit people in different age bands, so that we have a full representation across different levels of education. So not only being able to say that we cover that spectrum, but really have good proportions across different levels of education. The mean education - I'm pulling information now - was 10 years. We had about 20 to 30% of the group in each of four education categories - so, less or equal to 6 years, 7-10, 11-12, and greater or equal to 13 years. There was about 20 to 30% of the sample in each of

those bands, so we really try to capture people throughout. And same thing for age. We really try to capture people at different age ranges. We have a smaller proportion of the sample in the older age group of 50 to 60, but it's still quite sizable. So, it ranges - the education and the age spectrum within what we report on what we have, and we tried again to have people in the different bands.



**Ryan Van Patten** 33:10

I'm curious, you had mentioned earlier that, knowing what you know now in 2021, you may have collected a few more sociocultural variables or factors. Could you just mention or list a few of those?

**Maria Marquine** 33:22

Yes, for sure. I think a few things that I might have tried to do a bit more of is trying to get at factors that might be good estimates of premorbid cognitive functioning or premorbid abilities. I think that this is going to be an important aspect of moving the field forward in neuropsychology within the Spanish-speaking population in the U.S. Because, as you know, we typically use tests of oral reading to capture premorbid functioning in English-speaking populations. It's unclear if those would work the same way in a Spanish-speaking population, especially where the educational background is so mixed and different - some in different countries and so forth. So I would have liked to capture maybe more factors having to do with education and the school setting and how that happened. We have a few, but I would have wanted to delve a little bit deeper on that. I'm hoping that's something that will provide us with an estimate of the quality of education, premorbid functioning to some degree.



The other part that that's not included in the norms that I think has become more obvious, I guess, is all aspects having to do with discrimination - maybe even like stereotype threat, you know, all of these things that we know can impact performance. We don't know how those might or might not be playing a role or how we might want to keep those in mind. So I think those were other factors that I would want to include in a normative sample. There's many more.

I'm having a hard time separating in my brain, because this is part of the work that I do - trying to develop these tools to identify brain dysfunction via neurocognitive tests. But also a lot of the work that I do is actually trying to identify what are the factors underlying that performance, or difference in performance, across ethnic-racial groups. So if we think of that, there's a host of other things that I would want to get at. We had some estimates of socioeconomic status, but they were not as strong as they could be. More information on, maybe, generation in the country.

More information on health care access and health care use. Acculturation - I mean, we have language assessments, but not quite acculturation. So a few different things. But I think that, really, the trick here in moving forward is not going to be so much in coming up with all of the things we should be assessing, but figuring out how can we do it systematically and in a way that, once we get the data, we can use this information in a clinic setting. Because I feel like we gather a lot in a research setting, and it's important, obviously, but how can we use that information once we go to clinic and we have a patient in front of us and we're trying to diagnose them? So depending on the project, I'm more or less mindful of that. But I think of how do we capture things? And how will we systematically do it in a psychometrically robust way? These other sociocultural factors, that's going to be something really hard, but that I'm very interested in. I hope others are very interested in it and it leads to the work of many, many people so that we can get it right.

**John Bellone** 36:52



Definitely. I think it might be helpful for the researchers and clinicians who are listening to know some of the tests that you gave. I know you gave a list of the cognitive domains, but I thought I'd just mention some of the main tests. So you had the WAIS Coding and Symbol Search, the PASAT, Letter-Number Sequencing, Arithmetic, Trails A and B, semantic and letter fluency, Block Design, BVMT-R, HVLT-R, the Halstead Category Tests, finger tapping, groove pegboard - pretty comprehensive battery. Any others that I didn't mention?

**Maria Marquine** 37:27



I don't know that it kept track of all, but I think you mentioned most of it, if not all, that are part of that battery. Yes.

**John Bellone** 37:34



Great. Could you tell us about the efforts to adapt our conventional English-based tests to be more culturally and linguistically appropriate for the borderlands Spanish-speaking population?

**Maria Marquine** 37:49



Yes, sure. So the approach to the adaptation of the test materials was to try to remain as faithful and as closely to the English-language versions of each of the tests. It's definitely not the only way to do it, but this was the approach used in this study. Again, we all think that there's different ways that things can be adapted, and it's not always just trying to keep close to what was originally done. But in this case,

for many different reasons, we wanted to keep it that way. We tried to be very careful about the translation adaptations, so that it was in a linguistically "neutral" Spanish language. So, in a Spanish that could be understood by members of different countries that moved here to the U.S., and different areas of countries that moved to the U.S.. So, to do that, we used a group consensus approach. We had a number of psychologists, neuropsychologists, staff members, psychometricians, do the initial translation and then meet as a group to make sure that - and from different places, you know, coming from different backgrounds in Latin America, so that it was not only for a specific group of people from a specific area. Then we discussed the materials to see whether any words wouldn't be good to use and so forth. Again, as I mentioned before, I was not part of the initial adaptation. I was not in neuropsychology at the time. But that was the approach. Once they created this version that was in Spanish that could be understood by different people, it was back-translated into English to make sure it fit the original test. For the most part, the adaptation consisted of adapting the test instructions.

For other stimuli, they are pretty much the same that they are in the English version of the test. The only two where that's not the case, is the Hopkins Verbal Learning Test. So there were a couple of words that were changed because they were not a good fit in Spanish for different reasons. There might be a word that if you translate that word into Spanish, it meant two different things or things like that. Then for the PASAT, the Paced Auditory Serial Addition Test, we recorded the numbers in Spanish, obviously because it was only in English before. So that was mainly the adaptation of tests.



**John Bellone** 40:31

Did most people come from Mexico in the sample? Do you recall?



**Maria Marquine** 40:36

Most of the sample was from Mexican origin or descent. Again, that's one of the variables, but the way the data were collected is different from how it is done now, at least in most studies that are funded by the National Institute of Health because we have to follow certain guidelines. So it was not in that exact way. But, yes, most people were from Mexican origin or descent. Given the region of the country we were not very surprised by that.



**Ryan Van Patten** 41:05

You mentioned the HVLIT and how you adapted it and the word list to be more appropriate. The word list in Spanish, does it have semantic categories?

**Maria Marquine 41:16**



Yes, it does. There was an earlier paper on a smaller group of people that Dr. Cherner led, and she provides more details on the adaptation of that test. She's the best person to really talk about how this happened, because she was very closely involved with that. But, yes, it does have categories. She was mindful of that - trying to keep the same structure, the same cognitive processes that we think could be important for learning - that those also carried on to the Spanish-speaking version.

**Ryan Van Patten 41:48**



Your study wasn't designed to investigate bilingualism per se, but the Suarez et al. paper reported some interesting basic analyses about the degree of Spanish-English bilingualism in your sample. So, first, tell us about how you quantified bilingualism using fluency tests - the phonemic fluency ratio approach. And then speak to the findings regarding relationships between bilingualism and test performance.

**Maria Marquine 42:16**

Yes, as you mentioned, Dr. Suarez's paper on bilingualism examined the impact of this variable on test performance in a subset of the sample. So, for about 170 people, I believe, we had full continuous scores on verbal fluency tests both in English and Spanish. We use the letters FAS for the English version, and PMR for the Spanish version. Everybody got both of those in English and Spanish. There was a very small number of people that spoke no English at all, and so the FAS score was 0. But we gave those tests to everybody.



The ratio that we use is, basically, the ratio of total words produced on FAS to the total number of words produced in both the FAS and the PMR. So, basically, higher scores represent higher levels of English fluency. This was done as part of the screening because, as I mentioned before, if participants or potential participants were primarily English dominant, then they were excluded from the study. So for participants in that ratio that I mentioned -  $FAS / (FAS + PMR)$  - if they scored 0.67 or higher, they were considered English dominant and they were excluded. If the scores were less or equal to 0.33, then they were considered Spanish dominant. And in between, they were considered bilingual. So that was the ratio.

In that paper, Dr. Suarez looked both at the continuous scores on this ratio and also categorized people as bilingual or monolingual. What was unfortunate, in this case, is that - again, I guess, you live and you learn, right? - but these tests, the FAS and PMR, were administered at screening. So for a number of participants, because

this was done at screening, it was like, "Oh, these are not important" and these were tossed away. So, we have the scores and we knew whether they were bilingual or monolingual and that they were not English dominant, but we don't have their continuous scores anymore. That's why this data for that bilingualism paper, we wanted to use the entire ratio - the actual continuous score - so that's available for only 170 participants.

I understand this can be confusing, because we really do have data on everybody, whether people are monolingual or bilingual, but we don't have this continuous score. But, in Dr. Suarez paper, we use, again, the continuous and then we categorized as well. Basically what she found was that when you looked at the impact of this bilingualism estimate per verbal fluency test, when you looked at the association with raw scores, there were practically associations on every single test that was presented. But when the associations were with bilingualism and the demographically adjusted T-scores, then there were only significant associations of a small number of tests - primarily tests of speed of processing and executive function. I believe it was the WAIS-III Digit Symbol, Symbol Search, Trail Making Test B, and then Letter-Number Sequencing also came out in some analysis depending whether it was categorized bilingualism or not, but those were the tests that there were still associations. If I remember correctly, it was at about a half a standard, or I mean, four T scores difference or so forth. So it was not huge, but it was there. I think it's definitely something that needs to be considered in future studies. Again, unfortunately, we can systematically incorporate it into the norms, but it's certainly something that we believe needs to follow it up on.

**Ryan Van Patten** 46:14



So, years of education and other demographics that you collected explained some of the differences that you originally found in bilingualism. You originally found that people who are bilingual scored higher on most or all of the tests than people who are not. Some of those differences were accounted for by education and other factors, but not all of them. There are a few tests left, even after accounting for demographics, where people who were bilingual scored higher on those cognitive tests than people who are not. Is that right?



**Maria Marquine** 46:46

Exactly right. Thank you for putting it so clearly.



**Ryan Van Patten** 46:50

[laughs] I don't know about that.

**Maria Marquine** 46:48

The only thing that I would want to add to that, or the caveat, is that, - and this I think we discussed in more detail in a newer paper that we have, that builds on Dr. Suarez's finding and goes into the investigation of other sociocultural factors in addition to bilingualism and how they might impact that test performance. So this was a paper by Dr. - not "doctor", not yet [laughs] - by Lily Kamalyan. She's a graduate student at UCSD joint doctoral program in clinical psychology. She's working in my lab. She, again, did this study building on Dr. Suarez's paper where she looked at bilingualism and other factors. She couldn't consider bilingualism as a continuous variable because of what I mentioned before. But she looked at that. The reason why I'm bringing this up - and I can tell you a little bit more and discuss more of the findings on that - but we found something similar in that we found bilingualism and other sociocultural factors impacted performance over and above the basic demographics. But the effects were worth mentioning. A lot of the initially very strong associations were not accounted for and disappeared in the context of these demographic corrections. Again, we don't know why it is, right? So by saying this we are not saying that, "Oh, see years of education or age or this is more important than bilingualism." It's more like, when we consider these basic demographic adjustments that are easy to ascertain for the most part, it takes away a lot of this other effect. It doesn't mean that it's more important, it might be the other way around. It's just how we build our models. But, practically speaking, it tells us that once you adjust for the simple things, a lot of these big effects, you don't have to worry about in terms of trying to identify brain dysfunction, if that makes sense. So I think that's an important thing to keep in mind. Again, it's not like one is more important than the other. That's an empirical question. Now a lot of the work that I and others are trying to figure out is what are these key factors. But, practically speaking, it's very convenient in some way that a lot of these other effects that can impact performance are accounted for by these things.



**John Bellone** 49:27

Yeah, good point. I also wanted to just clarify for our listeners that in a normative study like this, you were administering these tests to healthy people. So we wouldn't expect there to be effects of brain injury or cognitive impairment on the phonemic fluency task. You're not using them to measure a clinical symptom like we usually do in our practices. You're specifically measuring bilingualism there. So I just wanted to clarify that.



**Maria Marquine** 49:51

Absolutely. Absolutely.





**John Bellone** 49:54

I also wanted to ask you how these findings, the Suarez et al. findings, fit in with the broader literature on bilingualism and cognitive performance?



**Maria Marquine** 50:06

You said which findings? The Flores?



**John Bellone** 50:08

Excuse me, Suarez. My accent is... [laughs]



**Maria Marquine** 50:12

That's okay. [laughs] Because there are other Flores findings that are relevant to this. [laughs] So that's why I like....

Okay, so the question was how are the Suarez findings - how do they relate to...?



**John Bellone** 50:25

To the larger literature on bilingualism and cognitive performance.



**Maria Marquine** 50:29

I think it's consistent with other findings that have shown that persons that are bilingual might show an advantage on certain cognitive domains. Similar to the ones that we found, like executive function - not executive function broadly speaking, but set switching and processing speeds. They're consistent with that. I think one thing, though, that it's important to keep in mind is that our study was not focused on understanding the effects of bilingualism, right? That was not the main goal. That was one variable that we thought was important for the purposes of what we're trying to accomplish. But because we're not investigating bilingualism per se, and what might be the effects on the brain or brain function or test performance, we do not have the full spectrum of bilingualism. So it's cut, because everybody who was primarily English-speaking is not in the study. So, again, when interpreting findings, I think it's important to realize that these are all primarily Spanish-speaking people, and some of them were bilingual. It's not like we have the full range from monolingual Spanish to monolingual English. So I just thought I would make a point of that, because that could have modified the findings. You know, obviously, when you have a bigger range, there's things that you might be able to see that we didn't pick up on.



**John Bellone** 50:29

Yeah, that's also a good point. I wasn't sure if you wanted to say anything else about the literature on bilingualism and how it might help or potentially impede people's performance.



**Maria Marquine** 52:13

Yes, I think the other part that what you're saying makes me think about is the work that I thought you were referring to earlier, some work we did with Ilse Flores.  
[laughs]



**John Bellone** 52:24

[laughs]



**Maria Marquine** 52:26

I think that was also published in TCN a number of years before. This was using data from the NIH Toolbox Cognition Battery normative study. In that battery, there are tests - you know, good tests of vocabulary and other language tests - which we did not have in NP-NUMBRS. What we found is that, in these cognitive domains that we measured, bilingualism in general was associated with better performance, if there was a significant association. But there are other findings on bilingualism that point to being bilingual - or maybe the other way around, being monolingual - is associated with better vocabulary scores on that language than being bilingual. My understanding of those findings - and again, I'm not a core bilingualism researcher, so I have a good knowledge, but it's not what I do day in and day out - but my understanding of those findings are that this vocabulary advantage in monolingual people is stronger in younger age groups, but it can maintain in adulthood as well.

In this paper I was referring to, with Flores, with adults in the NIH Toolbox Cognition Battery normative study, we looked at Spanish-speakers in that study. There were no really good measures of bilingualism but we looked at other measures that go along with being bilingual - like if people were born outside the U.S. or not, if they reported Spanish as their first language or not, whether they attended school in the U.S. or outside, or they spoke more Spanish at home. So all kinds of self-report measures that could speak to whether somebody is bilingual or not. And we found that those measures, if it was more towards people being Spanish speakers - I speak Spanish at home, Spanish is my first language I grew up... - those have higher scores on vocabulary tests, than people who, and the study was adults, than people who reported the opposite. They were still tested in Spanish, but either did not report Spanish as their first language or what have you. So they were probably

more likely to be bilingual. Again, this is not unique to our study. That was consistent with other studies in the literature as well.

Interestingly, similar self-report variables were related to better performance on tests of fluid cognition as assessed by the NIH Toolbox. But, again, worse on crystallized - like vocabulary and oral reading. So yeah, it's certainly, again, a lot to disentangle. It's not an easy, straightforward picture. But I think it's important to be mindful of at least some of the complexity. And I think it highlights, too, that it's not the right approach to say, "Okay, we're just going to adjust for these things, and they're going to operate the same way for all domains for all people", because there's a lot of interactions and complexities. The trick is going to be how can we simplify it in a way that it captures the key things, and we do a good job, yet, it's feasible to do it.



**John Bellone** 55:51

And that's why you're collecting these norms. So you're as close to those samples as you can possibly be.



**Maria Marquine** 55:56

We're trying. You know, I'm hopeful. I think we're just at the very early stages. I'm very confident that neuropsychology will move way beyond this, and this will be, you know, "What? What are they doing?" [laughs] But this is what we have now and I think it is an important tool. There's been some controversy about norms, and demographically adjusted norms. I think it's important to acknowledge that and move the field forward, again, in identifying what are the underlying factors impacting performance. But, at the same time, we shouldn't toss a tool that we have. I mean, it's so powerful, I can tell you that. You know, I still see some clinical or legal cases, and having this tool makes a whole lot of a difference as a clinician than when you don't have it. So, they're not perfect. There's a lot to do still, but it's an important tool. I'm hoping we develop even better tools, and I think technology might be helpful for that in the future. But this is what we have.



**Ryan Van Patten** 57:05

Right. The monolingual advantage in vocabulary has always made sense to me in terms of opportunity cost. You know, there are only 24 hours in a day and if somebody spends some of their time thinking, talking, reading, writing in one language, and some of their time in the other language, they just don't have as much time to develop as thorough a vocabulary in either language as does someone who spends 100% of their time in one language.



**Maria Marquine** 57:34

Yeah, absolutely. That's how you know that that advantage, or disadvantage depending on how you're looking at it, is explained. I can tell you some days I feel like I cannot speak either English or Spanish. [laughs]



**Ryan Van Patten** 57:47

[laughs]



**Maria Marquine** 57:47

Like, I don't know either. [laughs]



**Ryan Van Patten** 57:52

Right. And then the flip side to that coin would be abilities like task switching, inhibition, processing speed, where people who are bilingual or multilingual are doing that on a regular basis. You're constantly inhibiting one language, switching back and forth between one and another, and you see some of those advantages come out in testing.



**Maria Marquine** 58:11

Yeah, exactly right. In this era of COVID, it makes me think, like, "I wonder if we tested mothers..." [laughs]



**Ryan Van Patten** 58:18

[laughs]



**Maria Marquine** 58:18

[laughs] We just switch between not only different languages, but different tasks all the time. What one would we get? But I'm derailing. [laughs]



**Ryan Van Patten** 58:29

[laughs] Yeah, COVID has changed so many things, without a doubt.

So, you also reported on diagnostic validity of the norms using a sample of people with HIV. You had referenced this sample earlier as you're talking about methodology. So what did you find?

**Maria Marquine 58:45**

So what we did is we had a group of 150 people with HIV - 150+ Spanish-speakers with HIV - from the same region of the country. Again, recruited in a similar way as people that are used in the norms. They completed the same battery of tests, and we use our normative data to look at rates of impairment within this

Spanish-speaking sample of persons with HIV. And what we found is that, using the one standard deviation of 40 or lower, we found that on a summary score - the global score of cognition based on the different tests that we had - we found that close to 40% of the Spanish-speaking sample of persons with HIV showed neurocognitive impairment when using those norms.

And then we also applied the same raw scores to normative data developed for English-speaking non-Latino Whites and non-Latino Blacks and we found wildly different rates of impairment using those different sets of norms. When we used norms for non-Latino blacks, I believe we got about 17 or 18% of impairment, and about 60% with norms for Whites, which I think underscores the importance of using the right norms. So, in general, when you look at a sample of HIV studies across cultures, we typically get 40% of the sample shows as impaired, 40 to 50%. So using the norms that are specific to this population yielded similar rates of impairment in the population than we would expect, given what we typically see in HIV. But when we used other norms, we found very different rates of impairment.



I think it's important to highlight that because the story becomes very different when you use these different sets of norms. So if we didn't have the norms for this population, and a researcher wanted to study Spanish-speakers, and they said, "Well, what norms should I use? Okay, I'm going to use this one for this group", for example. And, say they pick the norms for non-Latino Blacks because it's another kind of minority group in the U.S. That would make a lot of sense, the rates of impairment would have been much smaller and the interpretation might have been, "Wow, look at Latinos! You know, Hispanic paradox again. Even though they have all this, you know, poor access to care and high rates of AIDS and poor metrics of health related to HIV, they're doing quite well in terms of the neurocognitive impairment." So that might have been the interpretation. And if they had decided to use the norms for Whites, it would have been like, "Wow, look at this huge neurocognitive disparity. It's like 60% of the sample is impaired. That's not what we typically see in HIV." So I think that kind of drives the point.

Having said that, I think it's also important to be very, again, mindful that we didn't have a gold standard here. Really, to truly establish validity, you need a gold standard. Like brain imaging or another set of norms. If we already knew these

norms work, then it's another set of norms we could compare to, something along those lines. So we didn't have that here. So, really, we're comparing to what we know happens in HIV. This seems to be a way that it supports that these tests are functioning how they should. But we didn't have that gold standard. In similar batteries, in English-speakers, we have established that these tests used in this way, with gold standard outcomes, like brain imaging and other things - this battery actually does pick up HIV-associated neurocognitive impairment and this battery has been used in studies across different cultures and in different languages. So that, again, lends to the validity of this, but it's not it's not the ultimate way to establish validity this way. So there's a lot to work on that in that regard.

**Ryan Van Patten** 1:03:13



Right. I appreciate how, as we're going along, you're talking about the limitations of the NP-NUMBRS norms. They have great utility, and I'm very excited that we now have them to use. As with anything, there are limitations, so we can bring up just a few more of those. One that comes to mind is, of course, you know, good norms are not the only ingredient in a culturally informed and appropriate assessment. I don't know if we want to call that a limitation. It's just something to be aware of - this is not a panacea. More specifically, I'm wondering to what extent might different dialects of Spanish influence the utility of the norms?

**Maria Marquine** 1:03:51



We try to pay close attention to that - to the different kinds of ways that people might speak Spanish or different words that people use. You know, married to a Colombian, I'm very aware of that. I feel like we were not really understanding each other initially. You know, there are pretty big differences. But we really paid close attention to making sure that the Spanish language would be understandable, at least across most people here in the U.S. that speak Spanish. Our concern, though, that definitely is, again, an empirical question is that, as you know, there's other ways in which Latinos or Spanish-speakers in the U.S. vary. And we don't know whether that is going to impact the utility of these norms. Other than the dialect or the Spanish-speaking itself, there are cultural and regional differences within subgroups of Latinos and that might impact how somebody performs on the test. So until we can test those in different groups of Spanish-speakers, in different areas of the country, from different countries of origin - as you mentioned, these are primarily people from Mexican origin - we don't know if the norms are going to work the same way.



**John Bellone** 1:05:08

And along those lines, do you think it's possible to use these norms in other countries? Other than the U.S. and Mexico? Or would that difference in dialects, different populations, would that be problematic?



**Maria Marquine** 1:05:21

I think it will be problematic. Again, I think it's an empirical question. Until we don't test it, we wouldn't know. They might work better in some countries than others. But, I would say, for anybody who's looking for norms in other Latin American countries, there are a lot of other large, strong norming efforts in a lot of Latin American countries and that's where people should start. [laughs] So I would not apply them, at least not without first really looking into what might be a better set of norms for a specific country. If there is none, and these are understood to be stronger because not every country has norms, then they could be helpful in some way - you know, better than not having any. But it wouldn't be the place where I would start.



**John Bellone** 1:06:26

And then one last limitation question before we move on to more of the clinical application side. Some of the norms were collected 10 to 20 years ago. Do you have any concerns about the appropriateness of using those today?



**Maria Marquine** 1:06:40

So I can tell you that I am quite less concerned now than what I was at the beginning of the project about this. This is one of the first things that I really wanted to look into. I was concerned. We ran analyses and we found that - because we practically have two cohorts spaced within 6 to 11 years apart, the earlier cohort and the other one - when we looked at changes across time, we didn't see any significant changes. It was only a small difference, I believe, in Letter-Number Sequencing - very small, but nothing else. So that really made me feel more at ease. I would use the norms confidently, given what we have. But, also, if I had resources to collect new norms today, I would jump on the opportunity to do that, you know what I mean? Like, I wouldn't say, "No, that's not needed. We have this..." Absolutely not. It's an empirical question. Until we don't have data from now, we don't know. But again, the analyses we've done at this point, gives us some confidence that they can be used.



**Ryan Van Patten** 1:07:51

Yeah, some people might wonder about the Flynn effect, for example, but it's good that you've tested the difference between cohort 1 and cohort 2, which were separated by multiple years and didn't find that there were differences.



**Maria Marquine** 1:08:04

Yeah, absolutely. I think in addition to the Flynn effect, in this case, there's been major differences in immigration patterns, in the generation of Latinos in the U.S., in how Latinos are viewed and how they view themselves in the U.S. - all things that, again, could impact behavior. And neuropsychological testing is the behavior. So yeah, absolutely. Absolutely, yes.



**Ryan Van Patten** 1:08:34

Yeah. And we can think about the NP-NUMBRS norms in comparison to WAIS norms or MMPI norms. You know, it's so expensive and time intensive to collect hundreds and hundreds or thousands of people that we just can't update them every three years. It takes a while to update norms. So I think the NP-NUMBRS norms are in line with other popular norms that we use for other tests, in terms of how old they are.

I wanted to move into clinical applications. Maria, I know a lot of our listeners are clinicians and/or do some clinical work. So the NP-NUMBRS norms are very exciting in that we have a tool now that we did not used to have. And it's also not lost on me that you mentioned that you used to be a clinician before, now spending more of your time on research, and I think that helps a lot. You did the day-to-day grind of clinical work. And so you and your group, you've done a lot to make these norms clinician friendly, which I think is helpful. You mentioned that the norms provided account for both linear and nonlinear effects of age, education, and sex. And you mentioned the digital calculator for convenience. Just real quick, how do people access the calculator?



**Maria Marquine** 1:09:50

It is an online supplement to a number of the articles on the issue. So if people go to the articles, there should be a way to access it. In what way? You just click in the online supplement and it should pop up. I believe it can be downloaded and it's an Excel file that you can keep in your computer.



**Ryan Van Patten** 1:10:11

Great. A few other materials that I was wondering about would be the HVLТ and PASAT stimuli. So, if I'm a clinician who will be seeing a Spanish-speaking patient tomorrow and I want to use your norms, how might I be able to administer the HVLТ and PASAT as you did for this project?



**Maria Marquine** 1:10:28

Yeah, and that's a very, very good question. I feel like we try to be very user friendly with all of the tests, even saying where you can find these stimuli. For the HVLТ and PASAT it's harder because the stimuli per se will change. So for the HVLТ - and I know because this test is copyrighted in English, and Dr. Cherner was the one that initially did this adaptation. So I believe, and I don't want to - I might need to look further - but my understanding is that if you want to use that test, you should purchase the Spanish-speaking version of the HVLТ from the publishing company, and then change the couple of words that were different based on what's described in the Cherner paper. That's the best way to do that. For the PASAT, I need to find that out. We've been contacted for that, and that's something that can be distributed, but I'm not sure. So I don't want to say one thing or another.



**John Bellone** 1:11:40

Yeah. And before we release this, if you want to let us know, we'll link to all of the resources, the calculator, all the papers, especially in that TCN special issue. So we'll have it all in our show notes.



**Maria Marquine** 1:11:54

Oh, that's great to know. Yes. Because this is a question that keeps coming often. And again, I mean, people kind of reach out, "How do I do this?" And this is what my understanding is. With the PASAT there hasn't been a problem in releasing that. Again, because I was not involved in the initial part of getting the permissions in place and making sure that's all good, I'm not 100% sure. I typically send people toward Dr. Cherner [laughs] and she handles it. But I'll find out so that we can have a more clear answer and resource. Because, again, we wanted to do this so that people can actually use it. It's not, you know, just to publish data.



**Ryan Van Patten** 1:12:36

Yeah. That's why you have a team, right?

I wanted to also ask one follow up question about the bilingualism ratio. So this is FAS in English and PMR in Spanish, and the ratio is  $FAS / (FAS + PMR)$ . And if that

score is 0.67 or higher, the person is considered to be English-speaking monolingual. If it's 0.33 or lower, they're considered Spanish-speaking monolingual. In the middle would be bilingual. Do you recommend that approach for clinicians who are looking to determine the language status of their patients? Or not so much?

**Maria Marquine 1:13:18**

I think it's an approach. What I like about it is that it can be quantified. So the other paper that we haven't quite discussed a great deal, I mentioned it but I didn't go into a lot of detail, is the paper by Lily Kamalyan that came out more recently. It's not part of this special issue, but it's now available in JINS, Journal of the International Neuropsychological Society. So, in that paper, we looked at performance-based bilingualism as measured by this ratio that you just mentioned. We also looked at self-reports of bilingualism based on participants' self-report and report on bilingualism per the examiner - so what the examiner thought, whether the person was bilingual or not. And while all three types of assessments were associated with performance when non-demographically adjusted scores were used, the only one that remained significantly associated was this ratio. So it gives me a bit more confidence that this is probably better than, say, self-reporting of bilingualism based on our findings and based on the way that we asked it. Again, without being a core bilingualism researcher, there might be better ways. I think some bilingualism researchers would argue that there are better ways of getting at performance-based bilingualism.



What I like about this ratio is that it's easy to quantify in a sense - you know, you administer the test per instructions and you get a number that you can use. Second is that if you're evaluating a person in one of these languages, you would have administered that test anyway. So it adds little burden, right? You just need to administer in another language to get something tangible. So what I would say is, at least for these norms, if you're going to use the norms in the ways that they were developed and you want to get at bilingualism, this is probably the best thing that I can recommend. It doesn't mean that it is the best assessment of bilingualism. But if you assess it in the same way that we assessed it, at the very least it'd be consistent. We know that it's better than self-report or other-report. And because it's the same instrument we used, you can use it in a similar way. You can say, "Okay, I would expect this much difference in terms of scores if people are bilingual or not." So, that's why I would suggest it when using these norms, if people are interested in getting at that. Again, without saying that this is the best way to capture bilingualism for other purposes.

**Ryan Van Patten** 1:16:11



Yeah, thank you. I have one more clinical application question. Thank you for your patience with all of these. In the papers, you do a good job, your team does a good job of emphasizing how we don't know how well these norms generalize to other Spanish-speaking people in the U.S. And in our conversation, John had asked about generalizing outside the U.S. and you spoke to that. So I'm wondering if you can give general advice to clinicians who are looking for norms for their Spanish-speaking patients, but can't find just what they need. They can't find norms that are quite the apples to apples comparison. But they want to do something. They want to make the best clinical decision they can. How do you suggest people think through these decisions about which norms to use? And how to caveat the use of norms that don't exactly match the patient in front of them?

**Maria Marquine** 1:17:03



Yes, that's another very, very good question. And one that I wish I had a better answer to. I wish I could tell you, "Oh, wait, here. We found the norms for your patient."

**Ryan Van Patten** 1:17:13



[laughs]

**Maria Marquine** 1:17:11



But that's not the case. Again, I've been there. So I know how frustrating and how sometimes we might feel like, you know, we're reading tea leaves. Like, "What are we saying?" We're really trying to make the best assessment we can. Or we're being asked to, you know, operate with a butcher's knife. I feel like that's the thing we need to do, of trying to figure out using the limited tools. But, what I would say is, number one, have a very good understanding of the norms that are available for a population that is similar - in this case, of Spanish-speakers. Have a good understanding of what norms are out there and what the findings have been so you can make a determination. "Okay, so for this patient, there might not be a great set of norms, but these ones are the ones that should be closer because of X, Y, and Z. They're within the age range that I'm evaluating. It's the type of Latino or close to what I'm thinking of." Right? That's what I would start with. And have a good understanding of what is important in neuropsychological assessments, right? Because we, as researchers, try to put out what are the limitations and strengths. But, you know, it has to be a critical exercise of how they lump people in here and so forth. So, again, it can be hard to know all of those, but I think having a good understanding of the psychometrics of neuropsychological testing, and of the norms

that are available, is number one. And it's not always easy to do, but there's ways to do it.

The other part, of course, that you alluded to is - any findings that we put out there based on norms that we know are not a strong fit - is to be very humble and not over-interpret our findings. Outline what are the limitations and what are the strengths of what we used, so that others can also understand what the repercussions might be of that. Because we write these reports and we give findings to someone, right? If this is going to be part of a comprehensive examination for, you know, pre-epilepsy surgery, so that the team understands these are the issues - we might not have as much confidence on this particular case on the neuropsychological testing as we would have on a White, English-speaking American. And it doesn't mean that it can't be used, but understand what the limitations might be so that the team has that knowledge as well.

The other part is, of course, trying to find the norms that most closely approximate the key characteristics. If you're testing a Spanish-speaker, probably Spanish-speaking norms are better than English-speaking norms. It's an important part of testing. So trying to find what those key ingredients are and what would be closer. I think using a co-normed battery, such as ours, is an important part because at least you'll be able to compare the different tests and performance. Of course, it doesn't mean that somebody from another group is just going to perform lower or higher compared to our reference. It could be, you know, a different way for different domains. But if you have a co-normed battery of tests, at least you're comparing to the same reference group. So I think that would be high on my list when picking what I will be using.

In some cases, as I said before, where there's nothing that's great, I might even apply more than one set of norms, understanding the limitations of the different ones, and trying to take that into account in making a determination whether I think there is a problem or not. I think that it complicates the picture, but it can be helpful. Then the other thing is, if it's a condition that should exhibit change over time, I strongly recommend retesting. So if this is a case of somebody that's being evaluated for a progressive neurological disorder, I make a lot of emphasis on that retesting happening because then you have the comparison with oneself. Similarly, if this is a thing that you think it should resolve, or what have you, then re-testing as well. So that'd be the other thing.

And then, as in any other neuropsychological eval, is to make good use of all other supporting data, and going to the extent that you need to go to get the other data that would allow you to try to figure out what's going on. If there is no informant, really go to great lengths to find informants, and maybe more than one, and what have people observed. And, of course, other-report is not the same as having our norms, but I think that really delving into the records and what has been found and making sure you don't miss anything. If they don't give them to you right away, call again and get those records. Make sure you do get them. Get as much information as you can to do a good job in the neuropsychological evaluation overall, as much as you can. So those are some of the things that I would recommend.



**Ryan Van Patten** 1:17:29

Yeah, those assessment-specific factors you mentioned that are outside of the formal testing process that are so important to competent neuropsychology.



**Maria Marquine** 1:22:30

Yeah, exactly. And, of course, that's for any case, right? But I think especially in this case when our tools are not as strong maybe, to go above and beyond. That is why I always say that my evaluations of Spanish-speakers typically take so much longer than other evaluations. Because we have to go the extra mile in every single case. As a clinician, you're struggling just because there's so many people to see, and it's not like we have all the time in the world to do these things or the resources. But I think, in this case, it really pays off if you can.



**John Bellone** 1:23:06

Yeah, those were all excellent points. I especially like the humility comment that you made. I think being humble and acknowledging the limitations in what we do is essential. And not being overconfident in a diagnosis. My preference is generally to take a more conservative approach, especially if it's the first time I see somebody - even a monolingual, White American - I don't want to be overconfident. And then the retesting piece is also incredibly important.

All right. Well, thank you so much for the overview of everything we talked about. It's really, really helpful. We do have a couple of bonus questions for you.



**Maria Marquine** 1:23:44

Sure. Thank you so much, again, for doing this. I think it's great that you're taking the time and effort. I'm hoping that it can be helpful for a lot of people, but I'm very glad that you have this program. I think it's awesome.



**Ryan Van Patten** 1:23:58

Thank you.



**John Bellone** 1:23:58

Thank you. So the first bonus question for you: If you could improve one thing about the field of neuropsychology, and it could be related to what we've talked about today, it doesn't have to be, but what would it be?



**Maria Marquine** 1:24:09

This one is really tough. Because I don't think I can say just one thing. [laughs]



**Ryan Van Patten** 1:24:15

[laughs] A few guests have listed two or three. So you're welcome...



**Maria Marquine** 1:24:18

Okay. I'm going to try two, with subheadings. [laughs]



**Ryan Van Patten** 1:24:21

[laughs]



**Maria Marquine** 1:24:26

You know my biases, of course, but I think that the one thing that we really need to continue to work on is making sure that we diversify our field in many ways. Not only people practicing neuropsychology, both in research and in clinical practice, but also the training of neuropsychology. Make sure that we are talking about these important aspects of assessments across cultures. That we are including, and we're giving the opportunity, and a fair opportunity, for people of all backgrounds to pursue this career. Because it's not easy. You know, we all know that. We've all gone through it. It's a lot. It's a lot. And I think it's from many different aspects - financially, it's hard. You know, we're asked to do a lot of things to get through all of the different stages of the program. I think there's been an increased awareness of that, but for people that do not have those resources easily available, it can be very hard to become a neuropsychologist. So while I think that one of the great things about our field is that we have pretty strong standards, so that we make sure that people have good training and are ready to do what they do, I think that some of those training standards could be modified to make sure that what we're doing applies to different people of different cultures and that we give the opportunity for people of all backgrounds to become a neuropsychologist. So that's one key thing.

Then the other thing is, I think - and this is more speaking, I guess, as a scientist - is to not be afraid to think outside the box. And, really, I think we ought to do that to move the field forward, while not discarding basic tools that we know work - like, in this case, the norms. So again, they're not perfect, but they are important tools. Understanding what they are and being willing to stand up for that because I feel other fields are really good at saying, "What we do is great! And it's going to...", you know? I think, as neuropsychologists, because we understand all the limitations, as we were talking about before, sometimes it's harder for us to stand up and say, "Yes, there are limitations, as there are in blood tests, as they are in all sorts of different things that people do. But our instruments are strong and they do consider a lot of things that are important to identify neurocognitive impairment." While, at the same time, we're creating new science and not getting stuck on, "This is the way and because we've always done this way, this is how it should stay." But actually really thinking outside the box as to how can we further the field of neuropsychology to do what we want to do. Right? Help people. So that would be my take on it. My two things.

**Ryan Van Patten** 1:27:19



Very well said. Thank you. Our second and last bonus question is: what is one bit of advice you wish someone told you when you were training, or maybe someone did tell you, that really made a difference? So with this question, we're looking for an actionable step for trainees that they can take that can improve their performance.

**Maria Marquine** 1:27:38



Yeah. So this one, again, is a tough one. I think that what I will say, it actually goes well before I even knew neuropsychology existed. I only learned, I don't know, in my third year of college that it existed as a profession. And even within graduate school, I was not sure what all it would entail. I don't know if I would have gone all the way if I knew to begin with. [laughs]

**Ryan Van Patten** 1:28:03



[laughs]

**Maria Marquine** 1:28:03



I'm very grateful I was a little ignorant. But, in any case, what I'm going to say goes beyond the training per se as a neuropsychologist. It comes way before that. But the most important thing for me, or something that has helped me and it might help others, is how important it is to not lose sight of what is most important to you. So I

think, like many professions, neuropsychology is a tough profession. It's hard to get all the training. It's hard to do, it's not something that's easy to do. It requires a lot of dedication, brain power, being present in the moment when you are with a patient while you might be dealing with your own things going on in your life. As a scientist, navigating academia and the pressures and the grant writing and the rejections. Again, it's not an easy profession. I don't know that we all truly understand that. Or, we might think it's just us, but I think it is for most people, it's not an easy thing to do. And so I think when things get hard, it's easy sometimes to lose sight of what's most important to you. You know, whether it is your core values, the people in your life, your goals in your career, why you're doing what you're doing. So I know, maybe it's not so much an actionable item, per se, but it can translate.

To me keeping that in mind really has translated into a lot of very tangible things. Because it guides how I behave, how I respond to certain things. And it's made it easier to make tough decisions, or what other people would think would be tough decisions. A lot of times, for me, it's a no-brainer. This is what's going to happen, and people might not like it or people might think differently but I feel like that's the right thing to do. That's who I am and that's how I'm going to move forward. I think it helps alleviate some of the pressures when you keep in sight, again, what's important to you, who you are, and where you want to go. So that's my take.



**Ryan Van Patten** 1:28:06

Yeah, sounds like values-based decision making, which we teach in some of our psychological treatments. I like it.



**Maria Marquine** 1:30:26

Psych neuro. [laughs]



**Ryan Van Patten** 1:30:28

[laughs] Maria, thank you so much for your generosity, your time, and sharing the wisdom. This has been great.



**Maria Marquine** 1:30:34

Thank you. I don't know about wisdom, but I try. [laughs]



**Ryan Van Patten** 1:30:39

[laughs]



**Maria Marquine** 1:30:40

Thank you both so much, again, for doing this - for spending the time, for doing what you do, and for having me.



**Transition Music** 1:30:47



**Ryan Van Patten** 1:30:51

Well, that does it for our conversation with Maria. Be on the lookout for upcoming episodes on behavioral variant FTD with Dr. Bruce Miller, pediatric case presentations with Dr. Beth Slomine, and other topics. And, as always, thanks so much for listening, and join us next time as we continue to navigate the brain and behavior.



**Exit Music** 1:31:13



**John Bellone** 1:31:37

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**Ryan Van Patten** 1:31:49

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