



Cross-cultural Adaptation and Validation of the Family Hardiness Index for the Brazilian Population

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Abstract: Despite the importance of family hardiness for the adaptation of families to adverse situations, there are gaps in the Brazilian literature regarding this construct. The objective of this study was to carry out the cross-cultural adaptation and validation of the Family Hardiness Index (FHI) for the Brazilian population. The process was developed in two phases: (1) cross-cultural adaptation, conducted in five stages - translation, synthesis, back translation, expert analysis and pre-testing; and (2) validation with 210 caregivers (mothers, fathers, and grandmothers) of children with disabilities. An Item Comprehension Assessment Questionnaire was also administered. The FHI demonstrated good semantic and cultural agreement, with a Kappa coefficient of 80%. Confirmatory Factor Analysis indicated that the model with two factors (Commitment/Challenge and Confidence/Control) and 11 items was the most appropriate. This study presents indicators of the validity of the FHI for the Brazilian context.

Keywords: adaptation, validity of test, resistance, family

Adaptação Transcultural e Validação do *Family Hardiness Index* para a População Brasileira

Resumo: Apesar da importância da resistência familiar para a adaptação de famílias frente a situações adversas, existem lacunas na literatura brasileira sobre esse constructo. O objetivo deste estudo foi realizar a adaptação transcultural e a validação do *Family Hardiness Index* (FHI) para a população brasileira. O processo foi desenvolvido em duas fases: (1) adaptação transcultural, conduzida em cinco etapas - tradução, síntese, tradução reversa, análise por especialistas e pré-teste; e (2) validação com 210 cuidadores (mães, pais e avós) de crianças com deficiência. Também foi aplicado um Questionário de Avaliação da Compreensão dos Itens. O FHI demonstrou boa concordância semântica e cultural, com um índice Kappa de 80%. A Análise Fatorial Confirmatória indicou que o modelo com dois fatores (Compromisso/Desafio e Confiança/Controle) e 11 itens foi o mais adequado. Este estudo apresenta indicadores de validade do FHI para o contexto brasileiro.

Palavras-chave: adaptação, validade do teste, resistência, família

Adaptación Transcultural y Validación del *Family Hardiness Index* para la Población Brasileña

Resumen: A pesar de la importancia de la resiliencia familiar para la adaptación de las familias a situaciones adversas, existen lagunas en la literatura brasileña sobre este constructo. El objetivo de este estudio fue realizar la adaptación transcultural y la validación del

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Family Hardiness Index (FHI) para la población brasileña. El proceso se desarrolló en dos fases: (1) adaptación transcultural, llevada a cabo en cinco etapas - traducción, síntesis, traducción inversa, análisis de expertos y pre-test; y (2) validación con 210 cuidadores (madres, padres y abuelas) de niños con discapacidad. También se aplicó un Cuestionario de Evaluación de la Comprensión de los Ítems. El FHI mostró una buena concordancia semántica y cultural, con un índice Kappa del 80%. El Análisis Factorial Confirmatorio indicó que el modelo con dos factores (Compromiso/Reto y Confianza/Control) y 11 ítems era el más adecuado. Este estudio presenta indicadores de la validez del FHI para el contexto brasileño.

Palabras clave: adaptación, validez de la prueba, resistencia, familia

The investigation of hardiness in families facing adverse situations, such as disabilities, chronic illnesses, and stress, is essential to understanding how these families adapt and overcome challenges. Studying family hardiness can help shed light on how adversity and resilience influence the health and well-being of family members. Researchers and practitioners can identify best practices that not only help mitigate the impact of adversity but also enhance the development of internal skills and resources that strengthen family unity in the long term. Although numerous studies over the years (Dunst, 2021; Hu et al., 2021; Gugliandolo et al., 2023) have investigated family hardiness, this construct remains underexplored in Brazilian research. Furthermore, the Family Hardiness Index (FHI), despite its widespread use in international contexts (Dunst, 2021; Hu et al., 2021; Gugliandolo et al., 2023), is still relatively unknown within the Brazilian academic community. This study aimed to carry out the cross-cultural adaptation and validation of the Family Hardiness Index (FHI) for the Brazilian population.

The concept of family hardiness, which underpins this investigation, is derived from the notion of individual hardiness proposed by Kobasa (1979), who observed individuals that, despite experiencing high levels of stress, did not become ill. Grounded in existential psychology, Kobasa believed that studying such individuals could help identify the factors that influence the ability to cope with adversity. Research on the topic led to the development of the concept of hardiness as a personality trait, involving cognitive components (commitment and control) and behavioral components (challenge). Hardiness functions as a resource that buffers stress and mitigates its illness-generating effects (Kobasa, 1979).

The adaptation of the hardiness concept to the family context was developed by McCubbin et al. (1987). According to the authors, family hardiness refers to the strengths and internal durability of the family unit and can be characterized as a sense of control the family possesses to cope with stressful events and life's difficulties. It is a resource that enables families to face adversity and adapt, functioning as a buffer or mediator that reduces the impact of stressors and demands, thereby facilitating family adjustment and adaptation over time.

The process of adapting the concept of individual hardiness to the family unit involved shifting the focus from "I" to "we." Accordingly, McCubbin et al. (1987) propose that family hardiness comprises four factors: commitment, understood as the family's internal strength, trustworthiness, and ability to work together; control, referring to the

family's perception that it governs its own life rather than being shaped by external events; challenge, which reflects the family's effort to innovate, learn new things, and remain active; and confidence, defined as the family's ability to plan ahead, have its efforts acknowledged, endure hardships, and live life with purpose and meaning (McCubbin et al., 1987).

Considering the need for instruments specifically designed to assess family hardiness, McCubbin et al. (1987) developed the Family Hardiness Index (FHI), a 20-item instrument structured into either four subscales (co-oriented commitment, confidence, challenge, and control) or three subscales (commitment, challenge, and control). The items consist of statements describing the current situation of the family, and responses are rated on a 4-point Likert scale (0 – false, 1 – mostly false, 2 – mostly true, and 3 – true). The overall internal reliability of the FHI is 0.82 (Cronbach's alpha), with subscale reliabilities of 0.81 for commitment, 0.80 for challenge, and 0.65 for control (McCubbin et al., 1987).

Although the scale can be considered in terms of four factors, the authors indicate through statistical analyses that the three-factor structure provides a more concise and theoretically robust organization. This structure simplifies the measurement of family hardiness in terms of Commitment, Control, and Challenge. The choice of three factors highlights the essential pillars for coping with stressors, favoring a more direct and effective application of the index in both research and family interventions.

Over the years, numerous studies have investigated family hardiness. Thornton's (2018) study with 186 caregivers of children with disabilities employed the Family Hardiness Index (FHI). The findings revealed that higher levels of family hardiness were associated with better coping strategies and greater marital satisfaction, contributing to families' emotional and functional adaptation.

Dunst (2021) conducted a meta-analysis of 52 studies published between 1992 and 2017, encompassing a total of 4,418 participants, and found that family hardiness was related to lower levels of parental stress, anxiety, and depression, as well as to improved well-being and parenting practices. It was also positively associated with family satisfaction and cohesion. Meanwhile, Hu et al. (2021) investigated fear of cancer recurrence in 127 Chinese couples and found that high levels of family hardiness reduced recurrence-related fear, underscoring its critical role in patients' emotional experiences.

To expand and enhance the study of family resilience in Brazil, it is essential to have adapted and validated instruments capable of assessing this construct. The adaptation and validation of instruments are crucial to ensure factors

such as coherence, cohesion, validity, reliability, among other aspects that constitute a sound construct for a given population. This process not only enables the comparison of results across different cultures, but also allows for the generalization of findings and the investigation of variations among populations, thereby contributing to the development of a more robust theoretical framework (Hutz et al., 2015; Prodrissimo et al., 2021).

Liu et al. (2014) conducted the adaptation and validation of the Family Hardiness Index (FHI) for the Chinese cultural context, involving 330 caregivers of hospitalized children. Cronbach's alpha was assessed and indicated good reliability (0.803), and content validity was also analyzed and considered high. Factor analysis revealed that the three-factor version of the instrument was the most appropriate, accounting for 61.25% of the total variance. Similarly aiming to adapt and validate the FHI, Persson et al. (2016) carried out a study in the Swedish context with the participation of 174 individuals. The study evaluated psychometric properties such as internal consistency, construct validity, and content validity. The results indicated that the Swedish version of the FHI demonstrated good internal consistency, with a Cronbach's alpha coefficient of 0.86 for the overall scale. Confirmatory Factor Analysis (CFA) showed that the three-factor model, excluding the control subscale, provided the best fit to the data.

Cunha et al. (2016) conducted the adaptation and validation of the FHI for the Portuguese context, involving 144 mothers and fathers of children with chronic illnesses such as diabetes, asthma, and arthritis. The data were analyzed using Cronbach's alpha, yielding a value of 0.76 for the total scale, with acceptable values for Control ($\alpha = .73$) and Commitment ($\alpha = .71$), but an inadequate value for Challenge ($\alpha = .38$), indicating the need for further analysis. An Exploratory Factor Analysis (EFA) with Varimax rotation for three factors (Control, Commitment, and Challenge) showed that these factors explained 42.31% of the variance. Finally, a comparison between parents of children with asthma ($N = 61$) and those with diabetes ($N = 69$) revealed no statistically significant differences in the total FHI scores.

The study by Erica and Pudjati (2024) adapted and validated the Family Hardiness Index (FHI) within the Indonesian context, using a sample of 276 adolescents aged between 12 and 17 years. The first test conducted was Cronbach's alpha, which yielded satisfactory results: 0.75 for the overall index, 0.84 for the Commitment subscale, 0.84 for the Control subscale, and 0.94 for the Challenge subscale - all exceeding expected thresholds. The second test was the Corrected Item-Total Correlation (CITC), which assessed the internal consistency of the items in relation to the overall construct. Of the 20 items, 18 showed CITC > 0.2 , indicating good internal consistency. Only items 3 and 5 from the Challenge subscale had CITC < 0.2 , suggesting the need for revision. For construct validity analysis, a Confirmatory Factor Analysis (CFA) was conducted, which demonstrated that nearly all model fit indices met the established criteria, confirming that the three-factor structure of the FHI was well

represented. However, items 2 and 5 from the Challenge subscale fell below recommended thresholds, indicating a need for further evaluation. Overall, the construct was deemed valid for measuring resilience among Indonesian adolescents.

The study of family resilience can be conducted across various domains, encompassing families that face a range of adverse situations, such as the presence of disabilities, chronic illnesses, significant losses, unemployment, or even everyday stressors like family conflicts and social changes. Each of these contexts presents a unique opportunity to understand how family dynamics, the roles of individual members, and available resources influence the ability to cope with and overcome challenges.

The focus of the present study on caregivers of children with disabilities is justified by their significant relevance within the context of resilience. Families living with disability face a series of additional challenges beyond pre-existing ones, such as the need for continuous care, emotional and financial strain, rehabilitation demands, and constant adjustments to family routines (Staunton et al., 2023; Aguiar & Araújo, 2021; Wondemu et al., 2022; Zhao et al., 2021).

Families of children with disabilities face significant challenges that impact various aspects of their lives. Among the main obstacles are the emotional, financial, and time-related demands of caregiving, which often fall predominantly on mothers. This burden can lead to high levels of stress and negatively affect the mental health of caregivers. Furthermore, the lack of adequate support from the state and the absence of effective public policies exacerbate the situation, leaving these families without the necessary resources to cope with everyday difficulties (Silva & Alves, 2021). These factors can directly influence the family's cohesion and coping capacity, dimensions assessed by the FHI, which may be closely linked to overall family well-being, as the instrument aims to measure.

Furthermore, the lack of validated instruments in Brazil to assess family resilience may have a significant impact on the formulation of public policies and social interventions targeting families of children with disabilities. Without an appropriate tool to measure family resilience, it is difficult to gain an accurate understanding of the factors that influence a family's ability to cope with challenges. Therefore, the validation of instruments within the Brazilian context is essential to ensure that public policies are grounded in reliable data, thereby promoting more effective and responsive interventions that address the specific needs of these families.

It is important to highlight that, although other instruments exist for assessing family resilience, the selection of the Family Hardiness Index (FHI) is justified by its strong theoretical foundation and widespread use in international research. Its application across diverse cultural and population contexts, as demonstrated in studies conducted in countries such as Indonesia, Sweden, and China, reinforces its validity and reliability. Moreover, the FHI enables a more direct and specific assessment of family resilience. Adapting and validating the FHI for the Brazilian context contributes to the availability of a psychometrically robust and culturally

appropriate instrument for future studies involving families facing significant challenges.

Furthermore, the use of the Family Hardiness Index (FHI) can play a key role in enhancing the effectiveness of various interventions aimed at families of children with disabilities and other groups. This tool provides an accurate assessment of family resilience, enabling the identification of families experiencing greater difficulties. Based on the information gathered through the FHI, it becomes possible to tailor psychological and emotional support programs, offering adaptive coping strategies that strengthen family resilience. In addition, the FHI can inform the development of educational interventions targeted at caregivers, equipping them to better manage stress and promoting the autonomy of children. Inclusion programs, social support, and support networks can also be adjusted with the help of the FHI, ensuring that families receive the necessary resources to face adversity. Thus, by integrating the FHI into public policies and social interventions, it is possible to deliver more effective and targeted support that takes into account the specific needs of each family, ultimately improving the quality of life for all involved.

In this way, validating the instrument in this specific context not only allows for the assessment of the measure's applicability but also provides an appropriate tool to capture the resilience of these families, contributing to interventions and policies that can improve their quality of life. In this regard, the objective of this study was to carry out the cross-cultural adaptation and validation of the Family Hardiness Index (FHI) for the Brazilian population.

Method

Participants

Participants were included in the study upon providing informed consent for voluntary participation. Individuals who did not meet the inclusion criteria (to be described later) or who chose to withdraw from the study were excluded. The participants were divided into three groups according to their role in the adaptation process.

The cross-cultural adaptation phase included three groups of participants. Five translators were involved in the first three stages of the process and met the following criteria: being over 18 years old, proficient in both English (source language) and Portuguese (target language), and available to read and translate the instruments. Three experts took part in the fourth stage (expert committee review). In addition to fulfilling the same requirements as the translators, they also had recognized expertise in the field of human development. Finally, ten caregivers participated in the final phase (pre-test), meeting the inclusion criteria of being the primary caregiver of a child with a disability and at least 18 years of age.

Regarding the instrument validation phase, the study included 210 caregivers of children with disabilities who were receiving services from pediatric rehabilitation centers in the

metropolitan region of Belém, Brazil. The inclusion criteria required participants to be the primary caregiver of the child, to be at least 18 years old, and to have a child receiving care from one of the selected rehabilitation services.

In terms of participant profile, 95% were women and 3% were men; 67% were married or in a stable union, 24% were separated or divorced, and 9% were single. Monthly household income was up to two minimum wages for 81% of the participants, and between three and four minimum wages for the remaining 19%. The children were 61% boys and 39% girls, with a mean age of 8 years. Diagnoses included Autism Spectrum Disorder (42%), Cerebral Palsy (14%), Attention Deficit Hyperactivity Disorder (14%), and a range of other conditions (30%) such as Down Syndrome, Hearing Impairment, Physical Disability, Visual Impairment, and Multiple Disabilities.

Instruments

Family Hardiness Index (FHI) (McCubbin et al., 1987): The FHI is designed to measure family hardiness, understood as the family's internal resource for coping with stress and adapting to adversity. The instrument consists of 20 items and offers two different sets of scales, comprising either three or four subscales. The first set includes three subscales: commitment, challenge, and control; the second set includes these three plus a fourth subscale: confidence. Due to its stronger psychometric properties, the authors (McCubbin et al., 1987) recommend the use of the three-subscale model. The instrument demonstrates good internal consistency, with a reported Cronbach's alpha of 0.82.

Item Comprehension Assessment Questionnaire: This questionnaire aims to measure the extent to which participants understand the items of the adapted instrument. It was administered during the final phase of the adaptation process (pre-test). The instrument consisted of three questions: "Did you understand all the items of the instrument?", "Were the response options clear and easy to choose?", and "Do you have any suggestions for improving the instrument?"

Procedures

Data collection. This study is a methodological research conducted in two phases: (1) cross-cultural adaptation and (2) validation. The study began after receiving authorization from the authors of the original instrument via email.

Phase 1 - corresponding to the cross-cultural adaptation of the instrument - was carried out in five stages: translation, synthesis of translations, back translation, expert committee review, and pre-testing. In Stage 1 (translation), two translators received the protocol containing general information about the study and the original instrument. Both translated the instrument independently, resulting in Translations 1 and 2. Subsequently, Stage 2 began, during which a third translator synthesized the two versions, producing Translation 3.

Subsequently, Translation 3 was submitted to Stage 3, in which two other translators carried out the back translation

from Portuguese into English, resulting in Translations 4 and 5. All five translations, along with the original instrument, were then taken to Stage 4, where a committee of three experts reviewed and evaluated the content, making the necessary adjustments. This process resulted in a pre-final version of the instrument, referred to as Translation 6. This version was submitted to Stage 5, which consisted of the pre-testing of the instrument, along with an Item Comprehension Questionnaire, involving ten caregivers of children with disabilities.

Regarding the inclusion criteria for the pre-testing participants, individuals had to be the child's primary caregiver, aged 18 years or older, with the child receiving care from the selected pediatric rehabilitation service. Paid caregivers, such as nannies or tutors, were excluded. This stage was carried out exclusively by the lead author. Participants were recruited in the waiting area of the rehabilitation center and were informed about the study's purpose, as well as its potential risks and benefits. Those who agreed to participate signed the Informed Consent Form (ICF) and completed the adapted instrument. Based on the participants' level of understanding and their feedback, the instrument was considered culturally appropriate and suitable for the target population.

For the data collection phase related to the instrument's validation, the inclusion and exclusion criteria mirrored those used in Stage 5 (pre-testing) of the cross-cultural adaptation. At this moment, a team of trained researchers, comprising undergraduate and graduate students, was supervised and trained by the lead investigator to carry out data collection. Participants were recruited in the waiting rooms of the selected pediatric rehabilitation services while awaiting their scheduled appointments. Researchers provided a brief explanation of the study and invited individuals to participate. After reading and signing the Informed Consent Form (ICF), participants proceeded to complete the research protocol. The researcher read the questionnaire items aloud, and participants provided their responses, which were then recorded by the researcher.

Data analysis. With regard to Phase 1 - Cross-Cultural Adaptation -, Semantic and Cultural Agreement were analyzed. To calculate agreement levels, the Kappa coefficient test was used, where "P(O)" represents the observed proportion of agreement (i.e., the sum of concordant responses divided by the total), and "P(E)" refers to the expected proportion of agreement, calculated by dividing the sum of expected concordant values by the total (Marques et al., 2023).

Data from the Item Comprehension Assessment Questionnaire were entered and analyzed using Microsoft Excel, aiming to evaluate participants' understanding of the items during Stage 5 of the study. A minimum agreement threshold of 80% was established, in accordance with the literature, as an acceptable level of comprehension.

Regarding the data analysis for validation, participants' scores on the Family Hardiness Index (FHI) were first subjected to descriptive analyses to examine their distribution, and the negatively worded items were reverse-coded. Subsequently, a series of Confirmatory Factor

Analyses (CFAs) were conducted within the Structural Equation Modeling (SEM) framework using the Jeffreys's Amazing Statistics Program (JASP Team), version 0.17.1, to assess the internal structure of the FHI. Models with four and three oblique factors were tested, followed by a model with two oblique factors.

To assess model fit, the following indices were considered: the Chi-square statistic (χ^2), which evaluates the magnitude of discrepancy between the population covariance matrix and the sample covariance matrix. The χ^2 is a conservative estimate of model fit when the sample size exceeds 200. In this case, the χ^2/df ratio was used, with values < 2.0 indicating a very good fit and values between 2.0-3.0 considered acceptable. The Comparative Fit Index (CFI), a relative index that compares the fit of the specified model to a baseline model, was also used; values > 0.90 indicate good fit and values > 0.95 indicate excellent fit (Marôco, 2021). The Root Mean Square Residual (RMSR), which represents the square root of the average squared residuals normalized by degrees of freedom, was interpreted such that lower values indicate better fit, with values < 0.08 considered satisfactory (Hu & Bentler, 1999). The Root Mean Square Error of Approximation (RMSEA), which measures the discrepancy per degree of freedom between the model and the population covariance matrices, was also employed; values < 0.05 are considered indicative of excellent fit (Hair et al., 2018). Internal consistency was assessed using Cronbach's Alpha, McDonald's Omega, and Composite Reliability for each of the FHI factors.

Ethical Considerations

This study is part of a broader research project entitled *Adaptação familiar diante da deficiência: uma perspectiva positiva das relações em famílias pobres* (Family adaptation to disability: a positive perspective on relationships in low-income families) which was submitted to and approved by the Research Ethics Committee (REC) of the Instituto de Ciências da Saúde (ICS) of the Universidade Federal do Pará (UFPA), under approval number 3.817.341 – CAAE No. 26475719.3.0000.0018. Participants in all phases of the study were fully informed about their involvement, including the voluntary nature of their participation and their right to withdraw from the study at any time. All ethical protocols were rigorously followed, in compliance with Resolution No. 510/2016 of the Brazilian Ministry of Health, which regulates research ethics involving human subjects.

Results

Cross-cultural adaptation

Firstly, regarding the process of cross-cultural adaptation, a series of discussions were held throughout all stages, concerning each item of the instrument, with several items being modified more than once. It is essential to highlight some examples of these modifications in order to illustrate

that cross-cultural adaptation involves more than the mere translation of the instrument, as previously noted.

In total, four translated items were questioned and subsequently reformulated by the expert committee. Item two, originally phrased as “It is not wise to plan ahead and hope because things do not turn out anyway” was initially translated (Translation A) as “*Não é sensato planejar o futuro e ter fé porque as coisas não acabam bem de qualquer forma.*” In the final version, this item was revised to: “*Não é sensato planejar o futuro e ter esperança porque as coisas não mudam de qualquer forma.*” The original version of item four stated: “In the long run, the bad things that happen to us are balanced by the good things that happen,” which was initially translated (Translation A) as “*A longo prazo, as coisas ruins que acontecem conosco são contrabalanceadas pelas coisas boas que acontecem.*” The final version was adjusted to: “*Ao longo do tempo, as coisas ruins que nos acontecem são equilibradas pelas coisas boas.*”

Item six stated: “We do not feel we can survive if another problem hits us,” and was initially translated (Translation A) as “*Nós sentimos que não sobreviveríamos caso sejamos atingidos por outro problema.*” Its final version was reformulated to: “*A impressão que nós temos é que não sobreviveremos se fossemos atingidos por outro problema.*” Finally, item seventeen, “Being active and learning new things are encouraged,” was translated (Translation A) as “*Encorajamo-nos a sermos ativos e tentar coisas novas*” and the final version read: “*Ser ativo e aprender coisas novas é encorajador.*”

As can be seen, only a few items were questioned and discussed by the Expert Committee, which indicates that the

initial translations were satisfactory and, in the specialists’ view, aligned with the intended meaning of the instrument. Furthermore, during the pre-testing stage, it was observed that participants demonstrated an adequate understanding of the FHI.

When assessing participants’ understanding of the instrument, the adapted version of the FHI for the Brazilian population proved to be easy to comprehend, as 100% of the participants reported understanding it, and none provided suggestions for improvement. Finally, 90% of the participants responded affirmatively when asked whether the response options were clear and easy to select.

Validation

The univariate analysis of the FHI score distribution revealed skewness values ranging from -3.1 to $+0.7$ and kurtosis values ranging from -1.8 to $+9.6$. The multivariate distribution analysis of the FHI scores, following Mardia’s (1970) method, also indicated non-normality. Given the distributional characteristics of the data, items were treated as ordinal variables in the Confirmatory Factor Analysis (CFA), and estimation was based on a polychoric correlation matrix (Muthén & Kaplan, 1992). The estimation method employed was Robust Diagonally Weighted Least Squares (RDWLS), which does not require multivariate normality.

The overall fit of the four-factor models (with 20 and 13 items) and three-factor models (with 20 and 14 items) of the FHI was very good (Table 1). Only the RMSR value exceeded the recommended cutoff (Hu & Bentler, 1999).

Table 1

Fit Indices for the Tested FHI Models

Model	$\chi^2(df)$	χ^2/df	RMSR	CFI	RMSEA 90 CI (LO-HI)
FHI-4F-20 items	330.238(164)	2.01	0.10	0.96	0.07(0.06-0.08)
FHI-4F-13 items	62.199(59)	1.05	0.07	1.00	0.02(0.00-0.05)
FHI-3F-20 items	538.334(167)	3.22	0.13	0.92	0.10(0.09-0.11)
FHI-3F-14 items	108.828(74)	1.47	0.09	0.99	0.05(0.03-0.07)
FHI-2F-20 items	379.439(169)	2.25	0.11	0.95	0.08(0.07-0.09)
FHI-2F-11 items	65.782(43)	1.53	0.09	0.99	0.05(0.02-0.07)

The factor loadings (λ) of several items were below 0.50 in both models (Table 2). Moreover, in the four-factor models (with 20 and 13 items) of the FHI, high correlations were observed between Co-oriented Commitment and Challenge (0.95), and between Confidence and Control (0.88). Similarly, in the three-

factor models (with 20 and 14 items), the strong correlation between Commitment and Challenge (0.91) persisted. In other words, even after excluding items with $\lambda < 0.50$, inter-factor correlations remained high. Internal consistency coefficients fell below acceptable levels in the four-factor model (Table 3).

Table 2

The 20 FHI Items and Their Corresponding Factor Loadings in the Tested Four-, Three-, and Two-Factor Models

Item	F1	F2	F3	F4	F1(2)	F2(2)	F3(2)	F1+F3	F2+F4
04	0.28				0.24			0.28	
05	0.77				0.77			0.77	
06	0.71				0.70			0.71	

continued...

...continuation

Item	F1	F2	F3	F4	F1(2)	F2(2)	F3(2)	F1+F3	F2+F4
07	0.70				0.69			0.70	
09	0.65				-0.56			0.65	
11	0.83				0.65			0.82	
13	0.73					0.74		0.72	
18	0.80				0.78			0.79	
02		0.43					0.46		0.44
03		0.61					0.62		0.61
08		0.80			-0.56				0.80
10		0.75					0.78		0.77
12			0.83			0.84		0.80	
14			-0.28			-0.27		-0.28	
15			0.86			0.87		0.84	
16			-0.15			-0.15		-0.15	
17			0.70			0.71		0.68	
01				0.19			0.23		0.21
19				0.88			0.80		0.79
20				0.79			0.74		0.73

Note. F1 = Co-oriented Commitment; F2 = Confidence; F3 = Challenge; F4 = Control; F1(2) = Commitment. F2 (2) = Challenge; F3(2) = Control.

Table 3

Internal Consistency Coefficients for FHI Factors in the Tested Models

Model	Factor	ω (95% C.I.)	α (95% C.I.)
4 Factors 13 items	Co-oriented Commitment / Compromisso Coorientado	0.67(0.60-0.74)	0.67(0.60-0.74)
	Confidence / Confiança	0.59(0.44-0.71)	0.59(0.46-0.69)
	Challenge / Desafio	0.80(0.74-0.85)	0.78(0.73-0.82)
	Control / Controle	0.76(0.64-0.81)	0.74(0.65-0.80)
3 Factors 14 items	Commitment / Compromisso	0.77(0.67-0.83)	0.75(0.69-0.80)
	Control / Controle	0.73(0.67-0.79)	0.71(0.64-0.77)
	Challenge / Desafio	0.80(0.74-0.85)	0.78(0.73-0.82)

In the two-factor model of the FHI with 11 items, nine items were excluded due to factor loadings (λ) below 0.50, and the overall model fit to the empirical data was very good, as shown in Table 5. Nevertheless, the RMSR slightly exceeded the cutoff point; however, given the relatively small sample size ($n = 210$), this index may be overestimated (Hu & Bentler, 1999). The first factor retained seven items originally from Commitment

and Challenge, while the second factor comprised four items from Confidence and Control. The correlation between these two factors was weak and negative (Table 3). An assessment of discriminant validity (Fornell & Larcker, 1981) indicated that the Average Variance Extracted (AVEs) exceeded the squared correlation between the factors. Internal consistency coefficients for both factors were adequate (Table 4).

Table 4

Items and Factor Loadings of the Two-Factor FHI Model

Nº	Item	CFA	
		F1	F2
11	We strive together and help each other no matter what. / Nós nos empenhamos juntos e ajudamos uns aos outros, não importa o que aconteça.	0.83	-
12	When our family plans activities we try new and exciting things. / Quando a nossa família planeja atividades, experimentamos coisas novas e empolgantes.	0.83	-

continued...

		...continuation	
Nº	Item	CFA	
		F1	F2
15	We seem to encourage each other to try new things and experiences. / Nós encorajamos uns aos outros a tentar coisas e experiências novas.	0.82	-
18	We work together to solve problems. / Nós trabalhamos juntos para resolver os problemas.	0.79	-
13	We listen to each others' problems, hurts and fears. / Nós escutamos os problemas, tristezas e medos uns dos outros.	0.77	-
5	We have a sense of being strong even when we face big problems. / Nos sentimos fortes mesmo quando enfrentamos grandes problemas.	0.70	-
7	While we don't always agree, we can count on each other to stand by us in times of need. / Mesmo não concordando sempre, podemos nos apoiar.	0.67	-
19	Most of the unhappy things that happen are due to bad luck. / A maioria das coisas tristes que acontecem é por causa de má sorte.	-	0.87
10	Life seems dull and meaningless. / A vida parece monótona e sem sentido.	-	0.77
8	We do not feel we can survive if another problem hits us. / A impressão que nós temos é que não sobreviveremos se fossemos atingidos por outro problema.	-	0.76
20	We realize our lives are controlled by accidents and luck. / Acreditamos que as nossas vidas são controladas pelo acaso e sorte.	-	0.76

Table 5

Fornell-Larcker Criterion for Discriminant Validity and Internal Consistency Coefficients of the Two-Factor FHI Model

Factor	F1	F2	ω (95% C.I.)	α (95% C.I.)	CR
F1	0.60	-	0.86 (0.83-0.89)	0.85(0.81-0.88)	0.91
F2	0.00004	0.62	0.78(0.73-0.83)	0.78(0.72-0.82)	0.87

Note. Below the diagonal: squared correlations; on the diagonal (in bold): AVEs; ω = McDonald's Omega; α = Cronbach's Alpha; CR = Composite Reliability.

Discussion

The objective of this study was to carry out the cross-cultural adaptation and validation of the Family Hardiness Index (FHI) for the Brazilian population. The cross-cultural adaptation of the FHI demonstrated excellent semantic equivalence, with a language level appropriate for the target population (Fortes & Araújo, 2019). Furthermore, the instrument showed satisfactory idiomatic equivalence, as it was easily understood by participants, as well as cultural equivalence, which accounted for the context and characteristics of the study population. A noteworthy aspect is that the questionnaire items are applicable to diverse family structures, beginning with the phrase "In my family," which encompasses the family unit as a whole, without focusing on specific members. Another strength of the original instrument is its ability to assess family resilience in the face of various stressors, without being limited to a specific event (McCubbin et al., 1987), thus allowing for its use in a variety of contexts.

During the adaptation process, few issues were encountered, and the instrument proved to be easily understood from the very first stage. The agreement between the translators and the low number of items discussed by the expert committee (only four) highlight this aspect.

Regarding the validation process, the results of this study indicate that the two-factor model with 11 items provided the

best fit for the Brazilian data, with satisfactory goodness-of-fit indices according to Confirmatory Factor Analysis (CFA). This finding is consistent with recent literature, such as the studies by Erica and Pudjati (2024) in Indonesia and Persson et al. (2016) in Sweden, which also identified a simplified factor structure, emphasizing the dimensions of commitment, control, and challenge.

However, a significant difference was observed regarding the internal consistency of the Control factor. While McCubbin et al. (1987) originally proposed a robust structure with four subscales (commitment, control, challenge, and confidence), which was later simplified with an emphasis on three factors, the present study encountered issues with the internal consistency of the Control factor, leading to its exclusion from the final model. This exclusion is similar to the findings of Persson et al. (2016) in Sweden, where the Control subscale also demonstrated weak consistency and validity, suggesting that this component may not be universally applicable across cultures. The Brazilian version maintained high reliability in the Commitment and Challenge subscales, reflecting the theoretical robustness and applicability of the FHI.

The present study reinforces the original structure proposed by McCubbin et al. (1997), with the caveat that the Control factor has not demonstrated consistency across various cultural adaptations. The strong correlation between "Commitment" and "Challenge" observed in the

current study was also reported by the original authors, indicating that these two dimensions are central to the concept of family hardiness.

The adaptation and validation of research instruments for different cultural contexts are essential to ensure the accuracy and relevance of data in cross-cultural studies. Voormolen et al. (2021) conducted a multicenter validation of the CarerQol, an instrument designed to measure the quality of life of informal caregivers of individuals with dementia. The study, carried out across eight European countries, demonstrated the robustness of the instrument by assessing its psychometric properties, such as validity and reliability, across different cultures. The findings emphasized the importance of adapting instruments to capture cultural nuances without compromising consistency, thereby enabling meaningful comparisons across diverse populations.

Furthermore, the work of Al Umairi et al. (2023) illustrates the adaptation of a mathematics self-efficacy scale to the context of Oman. The scale was translated and modified to reflect local cultural and educational specificities, undergoing rigorous validity and reliability testing. This approach ensured that the instrument was culturally appropriate and sensitive to the realities of Omani students, highlighting the central role of linguistic and cultural adaptation in the validation process.

Similarly, the present study employed methodological rigor in data collection and analysis, aiming to present an instrument with solid psychometric properties while preserving its intended purpose. According to Hudecek et al. (2020), it is essential to retain the core components of the construct while taking into account cultural specificities.

The adaptation and validation of instruments across different cultural contexts are essential to ensure the accuracy, relevance, and comparability of data in international research. Each population has unique characteristics, such as linguistic differences, cultural values, and specific life experiences, that may influence how individuals interpret and respond to items within an instrument. Studies such as those by Al Umairi et al. (2023), Hudecek et al. (2020), Sjöström et al. (2023), and Voormolen et al. (2021) demonstrate that rigorous adaptation and validation processes enhance measurement fidelity and support the ethical application of research tools across diverse contexts. Therefore, validating instruments for each cultural reality contributes to the development of globally representative scientific knowledge, particularly in the field of psychometrics, and supports the implementation of evidence-based policies and interventions that respect the unique characteristics of each population.

Thus, the main contribution of the present study lies in providing construct validity indicators, as evidenced by the Confirmatory Factor Analysis (CFA) conducted. This research has the potential to enrich the fields of psychology and psychometrics, as it presents an instrument with statistically validated indicators. Moreover, from a practical perspective, the availability of a tool designed to assess family hardiness, particularly among families of children

with disabilities (though not limited to them), may support professionals working with this population in delivering services and interventions aimed at strengthening family resilience.

Among the study's limitations, it is important to note that data collection was conducted exclusively in the metropolitan region of Belém and focused solely on caregivers of children with disabilities. While this group presents numerous specific characteristics that contribute to its vulnerability, the findings cannot be generalized. Furthermore, although the sample size is considered statistically adequate, further analyses with a larger sample (N) may yield additional insights. Therefore, future studies should be conducted with Brazilian populations of diverse backgrounds and larger sample sizes to obtain a more comprehensive understanding.

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