

**CROSS CULTURAL ADAPTATION OF THE FUNCTIONAL MOBILITY  
ASSESSMENT (FMA) AND FUNCTIONAL MOBILITY ASSESSMENT – FAMILY  
CENTERED (FMA-FC) TO LATIN AMERICAN SPANISH**

by

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In response to an increasing population of Latin Americans and the lack of outcomes tools for mobility in Spanish, a cross-cultural adaptation (CCA) of the Functional Mobility Assessment (FMA) and the Functional Mobility Assessment - Family Centered (FMA-FC) outcome measurement tools to Latin American Spanish was conducted. These outcome measurement tools are patient reported outcome (PRO) questionnaires that quantify the impact of Mobility Assistive Equipment (MAE) in the functional level of the client during Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs). After an extensive review of various CCA guidelines, a combination of the guidelines set by the World Health Organization (WHO) and the American Association of Orthopedic Surgeons (AAOS) was utilized to adapt these two tools for use throughout Latin America, North America, and the Caribbean. Unlike a simple translation, a CCA focuses on maintaining cultural and conceptual equivalences, rather than linguistic equivalence; ensuring that the adapted tools function equally as well as the originals. For this study, two different independent translators created separate versions of a forward translation. These versions were then merged (synthesized) and a review panel comprised of seating and mobility experts from across Latin America reviewed the synthesized translations. With the review panel's feedback, the lead translator created a preliminary forward translation which was then back-

translated by an independent translator for review by the authors of the original tools. After getting the authors' approval, these tools were pre-tested with subjects representative of the target population. Further work is still required to validate these adaptations and obtain their psychometric properties; however, positive results have been obtained by the CCA process. The FMA and FMA-FC Spanish versions were found to be culturally, conceptually, semantically, and idiomatically equivalent as the original versions; thus, validating their use in the field of rehabilitation.

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*Para mis papás, quienes han sacrificado tanto para lograr que yo pueda cumplir mis metas.*

## 1.0 INTRODUCTION

For the Rehabilitation professional, Outcome Measurement tools are a valuable method that can be used to quantify qualitative data, such as the impact of assistive technology (AT) in the quality of life of clients. Using these tools allows for increased quality of care, performance quality control for clinicians, scientific data for use in evidence-based practice, among other benefits. The University of Pittsburgh's Department of Rehabilitation Science and Technology have developed and validated outcome measurement tools to quantify the impact of Mobility Assistive Equipment (MAE) (i.e. Wheelchairs (both power and manual), Scooters, Walkers, Rollators, Crutches, etc.) in the functional quality of life of clients. The tools include the Functional Mobility Assessment (FMA) and the Functional Mobility Assessment – Family Centered (FMA-FC). The FMA measures an adult person's satisfaction in performing common Mobility Related Activities of Daily Living (MRADLs) while the FMA-FC measures MRADL's for people with disabilities who are unable to answer the questions themselves, because they are children, or are cognitively or verbally unable to do so, having a parent or caregiver responding for them.

The specific aim for this study focuses on the cross-cultural adaptation (CCA) of both the FMA and FMA-FC to Latin American Spanish. Having access to these tools will give Spanish-speaking individuals a higher quality care regarding functional ability through the assistance of MAE. Both cross-cultural adaptations are intended to be used throughout the United States and Latin America by those who speak Latin American Spanish. According to the United States Census

Bureau, the total number of Hispanics living in the US in 2014 was 319 million, with projected increase to 417 million by the year 2060 (Colby & Ortman, 2015). Although many of these individuals are English-speaking, there is a considerable amount who only speak Spanish and are equally entitled to a high-quality medical care. In many situations, it is difficult for clinicians to follow their typical service delivery process when the tools are not available to conduct an assessment in another language, hence the importance of developing cross-cultural adaptations for validated tools.

## **1.1 BACKGROUND**

In many cases, for people with disabilities, it is not their physical or neurological condition that impedes them from living to their greatest potential; rather, it is the fact that their environment is not designed with accessibility in mind. When the environment around the person is full of physical or social barriers, the person's functional ability is hindered, regardless of physical condition (Lilja & Borell, 1997). Wheelchairs, scooters, walkers, crutches, and other types of Assistive Technologies (AT) have been developed to allow those with mobility limitations to engage with their environment in the most independent and safe manner. When prescribed correctly, MAE can increase, maintain or improve means of mobility for people with disabilities (Da Cruz, 2015). Problems arise when these devices are prescribed without the use of a proper service delivery process which includes outcome measurement. Incorrect assessment of physical function, home and community functional ability, and the person's environment can lead to complications such as injury or device abandonment and an overall lower quality of life.

A documented issue of assistive technology is device abandonment, defined as permanently giving up use of the device (Scherer & Federici, 2015). This issue represents ineffective use of limited funds by federal, state, and local government agencies, insurers and other provider organizations (Phillips & Zhao, 1993, Batavia & Hammer, 1990). Device abandonment also represents a poor service delivery process by the therapist or clinician, which could be mitigated through the use of outcomes measurement tools during the evaluation. This is why the Center for Medicare and Medicaid Services (CMS) policies require function-based criteria for prescription of a mobility device, which is based on results from these tools (Kumar et al., 2013, Centre for Medicare and Medicaid Services, 2006). It has been suggested that in order to provide the best service delivery process, the consumer must be involved in device selection. This can be facilitated by self-reported outcome tools, which assist the clinician in understanding personal, health, and functional needs of the client (Kumar et al., 2013, Cooper, 2006).

In less resourced settings and developing countries, such as many countries throughout Latin America, few people who need MAE have access to the adequate device for them (Borg & Khasnabis, 2008). To address this, the WHO released the *Guidelines on the Provision of Manual Wheelchairs in Less-Resourced Settings* in 2008. These guidelines state that the correct service delivery process is comprised of 8 steps outlined as: Referral and appointment, Assessment, Prescription, Funding and ordering, Product preparation, Fitting, User training, and Follow-up, maintenance and repairs (Borg & Khasnabis, 2008). Having outcome tools available in the language of these developing countries would facilitate a thorough assessment and better understanding of the clients' needs for better MAE prescription.

Currently, there are no outcome tools being used throughout Latin America that focus on MAE. Additionally, none of the tools used to evaluate this equipment are available in Spanish

language. Without a translated tool, it is difficult to include Spanish-speaking individuals throughout Latin America and the United States in the device selection process and be able to understand their situation thoroughly. This brought the need for a cross-cultural adaptation of a MAE focused tool to Latin American Spanish.

## 1.2 RELATED RESEARCH

Throughout the years, there have been a number of tools developed related to Assistive Technology and MAE. Some have been utilized to evaluate MAE but were developed for broader scopes, some are specific to types of MAE, some are performance-based tools, and others are self-report tools.

**Table 1. Common Outcome Measurement Tools used for MAE**

<b>Tool Name</b>	<b>Scope</b>	<b>Reference</b>
Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST)	User satisfaction with AT devices	(Demers, Weiss-Lambrou, & Ska, 1996)
Psychosocial Affect of Assistive Devices (PIADS)	Perceived impact of AT on their Quality of Life (QoL) and sense of well-being	(Day, Jutai, & Campbell, 2002)
Functioning Everyday With a Wheelchair (FEW)	Functional activity satisfaction using wheeled mobility and seating system	(Mills, Holm, & Schmeler, 2007)
Functional Independence Measure	Measure of independence completing functional tasks	(Dodds, Martin, Stolov, & Deyo, 1993)

**Table 1 (continued)**

Functional Mobility Assessment	Perceived satisfaction with user mobility while completing activities of daily living and instrumental activities of daily living	(Kumar et al., 2013)
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For example, the Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST) has been used in seating clinics to evaluate user satisfaction with their devices. This tool measures satisfaction related to assistive device usage, however, it does not evaluate functional changes with respect to Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs) in home or community settings (Kumar et al., 2013).

Another frequently used tool to evaluate wheelchair users is the Functional Independence Measure (FIM) (Stanley, Stafford, & Rasch, 2003). This tool measures independence in ADLs and IADLs and is applicable for clients with a variety of disabilities (Stanley et al., 2003). It is a widely used tool in many clinics today, however, it evaluates the user's functional independence level rather than the devices' impact on functional independence level.

Due to the lack of measures that fully represented important tasks for wheelchair users, researchers at the University of Pittsburgh developed the Functioning Everyday with a Wheelchair (FEW) tool (Schmeler, Holm, & Mills, 2006). It is a self-report tool that measures consumer satisfaction levels with respect to functional performance of everyday tasks while using a Wheeled Mobility System (WMS) (Kumar et al., 2013, Mills et al., 2007). Even though this is a useful tool for people already in manual wheelchairs or power wheelchair, it was not applicable for those

looking to get MAE for the first time or for those using other types of MAE such as canes, crutches, walkers, etc.

In order to measure functional activity satisfaction on clients whose current means of mobility range from walking all the way to using power wheelchairs, the FMA was developed, a derivative of the FEW. The FMA was developed so to be more inclusive of other MAE in addition to wheelchairs (Kumar et al., 2013).

### **1.2.1 Functional Mobility Assessment (FMA)**

As previously stated, the FMA was developed so that items were relevant to individuals who used or planned to use canes, crutches, walkers, wheelchairs or scooters as their primary mobility devices (Kumar et al., 2013). Adapted from the FEW, it contains the same 10 items identified to be of great functional importance to MAE users. These 10 items are: (1) carrying out my daily routine, (2) comfort needs, (3) health needs, (4) operate with independence and safety, (5) reaching and carrying out tasks at different surface heights, (6) transfers from one surface to another, (7) personal care tasks, (8) indoor mobility, (9) outdoor mobility, and (10) personal or public transportation (Kumar et al., 2013). Items on this tool are scored on a 7-point Likert scale ranging from 1 (Completely Disagree) to 6 (Completely Agree); 0 being “does not apply” (Kumar et al., 2013). An Adjusted Total Score (ATS) is calculated by dividing the summed total by the total number of points possible. This ATS is used to determine the participants’ satisfaction with their current means of mobility in terms of their functional ability to perform ADLs and IADLs.

It is the only current self-report tool that is reliable and validated to measure the functional performance of both existing users and non-users of MAE and applicable to clients of all ages (Kumar et al., 2013).

### **1.2.2 Functional Mobility Assessment – Family Centered Version (FMA-FC)**

A variation of the FMA, the Functional Mobility Assessment – Family Centered Version (FMA-FC), was systematically developed by Dalthea Beavers for verbal and non-verbal children for whom caregivers or family members can more accurately report on satisfaction of mobility related activities of daily living. Both test-retest reliability (ICC = 0.85) and internal consistency (Cronbach’s alpha = 0.87) of FMA-FC were found to be acceptable (Beavers, 2016). Most items on this tool are the same as those in the original FMA, however the wording was changed to reflect activities children engage on in their daily lives and some items were added for the same reason (Beavers, 2016). These items are:

- Daily Supply Management
- Independence from family/caregiver for social activities

In order to keep the tool brief and consistent to the original FMA at 10-statements, “getting around indoors” and “getting around outdoors” were combined into one item to make room for the added items.

Because children tend to use multiple MAE devices as they develop, this tool allows consideration of multiple devices at once when being applied. Crawling and strollers are also added to the list of “means of mobility” at the beginning of the tool. Having these additional items allow for a better understanding of how the client gets around on a daily basis for a better service delivery.

### **1.2.3 Variations of Spanish Across Latin America**

This adaptation focuses on the target language of Spanish; specifically, Latin American Spanish which is widely used throughout North and South America. Spanish itself has many different



variations, or “second languages” as defined by linguists, dependent on region and culture (Hendricson et al., 1989). Although the foundation for the language is the same throughout every “second language,” they vary in language variations and dialects (Hendricson et al., 1989).

For this project, the European variation of Spanish was excluded as it is very different compared to the variations heard across North and South America and the Caribbean. Due to the variations of dialects found throughout Latin America, necessary modifications were taken to the adaptation procedure followed; these modifications will be outlined in the Methods portion of this report.

#### **1.2.4 Cross Cultural Adaptations of Outcomes Measurement Tools**

It is recommended that if there is currently a tool available to measure the desired outcome in another language, rather than a new tool development, a cross-cultural adaptation (CCA) is conducted for the target culture because the CCA is faster and is assumed to produce an equivalent measure (Epstein, Santo, & Guillemin, 2014; Beaton, Bombardier, Guillemin, & Ferraz, 2000). Instead of a simple translation of the tool, a CCA refers to the process of considering any differences between the source and the target culture so as to maintain equivalence in meaning (Epstein et al., 2014). The goal of a CCA is to create an instrument that is equally natural and acceptable and performs practically in the same way as the original instrument (WHO). Therefore, the focus of the CCA is on conceptual, rather than linguistic/literal equivalence (WHO).

Difficulties may arise during a CCA in the attempt to find equivalent phrasing to match the original instrument’s intended meaning. In a linguistic sense, a target language may not have equivalent words or expressions to represent an item from the original instrument (Epstein et al., 2014). In other cases, items from the original instrument may have a different meaning, or no

meaning at all, in the target language (Epstein et al., 2014). More technical difficulties may arise when attempting to maintain various types of equivalence while translating colloquial phrases, idiomatic expressions, and emotionally evocative terms (Epstein et al., 2014; Jen & Lien, 2010).

Since the target population for this adaptation are Latin Americans and Hispanics who speak Latin American Spanish, a greater obstacle for this CCA is the attempt to find terms that will represent the original instrument across all variations of the Spanish language. To mitigate any of the previous issues, it is necessary to follow the correct cross-cultural adaptation procedure outlined below.

## **2.0 CROSS CULTURAL ADAPTATION PROCESS**

After a literature review of guidelines and methods for CCA conducted by the University of Lorraine and the Paris Descartes University, Jonathan Epstein (2014) did not find strong scientific evidence for what is considered a “gold standard.” What they found was that although many of the processes were similar, the recommended number and characteristics of translators and back translators varied, as did the timing of the back translation and discrepancies in the types of equivalencies attempted to be met (Epstein et al., 2014). When a review of literature was conducted for this study, it was concluded that there had been no significant changes since these findings. Therefore, it was necessary to review multiple CCA processes and select the one that best corresponded to this project.

### **2.1 INTRODUCTION**

One of the most common processes for CCA found was one followed by The American Association of Orthopedic Surgeons (AAOS) Outcomes Committee. Their guidelines follow well-defined steps (initial translation, synthesis/reconciliation of the translations, back translation, expert committee review, pretesting) (Epstein et al., 2014). In fact, this process was used in the CCA of the FMA to Brazilian Portuguese conducted by Daniel da Cruz. This process can be seen in Figure 1 below.

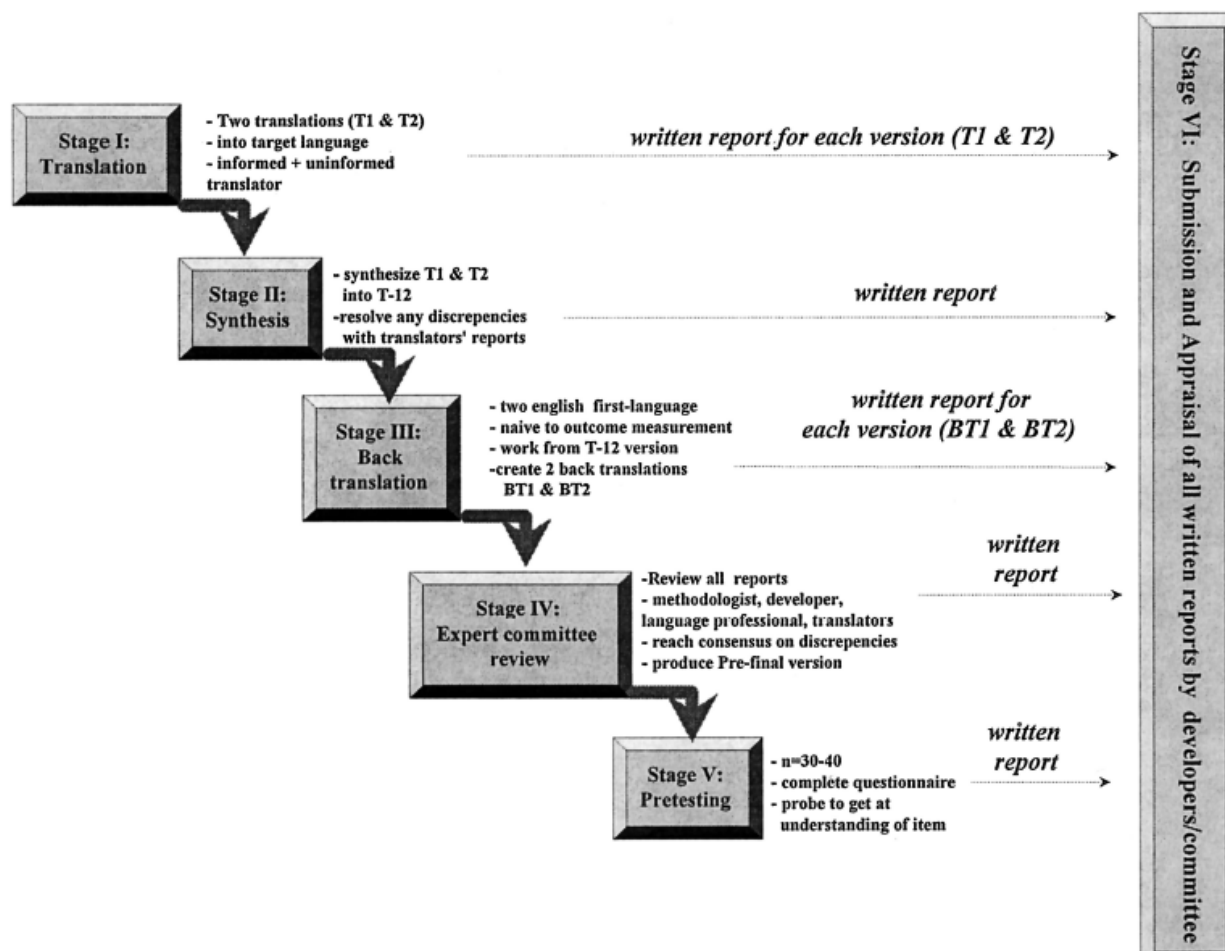


Figure 1. AAOS Cross-Cultural Adaptation Process (Beaton et al., 2000)

During the review of processes conducted for this project, it was found that the World Health Organization (WHO) had released guidelines for CCAs of outcome tools. In Epstein’s review there was no mention of these guidelines, which are similar to the one used by the AAOS (Epstein et al., 2014). One noticeable difference is that the “back-translation” step is done after the expert committee review according to the WHO, rather than before. Another significant difference between these two methods is that the WHO does not require two translators to independently conduct forward translations for a synthesis afterwards while the AAOS does.

Because the CCA of the FMA and FMA-FC to Latin American Spanish attempts to create tools to be used by Spanish speaking people from many different regions, it was decided that a combination of these two methods would be used. In order to succeed in finding a “universal” language that could be understood throughout the target population, it was considered important to have the back-translation of the initial forward translation completed after the expert panel review, as recommended by the WHO. Since the expert panel consisted of professionals from a number of countries, it would be helpful to get their wording suggestions based on the Spanish version of the tools rather than the back-translated English version. Additionally, for a successful initial forward translation, two Spanish speaking individuals, experienced with the tools and from different countries, were tasked to conduct their translations individually. These translations were then merged, or “synthesized,” as per the AAOS guidelines.

### **2.1.1 Equivalences**

A major component of a successful CCA is the different equivalences between the original tool’s language and the target language. It is necessary to show equivalence between the translated version and the original version of a tool in order to demonstrate a valid CCA (Herdman, Rushby, & Badia, 1997). A variety of equivalences have been used throughout different CCA methods; therefore, it was necessary to determine which types of equivalences would be measured in this project. According to a review conducted by the Catalan Institute of Public Health, the most frequently mentioned types of equivalence in CCA guidelines were: conceptual equivalence (30%), semantic equivalence (12%), functional equivalence (8%), scalar/metric equivalence (8%), scale equivalence (8%), technical equivalence (6%), and operational equivalence (6%) (Herdman et al., 1997).

During the FMA adaptation to Brazilian Portuguese, the equivalences used were semantic equivalence, idiomatic equivalence, conceptual equivalence, and cultural equivalence (Paulisso et al., 2015). Because this CCA used the guidelines proposed by the AAOS and contain the two equivalences required by the WHO guidelines (cultural equivalence and conceptual equivalence), it was decided that these same four equivalences would be used in this project.

Each of these equivalences measures a different level of relevance between the translation and the original language. Semantic equivalence refers to the equal meaning being maintained between the source and the target language (Herdman et al., 1997). Idioms are phrases or sayings used to express an idea that is not portrayed by the literal meaning of these words. These sayings cannot be typically translated in a literal manner, therefore idiomatic equivalence requires that equivalent expressions have to be found or items have to be substituted to express the same ideas in the target language (Herdman et al., 1997). Conceptual equivalence means that the adapted tool is similar in meaning and reflects the same concepts as the original tool (Herdman et al., 1997). Because cultures may have different ways of thinking, or some items in a tool may not be relevant to another culture, cultural equivalence ensures that every item in the translated tool is culturally relevant in the target population. In some cases, items may need to be changed to portray the same concepts in a different manner that is culturally relevant.

For this project, the goal was to meet all four equivalences in each of the 10 items for both tools. Doing so would ensure that the tool is equally relevant in every aspect for the target population.

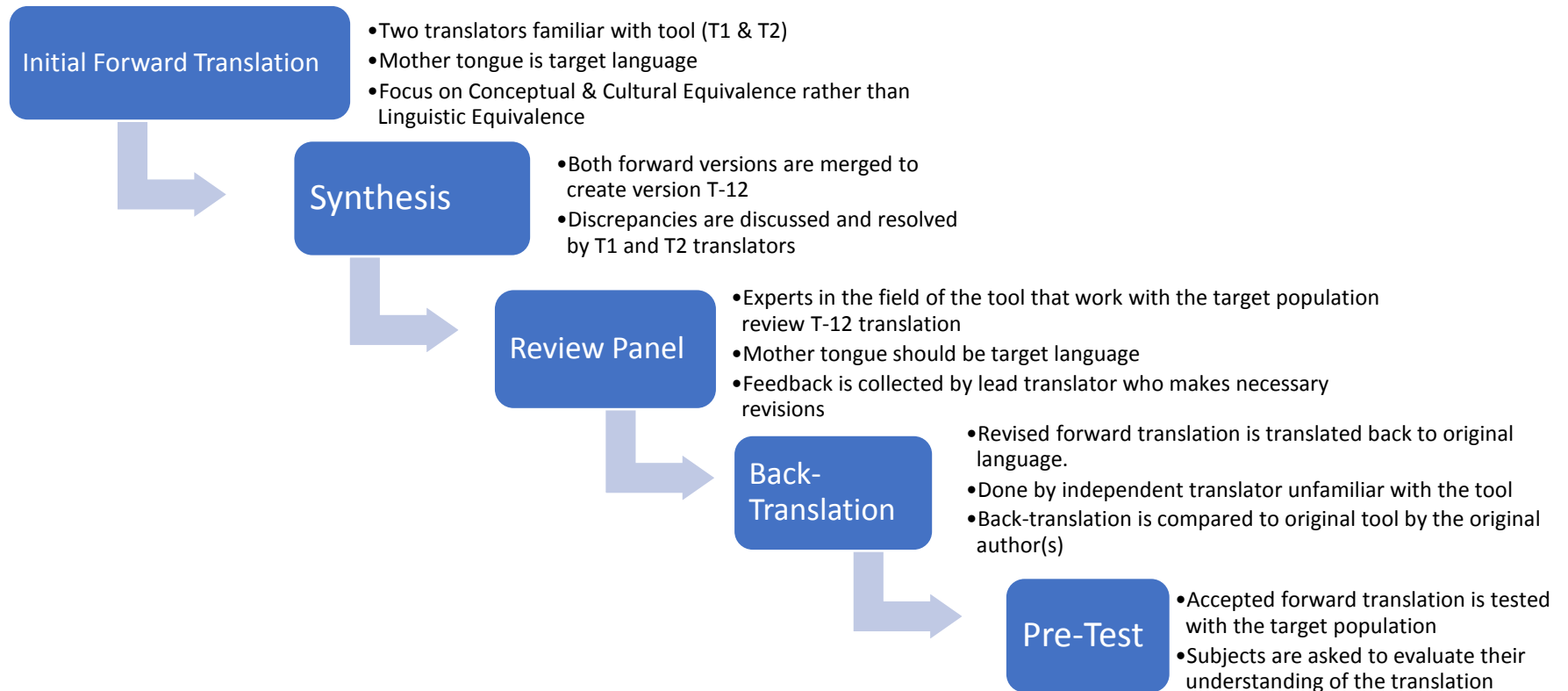
## **2.2 METHODS**

### **2.2.1 IRB Approval**

Before this project was conducted, the Human Research Protection Office (HRPO) of the University of Pittsburgh was contacted to determine if approval from the Institutional Review Board (IRB) was required for this project. Because there was no identifiable personal information being collected, it was determined that it was not necessary to file for an IRB waiver or a review.

### **2.2.2 Cross Cultural Adaptation Process**

As stated above, the selected method for this CCA is a combination of guidelines established by the WHO and the AAOS. The process consists of an initial forward translation derived from a synthesis of two independent translations, a review of the forward translation conducted by an expert panel, a back-translation, comparison of the back-translation with the original tool, and finally a pre-test of the forward translation with the target population. Figure 2 below shows the process chart for the methodology followed in this project.



**Figure 2. FMA & FMA-FC to Latin American Spanish Cross-Cultural Adaptation Process**



### **2.2.3 Initial Forward Translation**

The first step of the translation process is to conduct a forward translation of the tools into the target language. According to WHO guidelines, only one translator, preferably a health professional that is familiar with terminology in the area of the instrument and with interview skills should be in charge of the forward translation. It is important that the mother tongue of the translator is that of the target language and that the translation is focused on conceptual and cultural equivalence rather than linguistic equivalence (WHO). Many other guidelines, however, such as those proposed by the AAOS, recommend that the forward translation is conducted by two or more translators independently (Beaton et al., 2000). For these CCAs, it was decided that having two translators from multiple Spanish-speaking regions in Latin America conduct the forward translations would be a good way to eliminate some bias from the translation process.

In this CCA, two translators from different backgrounds conducted the initial forward translations. One of them, the lead translator in this project, is a Graduate Student in the field of Rehabilitation Technology. His mother tongue is Spanish from the northeastern region of Mexico and is fluent in English. Having applied both tools in the clinical setting many times, this translator was extremely familiar with both the FMA and the FMA-FC. The initial forward translations conducted by this translator were labeled “T-1.”

A second forward translation “T-2” was conducted by another Graduate Student in the field of Rehabilitation Technology. Her mother tongue is Spanish from the central region of Colombia and is also fluent in English. Similar to the lead translator, she was also very familiar with both tools and had in-field experience applying them.

#### **2.2.4 Synthesis**

While the WHO guidelines do not require a synthesis of the two initial forward translations, the AAOS guidelines do. In this step, the two forward translations (T1 & T2) are merged to produce one common translation labeled “T-12” (Beaton et al., 2000). The decision to include a synthesis step in these CCAs goes hand-in-hand with the decision to have two translators conduct the forward translations.

In this step, both translators who participated in the forward translations got together with the original tools in hand as well as with their translated versions, and decided on the simplest, most neutral language to use on versions T-12 of the tools. This step required a great amount of discussion and detailed comparisons of all versions of the tools. With few changes in wording, explained below, both T-12 versions of the FMA and FMA-FC were completed in a more universal Latin American Spanish that would be understood in wider populations than the initial forward translations.

#### **2.2.5 Review Panel**

Because there was still some bias towards Mexican and Colombian variations of Spanish in the T-12 versions of the tools, it was decided that the review panel would be implemented before the back-translation process, as suggested by the WHO guidelines. This panel was to be comprised of experts in the field of seating and mobility with experience working with the target population of this project. Additionally, the panel members were to be multinational or multiregional bilingual (Spanish and English) from across North and South America, ensuring that the translations are

appropriate for examinees regardless of their nation or region of origin (Epstein et al., 2015, Bracken and Barona, 1991).

For this step, an email request to participate in the review panels was sent out to the network of therapists, clinicians, and professionals in the seating and mobility field, who met the inclusion criteria to participate in the panel and had been in contact with the University of Pittsburgh willing to participate in studies. For the FMA review panel, there were 9 people who agreed to participate from the following countries: Argentina (n=2), Colombia (n=1), Ecuador (n=1), Guatemala (n=1), Mexico (n=3), and Peru (n=1). Members included Rehabilitation Engineers, Physical Therapists, and Occupational Therapists. For the FMA-FC review panel, there were 9 people who agreed to participate from the following countries: Argentina (n=2), Colombia (n=1), Costa Rica (n=1), Ecuador (n=1), Guatemala (n=1), Mexico (n=2), and Peru (n=1). These members were also Rehabilitation Engineers, Physical Therapists, and Occupational Therapists.

Due to difficulties in meeting in person with the review panel, two surveys (one for the FMA and one for the FMA-FC) were created on the online Qualtrics Insight Platform, the University of Pittsburgh's service for conducting polls, surveys, and related projects. The surveys consisted of each item of the T-12 versions of the tools being broken down and set side by side with the equivalent items of the original tools. The panelists were asked to rate the translations for Semantic Equivalence, Idiomatic Equivalence, Cultural Equivalence, and Conceptual Equivalence on a 4-point Likert Scale (Not Equivalent, Somewhat Equivalent, Quite Equivalent, and Highly Equivalent). If any of the panelists selected "Not Equivalent" for an item, a text box appeared where they were asked to provide a suggestion for the translation.

With the feedback collected from all panelists, the lead translator for this project was in charge of going back to the T-12 versions of the tools and make the necessary changes to have a more inclusive version of the tools that would be appropriate for the target population.

### **2.2.6 Back-translation**

Back-translation consists of bringing a forward translation version of the tool back into the original tool's language, so the author of the original tool can review the translation for any discrepancies. Doing so is a type of validity check for a consistency in the translations which highlight gross inconsistencies or conceptual errors in the forward versions (Beaton et al., 2000). Even though many guidelines do not require this step, both the WHO guidelines and the AAOS guidelines recommend it, therefore it was implemented in this project. It is considered important because it is a useful communication tool with the author of the original questionnaire and allows researchers to have some control over the final version of the translated instrument by comparing both versions (translated and original tools) and make an inference about the quality of the translation (Epstein et al., 2014, Sperber, Devellis, & Boehlecke, 1994, Weeks, Swerissen, & Belfrage, 2007).

During a back-translation, an independent translator, with no knowledge of the questionnaire and whose mother tongue is that of the original tool, is tasked to translate the forward translation back to the original tool's language (WHO). Just as in the initial forward translation, the WHO recommends that this translation should focus on conceptual and cultural equivalence, not linguistic equivalence.

For this CCA, a licensed translator who grew up speaking both English and Spanish (Mexico) simultaneously was in charge of the back-translation. Her expertise was not in the healthcare field, rather in the legal field, ensuring she was not familiar with the FMA or the FMA-

FC questionnaires. The independent translator was given the translated versions of the FMA and the FMA-FC with revisions made from the feedback received by the review panels. She was instructed to translate them back to English focusing on conceptual and cultural equivalence and given a month to do so.

### **2.2.7 Original Author Approval**

A comparison of the back-translated versions of the tools and the original versions of the tools was then made by the editor-in-chief (one of the main tool developers) of both the FMA and the FMA-FC questionnaires. The editor-in-chief was instructed to focus on semantic equivalence, idiomatic equivalence, conceptual equivalence, and cultural equivalence for each item and identify any discrepancies between both versions. Any suggestions by the editor-in-chief were to be implemented and, if necessary, additional iterations of the forward translation, review panel, and back-translation process were to be conducted until the editor-in-chief approved of the back-translated versions of the tools.

### **2.2.8 Pre-Test**

With approval of the back-translations from the editor-in-chief of the original tools, both translated versions were ready to move to the pre-testing phase. This step is essential because translators cannot anticipate all problems encountered by examinees that take a test in another language (Epstein et al., 2014; Hambleton & Patsula, 1999). It allows researchers to determine whether the target population understands the questions, concepts, and tasks the tool requires in its intended way and in a consistent manner (Epstein et al., 2014).

According to the WHO guidelines, it is necessary to pre-test the instrument with at least 10 males and females of all age groups representative of those who will be administered the questionnaire. Respondents should be applied the questionnaire and asked what they thought the question was asking, whether they could repeat the question in their own words, what came to mind when they heard a particular phrase or term, if there were any words or phrases they could not understand or found unacceptable or offensive, and to explain how they chose their answer (WHO). These interviews should be conducted by an experienced interviewer, preferably with experience on the subject (WHO). The number of pre-test subjects required varies across different guidelines. During the FMA adaptation to Portuguese (following the AAOS guidelines), there were a total of 26 participants recruited for this step (Paulisso et al., 2015).

Because it would be difficult for the lead researchers in this project to recruit study participants throughout Latin America, an email was sent to the review panel members who had agreed to participate in the pre-test phase asking to do so. Since most of the members of the review panel were clinicians and therapists who would be administering the finalized tools in the field, they were asked to recruit sample clients and administer the pre-test questionnaires. These questionnaires were created using the Qualtrics Insight Platform, with the Spanish version items being asked first and the pre-test questions right after each item. Panel members were instructed to find 2-3 subjects each, representative of the target population to whom they would be administering the finalized tools.

With the responses collected, the lead translator compared the answers to the pre-test questions to the respondent's actual responses to the instrument for verification of consistency. It allowed researchers to establish whether respondents understood the question concepts and tasks, in a consistent way, and how the researchers intended (Epstein et al., 2014).

## 2.3 RESULTS

### 2.3.1 Forward Translation

During the forward translation process, every sentence of the FMA and FMA-FC original tools was analyzed by two separate translators who were fluent in English but whose mother tongue was Spanish and were familiar with the original tools. Following CCA guidelines, every statement was translated in the simplest possible form that could maintain semantic, idiomatic, cultural, and conceptual equivalence. There were a total of 44 statements and terms translated for the FMA and 41 statements and terms translated for the FMA-FC, including the Likert scale terms and equipment terms.

Tables 2 and 3 below highlight similarities and differences of the translations of important terms and phrases between the T1 and T2 versions alongside their respective terms in the original versions of the tools.

**Table 2. FMA T1 and T2 Translation Comparisons**

<b>Original FMA Version</b>	<b>FMA-Spanish T1</b>	<b>FMA-Spanish T2</b>
<b>Completely Agree</b>	Completamente de acuerdo	Completamente de acuerdo
<b>Mostly Agree</b>	En la mayor parte de acuerdo	Ligeramente de acuerdo
<b>Somewhat Agree</b>	Un poco de acuerdo	De acuerdo
<b>Somewhat Disagree</b>	Un poco en desacuerdo	En desacuerdo

**Table 2 (continued)**

<b>Mostly Disagree</b>	En la mayor parte en desacuerdo	Ligeramente en desacuerdo
<b>Completely Disagree</b>	Completamente en desacuerdo	Completamente en desacuerdo
<b>Does Not Apply</b>	No Aplica	No aplica
<b>Walking</b>	Caminando	Caminar
<b>Walker</b>	Andador/Caminador	Caminador
<b>Cane</b>	Bastón	Bastón
<b>Crutch</b>	Muleta	Muleta
<b>Manual Wheelchair</b>	Silla de Ruedas Manual	Silla de Ruedas Manual
<b>Power Wheelchair</b>	Silla de Ruedas Eléctrica	Silla de Ruedas Motorizada
<b>Scooter</b>	Scooter	Scooter
<b>Prosthetic</b>	Prótesis	Prótesis
<b>Orthotic</b>	Ortesis	Ortesis
<b>Means of Mobility</b>	Medio de Movilidad	Dispositivo de Movilidad
<b>Carry out my daily routine</b>	Realizar mi rutina diaria	Llevar a cabo mi rutina diaria
<b>Comfort needs</b>	Necesidades de comodidad	Necesidades de comodidad
<b>Health needs</b>	Necesidades de salud	Necesidades de salud
<b>To operate it</b>	Permite operarlo	Permite funcionar
<b>Reach and carry out tasks at different surface heights</b>	Alcanzar y realizar tareas a diferentes alturas de superficie	Alcanzar y realizar tareas en superficies de diferentes alturas
<b>To transfer</b>	Transferirme	Hacer transferencias
<b>Carry out personal care tasks</b>	Realizar tareas de cuidado personal	Realizar actividades de cuidado personal
<b>Get around indoors</b>	Navegar en el interior	Moverme en interiores
<b>Get around outdoors</b>	Navegar en el exterior	Moverme en exteriores
<b>Use personal or public transportation</b>	Utilizar transporte personal o público	Utilizar transporte público o privado



**Table 3. FMA-FC T1 and T2 Translation Comparisons**

<b>Original FMA-FC Version</b>	<b>FMA-FC Spanish T1</b>	<b>FMA-FC Spanish T2</b>
<b>Completely Agree</b>	Completamente de acuerdo	Completamente de acuerdo
<b>Mostly Agree</b>	En la mayor parte de acuerdo	Ligeramente de acuerdo
<b>Somewhat Agree</b>	Un poco de acuerdo	De acuerdo
<b>Somewhat Disagree</b>	Un poco en desacuerdo	En desacuerdo
<b>Mostly Disagree</b>	En la mayor parte en desacuerdo	Ligeramente en desacuerdo
<b>Completely Disagree</b>	Completamente en desacuerdo	Completamente en desacuerdo
<b>Does Not Apply</b>	No Aplica	No aplica
<b>Crawling</b>	Arrastrarse	Gateo
<b>Walking</b>	Caminando	Caminar
<b>Walker</b>	Andador/Caminador	Caminador
<b>Cane</b>	Bastón	Bastón
<b>Stroller</b>	Paseante	Coche
<b>Manual Wheelchair</b>	Silla de Ruedas Manual	Silla de Ruedas Manual
<b>Power Wheelchair</b>	Silla de Ruedas Eléctrica	Silla de Ruedas Motorizada
<b>Scooter</b>	Scooter	Scooter
<b>Means of Mobility</b>	Medio de Movilidad	Medios de Movilidad
<b>To participate in our daily routines</b>	Permite participar en la rutina diaria de nuestra familia	Permitan que nuestra familia participe en nuestras rutinas diarias
<b>Comfort needs</b>	Necesidades de comodidad	Necesidades de comodidad
<b>Postural support needs</b>	Necesidades de soporte postural	Necesidades posturales
<b>For managing daily supplies</b>	Control de suministros diarios	Manejar sus suministros diarios

**Table 3 (continued)**

<b>Access and completion of tasks at different surface heights</b>	Que acese y realice tareas a diferentes alturas de superficies	Alcanzar y realizar tareas en superficies de diferentes alturas
<b>Ease of transfers with or without help</b>	Una fácil transferencia con o sin ayuda	Hacer transferencias de una superficie a otra
<b>Completion of personal care tasks</b>	La fácil realización de tareas de cuidado personal	Realizar actividades de cuidado personal
<b>Movement freely and easily around our environment indoors and outdoors</b>	Libre y fácil movimiento alrededor de nuestro ambiente interior y exterior	Moverse libre y fácilmente en interiores y exteriores
<b>Independence from family/caregiver for desired activities</b>	Independencia de la familia/ayudante para actividades deseadas	Ser independiente de la familia o cuidador en actividades deseadas
<b>Use of school, personal or public transportation</b>	Uso de transporte escolar, personal o público	Utilizar el transporte del colegio, público, o personal

Some significant discrepancies were observed in both the FMA and the FMA-FC initial forward translations. For the phrase “Mostly Agree,” one translator used the translation “En la mayor parte de acuerdo” versus “Ligeramente de acuerdo” used by the second translator. This was the same case with the phrase “Mostly Disagree.” Another significant difference was the word “Crawling” in the FMA-FC tool, where one translator used “Arrastrarse” while the other used “Gateo.” Other discrepancies varied in word choice and sentence structure, some more significant than others.

It is clear that there are major differences in the variations of Spanish throughout Latin America. Many words have multiple meanings, many things have multiple names, many actions have multiple verbs. Conducting two separate translations in the initial forward translation was a

helpful way to identify discrepancies in terms that would have to be addressed throughout the CCA process.

### 2.3.2 Synthesis

In order to create a single Spanish version of the FMA and FMA-FC tools, both forward translators got together to compare their versions and decide on the most practical translations that would apply to the largest population as possible. Every difference was analyzed, researched, discussed, and solved, with the lead translator having the final say in the translation.

Tables 4 and 5 show the final phrases and terms used in the initial forward translated Spanish versions of the FMA and FMA-FC after the synthesis phase.

**Table 4. FMA Spanish T12 Version**

<b>Original FMA Version</b>	<b>FMA-Spanish T12</b>
<b>Completely Agree</b>	Completamente de acuerdo
<b>Mostly Agree</b>	Algo de acuerdo
<b>Somewhat Agree</b>	Un poco de acuerdo
<b>Somewhat Disagree</b>	Un poco en desacuerdo
<b>Mostly Disagree</b>	Algo en desacuerdo
<b>Completely Disagree</b>	Completamente en desacuerdo
<b>Does Not Apply</b>	No Aplica
<b>Walking</b>	Caminando
<b>Walker</b>	Andador/Caminador
<b>Cane</b>	Bastón
<b>Crutch</b>	Muleta
<b>Manual Wheelchair</b>	Silla de Ruedas Manual
<b>Power Wheelchair</b>	Silla de Ruedas Motorizada

**Table 4 (continued)**

<b>Scooter</b>	Scooter
<b>Prosthetic</b>	Prótesis
<b>Orthotic</b>	Ortesis
<b>Means of Mobility</b>	Medio de Movilidad
<b>Carry out my daily routine</b>	Llevar a cabo mi rutina diaria
<b>Comfort needs</b>	Necesidades de comodidad
<b>Health needs</b>	Necesidades de salud
<b>To operate it</b>	Permite operarlo
<b>Reach and carry out tasks at different surface heights</b>	Alcanzar y realizar tareas en superficies de diferentes alturas
<b>To transfer</b>	Realizar transferencias
<b>Carry out personal care tasks</b>	Realizar tareas de cuidado personal
<b>Get around indoors</b>	Moverme en interiores
<b>Get around outdoors</b>	Moverme en exteriores
<b>Use personal or public transportation</b>	Utilizar transporte personal o público

**Table 5. FMA-FC Spanish T12 Version**

<b>Original FMA-FC Version</b>	<b>FMA-FC Spanish T12</b>
<b>Completely Agree</b>	Completamente de acuerdo
<b>Mostly Agree</b>	Algo de acuerdo
<b>Somewhat Agree</b>	Un poco de acuerdo
<b>Somewhat Disagree</b>	Un poco en desacuerdo
<b>Mostly Disagree</b>	Algo en desacuerdo
<b>Completely Disagree</b>	Completamente en desacuerdo
<b>Does Not Apply</b>	No Aplica
<b>Crawling</b>	Arrastrarse
<b>Walking</b>	Caminando

**Table 5 (continued)**

<b>Walker</b>	Andador/Caminador
<b>Cane</b>	Bastón
<b>Stroller</b>	Carreola/Cochecito
<b>Manual Wheelchair</b>	Silla de Ruedas Manual
<b>Power Wheelchair</b>	Silla de Ruedas Motorizada
<b> Scooter</b>	Scooter
<b>Means of Mobility</b>	Medios de Movilidad
<b>To participate in our daily routines</b>	Permite participar en la rutina diaria de nuestra familia
<b>Comfort needs</b>	Necesidades de comodidad
<b>Postural support needs</b>	Necesidades de soporte postural
<b>For managing daily supplies</b>	Control de suministros diarios
<b>Access and completion of tasks at different surface heights</b>	Alcanzar y realizar tareas en superficies de diferentes alturas
<b>Ease of transfers with or without help</b>	Realizar transferencias con o sin ayuda
<b>Completion of personal care tasks</b>	Realizar tareas de cuidado personal fácilmente
<b>Movement freely and easily around our environment indoors and outdoors</b>	Moverse libremente y fácilmente alrededor de nuestro ambiente interior y exterior
<b>Independence from family/caregiver for desired activities</b>	Independiente de la familia y/o cuidador en actividades deseadas
<b>Use of school, personal or public transportation</b>	Uso de transporte escolar, personal o público

Finding the most neutral and basic terminology while maintaining the four types of equivalence being used for this CCA was the primary goal of the synthesis portion of this

adaptation process. Because the two translators were from very different areas of Latin America and had different career backgrounds, it was expected to find differences in their translations. For the most part, however, they both understood the terminology being used in the other translators' forward versions. This demonstrates that while the Spanish language varies regionally, it typically maintains the same common language base throughout; meaning, it is likely that the majority of the target population would understand what the tools were saying even though the terminology would not be their initial choice of words.

### **2.3.3 Review Panel**

Using the Qualtrics Insight Platform, a survey was created for each of the tools for the review panels to provide their translation feedback. These surveys contained the T12 versions of the tools broken down by items and/or terms and provided the text in both the original and the target languages. Panelists were asked to rate the translations in a 4-point Likert scale (highly equivalent, quite equivalent, somewhat equivalent, or not equivalent) for semantic, idiomatic, conceptual, and cultural equivalences. If for any of the equivalences, a panelist selected "not equivalent," a text box appeared which prompted the panelist to explain their answer and provide an alternate translation. Panel members were volunteers who had been contacted by the lead researcher through the University of Pittsburgh peer network.

#### **2.3.3.1 FMA Review Panel Feedback**

Demographics from the FMA expert review panel are as follows. There was a total of 9 experts included in the panel from Argentina (2), Ecuador, Guatemala, Mexico (3), Colombia, and Peru. An effort was made to recruit experts from Puerto Rico who had agreed to participate, so as to

receive feedback from the Caribbean, however this was during the time of the 2017 Hurricane Maria and contact was lost with the experts before sending out the survey.



**Figure 3. Review Panel Map**

Panel members practiced as Physical Therapists (2), Occupational Therapist, Rehabilitation or Biomedical Engineers (3), Kinesiologist, Physical and Occupational Therapist, and one was a Philosophy and Social Sciences major. All panelists were fluent in Spanish; most, if not all, were bilingual in English and Spanish. Out of the 9 panelists, 7 considered themselves adult seating and mobility experts, while 2 responded that they did not consider themselves seating and mobility experts.

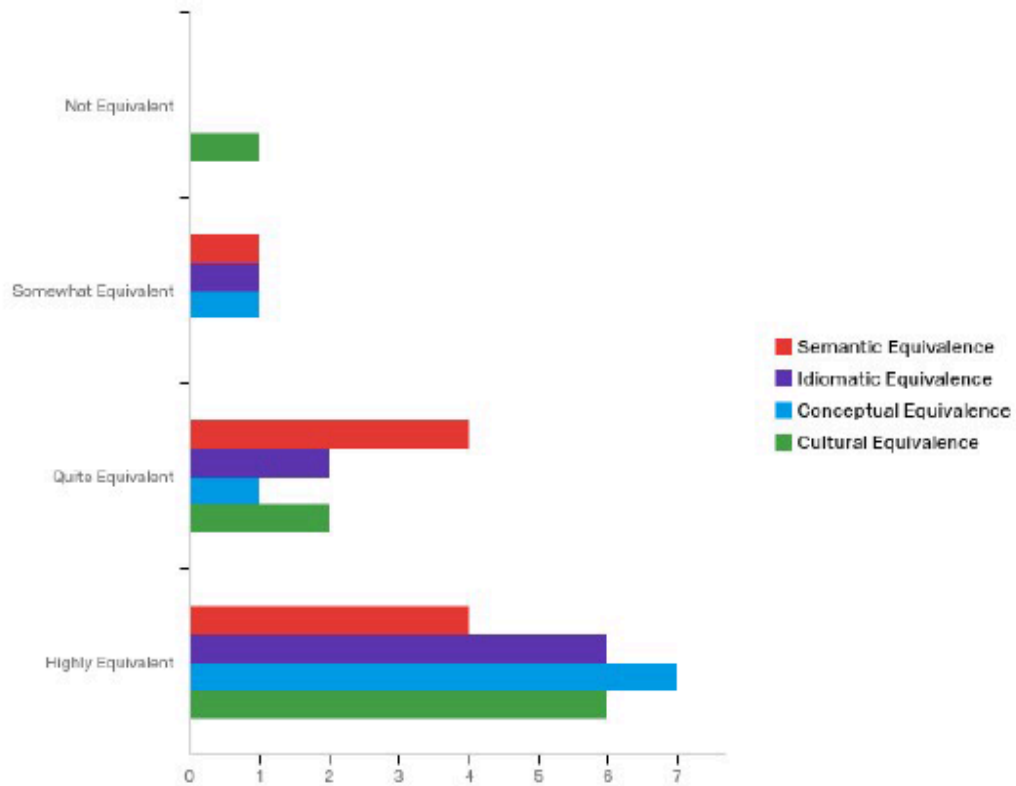
From the FMA survey conducted on Qualtrics, there were only two items along with a section of the instructions that received translation suggestions. Eight out of the ten items received positive feedback (no “not equivalent” for any type of equivalence) as seen in Table 6.

**Table 6. FMA Review Panel Results**

Functional Mobility Assessment	Daily Routine
	Comfort Needs
	Health Needs
	Operate Means of Mobility
	Reaching Tasks at Different Surface Heights
	Transfers
	Personal Care Tasks
	Getting Around Indoors
	Getting Around Outdoors
	Transportation

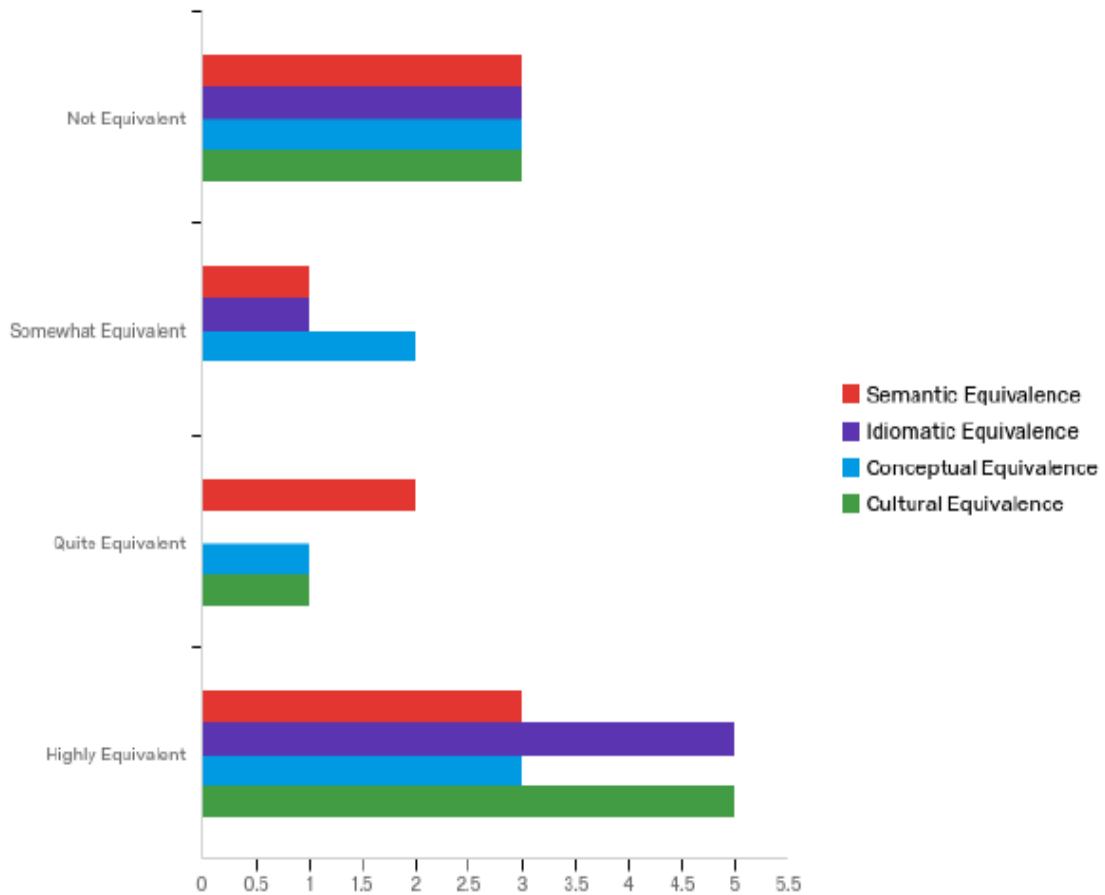
It was observed that the greatest translation suggestions came from the instructions part of the tools. In the initial sentence of the FMA instructions, the phrase “placing an ‘X’ in the box under the response that best matches your ability to function while using your current means of mobility” was originally translated to “colocando una ‘X’ debajo de la respuesta correspondiente a su capacidad de funcionar al usar su actual medio de movilidad.” Some suggestions for this translation were to change it to “que más se acerque a su habilidad de utilizar términos actuales relativos a movilidad” or “que mejor corresponda a su habilidad funcional mientras usa su medio actual de movilidad;” as well as using “en el cuadro debajo” instead of “debajo de la respuesta.”





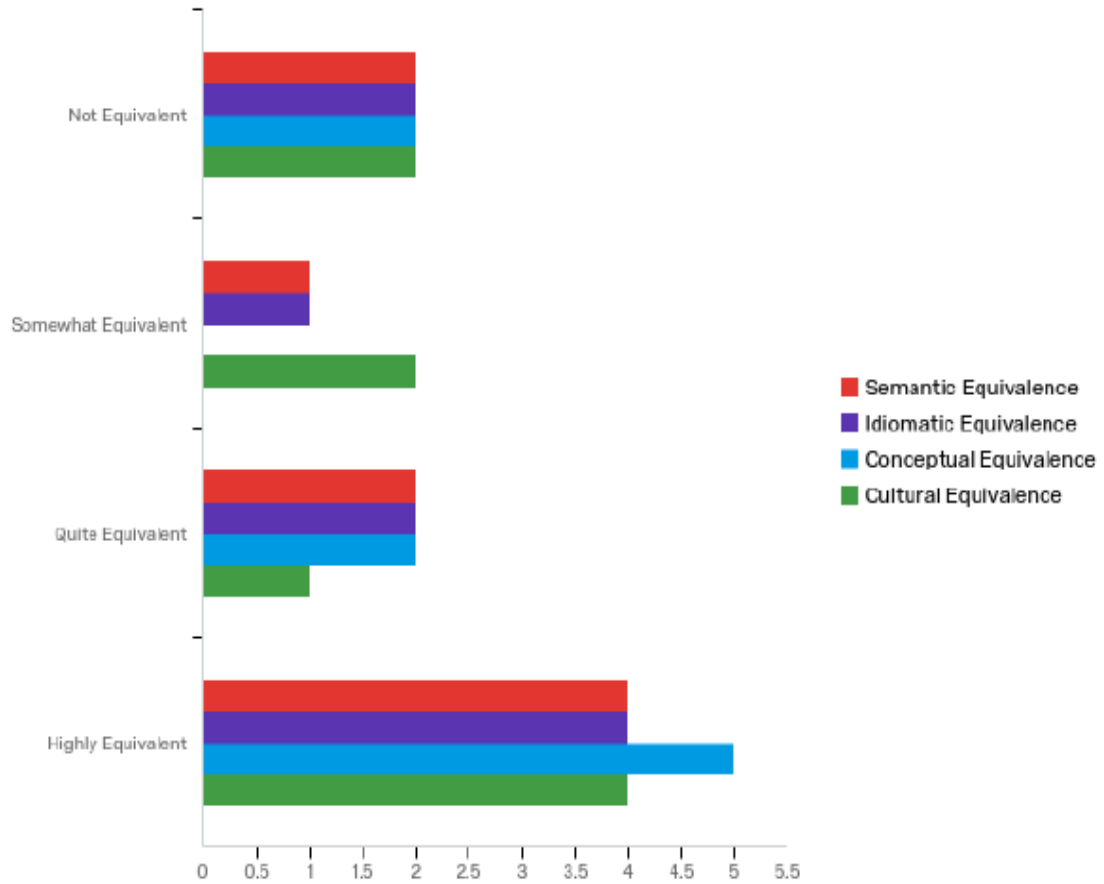
**Figure 4. "Means of Mobility" Translation Equivalence**

As seen in the figure above, there was one person who considered the translation “¿Cuál es su actual medio de movilidad?” for “What is your current means of mobility” to not be culturally equivalent. The suggestion for that translation was to change it to “¿Cuál es su dispositivo de movilidad en la actualidad?” However, because there was such a high equivalence from the rest of the panelists, it was decided that the translation stayed the same for this specific phrase.



**Figure 5. FMA Statement 3 Equivalence Results**

Figure 5 above shows the results from Statement 3 of the FMA: My current means of mobility meets my health needs: (e.g., heat/moisture, sitting tolerance, pain, stability). This statement had been initially translated to: Mi actual medio de movilidad satisface mis necesidades de salud: (ej., Comodidad del encaje, respiración, control de volumen, equipo médico, lesiones por presión). It was suggested that “lesiones por presión” be changed to “ulceras por presión” and “control de volumen” be changed to “control de inflamación,” both of which were accepted by the lead translator.



**Figure 6. FMA Statement 4 Equivalence Results**

Along with statement 3, the only other statement from the FMA that had “not equivalent” responses was statement 4, which focuses on the operation of the means of mobility. Initially translated as: *Mi actual medio de movilidad me permite operarlo de la manera más independiente, segura y eficiente posible (ej., realizar lo que quiero, donde y cuando quiero)*, it was suggested that “operarlo” would be changed to “funcionar” or “moverme.” After considering the suggestions, the lead translator decided to change the word to “operar” instead, believing it would keep the intended meaning in the simplest, most neutral terminology.

### 2.3.3.2 FMA-FC Review Panel Feedback

Demographics for the FMA-FC review panel were similar to those of the FMA, with 9 Spanish-speaking people from Costa Rica, Guatemala, Mexico (2), Argentina (2), Colombia, Ecuador and Peru. There were Physical Therapists (2), an Occupational Therapist, Rehabilitation and Biomedical Engineers (3), a Kinesiologist, an executive director, and one Physical and Occupational Therapist. When asked if they considered themselves pediatric seating and mobility specialists, 6 answered “yes” and 3 answered “no.”

Similarly to the FMA, the feedback received from the FMA-FC was very positive, with eight out of ten items not receiving any “not equivalent” responses. Only two items within the Family Centered version received suggestions; these items are highlighted in Table 7 below.

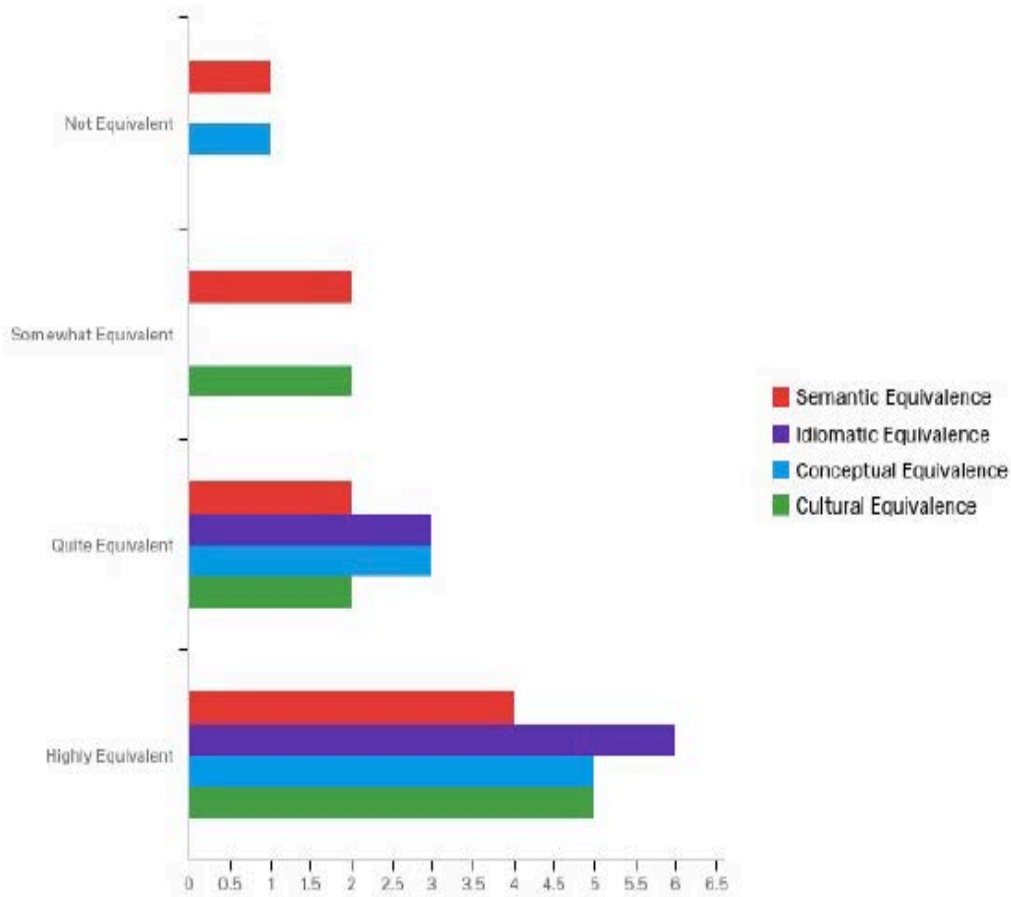
**Table 7. FMA-FC Review Panel Results**

Functional Mobility Assessment – Family Centered	Daily Routine
	Comfort Needs
	Health Needs
	Daily Supply Management
	Reaching Tasks at Different Surface Heights
	Transfers
	Personal Care Tasks
	Getting Around Indoors and Outdoors
	Independence from Family/Caregiver for Social Activities
	Transportation

The first major suggestion noticed from the FMA-FC feedback was to change the translation for “Crawling” from “Arrastrarse” to “Gateando.” From the 9 panelists, 5 suggested this change, therefore the lead translator accepted the feedback and made the correction.

A minor modification to the translation was made in the first statement of the FMA-FC which reads: My child’s current means of mobility allows our family to participate in our daily

routines as independently, safely and as easily as possible: (e.g., tasks we want to do, need to do, are required to do – when and where needed). The translation read “El actual medio de movilidad de mi hijo(a) lo(a) permite participar en la rutina diaria de nuestra familia...” meaning “my child’s current means of mobility allows him or her to participate in our family’s daily routine...”; the correction “El actual medio de movilidad de mi hijo(a) permite participar en la rutina diaria de nuestra familia...” to more accurately reflect the meaning of the original statement. Feedback results from this statement can be seen below in Figure 7.

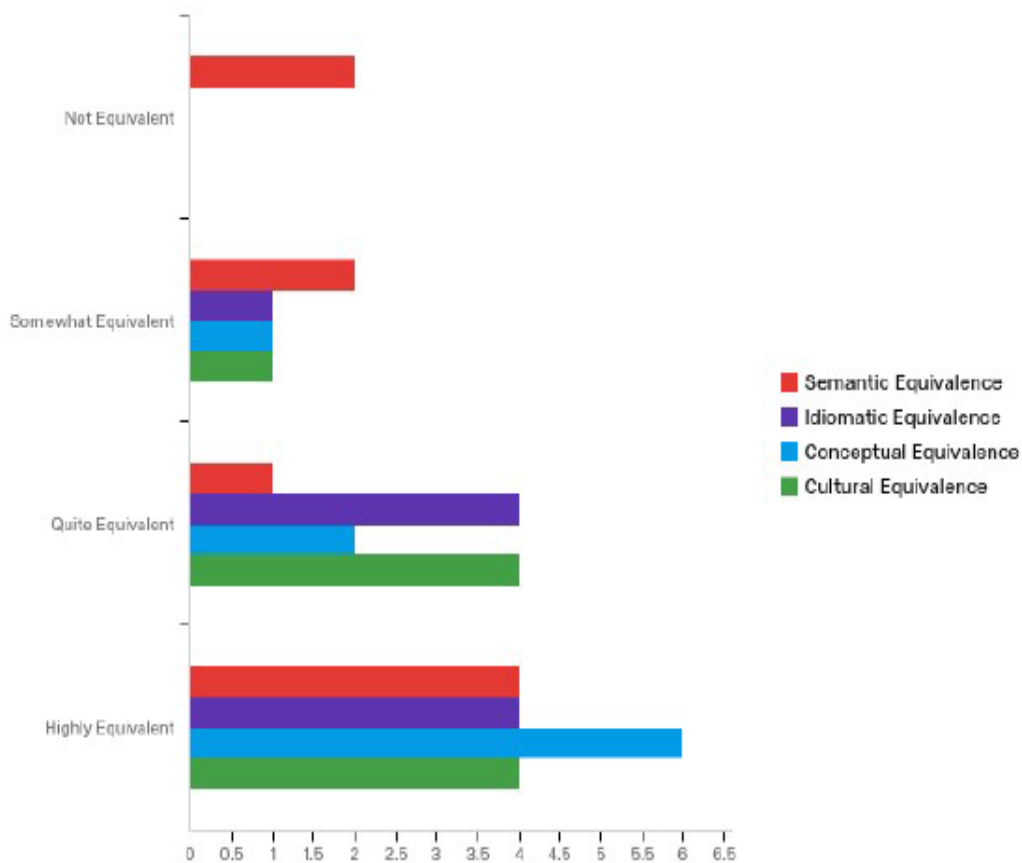


**Figure 7. FMA-FC Statement 1 Equivalence Results**

There was one panelist who thought statement 4 of the FMA-FC was not semantically or culturally equivalent to the original version. This statement talks about the child's ability to manage his or her daily supplies such as communication devices, switches, ventilator, oxygen, suction, catheter tubing, computer, braces, phone, lunch, etc. It was suggested that the translation "control de suministros diarios" was changed to "manejo de dispositivos de uso diario," however, the lead translator believed this change would complicate the terminology and because only one panelist suggested a change, the translation was left unmodified.

For both statements 5 and 6 of the FMA-FC, the original translation was lacking the pronoun "le," as pointed out by the panelists. There were other suggestions made to these statements, such as changing "permite alcanzar y realizar tareas en superficies de diferentes alturas..." to "le permite realizar tareas y alcances a diferentes alturas" in statement 5, however, the lead translator believed the addition of the identified pronoun was sufficient to maintain equivalence in the simplest terminology.

Figure 8 below shows the equivalence results from statement 7 of the FMA-FC translation. When the survey was created, it appears that the lead translator excluded the word "permite" or "allows" from the item. Fortunately, the panelists pointed this out and the lead researcher was able to make the necessary corrections.



**Figure 8. FMA-FC Statement 7 Equivalence Results**

The final significant changes to the Spanish versions of both tools was the phrasing of the Likert scale. Feedback received for all 6 phrases (completely agree, mostly agree, slightly agree, slightly disagree, mostly disagree, and completely disagree) was varied throughout both surveys. The only phrases that did have “not equivalent” responses in all 4 equivalence categories were “mostly agree” and “mostly disagree” which were translated as “Algo de acuerdo” and “Algo en desacuerdo.” After reading the panelists feedback, the lead translator decided to change these to “Mayormente de acuerdo” and “Mayormente en desacuerdo” respectively.

### 2.3.4 Back-Translation

With the first iteration of the forward translations for both tools finalized, it was important to confirm these versions with the authors of the original FMA and FMA-FC and ensure there were no significant discrepancies between the original versions and the translated versions of the tools. Because the original authors of both tools are not Spanish speakers, the only way to achieve this was to bring the translated versions back to English in a back-translation.

In this step, an independent translator with no knowledge of the subject at hand was recruited to translate both forward translations from Spanish to English. As per the WHO guidelines, the translator's mother tongue should be, in this case, Spanish, and the translation should focus on cultural and conceptual equivalence instead of linguistic equivalence. A certified translator who met all of the above inclusion criteria was found and volunteered to conduct this phase of the study.

Comparing the back-translation to the original versions yielded minimal differences, mostly in word choice that did not affect the meaning of the statements in the tools. Tables 6 and 7 below compare both versions of the FMA and FMA-FC respectively.

**Table 8. FMA Original vs. Back-Translation Comparison**

<b>FMA Original Tool</b>	<b>FMA Back-Translated Version</b>
Answer	Respond
Mostly Agree / Mostly Disagree	Agree / Disagree
Slightly Agree / Slightly Disagree	Somewhat Agree / Somewhat Disagree
Power Wheelchair	Electric Wheelchair
Prosthetic / Orthotic	Prosthesis / Orthotics
Means of mobility	Aid of mobility



**Table 8 (continued)**

Reach and carry out tasks at different surface heights	Reach and complete tasks at different surface heights
To transfer from one surface to another	To move from one surface to another
Carry out personal care tasks	To meet my personal needs
Get around indoors	To move indoors/interiors
Get around outdoors	To move outside
To use personal or public transportation	To utilize personal or public transport

After reviewing the FMA original and back-translation with the editor-in-chief of the FMA, the lead translator and the original author decided there was no significant equivalent differences between both versions. Therefore, no modifications were necessary to the Spanish translated version of the FMA tool, which was now ready for the Pre-Test.

**Table 9. FMA-FC Original vs. Back-Translation Comparison**

<b>FMA-FC Original Tool</b>	<b>FMA-FC Back-Translated Version</b>
Mostly Agree / Mostly Disagree	Agree / Disagree
Slightly Agree / Slightly Disagree	Somewhat Agree / Somewhat Disagree
Power Wheelchair	Electric Wheelchair
Means of mobility	Aid of mobility
Toilet	Bathroom
Indoors and outdoors	Interior and exterior environment

Similar to the FMA, the FMA-FC comparisons made by the original author and the lead translator found no significant equivalent differences between the back-translation and the original tool. No modifications were made to the Spanish translated version of the FMA-FC tool, meaning it was also ready for the Pre-Test.

### 2.3.5 Pre-Test

Following the WHO and AAOS guidelines, a pre-test was necessary to trial the translated versions approved by the review panel, original author of the tools, and the lead translator with the intended population. For this phase, all members of the review panel were contacted and asked to participate by recruiting volunteers, representative of the target population, to whom they would administer a questionnaire. The questionnaire was built on the Qualtrics Insight Platform containing the translated tools, debriefing questions, and basic demographics. Because there was no identifiable information being collected, and the subjects were not being administered any interventions, the IRB informed the lead researcher that it was not necessary to apply for IRB approval.

The questionnaire started by asking demographic questions such as:

- What country are you from?
- What is your native language?
- What is your primary diagnosis?
- How long have you been using Mobility Assistive Equipment?

Following these basic questions, every item of the FMA and FMA-FC was administered to the volunteers. After each item, a debriefing with the following questions, which were established by the WHO in their set of CCA guidelines, was asked:

- What does this question ask?
- Please state the question in your own terms.
- How did you select your answer?

- Was there any word or phrase you did not understand or found unacceptable or offensive?

Following the WHO guidelines, the goal of this pre-test was to test each tool with 10 volunteers from the subject populations. With this in mind, each one of the 9 panel members from both review panels was asked to recruit at least 2 subjects and administer the questionnaire. Reminder emails were sent to them towards the end of the study, requesting the administration of the pre-tests to their subjects. A total of 4 FMA and 3 FMA-FC pre-tests were conducted, and their results are shown below.

#### **2.3.5.1 FMA Spanish Pre-Test**

There was a total of 4 respondents to the FMA Spanish version pre-test. Three of them were from Argentina, one of them was from Mexico. All 4 respondents' mother tongue was Spanish. Three of the subjects had a Spinal Cord Injury and one had a Cerebral Vascular Accident with left side Hemiplegia. Amount of time using MAE ranged from 2 – 20 years and the type of equipment used by them was 3 manual wheelchairs and 1 cane.

Running through the items of the tool, all throughout it is observed that the subjects clearly understood the questions, did not have difficulties selecting their answers, and did not find any words or phrases that were not understood or were found unacceptable or offensive. There was one instance where a subject selected “Does Not Apply” to the question asking if their current means of mobility meets their health needs. This subject was using a cane as their primary means of mobility and believed the use of a cane did not have an impact on their health needs.

### **2.3.5.2 FMA-FC Spanish Pre-Test**

Respondents for the FMA-FC were Spanish-speaking family members or caregivers of people who are not cognitively able to respond to medical questions for themselves. There was a total of 3 respondents to the FMA Spanish version pre-test. Two of them were from Mexico, one of them was from Argentina. All 3 respondents' mother tongue was Spanish and their child's or client's primary diagnosis was either Cerebral Palsy or Generalized Developmental Disorder. Child's or client's primary means of mobility was either Manual wheelchair, walker, stroller, or walking and had been using the equipment anywhere between 3-7 years.

There were a few more issues identified with the FMA-FC than with the FMA. These issues were lack of understanding of certain terms such as “sanitario” meaning “toilet” for which the respondent was unsure if it meant toilet, restroom, or water closet (WC). Because this is a term in the example list of an item, it was not as important as an actual item itself, therefore no changes were made to the translated tool. Another instance of misunderstanding was thinking that a statement was asking if the stroller had a feature or function that assisted with transfers, rather than the intended meaning of the statement that transfers are possible to and from the device itself. This misunderstanding was not an issue of linguistics, however, as they stated that there were no words or phrases they didn't understand in that statement. In cases like these, it is up to the trained clinician administering the questionnaire to indicate the correct meaning of the statement. Finally, just like in the FMA, there were 3 instances where “Does Not Apply” was selected as an answer choice, all by the same respondent. The subject's child used a stroller and the respondent believed the statements were asking about features the stroller had and not how the stroller impacted the child's functional mobility. Because it was only one respondent who had this issue and typically,

in cases like these, it is clinician's responsibility to clear up any misunderstandings, no modifications were made to the Spanish version of the FMA-FC.

### 3.0 DISCUSSION

During the initial forward translations done independently by the two translators, the differences between the Northern Mexican and Central Colombian dialects of Spanish were obvious. This reflected the need to go through a CCA process rather than a simple linguistic translation of the tools. Choosing to combine the WHO and the AAOS translation guidelines proved to be successful, as the review panel members were able to provide their input, based on their Spanish dialects, before the forward translation was finalized. Comparing the back-translations to the original tools confirmed the successful forward-translation and review panel processes.

Unfortunately, the total number of respondents for the Pre-tests did not meet the WHO guidelines requirements. Additionally, there were only respondents from 2 different Latin American countries compared to 7 different Latin American countries in the Review Panel. This might present some omission bias. An effort was made to recruit more participants for the Pre-Test phases, however only two clinicians actively recruited participants. For future work, it would be recommended that the lead translator has direct access to participant recruitment or is able to provide compensation to participants, increasing the recruitment rate.

Typically, the FMA should not get any “Does Not Apply” answer selection because the 10 items have been identified to be common to all people’s daily life. This was observed in the Pre-Test when a respondent believed the items did not apply to a stroller as MAE. It is still really common for therapists and clinicians to select it as an answer choice for the original version of the tool. It is believed this is caused by lack of training in administering the tools. Correct administration of the FMA Spanish version can be ensured by the development of a training manual and example videos for therapists and clinicians to follow.

In conclusion, the final CCA versions for the Latin American Spanish FMA and FMA-FC were those which were created after the review panel feedback was received. These versions can be seen in Appendix D. These versions are ready to use with clients who speak Spanish from the Latin American, North American, and Caribbean dialects, however they are awaiting validation to confirm the adaptations match the original tools' psychometric values.

### **3.1.1 Validation**

Finalizing the CCA of the FMA and the FMA-FC did not mean that the tools were cross-culturally validated (Epstein et al., 2014). While the CCA of the tools focuses on creating versions of the tools that are culturally and conceptually equivalent to the originals, cross-cultural validation ensures that the new questionnaires function as intended, in the same way and with the same properties as the original versions (Epstein et al., 2014; Mokkink et al., 2010). Although a validation is necessary at some point, following a successful CCA ensured that the adapted versions of both the FMA and FMA-FC were equivalent to the original questionnaires. For the purposes of this project, the cross-cultural validation was not conducted, leaving this step for a future project.

### **3.1.2 Future Work**

Although both tools went through an extensive CCA process and the Spanish versions of them demonstrated semantic, idiomatic, cultural, and conceptual equivalence to the original versions, these cross-cultural adaptations are not yet validated in the field. It is important that the psychometric properties of the Spanish versions of the tools are tested and compared to the original

tools. Additional work to be done on the FMA Spanish Version and FMA-FC Spanish Version are the development of training videos and training manuals for clinicians and therapists looking to administer these versions of the tools to their clients.



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