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Translation and Validation of the Spanish Version of the RBS-EC

by

Gabriela Sepulveda

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submitted in partial fulfillment

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Dedication/Dedicación

A mis padres, Maria G. Moncayo y Benedicto Sepulveda, que sacrificaron todo para apoyarme. Que me animaron incluso cuando no entendían lo que estaba pasando, y que siempre me han hecho saber lo orgullosos que están de mí. Dedico esta disertación a ellos, porque sin su amor y apoyo, no habría sido lo suficientemente valiente como para darme cuenta, de que la niña morena que batallaba para aprender inglés, algún día podría convertirse en doctora.

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Translation and Validation of the Spanish Version of the RBS-EC

Dissertation Abstract--Idaho State University (2023)

Despite the continual growth of the Latine population in the United States, relatively little research has focused on Spanish-speaking youth. Extant research indicates that Spanish-speaking children and families often receive inadequate mental health services, partially due to caregiver-provider language barriers and a lack of culturally, and linguistically appropriate assessment measures. Assessment of restricted, repetitive behaviors and interests (RRBIs), which are common features of many neurodevelopmental, psychiatric, and neurological conditions, represents one particular area in which validated, feasible psychosocial measures for Spanish-speaking children and their caregivers are needed. To that end, the current study sought to validate a newly translated, Spanish version of the Repetitive Behavior Scale for Early Childhood (RBS-EC), a 34-item standardized caregiver-report measure of RRBIs in children ages 2–7 years. Participants were 373 Spanish-speaking caregivers recruited through MTurk who had at least one child between 2–7 years of age. The Spanish version of the RBS-EC demonstrated good psychometric properties with good to excellent internal consistency across the different subscales. The Total Composite Frequency scale demonstrated good internal consistency ($\alpha = .90$), while the Total Composite Interference scale demonstrated excellent internal consistency ($\alpha = .91$). Additionally, a multi-group confirmatory factor analysis was conducted to compare the RBS-EC's relative factor invariance between the current Spanish-speaking sample and a previously collected MTurk sample of 300 English-speaking caregivers. The Spanish translation of the RBS-EC was found to be valid and reliable and offers an opportunity to improve the psychological assessment and intervention of early childhood RRBIs among Spanish-speaking populations in the United States. Results from this study provide a

valid and culturally relevant measure that can help improve service delivery and evaluation for this otherwise underserved population.

Key Words: RRBIS, repetitive behaviors, translation, validation, Spanish

Chapter 1: Introduction

According to the U.S. Bureau of the Census (2020), Latines make up about 18.5% of the estimated U.S. population and are currently considered the largest ethnic minority group in the United States. Despite this growing number, the literature suggests that there continue to be various mental health disparities commonly experienced by the Latine population (Flores, 2010; Parish et al., 2012; Zuckerman et al., 2014; Zuckerman et al., 2017). For example, one such disparity is that Latines were significantly less likely than non-Latine Whites to receive access to any mental health treatment (Alegría et al., 2008). Other studies have shown consistently lower quality health care outcomes in the area of developmental disabilities for Latine children when compared to White children (Parish et al., 2012). One possible reason for these and other existing disparities is English proficiency, which is a significant predictor of healthcare quality and access for children (Parish et al., 2012; Zuckerman et al., 2014). In general, non-English-speaking families are more likely to report unmet needs and longer waiting times for receiving services (Flores, 2010; Parish et al., 2012). This highlights a few continuing issues including a lack of Spanish-speaking providers as well as a lack of valid Spanish measures, especially those about the early identification of psychological disorders and neurodevelopmental disabilities.

Considering the lack of Spanish measures and providers, it only seems obvious that instruments that assist in the early diagnosis of disorders should be prioritized in terms of availability in languages other than English. This is important, considering that any instrument aiding in the early identification of symptoms and characteristics can assist in early diagnosis, and research indicates that early diagnosis typically leads to early intervention (Lord & Richler, 2008). Most importantly, the literature suggests that early interventions typically lead to an overall better prognosis for children (Dunst, 2010; Ramey & Ramey, 1998). However, it is not

enough to simply translate the measures and make them available; it is also important to assure that the measures are valid and reliable for the Spanish-speaking population they are intended to be used for. One particular area with this need is the assessment of restricted and repetitive behaviors and interests (RRBIs), which are common features of many neurodevelopmental, psychiatric, and neurological conditions.

Restricted, Repetitive Behaviors and Interests

According to the Diagnostic and Statistical Manual (DSM-5; American Psychiatric Association, 2013), there are four different categories of RRBIs: (1) stereotyped or repetitive speech, motor movements, or use of objects, (2) excessive adherence to routines, ritualized patterns of verbal or nonverbal behavior, or excessive resistance to change, (3) highly restricted, fixated interests that are abnormal in intensity or focus, and (4) hyper- or hypo-reactivity to sensory input or unusual interest in sensory aspects of the environment. RRBIs can include a very broad category of behaviors such as preoccupation with one or more restricted patterns of interest (e.g., a child who only wants to talk and read about dinosaurs), adherence to specific nonfunctional routines (e.g., a child who insists on putting their clothes on in a very specific order), repetitive motor manners (e.g., flapping hands), and preoccupation with parts of objects (e.g., continuously and repeatedly turning the wheels of a toy car).

Existing literature suggests that RRBIs can be divided into two categories: “lower-order” and “higher-order” (Turner, 1999). According to Turner, lower-order behaviors are those that are characterized by repetition of movements such as repetitive manipulation of objects, and repetitive forms of self-injurious behavior. Comparatively, higher-order behaviors such as inflexibility in routines and actions, adherence to ritualistic series of events, and rigid, rule-bound actions, are considered more complex cognitive behaviors. Turner (1999) suggested a

relationship between RRBIs and cognitive abilities, with higher-order behaviors being linked to higher cognitive levels, and lower-order behaviors being linked to lower cognitive levels. Some studies, such as Bishop et al. (2006), have found a relationship between non-verbal IQ (NVIQ) and lower-order behaviors, with NVIQ being more strongly related to the prevalence of RRBIs in older children. However, the relationship between higher-order repetitive behaviors and NVIQ is still contestable. While Bishop et al. (2006) found a relationship between the NVIQ and specific higher-order behaviors such as circumscribed interests, other studies such as Richler et al. (2010) and Lam et al. (2008) found no relationship between these. Further supporting the notion of no relationship, Dawson et al. (2010) conducted a study examining early behavioral intervention for young children with autism and found significant treatment-related improvements in both cognitive and social-communicative skills but no corresponding improvement in the RRBI domain.

Other findings suggest that children are more likely to engage in lower-order behaviors, while adults are more likely to engage in higher-order behaviors (Bishop et al., 2016). Richler et al. (2010) found that lower-order behaviors tend to remain stable or decrease over time, while higher-order behaviors tend to increase in severity over time. Existing literature has also suggested a possible relationship between gender and RRBIs. Studies, such as Leekam et al. (2007) and Wolff et al. (2016), both found evidence supporting boys displaying significantly more RRBIs (e.g., atypical motor behaviors, restricted interests, and higher-order RRBIs) than girls. However, this relationship has mixed support, with some studies finding no significant gender-based differences in RRBI frequency or intensity (Evans et al., 1997; Glenn et al., 2012) while others have supported the existence of significant gender-based differences (Cevikaslan et al., 2014; Lachance et al., 2021; Leekam et al., 2007).

RRBIs in Typical Development

Despite their inclusion in the DSM, it is important to note that RRBIs are not restricted to only neurodevelopmental or psychological conditions. In fact, RRBIs are usually considered part of typical development and are commonly observed in most children during early ages (Castellanos et al., 1996; Evans et al., 1997, 2014; Kopp, 1989; Leekam et al., 2007; Thelen, 1979). Take for example a child who sucks their thumb or insists on carrying their favorite “blankie” around. In most young children, RRBIs are not only typical and expected, but they are also functional. For instance, research indicates that in children, RRBIs are typically used for emotional regulation (Kopp, 1989), as well as for the acquisition of motor skills and action planning (Thelen, 1979). The existing literature suggests that RRBIs tend to be more common between 12 and 38 months of age and less common under 1 year (Evans et al., 1997). Although research indicates a general reduction in RRBIs as children age, RRBIs have also been observed to continue into adulthood, for both neurodivergent and typically developing adults. Take for example an adult who bounces their leg up and down while sitting or takes the same route to work every day; (Castellanos et al., 1996; Evans et al., 1997).

Nevertheless, although RRBIs are part of typical development, the persistence of these types of behaviors after their developmental utility usually indicates a delineation from neurotypical development (Barber et al., 2012, Evans et al., 1997). However, research in this area is limited, and the developmental timing of the transition from normative to pathological has yet to be examined (Evans et al., 2014). Overall, what the literature supports is that RRBIs emerge early in infancy, peak sometime before or during preschool years, and then tend to diminish or fade completely through maturation. For example, in a study by Leekam et al. (2007), parents of typically developing children between 24 and 33 months of age reported that

their children demonstrated various RRBIs, such as repetitive movements, rigidity/adherence to a routine, preoccupation with restricted patterns of interest, and unusual sensory interests. Later, Evans et al. (2014) identified the greatest amount of RRBIs in typically developing children between the ages of 2 to 4 years of age. Other studies have suggested that the emergence of RRBIs typically happens throughout the first year of life and that they peak in the middle with some patterns persisting beyond 12 months (Kravitz & Boehm, 1971). This is important to note, as it suggests that it is not easy to distinguish between typically developing RRBIs and those that are indications of disorders or conditions. RRBIs typically observed in children with neurodevelopmental disorders are also often present in typically developing children around the same ages, and during these ages, is when we typically begin to diagnose. Therefore, this leaves the question of when RRBIs stop being part of the typical development, and how to accurately differentiate between developmentally appropriate and clinically significant levels and types of RRBIs. This highlights a need for evidence-based tools that allow clinicians to accurately achieve this differentiation.

RRBIs in Conditions/Disorders

These delineations in repetitive behaviors are characteristic features of many neurodevelopmental and psychosocial conditions (Mahone et al., 2004). For example, RRBIs can often be observed in Tourette's disorder (Cath et al., 2001), anxiety disorders (Larkin et al., 2017), attention deficit hyperactivity disorder (ADHD; Grzadzinski et al., 2016), autism spectrum disorder (ASD; Richler et al., 2006), obsessive-compulsive disorder (OCD; Miguel et al., 1995), as well as many other disorders and conditions. For some conditions, such as ASD, not only are RRBIs typical and expected, but they are necessary to receive the diagnosis (American Psychiatric Association, 2013). The literature suggests that RRBIs found in children

and adults with disorders and conditions serve the same purpose as those present in typically developing children and in children without psychological disorders (Castellanos et al., 1996; Evans et al., 1997). However, Evans et al. (1997) suggested that in some cases, repetitive behaviors might be more self-stimulatory than adaptive for neurodivergent children and adults. Furthermore, although research is limited, studies have found possible evidence which suggests that individual differences in early manifestations of restricted and repetitive behaviors may predict adaptive behavior, anxiety, temperament, and later emerging psychopathology (Evans et al., 2014, Mahone et al., 2004).

Research that has examined subjective meanings and reasons for RRBIs found that when adults with ASD shared their perspectives about their own behaviors, they formed five central categories for explaining RRBIs: (a) arousal and attention regulation; (b) sensory regulation; (c) emotional regulation; (d) providing a sense of security and coping with unexpected changes in routine; and (e) managing social communication and social interaction (Goldfarb et al., 2021). Although these descriptions are subjective, it is important to note that similar explanations for RRBIs are also described by more empirical research. However, possibly even more important, these descriptions highlight the importance of RRBIs in everyday life and help us understand that RRBIs are not always behaviors that need to be stopped or replaced. Therefore, despite their presence in many disorders and conditions, RRBIs should not automatically be considered negative. This is not to say that no RRBI may require intervention. Take for example RRBIs such as self-injurious behaviors or those that have safety concerns for the individual or others (e.g., head banging, hand biting, dangerous pica, and polydipsia). These types of behaviors would require intervention to develop safe and functionally equivalent replacement behaviors (e.g., replacing hand biting with a chew toy or necklace). It is also important to note that studies

have suggested a negative relationship between functioning levels and RRBIs. More specifically, several studies found that children with higher levels of RRBIs were more likely to present with less developed receptive and expressive language abilities, as well as lower adaptive communication and socialization skills (Bishop et al., 2006; Richler et al., 2010; Szatmari et al., 2006). Although there is existing debate among the neurodivergent community on how much of those behaviors we should be trying to change, it nevertheless highlights an area of concern for many parents (South et al., 2005). Despite this knowledge, research in RRBIs outside of autistic children continues to be limited, and our ability to measure these behaviors past the concept of whether or not they are present is still in its early stages and requires ongoing research.

Some research in both neurotypical and neurodivergent samples (although mostly autistic samples) has also identified gender-based RRBIs differences across different RRBIs types (Antezana et al., 2019; Cevikaslan et al., 2014; Leekam et al., 2007). Leekam et al., (2007) reported that boys have significantly higher restricted patterns of interest than girls, although the effect was small. Arnott et al. (2010) found higher sensory interests in boys than girls. Additionally, Cevikaslan et al. (2014) found boys presented higher rigid/insistence on sameness-like behaviors than girls, although again, the effect was significant but small. Mandy et al. (2012), found that boys had greater levels of repetitive play with objects and circumscribed interests than girls. This was found with both the ADOS and the Developmental, Dimensional, and Diagnostic Interview. However, other studies (Evans et al. 1997; Glenn et al., 2012; Joseph et al., 2013; Zohar & Felz, 2011) have found no effect of gender on RRBIs. As stated by Lachance et al. (2021), while ASD research has helped expand the research of RRBIs, there remains the need for research on the frequency and the degree to which RRBIs vary by age and gender in neurotypical and other neurodivergent (non-ASD) populations. This existing gap in

research may be due partly to the absence of developmentally appropriate, empirically supported, and feasible measures that can examine those factors.

Outside of our ability to identify the presence of RRBIs, a central challenge that remains is being able to differentiate between typical and atypical presentations of RRBIs, as well as being able to identify when these behaviors are interfering with the individual's life and/or safety. Although the use of clinically oriented measures and direct-observation and video coding procedures are likely the best-known methods of measuring RRBIs (Thelen, 1979), these methods are either not designed to detect dimensional features of these behaviors, such as the clinically oriented measures, or are costly and/or time and labor intensive (Lam & Aman, 2007; Wolff et al., 2016), such as such as behavioral coding of direct and video observations. Contrastingly, informant-based questionnaires in general are less costly and more time-efficient alternatives. One such existing measure is the Repetitive Behavior Scale for Early Childhood (RBS-EC; Wolff et al., 2016), which is a caregiver report of restricted and repetitive behaviors and interests.

The RBS-EC, which was adapted from the Repetitive Behavior Scale-Revised (RBS-R; Lam & Aman, 2007), was designed for use in early childhood and to capture quantitative and dimensional features across a broad range of behaviors contributing to the repetitive behavior domain (Wolff et al., 2016). The measure has recently been validated across the whole age group that it was intended for (2 to 7 years old; Lachance et al., 2021), as well as with infants as young as 8 months of age (Sifre et al., 2021), and has proven to be a viable option for the dimensional measurement of RRBIs. However, all validity studies have been conducted with predominantly English-speaking populations, and to our knowledge, there is no existing Spanish version of the

measure, which leaves individuals who only speak Spanish or who have limited English proficiency with no options for a valid parent-report measure intended for this purpose.

Other Measures

Currently, there are several existing reliable measures of RRBIs, including the Repetitive Behavior Scale-Revised (RBS-R; Bodfish et al., 2000), the Repetitive Behavior Questionnaire-2 (RBQ-2; Leekam et al., 2007), and the Childhood Routines Inventory (CRI; Sytsma et al., 2001). Other measures also measure RRBIs; however, these are disorder-specific tools that measure a narrow subset of RRBIs. Examples of these are the Yale-Brown Obsessive Compulsive Scale (Y-BOCS; Goodman et al., 1981), and the Tourette's Syndrome Severity Scale (TSSS; Shapiro and Shapiro, 1984). Several, such as the RBS-R (Martínez-González & Piqueras, 2017) and the Y-BOCS (Vega-Dienstmaier et al., 2002), have even been translated and validated in Spanish. However, it is important to note that most of these measures were designed to assess RRBIs in clinical populations, and consequently result in very low floor effects when used with typically developing children. Additionally, most of these measures do not assess the full range of RRBIs because they were designed to assess behaviors specific to particular disorders (e.g., Y-BOCS and TSSS). Also, none of these measures capture RRBIs across the entire range of development, and some are limited to small age ranges, for example, the RBQ-2 which is intended only for infants 15 to 35 months. Therefore, even though some have been translated and validated, they are still limited in the population with which they can be used with. It is also important to note that in many cases where the measures are translated to Spanish, the measures were validated using Spanish-speaking individuals living outside of the United States (e.g., Barrett et al., 2018; Belloch et al., 2013; Pertusa et al., 2010; Vega-Dienstmaier et al., 2002), which therefore makes

it difficult to know if the measure will be valid with Spanish speaking individuals in the United States.

English Proficiency

Before moving forward, it is important to note that although Hispanic is the term that usually refers to people with a Spanish-language background and Latino is typically used to identify people who hail from Latin America, much of the little research that exists in the area erroneously uses the terms interchangeably. Furthermore, research that discusses Latinos(as)/Hispanics rarely specifies what group(s) they are referring to or what language they speak. Hence it is important to note that although Latinos(as) in the United States make up a large portion of the Spanish-speaking population, they are not the only people who speak or prefer Spanish, and conversely, not all Latinos(as) speak Spanish. With that being said, most research about Spanish-speaking populations usually refers to their samples as Latinos. When referring to this population there are the options of using the terms Latine or Latinx to be gender inclusive. Because the letter "e" in Latine illustrates gender inclusivity within existing Spanish pronunciation, and for cohesiveness throughout the paper, we will continue using the term Latine.

Considering that Latine individuals make up most people who speak Spanish, it would be irresponsible to not include related research. Research suggests that in general, Latine individuals, especially those who have more recently immigrated, tend to sustain strong relationships with their families and friends in their home communities. This closeness and proximity contribute to the increased maintenance of culture and language (Levitt et al., 2003; Viruell-Fuentes, 2006). Although some Latines can maintain their culture and language while also learning English proficiently, others, especially individuals who migrated to the United

States at an older age, may struggle to learn the language. A report from 2013 found that although the number of U.S. born Latines with English proficiency had increased, only 34% of foreign-born Latines spoke English proficiently, indicating that more than half of foreign-born Latines were not proficient in English (Krogstad et al., 2015). Hence, this growing group has led to an increasing number of individuals with limited English proficiency (Alegría & Woo, 2009). This information becomes even more important when we recognize that research suggests that Latines with limited English proficiency tend to have less access to mental health care and services overall (Alegría et al., 2008; Parish et al. 2012; Vega & Lopez, 2001; Zuckerman et al., 2014). These disparities in access to mental health services continue to pose significant concerns regarding equity among Latines.

These discrepancies are not only limited to adult Latines, but they are also observable for the children of this population. For example, growing research has highlighted many existing disparities for the Latine population in terms of ASD assessment, diagnosis, referrals, and access to resources (Lopez et al., 2020). Studies have found that Latine parents/caregivers often report limited English proficiency as a barrier to getting their child an ASD diagnosis, with the language barrier making it more difficult for parents to express their concerns and navigate the diagnostic process (Zuckerman et al., 2014). Children in Latine families with limited parental English proficiency have also been found to experience different diagnostic barriers, use fewer ASD treatments, and have more unmet ASD therapy needs than children in English-proficient Latine families or children in non-Latine White families (Zuckerman et al., 2017). Disparities also exist in terms of ADHD and OCD assessments and treatments. For example, Gerdes et al. (2013) highlights how our overreliance on the identification of ADHD symptoms instead of on functional impairment, can lead to underutilization of professional mental health services for

Latine families. Overall, Lopez et al. (2008) found that Latine parents were likely to report language and cultural issues as barriers to their children accessing mental health resources.

English proficiency does not only pose a barrier to access to mental health services, but it also poses a risk to the quality of those services (Gerdes et al., 2013; Lopez et al., 2008; Zuckerman et al., 2017). Consider, for example, psychological assessments. Research indicates that an individual's language ability and preference affect all aspects of the assessment process (Acevedo-Polakovich et al., 2007). Malgady and Costantino (1998) found that clients whose primary language was Spanish, appeared to receive more severe ratings of symptomatology when evaluated in Spanish, than when evaluated in English. Furthermore, in more recent years, Paniagua (2005) found that the use of mainstream assessment practices has been associated with inaccurate assessment results when not considering cultural considerations. This should not be surprising, as most psychological assessment measures in use today were primarily developed and validated for and with European Americans in mind (Dana, 2000).

According to the APA ethical standards (2002), psychologists should consider an individual's culture and linguistic background, as well as other situational factors, both when selecting assessment measures and when interpreting their results. Although the first suggestion is to use measures that have been validated for use with the population one is working with, the reality is that those measures are still limited in existence. The literature dedicated to the examination of a psychological assessment instrument's cross-cultural relevance has grown significantly in recent decades but still has a long way to go. If validated measures in the desired language are unavailable, the APA ethical standards suggest the use of other alternatives, such as conducting a written translation of the available assessment measures or making use of an on-site interpreter during the assessment process. However, there arise several problems, such as the

availability of an interpreter, the ability to be able to translate effectively, the time component involved in completing the translating, the assumption that the measure is valid with the client's identity, as well as the lack of standardization for the particular population.

However, even with the information provided by these studies, it is likely that they are not providing the whole picture. As described by Lopez et al. (2008), Spanish speakers were excluded from many studies on Latine child mental health access and utilization due to the lack of validated Spanish instruments. Therefore, even in studies that attempt to examine the existing barriers to mental health access for the Latine population, the barriers seem to exacerbate themselves. Furthermore, it should not be forgotten that the Latine population is not homogeneous. Within the Latine population, there exist many ethnic subgroups (e.g., Mexicans, Puerto Ricans, Cubans, etc.), and while there is literature indicating differences between them, more research is still needed in this area. Furthermore, outside of ethnic group differences, Alegría et al. (2007) found differences in mental health disorder rates and use of services between immigrant and US-born Latines. Additionally, differences in socioeconomic standing, as well as differences in English proficiency exist within the Latine population.

Translating and Validating a New Measure

Translation

There is substantial evidence indicating a great need for multi-language psychological tests. As the list of translated and adapted tests grows, it is important to understand the emerging methodological developments for conducting studies to increase the quality of measure translations. Depending on the changes that are required, instrument translators have three options: (1) to apply the instrument in a literal translation; (2) to adapt parts of the instrument; or (3) to assemble an entirely new instrument (van de Vijver & Leung, 2001). The International

Test Commission (ITC), along with several other organizations, created guidelines for translating and adapting tests and psychological instruments, and establishing score equivalence across language and/or cultural groups. Their guidelines cover best practices regarding context, development, administration, and the interpretation of psychological instruments (Hambleton et al., 2004; Slater, 1999; Tanzer & Sims, 1999; van de Vijver & Hambleton, 1996). These guidelines emphasize equivalence as a key concept in cross-cultural psychology.

The ITC guidelines highlight the importance of employing a proper translation methodology in order to increase equivalence between multilingual versions of an instrument and the measures' cross-cultural validity. The first step highlighted by the ITC guidelines is the original (forward) translation of the measure (Ægisdóttir et al., 2008; Brislin et al., 1973; Jones & Kay, 1992; Sousa & Rojjanasrirat, 2010; Wild et al., 2005). The guidelines emphasize that when translating an instrument, bilingual people who speak both the original and the target language should be employed, and this can be either a single person or a committee of translators, although a committee is ideal. The next step is a back translation in which the measure is independently translated back to the original language by a different person(s). This allows for further refinement of the translated version to ensure the equivalence of the measures. This is followed by decentering, which refers to a translation/back-translation process in which both the source and the target language versions are considered equally important, and both are open to modification. This may be needed if words in the original language have no equivalence in the target language. Back translations are then reviewed, revised, and compared with the original version by a committee. During this time, they are evaluated for the similarity of the instructions, items, and response format regarding wording, sentence structure, meaning, and relevance. Once agreement is reached, then this results in finalizing the newly translated

instrument (Ægisdóttir et al., 2008). Ideally, although not necessary, both the forward and back translations would be done by two separate individuals, and the finalization would be done by an expert committee (Sousa & Rojjanasrirat, 2010).

Validation

In addition to the translation, researchers need to provide further evidence of the measure's equivalence to the original instrument (Ægisdóttir et al., 2008). The ITC guidelines suggest that, outside of item analyses and Cronbach's alpha suggesting equivalence, there is a need for appropriate statistical techniques to (a) establish the equivalence of the different versions of the test or instrument, and (b) identify problematic components or aspects of the test or instrument which may be inadequate to one or more of the intended populations. These issues are addressed by invariance analysis, such as multilevel confirmatory factor analysis (MCFA) and analysis of means and covariance structures (MACS; Hambleton et al., 2005; Tanzer & Sim, 1999).

There exist different types of equivalence, each with its own usefulness. Four which have been discussed in literature (e.g., construct nonequivalence, construct, measurement unit, and scalar equivalence) represent a hierarchical order from absence to a higher degree of equivalence; (van de Vijver & Leung 2001). The first type, construct nonequivalence, refers to constructs being so dissimilar across cultures they cannot be compared. The second type is construct equivalence, in which constructs are considered to have the same meaning and nomological network across cultures but need not be operationally defined the same way for each cultural group. The third type is measurement unit equivalence, in which the measurement scales of the tools are equivalent (e.g., interval level), but their origins are different across groups. Finally, the last and highest level of equivalence is scalar equivalence. Equivalent

instruments at the scalar level measure a concept with the same interval or ratio scale across cultures, and the origins of the scales are the same. With this level, it is assumed that the most possible bias has been ruled out, and direct cross-cultural comparisons of average scores on an instrument can be made (van de Vijver & Leung, 2001).

RRBIs and Spanish Speaking Latines

As mentioned above, there is limited research examining the manifestation of RRBIs in Latines, and even less research about Spanish-speaking Latines. Magaña and Smith (2013) found that when using the Autism Diagnostic Interview-Revised (ADI-R), Latine adolescents and adults endorsed significantly lower levels of impairment in the domain of restrictive and repetitive behaviors compared to non-Latino white adolescents and adults. However, it was unclear whether there are actual differences in behaviors, or whether parent interpretation or understanding of the items differed. Notably, the study noted that 69 % of their participants were interviewed in Spanish due to preference, and that could have contributed to interpretation problems. These findings supported one of their earlier studies, which found that Latine adolescents and adults with autism had lower levels of restrictive and repetitive behaviors on the ADI-R than White adolescents and adults with diagnoses of autism. In this study, 75% of participants chose to be interviewed in Spanish (Magaña & Smith, 2006). Vanegas et al. (2016), which examined the validity of the Spanish ADI-R with Spanish-speaking Latine parents, found good validity in the restrictive and repetitive behavior domain of the measure. However, their sample only consisted of 50 Spanish-speaking Latine parents. Despite this, the results of Magaña and Smith (2006; 2013) may be suggesting a link between the Spanish-speaking Latines and their understanding of RRBIs, or their understanding of the language typically used in psychological measures. Note however, that while the ADI-R provides information about the

presence of such behaviors, it is limited in capturing information about more specific aspects of RRBIIs such as frequency or intensity (Lord et al., 2006). Therefore, we might also be seeing that the measure itself may not be specific enough or it may not have enough questions pertaining to RRBIIs.

Additionally, Maldonado (2008) found that Latine parents spoke of stereotyped behaviors and restricted patterns of interest in terms of obstinate or stubborn behavior, and not as indicative of developmental problems. Although these findings come from an unpublished dissertation, this pattern of responding is also observed when reporting tics in other studies. Mathews et al. (2001) found that people in Costa Rica labeled motor and vocal tics as “malas mañas” [bad habits] and considered them controllable. They were also found to largely deny any impairment in functioning during their childhood due to tics or obsessions and compulsions; even when the behaviors had resulted in hospitalization or dropping out of school. Due to the denial of impairment, there was less evidence of OCD or Tourette’s, due to not meeting diagnostic criteria pertaining to impairment. On the other hand, a similar study that looked at a Colombian population (Giraldo et al., 2013) did not find this attributional difference. A study that examined reported executive functioning problems and repetitive behaviors in young dual-language speakers with autism, found that dual-language learners with autism had significantly fewer parent-reported executive functioning problems and repetitive behaviors. However, the findings in the study were limited by its small sample size ($N = 55$), and it is worth mentioning that they only had six Latine Spanish speakers (Ratto et al., 2020). Therefore, there exists the possibility that Latine parents may interpret impairment differently or may require assistance identifying RRBIIs in order to assist in the earlier and proper identification of disorders and conditions.

Present Study

To the authors' knowledge, there are no validated instruments in Spanish that exclusively and effectively measure the frequency and degree of psychosocial interference of RRBIs in early childhood for both, children who are typically developing, as well as those with or at risk for a neurodevelopmental disorder. Importantly, although Spanish-speaking individuals exist across the globe, the present study focused on Spanish-speaking individuals who live in the United States. The existing literature highlights the many barriers that are in place for Spanish-speaking individuals concerning access to and quality of mental health resources and services, as well as highlights the need for validated Spanish measures. Consequently, this study aimed to validate the newly translated Spanish version of the RBS-EC in a Spanish-speaking sample. Specifically, the study examined the following hypotheses and exploratory research questions:

H₁: Consistent with prior examinations of the English version of the RBS-EC, the Spanish version of the RBS-EC will show adequate, or greater internal consistency when used with a predominantly Spanish-speaking population.

H₂: The Spanish RBS-EC's factor structure will match the 4-factor model of the English RBS-EC.

H₃: The Spanish RBS-EC will demonstrate measurement invariance with the English RBS-EC, demonstrating that the RBS-EC has the same or similar measurement properties in both English and Spanish.

ERQ₁: Will Spanish speakers who are less linguistically acculturated, as based on the SASH, report differences in frequency and interference of RRBIs, when compared to more linguistically acculturated Spanish speakers?

Chapter 2: Methodology

Participants

To address the above hypotheses and research questions, the current study used data from two RBS-EC samples. The first sample included 373 community-based, Spanish-speaking participants and the second included 300 community-based, English-speaking participants.

Spanish Speaking Participants

The first sample was a Spanish-speaking community sample of 373 caregivers, which were recruited utilizing Amazon Mechanical Turk (MTurk). This sample was collected in March 2020. Inclusion criteria included that participants must be a caregiver who was 18 years of age or older and must have at least one child in their care between the ages of 2-7 years old. Furthermore, the participants must reside in the US, have sufficient proficiency in Spanish to read and respond to the survey's items, had internet access, and had an MTurk account with a 95+% Human Intelligence Task (HIT) rate and 50+ approved HITs. These numbers were consistent with best-practice MTurk research practices suggested by Buhrmester et al. (2018). Participants who provide multiple submissions from the same IP address or GPS location or gave incorrect responses on any attention check (see below) were excluded.

Given that criteria, 1,008 respondents attempted the survey. Of those, 536 were excluded for not completing the RBS-EC, 92 respondents were removed due to multiple submissions from the same IP address or GPS location, and seven respondents were removed due to being older than 7 years and 11 months. More in-depth information on the final Spanish speaking sample can be found in Table 1.

Table 1

Sample Demographics

	Spanish			English		
	<i>M(SD)</i>	<i>n</i>	%	<i>M(SD)</i>	<i>n</i>	%
<i>Child</i>						
Age (In months)	50.7(17.9)			51.4(20.4)		
Gender						
Boys		188	50.4		167	55.7
Girls		171	45.8		132	44.0
Other		1	0.3		--	--
Did not report		13	3.5		1	0.3
Hispanic/Latine ethnicity		222	59.5		39	13.0
Race						
White/Caucasian		265	71.0		209	69.7
Black/African American		33	8.8		32	10.7
Asian		15	4.0		32	10.7
Native American/Alaskan Native		17	4.6		8	2.7
Native Hawaiian/Other Pacific Islander		3	0.8		--	--
Other		40	10.7		19	4.3
Intellectual/neurodevelopmental disorder		9	2.4		14	4.7
Motor Disorder		8	2.1		2	0.7
Sensory impairment		4	1.1		5	1.7
<i>Caregiver</i>						
Gender						
Men		133	35.7		117	39.0
Women		233	59.8		180	60.0
Other		1	0.3		3	1.0
Did not report		6	1.6		--	--
Hispanic/Latine		219	58.9		33	11.0
Race						
White/Caucasian		275	73.7		215	71.7
Black/African American		28	7.5		29	9.7
Asian		13	3.5		37	12.3
Native American/Alaskan Native		20	5.4		8	3.7
Native Hawaiian/Other Pacific Islander		1	0.3		--	--
Other		36	9.7		19	6.3
Relationship to child						
Biological mother		242	64.9		181	60.3
Biological father		115	30.8		112	60.0
Other		3	0.8		3	1.0
Did not report		13	3.5		4	1.3

English Speaking Participants

The second set of participants, which were English-speaking participants, were originally recruited for a study (Lachance et al., 2021) assessing the RBS-ECs psychometrics and extending the norms for its full, originally intended age range (i.e., 2–7 years). This data was collected between January and March of 2019. Inclusion criteria for these participants included being a caregiver to at least one child aged 2–7 years, internet access, residence in the United States or Canada, English proficiency sufficient to complete the survey, and having an MTurk Worker account with a Human Intelligence Task (HIT) approval rate greater than 95% and more than 50 approved HITs. A sample of 300 caregivers were recruited for this study. More information on the English-speaking sample can also be found in Table 1.

Measures

RBS-EC

The RBS-EC is a caregiver report intended to measure and assess RRBI frequency and degree of psychosocial interference in both neurotypical and atypical children ages 2–7 years (See Appendix A). The measure consists of 34 questions making up four different subscales: repetitive motor, ritual and routine, restricted interests and behaviors, and self-directed behavior. The RBS-EC has a 5-point Likert scale indicating how often the behavior occurs (0 = behavior does not occur, 1 = behavior occurs about weekly or less, 2 = behavior occurs several times a week, 3 = behavior occurs about daily, 4 = behavior occurs many times a day), as well as a 5-point Likert scale to determine interference of the behaviors. (0 = Never, 1 = Rarely, 2 = Sometimes, 3 = Often, 4 = Always). Higher scores indicate a higher frequency and higher interference.

The structure and content of the RBS-EC are based in part on the Repetitive Behavior Scale, Revised (RBS-R; Bodfish et al., 2000). Unlike the RBS-EC, the RBS-R is a 44-item self-report questionnaire intended for children, adolescents, and adults with autism spectrum disorder, and consists of six subscales. Additionally, other than the obvious differences with the number of questions, the number of subscales, and the target population, instead of focusing on repetitive behavior as a problem behavior, the RBS-EC is intended to quantify dimensions of restricted and repetitive behaviors in children who are typically developing as well as those with or at-risk for a neurodevelopmental disorder.

In the original RBS-EC's validation study (Wolff et al., 2016), the authors found that the measure had excellent overall internal consistency ($\alpha = .90$), adequate to excellent subscale internal consistency (α s = .70–.90), and good to excellent test–retest reliability (r s = .87–.90). These norms were obtained from 914 caregivers of neurotypical toddlers between the ages of 17–25 months (472 boys, 442 girls). Although the initial study supported a 3-factor model (i.e., Repetitive Motor, Ritual & Routine, Restricted Interests & Behaviors) as well as a 4-factor model (i.e., repetitive motor, ritual and routine, restricted interests, self-directed behaviors), a more recent study (Lachance et al., 2021), which expanded the norms to include the full, originally intended age range (i.e., 2–7 years) suggested that the 4-factor model fit the data better than the 3-factor mode. Lachance et al. (2021) found that the RBS-EC had excellent internal consistency for children ages 2–7 years, overall and for subscales (α s = .90–.94). Another recent study (Sifre et al., 2021), aimed to establish measurement invariance in the RBS-EC and to model developmental change in RRBIs from 8 to 36 months. The results suggested that the RBS-EC is sensitive enough to measure the presence of RRBIs in a typically developing sample, as well as their decline with age. Additionally, they found that by using adjusted factor scores as

opposed to unadjusted raw mean scores, they could increase within-person variability and precision starting with infants as young as 8 months old.

Short Acculturation Scale for Hispanics (SASH)

The Short Acculturation Scale for Hispanics (SASH; Marin et al., 1987) is an abbreviated self-report measure intended to identify the acculturation level of Hispanic respondents (see Appendix B). The measure consists of four questions on acculturation-relevant behaviors (e.g., media use, language use, ethnic social relations), which are answered with a 5-point Likert scale (1 = Only Spanish, 2 = More Spanish than English, 3 = Both equally, 4 = More English than Spanish, and 5 = Only English). The measure suggests an average score of 2.99 as the recommended cut point, with scores above this point representing higher levels of acculturation and scores below this point representing lower levels of acculturation.

The structure and content of the four question SASH was taken from the original scale, which included 12 items. This measure has three subscales: language use, media, and ethnic social relations. The scale has been used with respondents from a variety of Hispanic subgroups including Mexican Americans, Cuban Americans, Puerto Ricans, Dominicans, and Central and South Americans. The initial validation study, which found good validity and reliability (e.g., excellent internal consistency; $\alpha=.92$), also suggested that the scale could be reduced to four questions (questions number 1,3,4, and 5) without sacrificing predictive value, validity, or reliability (Ellison et al., 2011; Hamilton et al., 2009; Marin et al., 1987). Hamilton et al. (2009) which used the 4-item abbreviated SASH, found very high inter-item correlations ($r_s > .94$), and the factor analysis of the correlation matrix showed one dominant factor with very high loadings and uniqueness components of $<.07$ for all items.

Procedure

The first part of this project focused on the translation of the RBS-EC. In order to do this, several steps were taken. It is important to note that although the translation of the RBS-EC attempted to follow recommended guidelines, there were limitations due to the availability of available bilingual translators. First, permission was obtained from the authors, of the English version, for the use of the instrument. The forward translation of the RBS-EC (English to Spanish) was completed by the current study's author, who is a bilingual person whose native language is Spanish. During this translation, a few words stood out as words that a direct translation from English to Spanish would lead to different meanings. To attempt to maintain the true intended meanings of the items, the translator received assistance from two monolingual Spanish speakers.

Next, another translator, who was also bilingual, but whose first language was English, completed a backward translation (Spanish to English). This translation was done without access to the original English version. This was followed by a two-person panel, which included the author of the current study and a third researcher with expertise in assessing RRBIs who compared the backward translation and the original English measure. Words that did not match the original translation were then discussed to make sure that they still had the same intended meaning as the original English translation. Words that seemed to result in different words and meanings were then changed to better fit the original meaning. This process resulted in the final version of the instrument in Spanish.

The Spanish-speaking participants were recruited through MTurk and linked to an anonymous online Qualtrics survey. Participants were asked to complete five different questionnaires (i.e., demographics, Psychosocial Strengths Inventory for Children and

Adolescents, Strengths and Difficulties Questionnaire, SASH, and RBS-EC), however, for purposes of this study, only the data collected for the RBS-EC and the SASH were used.

Participants were first required to complete a CAPTCHA (a response test used in computing to determine whether or not the user is human) and a digital consent form. For caregivers with more than one child between the ages of 2–7 years, the survey randomly selected one child for caregivers to consider for the rest of the survey. To detect careless responding, participants were presented with one attention check (e.g., Select ‘2’ for this question) per subscale; an incorrect response on any attention check terminated the survey. Participants who successfully completed the survey were given a completion code and link back to MTurk. Upon completion, participants were compensated \$1.50, a rate consistent with similar MTurk studies with Spanish-speaking samples (Barnett et al., 2019). Participants for the comparison part of the study were recruited using a similar method, however, these participants were recruited at a different time, and for a different study (see Lachance et al., 2021).

Analytic Plan

Power Analysis

Sample size for the primary analyses was determined using the MacCallum and colleagues’ method (MacCallum et al., 1996). This approach emphasizes the statistical power of the data to identify an overall good fit of a theoretical model using the root mean error of approximation (RMSEA) in structural equation modeling. The target sample size was estimated based on a statistical power of .8. The proposed model includes four latent variables (Repetitive Motor, Ritual & Routine, Restricted Behaviors, Self-Directed Behaviors), and each is estimated by 9,10, 8, and 7 observed indicators respectively. A group comparison will be utilized in analyses. As such, there are 1,190 unique pieces of data (observed variables). As for parameters,

148 are estimated in the model, including 30 paths, 34 error terms, 4 variance terms, and 6 covariances per group. Therefore, this model would have 1,042 degrees of freedom. According to MacCallum et al. (1996), a minimum sample size of 132 would yield a power of .80 for a test of close fit.

Preliminary Analyses

Prior to analyzing the data, the dataset was evaluated to assure that the statistical assumptions for a multigroup CFA were met. Therefore, the data was tested for multivariate normality and the absence of outliers. Multivariate normality and outliers were evaluated using descriptive statistics and Q-Q plots. The examination of the data suggested that the normality or linearity assumptions were not violated. CFAs also assume that there will be no missing data and sample sizes are adequate. As shown by the power analysis, the sample size is adequate, and M-Plus (Múthen & Múthen, 2010) naturally excludes cases with missing data.

Internal Consistency

In order to examine the first hypothesis, the internal consistency of the RBS-EC overall scale and subscales (i.e., Repetitive Motor, Ritual & Routine, Restricted Interests & Behavior, and Self-Directed Behavior) were calculated with Cronbach's alphas.

Multi Group Invariance

The second and third hypotheses, which tested the structure of the overall RBS-EC for its measurement invariance between English- and Spanish-speaking samples, and for the latent mean differences, were based on the analysis of mean and covariance structures using multiple-group CFA (MGCFA). All CFAs were calculated using MPlus 8.2 (Múthen & Múthen, 2010). To run this analysis, two separate CFAs were run first: one for the Spanish RBS-EC and the other for the English RBS-EC. This tests for configural invariance, meaning that the construct is

consistent across groups, to ensure that different indicator variables do not load onto the constructs across groups. The fit of the models was evaluated using the common criteria recommended by Hu and Bentler (1999): robust chi-square, Comparative Fit Index ($CFI < .90$), Root Mean Square Error of Approximation ($RMSEA < .08$), and Standardized Root Mean Square Residual ($SRMR < .08$). If the same measurement model fits the data well across groups, then configural invariance was supported.

The second step was to examine metric invariance by comparing two nested models, consisting of a baseline model (configuration model) and an invariance model (metric model). The baseline model allows the factor loadings to be freely estimated across multiple groups, while the invariance model constrains the factor loadings to be equivalent across multiple groups. Differences between the two nested models are examined with the chi-square difference test (Muthén & Muthén, 2012) and the CFI (Cheung & Rensvold, 2002; Meade, Johnson, & Braddy, 2008). A non-significant result of the chi-square difference test would indicate that the invariance model is a better representation of the data because it fits the data equivalently relative to the baseline model but has better parsimony (Muthén & Muthén, 2012). In contrast, a significant result of the chi-square different test would indicate that the baseline model is a better representation of the data, suggesting that the psychological meanings of the latent constructs vary across groups. If the chi-square difference between the baseline and invariance models was non-significant, we would not be able to move on to the next step. Here we ran a scalar model, meaning we fit the model with the factor loadings and intercepts equal across all groups. Here we took the difference between the metric and the scalar chi-square estimates. If the chi-square difference between the metric and scalar models was non-significant, we then had group invariance, meaning that the construct is being measured the same across groups.

Differences in RRBIs based on Linguistic Acculturation

Lastly, the exploratory research question was addressed with two linear regressions. The first linear regression was conducted to assess if Spanish speakers who are less linguistically acculturated reported differences in the frequency of RRBIs when compared to more linguistically acculturated Spanish speakers. The second linear regression was used to determine if Spanish speakers who are less linguistically acculturated report differences in interference of RRBIs when compared to more linguistically acculturated Spanish speakers.

Chapter 3: Results

Assumptions for statistical analyses

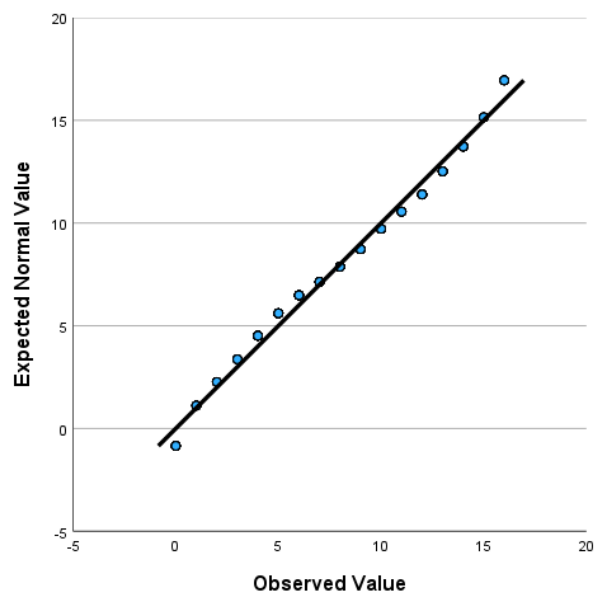
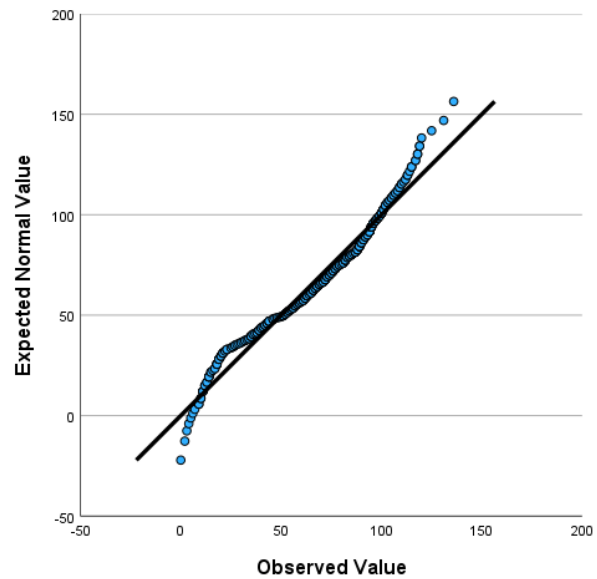
To help determine whether there were significant outliers for the frequency and interference variables, a stem-and-leaf plot and a boxplot were used. The boxplot (Tukey, 1977) identifies outliers by highlighting data that falls outside of the whiskers of the boxplot. Data points that fall within the whiskers are considered mild outliers, while data values which fall outside the whiskers of the boxplot are considered extreme outliers. When examining the boxplot, no outliers were found for either Frequency or Interference for the whole group when examining latine and non-latine groups together. However, when examining latine and non-latine separately, although there were no significant outliers found in interference for either group, the box plot indicated six potentially significant outliers for frequency in the non-latine group. After determining that it was likely not a data entry error or instrument error, it was decided that because the sample is somewhat large, it is to be expected that a few values will appear in the far lower or upper ends of the distribution. The standardized values of the outliers were checked by computing the corresponding z values for all values in frequency. No cases were identified as true outliers using a cutoff value of ± 3 (Badiou et al., 1988; Howell et al., 2013). Accordingly, the main analyses were completed using the whole group.

Normal distribution was checked using Q-Q plots and skewness and kurtosis. The Q-Q plots for frequency and interference of RRBIs, seen in Figure 1, indicated that the residuals were roughly normally distributed. Further analysis was done using skewness and kurtosis. Frequency was normally distributed, with skewness of $-.33$ ($SE = .13$) and kurtosis of $-.78$ ($SE = .25$). Interference was also normally distributed, with skewness of $.03$ ($SE = .13$) and kurtosis of $-.94$ ($SE = .25$). Homogeneity of variances was tested using a Levene's test. The test showed that the

variances for frequency of RRBIS were not significantly different $F(2,355) = .15, p = .70$. The test showed that the variances for the interference of RRBIS were also not significantly different, $F(2,356) = 1.81, p = .18$. Repetitive Motor had a skewness of $-.68 (SE = .13)$ and kurtosis of $-.23 (SE = .25)$. Ritual and Routine had a skewness of $-.32 (SE = .13)$ and kurtosis of $-.79 (SE = .25)$. Restricted Interests and Behavior had a skewness of $-.41 (SE = .13)$ and kurtosis of $.77 (SE = .25)$. Self-Directed Behavior had a skewness of $-.09 (SE = .13)$ and kurtosis of $-1.55 (SE = .25)$. Based on this information, the sample was determined to be sufficiently normal to meet assumptions.

Figure 1

Q-Q Plots for Total Composite Frequency (Top) and Interference (Bottom) Subscales



Examining Differences

Differences Between Latines and non-Latines

When examining the Spanish-speaking sample, there was no significant difference in age between the Latine and non-Latine groups, $t(356) = 1.094, p = .614$. There was, however, a significant difference in gender between these groups, $\chi^2(2, N = 357) = 23.63, p < .001$, with Latines having significantly more boys than non-Latines. These findings indicated that our Latine and non-Latine groups were comparable in terms of the age, but not gender of the children. However, as the sample would not be separated by ethnicity, this finding did not impact on our main analyses. It also indicated that if any analyses comparing Latines and non-Latines were completed, we would have to control for gender effects.

Differences Between Spanish-Speaking and English Speaking

Differences in age and gender were also examined between the Spanish-speaking sample and the English-speaking sample. An independent t-test was able to be used to examine possible differences in the ages of both samples. No significant difference was found between the samples in regard to gender $\chi^2(2, N = 659) = 5.25, p = .073$. When examining age differences between samples, a Mann–Whitney U test was used, due to a multimodal distribution of age for the English-speaking sample. The results indicated that there was no significant difference between the age of the Spanish-speaking sample and the age of the English-speaking sample $U = 58345.500, p = .338$. These results indicated that although there were some differences in the average age of participants and in the gender of participants between the two samples, the differences were not significant. Therefore, the groups do not differ considerably in terms of age and gender. More information on the demographics of both samples can be found in Table 2.

Table 2*Sample Demographics of Children for Both Samples*

	Spanish			English		
	<i>M(SD)</i>	<i>n</i>	%	<i>M(SD)</i>	<i>n</i>	%
Age (In months)	50.7(17.9)			51.4(20.4)		
Gender						
Boys		188	50.4		167	55.7
Girls		171	45.8		132	44.0
Other		1	0.3		0	0
Did not report		13	3.5		1	0.3
Hispanic/Latine ethnicity		222	59.5		39	13.0
Race						
White/Caucasian		265	71.0		209	69.7
Black/African American		33	8.8		32	10.7
Asian		15	4.0		32	10.7
Native American/Alaskan Native		17	4.6		8	2.7
Native Hawaiian/Other Pacific Islander		3	0.8		--	--
Other		40	10.7		19	5.1
Intellectual/neurodevelopmental disorder		9	2.4		14	4.7
Motor Disorder		8	2.1		2	0.7
Sensory impairment		4	1.1		5	1.7

Gender and Age Differences

There was a significant and negative relation between child age and RBS-EC composite frequency ($r(372) = -.224, p < .001$), RBS-EC interference ($r(373) = -.167, p = .001$), Repetitive Motor ($r(373) = -.208, p < .001$), Ritual & Routine ($r(373) = -.225, p < .001$), Restricted Interests & Behavior ($r(372) = -.167, p = .001$), and Self-Directed Behavior scores ($r(373) = -.170, p < .001$). Similar to the English RBS-EC, older children in the Spanish-speaking sample tended to have less frequent RRBI than younger children. However, unlike the results from Lachance et al. (2021), which found no relation between age and RRBI interference until they controlled for the association between age and RRBI frequency, our study found a significant negative relationship between age and interference without controlling for the previous relationship.

Results indicated that in general, caregivers in the Spanish-speaking sample tended to report RRBIs as less interfering as their child's age increased.

Regarding gender, our results unexpectedly differed from the English RBS-EC normative study and other previous literature. Our analysis indicated that there was a significant effect for gender ($t(356) = -2.178, p = .030, d = .23$) with girls ($M = 70.84, SD = 28.95$) attaining higher RBS-EC composite frequency scores than boys ($M = 63.86, SD = 31.41$). Indicating that in the Spanish-speaking sample, caregivers tended to report higher numbers of RRBIs for girls than for boys, although the effect size of gender was small. Similarly ($t(357) = -3.005, p = .003, d = .32$), girls ($M = 8.56, SD = 4.45$) attained higher RBS-EC interference scores than boys ($M = 7.21, SD = 4.06$). This indicated that caregivers in our Spanish-speaking sample tended to report higher interference stemming from RRBIs for girls than for boys, although again with a small effect size. Despite the effect sizes being small, it is of notice that these results differ from previous literature which has typically found that on average, boys had significantly more frequent and interfering RRBIs than girls. Although these findings would not have bearings on the MGCFA, they do suggest a possible need for different gender norms for this population.

Descriptives and Reliability

RBS-EC composite Frequency and Interference scores respectively ranged from 34-170 ($M = 47.91; SD = 29.70$) and 0–16 ($M = 5.32; SD = 4.09$). Mean Frequency subscales were: Repetitive Motor ($M = 20.98, SD = 8.93$), Ritual & Routine ($M = 19.69, SD = 9.46$), Restricted Interests & Behavior ($M = 16.22, SD = 7.795$), and Self-Directed Behavior ($M = 10.30, SD = 8.74$). Mean Interference subscale scores ranged between Never and Often ($Ms = 1.69–2.07$). Cronbach's alpha was used to explore the internal consistency of each of the scales. The Frequency scale ($\alpha = .90$) and the Interference scale ($\alpha = .91$) both demonstrated excellent

internal consistency. All the individual Frequency subscales were also analyzed, and all demonstrated excellent internal consistency (Repetitive Motor $\alpha = .92$; Ritual & Routine $\alpha = .92$; Restricted Interests & Behavior $\alpha = .91$; Self Directed Behavior $\alpha = .96$).

Multigroup Confirmatory Factor Analysis (MGCFA)

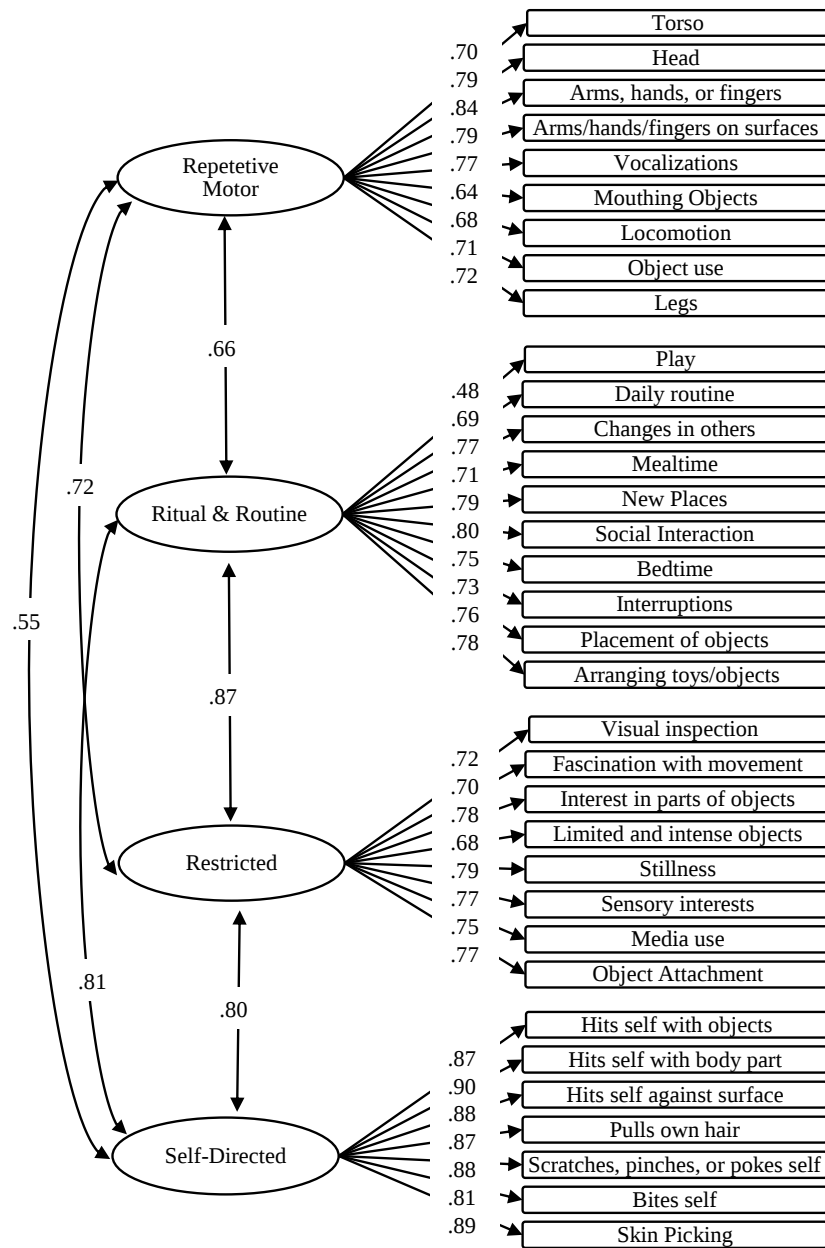
To run the MGCFA, two CFAs were run first. The first CFA examined model fit for the Spanish measure when all items were loaded onto four latent factors: Repetitive Motor (8 items), Ritual and Routine (9 items), Restricted Interests and Behavior (10 items), and Self-Directed Behavior (7 items). Overall, the measurement model fit the data well, $\chi^2(521) = 1111.005$, $p < .01$, $CFI = .94$, $TLI = .93$, $RMSEA = .055$, $SRMR = .055$. Fit indices were consistent with an acceptable model fit. Correlations among latent factors were all significant, but moderate in magnitude and indicative of four distinct factors (Figure 2). A second CFA was run with the same model, but for the English measure. Exactly like presented in Lachance et al. (2021), correlations between the four latent factors were significant but moderate and indicative of four distinct factors, and the measurement model fit the data well, $\chi^2(521) = 1255.43$, $p < .01$, $CFI = .90$, $TLI = .89$, $RMSEA = .069$, $SRMR = .063$. Fit indices were consistent with an acceptable model fit.

Lastly, to test for measurement invariance, an MGCFA was ran comparing the Spanish RBS-EC and English RBS-EC. Metric invariance was examined by looking at the chi-square difference test and the CFI difference between the configural and metric models. The chi-square difference test was non-significant ($\Delta\chi^2(30) = 33.081$, $p = .319$) indicating that each item contributes to the latent construct to a similar degree across groups. Changes in CFI were also examined ($\Delta CFI = .001$), also supporting metric invariance. Scalar invariance was examined by looking at the chi-square difference test and the change in CFI between the metric and scalar.

The chi-square difference test was significant ($\Delta\chi^2(30) = 94.178, p < .001$) indicating a significant difference, which meant that there is a lack of equivalence of item intercepts across groups. Changes in CFI ($\Delta CFI = .003$) and RMSEA ($\Delta RMSEA = .000$) were also analyzed. Although the chi-square difference test was significant, the chi-square difference test has been found to be highly sensitive to sample size, such that bigger sample sizes often lead to significant results. On the other hand, ΔCFI and $\Delta RMSEA$ are less sensitive to a lack of invariance (Chen, 2007; Cheung & Rensvold, 2002; Meade et al., 2008). Simulation studies comparing multiple goodness-of-fit indices have recommended ΔCFI less than .01 indicates invariance, and $\Delta RMSEA$ less than .015, as they are independent of model complexity and sample size (Chen, 2007; Cheung & Rensvold, 2002; Meade et al., 2008). Meade et al. (2008) have suggested that if ΔCFI indicates invariance and the sample size is greater than 200, any differences between groups are likely trivial. Based on this, scalar invariance was sufficiently established.

Figure 2

CFA path analysis of rationally derived 4-factor model



Differences in RRBIs based on Linguistic Acculturation

Two simple linear regressions were completed to address the exploratory question of whether less linguistically acculturated Spanish speakers report differences in frequency and interference of RRBIs, compared to more linguistically acculturated Spanish speakers. In these analyses, a higher number indicated lower acculturation and higher preference and use of the Spanish language. The first linear regression indicated a small, but significant effect of linguistic acculturation on the frequency of RRBIs [$F(1,354) = 51.994, \beta = .39, p < .001, R^2 = .13$], with acculturation explaining 13% of the total variance. The second linear regression also indicated a small, but significant effect of linguistic acculturation on the interference of RRBIs [$F(1,355) = 64.017, \beta = -.39, p < .001, R^2 = .15$] with acculturation explaining 15% of the total variance. Results indicated that higher scores in the SASH, meaning lower linguistic acculturation and higher preference for Spanish, predicted higher reports of frequency and interference of the RRBIs. Overall, it was found that linguistic acculturation significantly predicted the frequency and interference of RRBIs.

In order to do a further examination of this finding, we also completed further analyses. Importantly, the first independent t-test found that there was not a significant difference in levels of language acculturation between Latine and non-Latines, $t(353) = -1.232, p = .22$. This difference remained non-significant, even when accounting for gender ($F(2, 352) = .806, p = .27$). This indicated that levels of acculturation did not differ significantly between Latines and non-Latines in the Spanish speaking sample. The two other analyses examined differences in frequency and interference of RRBIs between Latine and non-Latine individuals. The results indicated that there was a significant difference in the frequency of RRBIs (when using combined total score) between Latines and non-Latines, $t(355) = -6.449, p < .001, d = .71$, with

Latines reporting less amounts of RRBIs ($M = 59.39$, $SD = 28.11$) than non-Latines ($M = 79.62$, $SD = 29.53$). This difference remained significant even when accounting for gender, $F(2, 354) = 20.91$, $p < .001$, $R^2 = .325$. There was also a significant difference in interference of RRBIs, between Latine and non-Latine participants, $t(356) = -7.047$, $p < .001$, $d = .77$, with Latines ($M = 6.66$, $SD = 28.11$). Once again reporting less interference than non-Latines ($M = 9.74$, $SD = 4.21$). The differences remained significant even when accounting for gender, $F(2, 355) = 25.52$, $p < .001$, $R^2 = .36$. Overall, results indicated Latine caregivers reported less frequency and interference of RRBIs when compared to non-Latines, and this remained true even when accounting for gender differences in both groups.

Chapter 4: Discussion

As the number of Spanish-speaking families continues to grow in the United States, the need for culturally valid and relevant psychological measures also grows. Gone are the days when a mere translation of a psychological measure into another language, without proper validation, would suffice. Beyond assuring that the translated measure assesses the same concepts as the original measure, equally or maybe even of higher importance is to ascertain that the translated measure is appropriate for the intended population. Not only because it would mean the translated measure is valid, but because of the importance of working towards equity in a field with a long history of being inequitable and inaccessible to non-English speaking individuals.

It is likely safe to say that the field of psychology has made significant advancements in terms of equity, including in the practice of psychological assessment. With that being said, there is still much work to be done. Literature exists that provides recommendations on various ways to work towards accurate and ethical assessment. From the translation process to the validation methodology (Ægisdóttir et al., 2008; Brislin et al., 1973; Hambleton et al., 2004; Jones & Kay, 1992; Sousa & Rojjanasrirat, 2010; Tanzer & Sims, 1999; van de Vijver and Hambleton, 1996; Wild et al., 2005), and even the way results should be presented, there are helpful recommendations that one can use. The trick is to use them.

The purpose of the study was to translate and validate a Spanish-language version of the Repetitive Behavior Scale for Early Childhood (RBS-EC; Wolff et al., 2016). Recognizing restricted and repetitive behaviors in children who are typically developing as well as those with or at-risk for neurodevelopmental disorders is often a challenge for both parents and clinicians. This is where the RBS-EC comes in. Several studies have concluded that the RBS-EC has good

internal consistency for measuring quantitative and dimensional features across a broad range of behaviors contributing to the repetitive behavior domain (Lachance et al., 2021; Sifre et al., 2021). The RBS-EC is free, readily available, and easy to complete. Unfortunately, all these studies have been done with English-speaking populations, excluding individuals who do not speak English or have limited English proficiency. For this reason, the aim of this study was to translate the original English RBS-EC, a 34-item measure of restricted and repetitive behaviors and interests (RRBIs) in young children, into the Spanish language and to validate it, with a Spanish-speaking population, as well as establish the equivalence of the measures.

The three main primary hypotheses that were investigated in this study were: 1) Consistent with prior examinations of the English version of the RBS-EC, the Spanish version of the RBS-EC will show adequate, or greater internal consistency when used with a predominantly Spanish-speaking population; 2) The Spanish RBS-EC's factor structure will match the 4-factor model of the English RBS-EC; and 3) The Spanish RBS-EC will demonstrate measurement invariance with the English RBS-EC, demonstrating that the RBS-EC has the same or similar measurement properties in both English and Spanish.

Differences in Latines and Non-Latines

Before the validation of the Spanish translation of the RBS-EC and comparison of the original RBS-EC and the Spanish translation, concerns were raised about the appropriateness of generalizing to all Spanish-speaking individuals, and not limiting participants to Latines as they are predominantly the group that most speak Spanish. This decision had originally been made due to two main reasons, the first was that the measure was intended for Spanish speakers, and although Latines may make up most Spanish speakers, they are not the only group who speaks Spanish, and this would exclude any Spanish speaker who for whichever reason does not identify

as Latine. The second was that during the validation of the English version of the RBS-EC, participants had not been separated by race/ethnicity/culture. Nevertheless, comparisons were done between Latine Spanish-speaking individuals and non-Latine Spanish-speaking individuals to check for heterogeneity of the groups. There were no significant differences between the groups when examining age, but there were significant differences in terms of gender. This indicated that our analyses comparing Latines and non-Latines, we controlled for gender effects.

Age and Gender

One of the objectives of this study was to evaluate the relationships between age and gender and the frequency and interference of RRBIs. Considering that differences based on these variables have been found in past literature and in the English version of RBS-EC (Lachance et al., 2021; Larkin et al., 2017), there was no indication for us to expect anything different. Therefore, although some of our results were expected, it was surprising when other results indicated some interesting differences. First, our study found that Spanish-speaking parents reported less frequency of RRBIs as their children aged. Considering that most of our participants were not reported to have a condition/disorder and that previous literature supports that RRBI frequency tends to taper off with age among neurotypical individuals (Barber et al., 2012, Evans et al., 1997; Lachance et al., 2021), these results made sense. However, our study also found that RRBI interference also tapered off with age. This is somewhat different from the results from Lachance et al. (2021) which found that age related non-significantly to interference. Yet, after controlling for the above association between child age and RRBI frequency, they found that caregivers tended to report RRBIs as more interfering as their child's age increased. The researchers hypothesized that caregivers likely perceived RRBIs in older children as more impairing even when such behaviors were lower in frequency. In the case of

our study, it is possible that these differences are due to possible cultural differences. Mathews et al. (2001) found that their Spanish-speaking sample largely denied any impairment in functioning in their childhood because of motor and vocal tics; even when the behaviors had resulted in hospitalization or dropping out of school. Similarly, although the rates of obsessive and compulsive symptoms in their participants were compared with the rates reported worldwide, there was less evidence of OCD, because of the requirement of these symptoms causing impairment. It is possible that Spanish-speaking parents, in general, report less interference of these behaviors, and as their children grow and the frequency decreases, then they see them as even less impairing, even when other people would have rated them as more interfering. It is also possible that these results are a result of differences in our scale.

Additionally, our study found an interesting relationship between gender with frequency and interference of RRBIs, which contradicted the results found by other studies (Antezana et al., 2019; Cevikaslan et al., 2014; Lachance et al., 2021; Leekam et al., 2007). In our study, we found that girls, rather than boys, were the ones who were being rated as having a higher frequency of RRBIs as well as being rated to have higher impairment due to these behaviors. It is possible that the results might be once again due to cultural differences. In some cultures, including many Latine cultures, there is often a greater tolerance of certain behaviors for boys than for girls. A study (Caughy et al., 2016) found that mothers were more likely to interfere when they saw certain behaviors in girls, and more demanding for that behavior to go away when compared to boys. Therefore, these higher reports could be due to the different expectations that Latine parents have for their children based on the child's gender. As ours is the first study, to our knowledge, to report this relationship between gender and RRBIs, the findings should be considered preliminary and should be interpreted with caution.

Translation

Even before the statistical analysis of the measure, the process through which the measure is translated is equally important. It is simply insufficient to translate a measure into another language (Ægisdóttir et al., 2008; International Test Commission, 2017). Instead, the International Test Commission (ITC) recommends extensively examining cultural and language equivalence (van de Vijver & Hambleton, 1996). To try to ensure the quality of the translated version and increase equivalence between both versions of an RBS-EC, this study attempted to apply these guidelines, including applying forward and backward translation procedures and employing multiple bilingual translators. Considering that the guidelines indicate that both the source and the target language versions are considered equally important (Ægisdóttir et al., 2008; International Test Commission, 2017; van de Vijver & Hambleton, 1996), differences between the backward translation and the original English version were discussed and reconciled. Adequate changes were made to the Spanish version to attempt to maintain the original meaning while attempting to also maintain cultural significance.

Several challenges were encountered as a result of the translation methodology. One of these challenges was that the differences between the Spanish language and English led to challenges in translation. During the forward translation, it became clear that a simple word-for-word translation without concern for comprehension and usability to the intended culture was not going to work. For example, the word “taps” can be directly translated into the Spanish words “golpea ligeramente” which directly translates to lightly hitting and it can also translate to “grifos,” which translates to faucets. It can also be translated to “toques” which is translated to “touches”. All would be direct translations, but none would convey the full meaning. If “taps” is turned to “tapping” though, it could also be translated to “golpeteo” which can be understood as

pounding. However, when the words are changed to “da golpecitos” it could be understood as the action of tapping, by some, even though it directly means “gives gentle hits.” Another example is the word “mouths.” In the English language the word can be used to describe both, multiple mouths (i.e., the body part), and/or, as is the case in this measure, taking in or touching something with the mouth. However, in Spanish, although it will also translate to “boca” which is the body part, it is not understood as mouthing objects unless the word “mouths” is followed by another word that provides context. However, in the original version of the RBS-EC the word is written without context, and therefore a direct translation would not convey the intended meaning.

Similarly, other words had to be translated in relation to the whole phrase rather than the word itself. For example, if the word “set” is directly translated it can translate to “configurar” which would actually mean “configure.” But when considering the phrase “follows a set verbal script” it could be translated to “sigue un guion verbal fijo” which is technically translated to “follows an established verbal script.” To attempt to improve comprehension of the individual items, the principal investigator, who also served as the bilingual translator for the forward translation, read over the translated scale and found words with direct translations that did seem to lead to the intended meaning. Literature suggests that when problems arise with different interpretations of certain words there should be a discussion with an expert panel and bilingual translators to try to resolve the problem (Ægisdóttir et al., 2008; International Test Commission, 2017; van de Vijver & Hambleton, 1996). Although this study did not have an expert panel, the bilingual translator was able to present these words to two separate monolingual Spanish speakers, who were parents from the community and not clinicians. These discussions conducted

by the main researcher with the monolingual individuals served similarly to help resolve the differences in the translation of specific terms.

Having only one native Spanish speaker also presented some difficulties. An example of this was the bilingual translator who did the backward translation. At times this translator would translate words with literal translations rather than considering cultural interpretation. An example of this is once again the word “mouths.” In the forward translation it was translated to “se mete objetos a la boca,” which would typically be understood as the act of mouthing to many native Spanish speakers. However, in the backward translation, it was translated to “introduces to the mouth,” which although not wrong, did not convey the actual meaning. Furthermore, having a monolingual English speaker as part of the two-person committee which did the comparison of the backward translation and the original RBS-EC also presented further complications. One example of this was that although the committee member was able to identify differences between both versions of the RBS-EC, he was not able to have the same level of input when determining if the Spanish words that led to those discrepancies should be kept or needed to be changed.

Despite these difficulties, the translation methodology that was used for this study can and should still be considered a strength of the study. It would have been easier and faster to have only done the forward translation, but it would not have been ethical (International Test Commission, 2017). As per the International Testing Commission (2017), the step of the back translation is important and should be used whenever possible. This part of the process has several benefits, including some control of the translation and an opportunity for refinement of the measure and allowing for comparing the two translations for equivalency. When we completed the backward translation of the RBS-EC, we found incompatibilities between the

original measure and our backward translation. We were then able to focus on the equivalence of specific words rather than the whole document, and it was easier to determine which words were not equivalent and had different meanings versus which words produced the same meaning but were not direct translations. This was beneficial as we were more interested in the equivalence of meaning versus direct and exact interpretation. Being able to have a native Spanish speaker was also important here, as although it is impossible for one person to be familiar with every Spanish-speaking population that was included in this study, they did offer some familiarity with the general target culture, and because the native speaker was also the main researcher, they were also knowledgeable about the construct being assessed and the principles of assessment. As stated by Hambleton & de Jong (2003) and van de Vijver & Hambleton (1996), being knowledgeable about such topics can help minimize item biases. Although it is important to acknowledge that it is likely that not every word used in the measure will be generalizable to every single Spanish-speaking individual, it is equally important to understand that dialects exist across every language, and in this study, efforts were done during the translation to use more generalizable terms rather than dialect specific words. Additionally, outside of focusing on intended meaning rather than direct translation, having the output of two monolingual Spanish-speaking parents during the translation process also strengthened the quality of our translation.

Validation

The translation process of a measure is essential to achieving a quality translation. However, a good translation methodology alone does not mean that the measure will be valid for the intended population (International Test Commission, 2017). Equivalence is a key concept in cross-cultural research, as it addresses the question of the comparability of observations across cultures (Ægisdóttir et al., 2008). When we compare scale scores across different groups, we

make a critical assumption that the scale measures the same construct in all the groups. However, if those assumptions are incorrect, comparisons cannot and should not be taken as valid results.

The findings of this study provided initial support for the Spanish translation of the RBS-EC having satisfactory psychometric properties. Similarly, to the original English version, the Spanish RBS-EC composite and subscale scores had good to excellent internal consistency for children ages 2–7 years, therefore supporting the internal consistency of the Spanish version. This indicated support that the Spanish version of the RBS-EC is fit for the purpose of quantifying RRBIs in children ages 2 to 7, who have Spanish-speaking parents. This provided support for our first research objective, which proposed that the Spanish version of the RBS-EC would show adequate or greater internal consistency when used with a predominantly Spanish-speaking population. Therefore, this indicated that the Spanish RBS-EC's internal consistency was consistent with that of prior examinations of the English RBS-EC. However, although reporting Cronbach's alphas and item-total scale correlations provide initial information about a measure's psychometric properties, this information by itself does not indicate equivalence. This is where measurement invariance comes in.

There are different levels of measurement invariance that one would expect a measure to meet for the assumptions to be supported. For this study, we examined all three. First, with our two CFAs, we examined configural invariance, which means that the basic organization of the constructs is supported in both groups, in this case, we were looking at four latent constructs (i.e., repetitive motor, ritual and routine, restricted interests, self-directed behaviors), with the same pattern of loadings as the original RBS-EC. Our results indicated the factor pattern in the Spanish version of the RBS-EC, was comparable with that of the original version. The results supported the same, rationally derived, 4-factor model, with moderate factor loadings

comparable to those of the English version, therefore supporting configural invariance. This supported our second research objective, which proposed that the Spanish RBS-EC's factor structure would match the 4-factor model of the English RBS-EC. Demonstrating configural invariance provided initial support for the third research objective, which proposed that the Spanish RBS-EC would demonstrate measurement invariance with the English RBS-EC. Configural invariance, although not indicating full measurement invariance, did indicate the same model holds for both groups and therefore allowed us to test for further measurement invariance.

As stated above, measurement invariance, which was the goal of our third research objective, requires more support than simply supporting configural invariance. Once we achieved configural invariance, we were then able to examine metric invariance, meaning that we were examining whether each item contributes to the latent construct to a similar degree across groups. Our MGCFA allowed us to examine the chi-square difference test and the CFI difference between the configural and metric models. Our results supported metric invariance, therefore indicating equivalence of the item loadings on the factors between the Spanish version of the RBS-EC and the original English version. These results indicate that the factor loadings are the same across the groups, which provided further support for measurement invariance. Metric invariance is an indicator that we are not seeing response bias in items in the two groups. It also allows us to move to the last step of measurement invariance which is needed to assume equal comparison between groups.

After ascertaining configural and metric invariance, the last step to fully support our third hypothesis of measurement invariance was to test for scalar invariance. This would mean that mean differences in the latent construct capture all mean differences in the shared variance

of the items. Our results indicated equivalence of item intercepts for metric invariant items and therefore indicated scalar invariance. With this, we were able to demonstrate the measurement invariance of our translated measure with the original RBS-EC. This indicated that the RBS-EC has the same measurement properties in both English and Spanish and that the latent means can be compared meaningfully across the groups.

Overall, the results indicated support for our third research question and demonstrated full measurement invariance of the Spanish translation of the RBS-EC with the original measure. This indicated the equivalence of model form, factor loadings, and of item intercepts, and lets us know that our respondents from the different groups [Spanish and English] seem to interpret RRBIs as measured by the RBS-EC in a conceptually similar way. These results are exciting, as they provide great support for the validity of the Spanish version of the RBS-EC, for the use of the Spanish version of the RBS-EC in Spanish-speaking individuals in the United States, and also indicate that future researchers who attempt comparisons between these groups can confidently use the RBS-EC to make such comparisons.

Although we acknowledge that there are still other psychometric properties needed for full validity, we also acknowledge that there are few measures which go through the rigorous validity testing that the Spanish version of the RBS-EC went through. In our study, not only did we examine the internal reliability of the various scales, but we also examined measurement invariance, as we wanted to assure that the Spanish version of the RBS-EC measured the same thing as the original English version, measured it in the same way, and was interpreted the same way by both groups. Additionally, our Spanish version of the RBS-EC met scalar invariance, which made us confident that any statistically significant differences in group means were not due to differences in scale properties across our two groups.

Differences in RRBIs based on Language Acculturation

Considering the cultural implications that might be playing a role in some of our other analyses, it seemed even more important than before for us to explore possible differences brought upon by linguistic acculturation. Although we acknowledge that language is only a part of the culture, considering that the measure was translated into Spanish it seemed like an important part of the culture to explore. Literature suggests that bilingual individuals often adopt some of the concepts, values, attitudes, and role expectations of the culture of the second language (Sperber, 2004). Therefore, although the measure is intended for Spanish-speaking individuals, we must be careful with generalizing the results to all Spanish-speaking individuals. Support for these statements was found with our exploratory question, when we examined differences in frequency and interference of RRBIs based on linguistic acculturation within our Spanish-speaking sample. The explorative research question which used the short acculturation measure, SASH-Spanish, resulted in support of linguistic acculturation having an effect, although a medium one, on the frequency and interference of RRBIs. The results showed that the less acculturated someone was, the higher number of RRBIs and the higher interference. In other words, when compared to people who reported listening to and talking more in English, people who reported talking and listening more in Spanish during their day-to-day reported a higher presence of RRBIs, as well as more interference stemming from those RRBIs. This is an interesting finding, considering that most of the limited literature that exists in this area has suggested that Spanish speakers tend to report a lower frequency of RRBIs (Magaña & Smith; 2013; Ratto et al., 2020). It is possible that these results are due to our measure being a valid, culturally relevant measure, meaning that because the measure was translated in a manner that was easy to understand, our participants were able to provide more accurate information.

Rather than state that they disprove other studies such as Magaña and Smith (2013) and Ratto et al. (2020), we think this provides further information to clarify their results. Magaña and Smith (2013) found lower levels of RRBIs when people were interviewed in Spanish using the ADI-R. However, as stated in their study, their measure was limited by its translation, as certain words were not translated due to a lack of exact translations. Therefore, the participants may not have understood the meaning of these items well, which could have resulted in lower reports. Ratto et al. (2020) found fewer parent-reported RRBIs in young dual-language learners. An important part to consider here is that although most of these young dual language learners heard 20% or more of another language at home, meaning that their parents were speaking two languages, the measures the parents were asked to complete were in English, meaning that once again, one must consider that they may not have always understood the meaning of certain items and therefore could have reported less.

In the case of our study, it could also be signifying that the measure is not appropriate for people who know Spanish, but predominantly use other languages in their day to day. For example, a person who learned Spanish, but does not regularly use the language, may not always understand the meanings of all the terms that were used and therefore resulting in differences in reporting. Nevertheless, as this was an explorative research question, these results indicate a need for further research in this area. Future research might even want to examine acculturation in general, rather than limiting it to linguistic acculturation.

Furthermore, further analysis indicated that the Latine participants in our sample were not significantly different than non-Latines in terms of linguistic acculturation. This is interesting because although Latine participants were not less or more linguistically acculturated, identifying as Latine did predict lower frequency or interference of RRBIs. This has possible implications

for future research and assessments, as this indicates that researchers and clinicians should consider not only the language preferences of their participants and clients but should also consider the factor of ethnicity when working with the Latine population. Now, although this does not indicate a need for a whole measure just for them, it does indicate a possible need for different norms for the Latine population. Future research could work on replicating these results to provide further evidence of a need for different norms or identifying if there might be other factors, that might be playing a role in the differences in frequency and interference of RRBIs that Latines are reporting.

Implications

Implications for RRBIs

As the neurodiversity movement continues to grow, there is more of a push to look at certain behaviors and characteristics in a more positive or neutral manner. This is especially seen with autism advocates who have made efforts to stop seeing RRBIs in a negative light. Although it might be necessary to target dangerous RRBIs, in terms of diagnosing and determining the need for intervention, it seems more important to capture the existence of these behaviors and examine the impairment, if any, that these behaviors lead to. Rather than focusing on repetitive behavior as a clinical concern or problem behavior, the RBS-EC is simply intended to quantify dimensions of RRBIs in children who are typically developing, as well as those with or at risk for a neurodevelopmental disorder. To our knowledge, this is the first study to not only translate, but also examine the validity of the RBS-EC in a Spanish-speaking population. Additionally, it is also the only validated Spanish measure that can help identify the presence and perceived impairment of RRBIs in neurotypical and neurodivergent children 2 to 7 years old. Furthermore, the Spanish version of the RBS-EC has good evidence to back up the

quality of the measure. Few measures are put through similar vigorous translation and validation processes, and even less end with such positive results. This is exciting because not only does it provide support for the validity of our measure, but because the original measure is free and readily available, and if this measure is able to also be made available online, this study could provide a great option for providers to give a valid parent-report measure to these families, and hopefully gather more valid and accurate information on RRBIs.

Implications for Early Diagnosing and Intervention

Despite the grand improvements that we have made in the diagnosis and intervention of neurodevelopmental and mental health disorders, there continue to be barriers to timely diagnosis and interventions for many families. One such barrier, or maybe it would be best put, one such failure on our end, is to continue to fail to meet the needs of non-English-speaking and dual language-speaking families. Literature has long highlighted our failure in this area (Flores, 2010; Parish et al., 2012; Zuckerman et al., 2014; Zuckerman et al., 2017), and yet, although it is not uncommon to read the limitations section of a peer-reviewed article stating that results may not be generalizable to non-English speaking individuals, we continue to use these measures with these populations hoping that they understand the meaning of the items and use interpreters to administer measures that we have not validated for them. The translation and validation of the RBS-EC to Spanish is part of the efforts done to continue to take down this barrier.

Furthermore, when focusing on Spanish-speaking individuals, we have seen that there is some indication of possible underreporting, especially when measures are in other languages, or translations are done incorrectly (Mathews et al., 2001) For this reason, the Spanish version of the RBS-EC presents an opportunity for providers to gather helpful information with a reliable, equivalent, and content-valid Spanish version of the RBS-EC. Furthermore, this study provides

possible norms for Latine Spanish speaking families, whose intersectional identities put them at a great disadvantage to accessing resources and services. Awareness of this possible underreporting by Latine Spanish speaking families gives a chance for families who might be missing a diagnosis due to their interference levels not meeting impairment levels that we typically expect during assessments. A validated and culturally relevant measure can be the difference between a family getting a diagnosis or intervention and a family struggling with no resources or assistance because their child does not meet the criteria.

Strengths, Limitations, and Future Directions

As previously mentioned, this study attempted to utilize standardized methodological strategies to translate and examine content validation of the Spanish version of the RBS-EC. This study did a forward and backward translation, it involved bilingual translators, and attempted cultural equivalencies. Also importantly, the content validity of the Spanish version of the RBS-EC was not subjective, instead, validity was demonstrated in various statistical methods. Something that cannot always be said for many existing measures. Ultimately, this study provides evidence that the Spanish version of the RBS-EC is a great measure to use with Spanish-speaking populations. When compared to other available Spanish measures that assess RRBIs, fully or partially, our measure represents a great option for the quick collection of valid and accurate data about RRBIs in young children from Spanish-speaking families. Our measure does not limit its usability to clinical populations, and it does not include irrelevant items for our age group, unlike the RBS-R which is intended for an autistic population, and is forced to have items for a very wide age group. Furthermore, it is worth noting that this study was completed with minimal funding and did not use professional translators. Although this does indicate caution, we believe it also demonstrates that not all translations and validations of measures must

be complicated or expensive. The results of this study indicate that it is possible to translate a measure with limited resources and get good results, which might be especially important for providers and researchers in smaller underfunded clinics or organizations.

Our sample demonstrates both a strength and a limitation of the study. Our measure was intended to be translated for Spanish speakers, without limitation of ethnicity or the number of languages spoken. Although it is intended for people with preferences for the Spanish language, our results indicate that our measure can be given to a wide number of people from different backgrounds. However, as previously mentioned, our study did not limit to monolingual Spanish speakers or even native Spanish speakers. Considering that differences between bilingual and monolingual populations have been found (Sperber, 2004), future research could evaluate how this measure would work with a monolingual Spanish population. Future research might also want to focus on changes that might be needed if the measure wants to be validated with a Spanish-speaking population outside of the United States. Additionally, our sample was collected through MTurk, which has been suggested to have demographic differences when compared to community samples (Walters et al., 2018). Therefore, similarly as suggested in Lachance et al. (2021) future research should use a community sample to evaluate whether the measure produces similar psychometric results with this population. That being said, our Spanish speaking sample was comparable to our English-speaking sample, which was collected about a year prior, in terms of various demographics (e.g., age and gender of child, gender of caregiver, relationship to child, number of children with and without developmental/physical conditions).

Lastly, some of our findings indicated some differences in the reporting of RRBIs, which although might be explained by cultural differences, contradicted the existing literature. Although the results might be explained by cultural factors, there is simply not enough research

that examines these cultural differences. Research should be done to further examine the relationships between language or linguistic acculturation and RRBIs. If more research indicates that less linguistic acculturation predicts higher frequency and interference of RRBIs, it would indicate a need for possible new norms based on this factor, as well as have clinical implications. Furthermore, research needs to work on examining the possible effects of gender on RRBIs in Spanish-speaking families in order to determine if our results can be replicated or if there might be another reason for the gender effects we found.

Conclusion

This study aimed to translate the original English version of the RBS-EC scale into the Spanish language, validate the translated version, and establish its psychometric properties to facilitate its reliability, validity, and adaptability to children aged 2 to 7 years old, with Spanish-speaking parents. Our results indicated that the Spanish version of the RBS-EC was found to be reliable, valid, and seemingly culturally- appropriate for Spanish-speaking individuals. Our measure represents a valuable option in terms of instruments intended to measure RRBIs in neurotypical and neurodivergent children aged 2 to 7.

The translated Spanish version of the RBS-EC can be utilized to capture quantitative, dimensional features across a broad range of behaviors that fall within the RRBI category. Moreover, the utilization of the measure in future studies could allow researchers to further gather more data that can help understand and differentiate the dimensions of RRBIs across neurotypical and neurodivergent development in individuals outside of English-speaking populations. Importantly, the Spanish version of the RBS-EC can aid in taking down barriers often experienced by non-English speaking families in terms of early diagnosis and access to intervention. Further studies are recommended to reinforce the application of the translated

Spanish version of the RBS-EC with Spanish-speaking families, but most importantly, future studies are encouraged to continue working on the proper translation and validation of all psychological measures in various languages in order to better serve the many communities we work with.

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Appendix A

Spanish RBS-EC

ESCALA DE COMPORTAMIENTO REPETITIVO PARA INFANCIA TEMPRANA

Esta es una medida de comportamientos repetitivos para uso en niños infantes hasta edad preescolar. Los comportamientos repetitivos varían de movimientos simples de motriz hasta patrones complejos de intereses y rutinas. Muchos de estos comportamientos son comunes en niños y ocurren como parte del desarrollo saludable.

INSTRUCCIONES: Por favor valore el comportamiento de su hijo para cada de los 34 temas enlistados circulando el marcador que mejor describan que tan a menudo ocurre el comportamiento. Asegúrese de leer y contestar todos los temas. Asegúrese que las valoraciones sean basadas en el comportamiento de su hijo en el último mes. Use las definiciones en la caja de abajo para evaluar cada tema:

- 0- El comportamiento no ocurre**
- 1- El comportamiento ocurre alrededor de una vez por semana o menos**
- 2- El comportamiento ocurre varias veces a la semana**
- 3- El comportamiento ocurre todos los días**
- 4- El comportamiento ocurre varias veces todos los días**

Si uno de los temas no “es aplicable” porque su hijo todavía no puede hacer ese comportamiento particular (por ejemplo, él o ella todavía no pueden agarrar objetos), el tema deberá de calificarse como un “0” (el comportamiento no ocurre). Por favor note que muchos de los temas pueden no aplicar a infantes debido a los límites de la variedad de sus comportamientos.

La fecha de hoy _____

Su relación con el niño _____

Día de nacimiento del niño _____

Edad del niño _____

El niño es ___ Hembra ___ Macho

Instrucciones: Lea cada uno de los temas enlistados y circule el puntaje que mejor describa que tan a menudo el comportamiento ocurre. Asegúrese de leer y contestar todos los temas. Haga sus valoraciones basadas en el comportamiento de su hijo sobre el mes pasado.

I. REPETICIONES DE MOTOR

DEFINICIÓN: consecutivo, movimientos no-sociales o acciones que son repetidas en una forma similar.

1. PIERNAS (pateando, flexionando, rebotando, balanceando, taconear)
2. CABEZA (rodando cabeza, cabeceando, sacudiendo- no cuente cabeceando o sacudiendo para comunicar 'sí' y 'no')
3. CUERPO COMPLETO/TORZO (meciendo, rebotando, balanceando, arqueando)
4. BRAZOS/MANOS/DEDOS (aletear o revolotear las manos o brazos en el aire; mueve o chasquea los dedos; sacude o aplaude- no cuente aplausos sociales o saludos a 'hola' o 'adiós')
5. BRAZOS/MANOS/DEDOS EN SUPERFICIE (cachetea, da golpecitos, o tamborileará contra objetos, paredes, pisos, mesas, o otros muebles)
6. USO DE OBJETO (pega, gira, sacude, suelta o rueda juguetes o otros objetos)
7. SE METE A LA BOCA (se mete objetos a la boca, muerde, lambe, o chupa objetos- no cuente botellas, chupones, tazas, o utensilios)
8. LOCOMOCION (girar repetidamente, deslizarse, gatear, caminar, brincar, o correr en círculos/para atrás y adelante)
9. VOCALIZACIONES (repetir el mismo sonido, palabra, o frase- no cuente intentos de comunicarse)

En total, ¿qué tan seguido los comportamientos de arriba interfieren con otras actividades o interacciones? Circule la mejor respuesta.

0 Nunca	1 Raras Veces	2 A veces	3 Seguido	4 Siempre
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II. RITUAL Y RUTINA

DEFINICION: resistente a cambio; realiza patrones de comportamientos fijos; fuertemente prefiere que las actividades diarias sean realizadas en la misma manera

25. <u>ACOMODANDO</u> (alineaa o acomoda juguetes o otros objetos)
26. COLOCACION DE OBJETOS (insiste que las cosas se mantengan en el mismo lugar, p. ej. Juguetes, muebles' regresa los artículos a la locación "correcta" cuando son disturbados por otros)
27. ENFADA VISITANDO LUGARES NUEVOS (llora o "se colapsa" cuando visita lugares no familiares; rehúsa entrar a entornos nuevos)
28. ENFADA SI ES INTERRUPIDO (llora o "hace un berrinche" cuando una actividad es interrumpida; dificultad con transiciones, aunque tenga advertencia temprana)
29. APARIENCIA DE OTROS (no le gusta o se enfada con cambios a la apariencia de otros, p. ej. peinados, sombreros, ropa)
30. RUTINA INFLEXIBLE (se enfada demasiado con cambios a la rutina diaria, p. ej. horario, personas involucradas, o orden de actividades; insiste que los eventos ocurran a un orden especifico)
31. COMER/TIEMPO DE COMER (insiste en mantener la rutina de comer, p. ej. come solo comidas o marcas específicas, come/bebe en un orden fijo o en lugares/tiempos específicos; rehusé comer comida que "toca")
32. DORMIR/TIEMPO DE DORMIR (rehusé dormir en lugares nuevos; insiste que el cuarto y la cama estén "justo de una manera" al tiempo de dormir; insiste que actividades específicas precedan el tiempo de dormir)
33. JUGAR (sigue una rutina estricta de juego; insiste que otros jueguen en una manera específica; se enfada si la rutina de juego es alterada)
34. INTERACION SOCIAL (insiste que otros respondan en una manera específica; sigue un guion verbal fijo o rutina a pesar del contexto o comportamiento social de otros niños o adultos)

En total, ¿qué tan seguido los comportamientos de arriba interfieren con otras actividades o interacciones?
Circule la mejor respuesta.

0	1	2	3	4
Nunca	Raras Veces	A veces	Seguido	Siempre

III. INTERESES Y COMPORTAMIENTO RESTRINGIDO

DEFINICION: comportamientos con variedad de gama focal limitada o inflexible; intereses o actividades intensas o inusuales

17. INTERESES LIMITADOS Y INTENSOS (preocupación estrecha con un tema o actividad, p. ej., trenes, dinosaurios, coleccionar artículos, p. ej. rocas, palos, hilos; juega solo con juguetes específicos)
18. USO RESTRINGIDO DE MEDIOS (fuertemente insiste en la misma música, libro, app, programa, película o parte de un programa/película etc.; firmemente rehúsa nuevos libros/apps/ películas etc.)
19. INTERESES SENSORIALES (busca específicas sensaciones táctiles, auditorias, o visuales, p. ej. huele o frota objetos específicos; fascinación intensa con sonidos, luces, o texturas específicas)
20. FUERTEMENTE ADJUNTO A OBJETO ESPECIFICO (insiste en traer/cargar un juguete o objeto específico)
21. PREOCUPACION CON PARTES DE OBJETOS (concentra en partes de objetos envés del objeto completo, p. ej. llantas en coches de juguete, ojos en muñecas o animales de peluche)
22. QUIETUD (acuesta o se siente quieto por periodos de tiempo extensos mientras esta solo; contento con hacer “nada”- no cuente siestas/tiempo de dormir)
23. INSPECCION VISUAL (inspecciona objetos estrechamente; ve juguetes y otros objetos de un ángulo inusual)
24. FASINACION CON MOVIMIENTO (interés intenso o centrar en cosas que se mueven; p. ej. abanicos, juguetes que giran, rebotan, ruedan, o aletean etc.)

En total, ¿qué tan seguido los comportamientos de arriba interfieren con otras actividades o interacciones?
Circule la mejor respuesta.

0	1	2	3	4
Nunca	Raras Veces	A veces	Seguido	Siempre

IV. COMPORTAMIENTO AUTODIRIGIDO

DEFINICION: movimientos repetitivos o acciones dirigidos hacia el cuerpo que tienen el potencial de causar enrojecimiento, moretones, o otras lesiones

10. GOLPEA A SI MISMO CON UNA PARTE DEL CUERPO (se pega o cachetea la cabeza, brazos, piernas o otra parte del cuerpo)
11. GOLPEA A SI MISMO CON OBJETOS (pegar o golpear la cabeza o otra parte del cuerpo con objetos, p. ej. juguetes)
12. GOLPEA A SI MISMO CONTRA SUPERFICIE (pegar o golpear la cabeza o otra parte del cuerpo en muebles, paredes, pisos, o otras superficies)
13. SE MUERDE EL MISMO (se muerde mano, dedos, brazo, labios o lengua)
14. FROTA, RASCA, PICA O PELLIZCA A SI MISMO (no cuente comezón por mordidas de insecto, eczema o otra irritación de piel)
15. JALA SU PROPIO PELO
16. PELLIZCA LA PIEL (pellizca a marcas, costras, cutículas, o piel saludable en la cara, brazos o torso)

En total, ¿qué tan seguido los comportamientos de arriba interfieren con otras actividades o interacciones?
Circule la mejor respuesta.

0	1	2	3	4
Nunca	Raras Veces	A veces	Seguido	Siempre

Appendix B

Short Acculturation Scale for Hispanics (SASH) – SPANISH

1. ¿Por lo general, qué idioma(s) lee y habla usted?

☐	☐	☐	☐	☐
Sólo inglés	Más inglés que español	Ambos por igual	Más español que inglés	Solo español

2. ¿Por lo general qué idioma habla en su casa?

☐	☐	☐	☐	☐
Sólo inglés	Más inglés que español	Ambos por igual	Más español que inglés	Solo español

3. ¿Por lo general en qué idioma piensa?

☐	☐	☐	☐	☐
Sólo inglés	Más inglés que español	Ambos por igual	Más español que inglés	Solo español

4. ¿Por lo general qué idioma(s) habla con sus amigos?

☐	☐	☐	☐	☐
Sólo inglés	Más inglés que español	Ambos por igual	Más español que inglés	Solo español