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## ORIGINAL ARTICLE

### Validation of the Cognitive Fusion Scale in Cuban adults with anxiety symptoms

*Validación de la Escala de Fusión Cognitiva en adultos cubanos con síntomas de ansiedad*

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#### ABSTRACT

**Background:** Cognitive Fusion (CF) is a psychological problem that is a fundamental concept within Acceptance and Commitment Therapy. The Cognitive Fusion Scale (CFS), which is used to measure this concept, has not been adapted or validated in Cuba. **Objective:** To evaluate the psychometric properties of the CFA in adults with anxiety symptoms. **Method:** Qualitative and quantitative techniques were combined: Expert interview, correlation and concordance coefficients and factor analysis. **Result:** The CFQ was adapted from a linguistic and cultural perspective. Nine experts were consulted and consensus was assessed using the content validity coefficient of appropriateness (0.97). During piloting with 35 people, the test achieved a Cronbach's  $\alpha$  coefficient (0.927). When the adapted test was applied to 106 adults with anxiety symptoms, a Cronbach's  $\alpha$  coefficient (0.869) was achieved, demonstrating the homogeneity of the test. The exploratory factor analysis ( $KMO = 0.820$ ,  $X^2(338) = 21$ ,  $p < 0.001$ ) showed item ambiguities of less than 0.6 and factor loadings of more than 0.3. The confirmatory factor analysis showed a good model fit ( $X^2(14) = 45.1$ ,  $p < 0.001$ ). A low and statistically significant correlation ( $Rho = 0.216$ ,  $p < 0.05$ ) was found in relation to IDARE (state). **Conclusion:** The adapted CFQ was valid in terms of content, showed high reliability values and its one-dimensionality was verified. The adapted instrument shows a correlation between FC and anxiety symptoms. An instrument like this could improve the diagnosis of CF, as well as increase the quality of care for the patient.

**Keywords:** Cognitive Fusion, Content Validity, Construct Validity, Reliability.

#### RESUMEN

**Introducción:** La Fusión Cognitiva (FC) es un problema psicológico que constituye un concepto fundamental dentro de la Terapia de Aceptación y Compromiso. La Escala de Fusión Cognitiva (EFC) utilizada para medir este concepto no ha sido adaptada ni validada en Cuba. **Objetivo:** Evaluar las propiedades psicométricas de la EFC en personas adultas con síntomas de ansiedad. **Método:** Se combinaron técnicas cualitativas y cuantitativas: consulta a expertos, coeficientes de correlación y concordancia y análisis factorial. **Resultados:** Se adaptó la EFC desde una perspectiva lingüística y cultural. Se consultaron a 9 expertos y se evaluó el consenso mediante el coeficiente de validez de contenido sobre la suficiencia (0,97). Durante el pilotaje con 35 personas, el test alcanzó un coeficiente  $\alpha$  de Cronbach (0,927). Al aplicar el test adaptado en 106 adultos con síntomas de ansiedad se obtuvo un coeficiente  $\alpha$  de Cronbach (0,869), lo que evidencia

la homogeneidad del test. El Análisis Factorial Exploratorio ( $KMO = 0,820$ ,  $X^2(338) = 21$ ,  $p < 0,001$ ) alcanzó unicidades de los ítems menores que 0,6 y cargas factoriales mayores que 0,3. El Análisis Factorial Confirmatorio mostró un buen ajuste del modelo ( $X^2(14) = 45,1$ ,  $p < 0,001$ ). Se encontró una correlación baja y estadísticamente significativa ( $Rho = 0,216$ ,  $p < 0,05$ ) respecto al IDARE (estado). **Conclusión:** La EFC adaptada fue válida en tanto contenido, mostró altos valores de fiabilidad y se verificó su unidimensionalidad. El instrumento adaptado muestra una correlación entre la FC y los síntomas de ansiedad. Contar con un instrumento como este podría mejorar el diagnóstico de la FC, así como incrementar la calidad del tratamiento que se le brinda al paciente.

**Palabras claves:** Fusión Cognitiva, Validez de Contenido, Validez de Constructo, Fiabilidad.

## BACKGROUND

The present research proposal is configured given the alienating nature of a daily work routine and a social regime in which even the average subject has the possibility of questioning his or her state of life or state of happiness (Bauman, 2015; Han, 2019; Ortega y Gasset, 1989). The idea stems from how contemporary man tries to solve problems in two ways: the problem as an experience of frustration or as the possibility of provoking a change that drives him to a new development.

In today's society, there are structural difficulties at the level of the economy, society, politics, poverty, health, and the environment. Therefore, today's man is also dominated by the technological flow of social networks and by exhausting existential rhythms that prevent him from reflecting on himself (Arés Muzio, 2018).

Ortega and Gasset (1989) state in their extraordinary work "Man and the People": "Almost everyone is changed, and with change, man loses his most essential quality: the ability to meditate, to withdraw into himself to agree with himself and to clarify what he believes, what he values and what he detests. The change obscures him, blinds him, forces him to act mechanically in a frenzied somnambulism."

Byung-Chul Han (2019), following other authors in the human and social sciences, proposes to recover "the bird of sleep that hatches the egg of experience", understanding that this sleep is the culmination of bodily relaxation, in contrast to the frenzy of capital that makes us lose the "gift of listening" and the "community that listens" (Rubio Gallardo, 2015). She also suggests returning to Merleau Ponty's memory or the *vita contemplativa* in its character of wonder at the being-there of the world (Ramos et al., 2018; Rubio Gallardo, 2015). Echoing the words of Friedrich Nietzsche, the author suggests that: "For lack of calm, our civilization leads to a new barbarism" (Rubio Gallardo, 2015).

These analyses have a macro-level impact on the individuality of people's lives together and lead to multidimensional changes, including mental health, which can be observed in the daily practice of professional work in these areas.

Cognitive fusion (CF) is a significant predictor of emotional problems such as anxiety and depression (Ramos et al., 2018; Valencia & Falcón, 2019). Therefore, interventions have been developed that aim to reduce cognitive fusion and promote its opposite: cognitive defusion (Mañas, 2009; Ramos et al., 2018). These interventions are effective in reducing the believability, frequency, and discomfort caused by unpleasant thoughts and increasing the person's positive affectivity towards the environment in which they develop.

Considering this review and the high incidence of adult patients

with anxiety symptoms attending the Center for Mental Health in the municipality of Cerro, Havana, Cuba, psychotherapists have observed CF symptoms in certain social contexts.

It is well known that FC is an essential element of the so-called third-generation therapies (Gillanders et al., 2014) that are emerging in the Cuban context. Considering the importance of FC in the study of psychological inflexibility in psychotherapeutic interventions (Mañas, 2009), it is necessary to have an instrument that measures this variable, since we have not found specific work in Cuba related to the adaptation and validation of an instrument to measure FC up to the time of the study.

From an analytical-behavioral or contextualist-functional perspective, some authors have established explicit relationships between language, suffering, and psychopathology; they have even specified what they call the verbal contexts responsible for the so-called experiential avoidance disorder, which, unlike the diagnoses of psychopathological manuals, is a functional diagnosis (Casellas Pujol, 2018; Ferro-García & Valero-Aguayo, 2017; Wakefield et al., 2018).

A central aspect that needs to be addressed is that of identification. We identify with our thoughts. That is, we can come to believe that we are this voice that speaks incessantly "inside" us. This identification has been described by some behavior analysts with the term cognitive fusion, which we could translate as "cognitive fusion". Mindfulness is seen as a technique for cognitive defusion. The terms "language deactivation" or "cognitive deactivation" are used to refer to cognitive defusion (Kabat-Zinn, 2021; Mañas, 2009).

In Acceptance and Commitment Therapy (ACT), cognitive defusion refers to the act of distancing oneself from one's thoughts. The opposite process is cognitive fusion, a state in which people respond to their thoughts (by reacting to their evaluations, judgments, memories, etc. as if they were absolute truths occurring in the present moment), allowing these private events to take control and determine behavior (Hayes et al., 2006; Zapata Téllez et al., 2020).

When thoughts are experienced as aversive, cognitive fusion leads to experiential avoidance, understood as a purposeful attempt to reduce the discomfort caused by such an aversive experience, thus activating a range of strategies such as situational avoidance, cognitive suppression, rumination, and excessive worry. These strategies usually have a short-term effect, so that they are negatively reinforced and therefore tend to be repeated and generalized in similar experiences. The latter leads to avoidance of aversive experiences and thwarts opportunities to engage in a life worth living (Gillanders et al., 2014; Ruiz et al., 2017).

The tendency of people to believe that our private events reflect ontological truths about the world around us and our identity. It is often difficult for us to distance ourselves from this and recognize that the thoughts, emotions, and behaviors with which we respond to stimuli are the result of the development of arbitrary relationships that respond to a history of socio-culturally conditioned learning (Romero-Moreno et al., 2014). Given the importance of cognitive fusion in ACT, several efforts have been made to operationalize CF through the development of different scales.

The aim of this study is therefore to evaluate the psychometric properties of the CFQ in adults with anxiety symptoms in the Cuban context. This includes the linguistic and cultural adaptation of a cognitive fusion scale to the Cuban context, the evaluation of its reliability, content validity, and construct validity. To the authors' knowledge, no research using this scale has been published in Cuba. For this reason, the present study analyzes some basic psychometric properties of this instrument in a sample from Havana.

## METHOD

### Design

The present study is instrumental, as its purpose is to analyze the evidence of the validity and reliability of a measurement instrument (Hernández-Sampieri & Mendoza Torres, 2018; Muñiz, 2018).

The validation of the instrument went through the following phases: linguistic and cultural adaptation, piloting and application (Babbie, 2000; Elosua & Egaña, 2020). For the linguistic and cultural adaptation, judges were selected to perform an expert criterion. A pilot study was then conducted for preliminary validation. During the application phase, the test was administered to a sample of Cuban patients and its psychometric properties were evaluated.

### Participants

For the selection of the experts, a list of possible experts in relation to the construct to be evaluated and experts in Spanish was created. The following inclusion criteria were considered: at least 5 years of professional experience in clinical psychology; academic training in psychology (mainly clinical psychology and health psychology); affiliation with national groups or scientific societies in the field of clinical psychology. For the second group of experts, the following criteria applied: They had a degree in Spanish from the College of Education or a degree in Philology and had been involved in teaching or research on Spanish language development for at least 5 years.

The sample of experts consisted of four doctors of psychological sciences, one doctor of medicine and specialist in psychiatry first degree, one specialist in health psychology, one master in psychodiagnosis and two bachelors of arts (9 experts in total). The sample included teachers, researchers and psychotherapists with an average experience of 30 years (SD = 17.5), with a minimum of 5 and a maximum of 56 years.

To conduct an initial examination of the test in Cuban adults, a pilot study was conducted with a sample size based on the suggestion of including at least five subjects per item to ade-

quately assess the psychometric properties of a measurement instrument (Babbie, 2000). The sample was intentional and non-probabilistic.

During the pilot, the adapted CFQ was applied to individuals treated at the Mental Health Center of the Municipality of Cerro, Havana, Cuba. The following inclusion and exclusion criteria were considered: Adults treated at the center who consented to participate in the study and who did not have a diagnosis of anxiety according to the classification manual, ICD-11 latest version (World Health Organization, 2022), the study was designed to collect sociodemographic data from participants who met the criteria established in the initial survey and to conduct a clinical screening using a semi-structured interview. In addition, the IDARE (state) (González Llana, 2007) was applied to filter out patients with medium and high levels of anxiety as a condition. Adults under psychopharmacological treatment or with psychiatric diagnoses were excluded.

The pilot study sample thus consisted of 35 people, with women outnumbering men (24, 68.6%). The average age of the participants was 41.7 years (SD = 13.0) and ranged from 20 to 67 years.

The sample for the application phase was intentional and non-probabilistic. Inclusion criteria were considered to be adults attending the health center who agreed to participate in the study, who did not have a diagnosis of anxiety according to ICD-11 (World Health Organization, 2022) and who obtained medium or high values of anxiety as a state, according to the IDARE (state) (González Llana, 2007) carried out in the initial interview (clinical screening). Adults under psychopharmacological treatment or with psychiatric diagnoses were excluded.

The application sample consisted of 106 people, with a predominance of women (77, 72.6%). The mean age of the participants was 38.9, median 37.0 (SD = 9.55), ranging from 25 to 55 years of age. In terms of educational level, the following frequencies were obtained: 52 (49.1%) with intermediate technical education, 26 (24.5%) with university studies, 24 people with intermediate education (22.6%), two with pre-university studies (1.9%) and two people with basic secondary education (1.9%). Regarding marital status, 40 women were single (37.7%), 27 were married (25.5%), 17 men were single (16.0%), 11 were married (10.4%), 7 were accompanied (6.6%), three were divorced (2.8%) and one was accompanied (0.9%). In terms of occupational status, there is a predominance of employment in different sectors of society, education, public transport, health, economy, industry, for a total of 57 workers (53.7%), although 32 self-employed workers (30.2%) and 17 housewives (16.0%) stand out. Regarding personal pathological history (PPH), 78 persons (73.6%) did not report PPH, 15 presented HA (14.2%), while 13 (12.2%) presented other underlying pathologies.

Of the IDARE scores obtained, 99 people scored high anxiety as a state (93.4%) and 7 people scored medium anxiety as a state (6.6%). The mean IDARE (state) score was 49.8 (SD = 3.39), median 49, with a minimum score of 43 and maximum score of 58.

### Instruments

#### *Expert spreadsheet*

A form was created to record the judges' consent to participate

(Appendix 1), the experts' personal and professional data and another to evaluate the questionnaire items and the dimensions to which they belong according to the attributes of sufficiency, clarity, coherence and relevance (Appendix 2) according to a four-point Likert scale based on Hernández-Nieto (2008).

#### *Initial semi-structured interview*

A semi-structured interview was designed to collect sociodemographic data of the patients (Appendixes 5 and 6), as well as to screen for the application phase. Data such as age, sex, occupational status, marital status, personal pathological history and other questions were collected to see the patient's psychological state.

#### *IDARE (state)*

One of the most widely used instruments for the diagnosis of anxiety is the IDARE, a self-assessment inventory designed to evaluate two relatively independent forms of anxiety: anxiety as a state (transitory emotional condition) and anxiety as a trait (relatively stable anxious propensity). It has been validated in the Cuban population (González Llana, 2007). Conventionally, the Anxiety as a state scale is applied first and then the Anxiety as a trait scale; but it is possible to apply only one of the subscales depending on the interests of the examiner. Studies have shown that the correlation between both forms is very high, so in practice they can be used interchangeably (González Llana, 2007).

In the IDARE (state) there are 10 positive anxiety items (i.e., the higher the score, the higher the anxiety) and 10 negative items. There are different Spanish versions of the test, one of the most widely used being that of Spielberger, Díaz Guerrero et al, which is the one we use in Cuba (González Llana, 2007). Each item is answered using a Likert scale where 1-almost never, 2-sometimes, 3-frequently and 4-almost always. The rating standard given by González Llana (2007, p. 171) was used.

In the application phase the IDARE (status) reported a Cronbach's  $\alpha$  value of 0.822, expressing that the measurement was reliable and consistent. Of the scores obtained on the IDARE, 99 people scored high anxiety (93.4%) and 7 people scored medium anxiety (6.6%). The mean IDARE score (state) was 49.8 (SD = 3.39), median 49, with a minimum score of 43 and maximum score of 58.

#### *CFQ*

In 2014, a group of researchers constructed the Cognitive Fusion Questionnaire (CFQ) from a large pool of items that covered different aspects of the construct (Valencia & Falcón, 2019). After a series of psychometric analyses conducted with large samples from the United Kingdom (Valencia & Falcón, 2019), the authors derived a final version composed of 7 items, all of which are straightforwardly worded (i.e., a high score indicates greater fusion) and present a unidimensional structure. The items are answered on a Likert scale with seven options (1 = Never true, 7 = Always true). The higher the score, the greater the cognitive fusion. The scores of non-clinical participants are usually between 20 and 24 points while the scores of clinical participants are usually above 29 points.

The CFQ has been translated into different languages showing effective results in psychological assessment (Kim & Cho, 2015; Solé et al., 2016). In countries such as Mexico, Peru and Colombia, studies have been conducted to demonstrate the reliability of the CFQ in different samples. In 2020 in Mexican population a Cronbach's  $\alpha$  of 0.932 was obtained (Zapata Téllez et al., 2020), while in Peru a Cronbach's  $\alpha$  of 0.915 was reported (Valencia & Falcón, 2019). This research adapts the CFQ validated in Colombia, where Cronbach's  $\alpha$  with values between 0.89 and 0.93 were obtained (Ruiz et al., 2017).

#### **Procedure**

In order to make a linguistic and cultural adaptation of this instrument based on the judges' criterion, nine Cuban experts were deliberately selected and asked for their informed consent to participate in the study (Appendix 1). These experts have a recognized background in the development, design, construction, and validation of psychological assessment instruments and experience in clinical practice, as well as two experts in Spanish language and literature. The language experts only assessed the clarity with which the items were written.

The preference method was applied with regard to the attributes of clarity, relevance and coherence of the items (Escobar-Pérez & Cuervo-Martínez, 2008). For this purpose, a form was designed to collect the assessment criteria (Appendix 2), which was sent by e-mail. After two weeks, the responses were received in the same way and the information was compiled in an Excel spreadsheet. The data was processed in an Excel spreadsheet designed to calculate the content validity coefficient (CVC). Descriptive statistics of the expert sample were performed using jamovi software (Elosua & Egaña, 2020; Şahin & Aybek, 2019).

The instrument was modified considering the experts' observations, resulting in the Cuban version of the Cognitive Fusion Scale (EFCvc, in Spanish) (Appendix 3).

To initially test the EFCvc, a pilot study was conducted that included a focus group (debriefing) at the end of the test administration, in which participants were asked about their understanding of the items, whether they found any of the items offensive and whether they were long to answer.

During the application phase, the center's psychotherapists were trained to apply and evaluate the EFCvc. A general examination of the stress questionnaires (Appendix 4) of the center's psychologists was conducted, identifying several adults who presented symptoms of anxiety and possible manifestations of cystic fibrosis.

Before starting the evaluation, informed consent was obtained from each participant by explaining the aim of the study, the confidential and anonymous treatment of the data and the potential benefits of their participation. The test was conducted on a larger sample and reliability was determined by the Cronbach's  $\alpha$  coefficient and the one-dimensionality of the scale by exploratory and confirmatory factor analysis. The potential of the adapted test for the psychological assessment of HF and its relationship to anxiety in participants was demonstrated.



### Data analysis

To estimate the experts' consensus regarding these attributes, the CVC was used (Escobar-Pérez & Cuervo-Martínez, 2008), considering it adequate if  $CVC > 0.7$ . The instrument was modified considering the experts' observations, which were processed through a content analysis (Hernández-Sampieri & Mendoza Torres, 2018).

After conducting the pilot study, a database was created in jamovi software (Elosua & Egaña, 2020; Şahin & Aybek, 2019), where an exploratory data analysis was performed through descriptive statistical methods, which allowed the detection of errors or omissions that were corrected. Arithmetic mean and standard deviation were used as summary measures for quantitative variables, and percentage as summary measure for qualitative variables. Reliability was calculated using Cronbach's  $\alpha$  and  $\omega$  coefficients, for check this psychometric attribute in case of tau-equivalence has not been assessed or when we assume a congeneric model, respectively (Muñiz et al., 2013).

After the application phase, the data obtained were inserted into the jamovi software. Descriptive statistics were performed on the sample, Cronbach's  $\alpha$  coefficients were computed for the EFCvc and IDARE. Exploratory and confirmatory factor analyses were performed to test the one-dimensionality of the test.

For the construct validity analysis, the Exploratory Factor Analysis (EFA) by minimum residuals was used. Prior to its application, the Kaiser-Meyer-Olkin Index (KMO) was calculated, which compares the magnitude of the observed correlation coefficients and the partial correlations between pairs of variables ( $KMO \geq 0.5$ ) and Bartlett's test of sphericity, which tests the null hypothesis that the correlation matrix is an identity matrix, in which case there would be no latent factors or variables in the data (it is desired to reject the hypothesis,  $p < 0.05$ ). 0.05), they can be used to verify the relevance of the selected method. For the naming of the factors, the correlations of each item with each factor -in the rotated matrix- were analyzed; a high correlation was considered if the coefficient was greater than 0.3. The rotation method used was oblimin (Elosua & Egaña, 2020). The Confirmatory Factor Analysis (CFA) was performed (Freiberg Hoffmann et al., 2013; Geerlings et al., 2014). The estimation method used was MLR -Maximum Likelihood Robust- and, since the variables are ordinal, the polychoric matrix was used, since it is more appropriate for this type of data (Elosua & Egaña, 2020). To assess the goodness of fit of the model, different indices were examined: chi-square ( $X^2$ ), comparative fit index (CFI), Bollen incremental fit index (IFI), standardized root mean square residual (SRMR) and root mean square error of approximation (RMSEA).

According to Elosua and Egaña (2020) the following goodness-of-fit indices were considered: chi-square ( $X^2$ ), comparative fit index (CFI), Bollen incremental fit index (IFI), the standardized root means square residual (SRMR), and root mean square error of approximation (RMSEA). Regarding the criteria of acceptable fit values, a value of 0.90 in CFI is considered, the values of IFI over 0.90 is a good fit, but the index can exceed 1; SRMR values should be  $< 0.0$ , and RMSEA values should be less than or equal to 0.08 (Byrne, 2020). Construct validity was assessed through the examination of factor loadings, standardized load-

ings greater than the cutoff of  $> 0.30$  were considered acceptable and, as for correlations between factors, values  $> 0.19$  as very low, between  $> 0.20$  and  $< 0.39$  as low, between  $> 0.40$  and  $< 0.59$  as moderate, between  $> 0.60$  and  $< 0.79$  as high and  $< 0.80$  as very high.

Then, a correlation matrix was established between the EFCvc and the IDARE (state) and the age of the individuals in the study through Spearman's correlation coefficient (Elosua & Egaña, 2020; Navarro & Foxcroft, 2022). The variables were recorded in order to perform a comparative analysis using the nonparametric U-Mann Whitney test (Elosua & Egaña, 2020; Navarro & Foxcroft, 2022). The results obtained from the above statistical processes were compared with three current studies conducted in Latin America.

### Ethics Aspects

The research was approved by the Ethical Committee of the Faculty of Medical Sciences "Miguel Enriquez", University of Medical Sciences of Havana, Cuba. All participants sign the informed consent. Ethical principles of autonomy, justice, beneficence and nonmaleficence were followed, as well as informed consent. Participants were informed of the need and objective of the research, the importance and voluntariness of participation, and their consent was requested. It was explained to them that the information would be used collectively, not individually, and that the principle of data confidentiality would always be complied with, and that the data would only be used for research purposes and in summary form, taking the Declaration of Helsinki as a reference (World Medical Association, 2013).

### RESULTS

This section describes the results obtained during the linguistic-cultural adaptation, the content validity, and the pilot study carried out with the Cuban version of the CFQ. Table 1 shows the content validity coefficients obtained for each attribute, by item, after the expert judgment. Note that all values that exceed the cut-off point of 0.7 are considered adequate.

Table 2 shows the modifications (in bold) made by the authors based on the observations made by the experts on each item, after a content analysis. This resulted in the version of the test that was applied during the pilot study (Appendix 3).

#### [TABLE 4]

The pilot study sample consisted of 35 people, with a predominance of women (24, 68.6%). The mean age of the participants was 41.7 (SD = 13.0), ranging from 20 to 67 years. In terms of educational level, the sample consisted of 14 people with university and higher education (40.0%), 17 with technical education (48.6%), and 4 people with other educational levels (11.6%). Concerning marital status, 19 married, 12 women and 7 men (54.3%), 10 single, 6 women and 4 men (28.5%), 3 married, 2 women and 1 man (8.6%), 2 divorced (5.7%) and 1 widow (2.9%) participated.

In terms of occupational status, there is a predominance of

employment in different sectors of society (30 people, 85.7%), three housewives (8.57%), and two retirees (5.7%). About the family pathologic antecedents (FPA) of the sample, 21 persons (60.0%) did not report FPA, five with arterial hypertension (14.3%), two with hematologic disorders (5.7%), one with vagal crisis (2.9%), one with chronic gastritis (2.9%), one with heart disease (2.9%), one with FPA of depression disorder (2.9%), one with obesity and hypothyroidism (2.9%), one with bronchial asthma (2.9%) and one with Sicklemia (2.9%).

From the scores obtained in the IDARE (state), it was obtained that in the pilot test sample, there are 22 people (62.9%) with high anxiety as state and 13 people (37.1%) with medium anxiety as state. The average total score of the IDARE (state) was 50.9 (SD = 10.7), with a median of 49, minimum of 33, and maximum of 71.

High values of Cronbach’s  $\alpha$  (0.927) and  $\omega$  (0.929) coefficients were reported, considered excellent, showing high test-retest reliability during piloting. Item deletion analysis evidenced that there is no need to add or delete items (Appendix 7).

Regarding the EFCvc of the pilot test, 19 people presented clinical cognitive fusion (54.3%), and 16 participants with non-clinical cognitive fusion (45.7%). A mean of 29.5 (SD = 11.0) and a

median of 31, with a minimum score of 8 and a maximum of 46 was observed.

During the debriefing or focus group conducted after the application of the EFCvc, the participants reported that each of the aspects asked was understandable. Some shared the idea that the scale could be more extensive. Participants reported that while answering the scale they realized that they were not so happy in their lives and that, therefore, it was a moment to reflect on that aspect of their life. They say that it is a very practical test to answer and saves them time since the words are precise and clear. In sum, after the criteria collected in this technique, it was not necessary to modify the EFCvc instrument for its subsequent application in a larger sample.

The reliability analysis of the application reported a high value of Cronbach’s  $\alpha$  of 0.869 and  $\omega = 0.828$ , considered excellent according to Muñiz (2018) which shows a high reliability of the test and shows homogeneity of the items to measure the construct. The item deletion analysis evidenced that it is not necessary to add or delete items (Appendix 8). For IDARE (status) in the application test, a Cronbach’s  $\alpha$  value of 0.822 was reported. This expresses that such measurement is reliable and consistent.

**Table 1.** Results of content validity by items and attributes

Item	Attributes to evaluate			
	Sufficiency	Clarity	Relevance	Consistency
1		0,97	1,00	1,00
2		0,89	1,00	1,00
3		0,97	1,00	0,97
4	0,97	0,97	0,92	1,00
5		0,92	1,00	0,97
6		0,94	1,00	1,00
7		0,97	1,00	1,00
Average CVC		0,94	0,99	0,99

**Table 2.** Modifications made to the test by the authors based on the observations made by the experts on each item

Items	Statement appearing in the instrument	Proposed wording
1	My thoughts cause me emotional distress or pain. / Mis pensamientos me causan angustia o dolor emocional.	My thoughts cause me suffering. / Mis pensamientos me causan sufrimiento.
2	I get so caught up in my thoughts that I am not able to do the things I most want to do. / Me quedo tan enganchado a mis pensamientos que no soy capaz de hacer las cosas que más quiero hacer.	I stay connected to my thoughts and am not able to do the things I most want to do. / Me quedo conectado a mis pensamientos y no soy capaz de hacer las cosas que más quiero hacer.
3	I analyze situations too much, to the point that it is not useful to me. / Analizo las situaciones demasiado, hasta el punto de que no me resulta útil.	I overanalyze situations to the point where it is not useful to me. / Analizo demasiado las situaciones, hasta el punto en que no me resulta útil.
5	I get angry at myself for having certain thoughts. / Me enfado conmigo mismo por tener determinados pensamientos.	I get upset with myself for having certain thoughts. / Me molesto conmigo por tener determinados pensamientos.
6	I tend to get too caught up in my thoughts. / Tiendo a enredarme mucho en mis pensamientos.	I tend to get very complicated in my thoughts. / Tiendo a complicarme mucho en mis pensamientos.
7	I find it very difficult to let upsetting thoughts go even when I know that doing so would help me. / Me resulta muy difícil dejar pasar los pensamientos molestos incluso cuando sé que hacerlo me ayudaría.	I find it very difficult to let bothersome thoughts go, even when I know that doing so would help me. / Me resulta muy difícil dejar pasar los pensamientos molestos, incluso cuando sé que hacerlo me ayudaría.

The Kaiser-Meyer-Olkin index obtained (KMO = 0.820) showed strong partial correlations between pairs of variables, which suggested the relevance of using the Exploratory Factor Analysis (EFA) statistical method to evaluate the construct validity of the test; Bartlett's sphericity test, whose results were significant ( $\chi^2(338) = 21, p < 0.001$ ), rejects the null hypothesis that the correlation matrix is an identity matrix, thus corroborating the relevance of the EFA.

The results indicate that it is appropriate to use the CFA to test the unidimensional structure of the EFCvc. This will be done using the method of minimum residuals, and then a Confirmatory Factor Analysis (CFA) will be applied to test the hypothesis of one-dimensionality of the scale.

The AFE showed that the main factor explains 49.3% of the total variance. This value is used in the psychometric literature to support the idea of the existence of a dominant factor and a cutoff point of 20% has been defined for this purpose (Muñiz, 2018). Table 3 shows the uniquenesses of all items with values less than 0.6 and factor loadings greater than 0.3, suggesting high relevance or contribution of the items to the unidimensional factor model.

Confirmatory Factor Analysis (CFA) was then performed. All indicated a good fit of the one-factor model in the sample of adults with anxiety symptoms:  $\chi^2(14) = 45.1, p < 0.001$ ; CFI

= 0.980; IFI = 0.980; RSMR = 0.0632, RMSEA = 0.145, 95% CI = [0.099, 0.194],  $p < 0.001$ , except for RMSEA that means the model is not a close-fitting model. In addition, the regression weights for each element (Figure 1) were high (Elosua & Egaña, 2020; Navarro & Foxcroft, 2022). The AFE and AFC results verify the hypothesis of one-dimensionality of the test, coinciding with the theoretical assumption of the original CFQ.

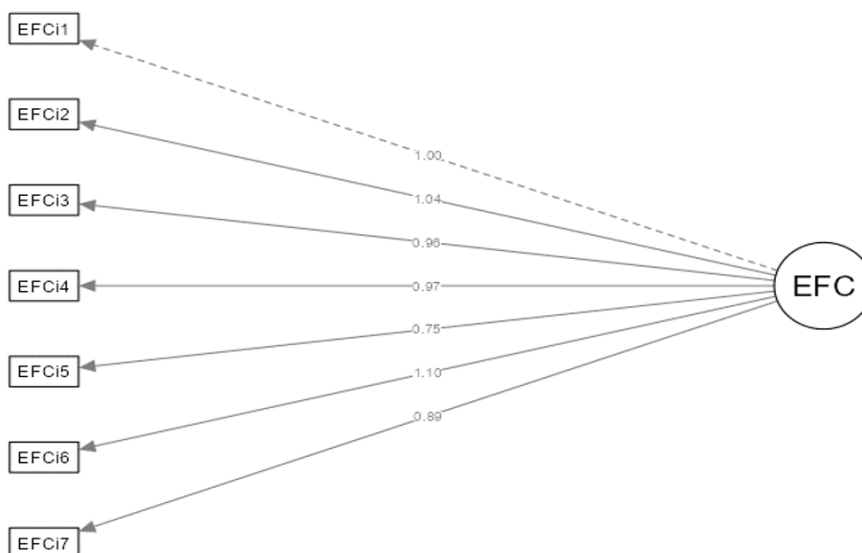
A negative, weak, and not statistically significant correlation was reported between age and EFCvc total score (Rho = -0.167,  $p = 0.09$ ). On the other hand, a positive, weak, and statistically significant correlation was found between IDARE total score and EFCvc (Rho = 0.216,  $p < 0.05$ ).

When comparing how the EFCvc total score varied by level of schooling, no statistically significant differences were reported ( $U = 781, p = 0.06$ ) and it was obtained that the upper intermediate level graduates presented a mean of 33.9 in the EFCvc total score (SD = 8.90), while the higher-level graduates reached a mean of 29.8 of the EFCvc (SD = 9.27). This indicates a difference between the means of 4.00, indicating that the FC was higher in the participants with upper intermediate levels.

On the other hand, a statistically significant difference was found in the total score of the EFCvc concerning whether or not the participants were in a couple ( $U = 863, p < 0.01$ ). The mean difference between the groups was -6.00, meaning that

**Table 3.** EFA factor loadings (n = 106)

	F1	Uniqueness
EFC-i1	0,679	0,539
EFC-i2	0,742	0,450
EFC-i3	0,700	0,510
EFC-i4	0,697	0,514
EFC-i5	0,580	0,663
EFC-i6	0,799	0,362
EFC-i7	0,698	0,513



**Figure 1.** Diagram of the test structure according to the CFA performed (n = 106).

the group without a partner scored on average 6 points higher than the group with a partner. In particular, the participants with a partner reported a mean HR of 29.5 (SD = 8.72), while the group without a partner achieved a mean total HR score of 35.2 (SD = 8.71).

No statistically significant differences were found between the participants with and without employment ties ( $U = 750$ ,  $p = 0.96$ ). The difference in means between the two groups is  $-0.3$ , which means that the group of those who were not in employment obtained a slightly higher mean score than the group of those who were in employment. In fact, the latter group had a mean HR of 32.8 (SD = 9.26), while the unattached group had a mean HR of 33.1 (SD = 8.60).

The total EFCvc score showed no significant differences by sex ( $U = 1028$ ,  $p = 0.53$ ). The mean difference was  $-1.00$ , the female sex reported a mean HR of 32.5 (SD = 9.41), while the male sex had a mean HR of 33.8 (SD = 8.38). The data suggest that both groups had similar average cognitive fusion scores.

## DISCUSSION

Table 1 shows that for most questions the CVC value was above the threshold for appropriateness (0.70). The CVCs for appropriateness (0.97), clarity (0.94), relevance (0.99), and coherence (0.99) achieved adequate scores overall, indicating that the CVC is content valid. This indicates that the instrument evaluated contains sufficient and relevant items to measure the construct, i.e. there are no deficiencies or an excess of items to cover the entire domain. No studies were found in the literature reviewed that used the CVC to validate the content of the CFQ, so a comparison with previous studies was not possible.

Studies have been conducted in countries such as Mexico, Peru, and Colombia to demonstrate the reliability of the CFQ in different samples. Zapata Téllez et al. (2020) found a Cronbach's  $\alpha$  coefficient of 0.932. Another relevant study was that of Valencia and Falcón (2019), who found a Cronbach's  $\alpha$  of 0.915. The study on the psychometric properties of the CFQ in Colombia (Ruiz et al., 2017) showed reasonable reliability (Cronbach's  $\alpha$  between 0.89 and 0.93). These results, obtained in different Latin American samples, are consistent with the alpha reported in our sample and demonstrate a high reliability of the scale.

The results of the AFE in the Mexican population (Zapata Téllez et al., 2020), where three factorial models were performed, were able to explain 70.99% of the total variance. They obtained factor loadings of over 0.690 for the seven items that make up the CFQ. According to these data, no item was excluded for further analysis, which corresponds to the results of the Cuban sample.

In the study by Valencia and Falcón (2019), an AFC was also conducted to test the one-dimensionality of the CFQ. The fit of this model was acceptable:  $\chi^2(14) = 38.73$ ,  $p < 0.001$ ; robust CFI = 0.976; robust TLI = 0.964; robust RMSEA = 0.085, 90% CI = [0.054, 0.118]. As can be seen when examining the fit indices, most of them, except the  $\chi^2$  and the robust RMSEA, indicated adequate fit. The modification indices did not indicate the need to respecify the model, so the one-dimensional model was considered final. This is consistent with what was found in our study.

In summary, it can be said that the EFCvc has high values for reliability and content validity and that the one-dimensionality of the test was confirmed. This confirms the consistency of the items from the original adaptation for use in the Cuban population. It demonstrates the cross-cultural relevance of the FC as well as the applicability of the ACT in different cultural and ethnic contexts (Ruiz et al., 2017).

In the research reviewed, no reports of positive correlations were found about age. It seems that FC is a psychological process that is independent of age and is more related to other aspects such as psychological inflexibility (Ramos et al., 2018), although this opens avenues for further research.

In the Mexican population, for example, no positive correlation was found in a sample of 525 subjects in the non-clinical group and 570 in the clinical group in an age range between 18 and 66 years (Zapata Téllez et al., 2020). Another study conducted in Lima worked with a sample of 450 students from a public college whose ages ranged from 15 to 43 years (Valencia & Falcón, 2019), and no relevant correlation was found between these variables.

The studies examined consider the variable of school education, but do not report a statistically significant correlation with the total FC value. In Colombia, Ruiz et al. (2017) reported a mean FC score of 20.87 in a sample of 762 students of different levels, which is lower in both groups than in our study. In the United Kingdom, Gillanders et al. (2014) in a sample of 1 040 individuals among students and healthy adults obtained a mean FC value of 22.28, which is still lower than that obtained in our sample. This could be because a higher school level is associated, in most cases, with a much more varied and flexible cognitive activity, and therefore may be a factor that attenuates FC.

On the other hand, a statistically significant difference was found in the total score of the EFCvc concerning whether or not the participants were in a couple, where the group without a partner obtained an average score of 6 points higher than the group with a partner. According to the literature reviewed, no analyses of the relationship of these variables were found.

The total score of the EFCvc showed no significant differences between genders and similar results were obtained for the mean values of the total score by gender. This is in line with the study by Valencia and Falcón (2019), in which this invariance between men and women was also found in a sample of 450 people.

ACT is a model that achieves the interrelation of theory and practice; therefore, it is of utmost importance to have a psychological assessment tool that allows psychotherapists to identify CF. It is known to be an age-independent psychological process and is related to psychological inflexibility.

The adapted instrument shows an association between FC and anxiety symptoms. It can provide an approach to the patient's cognitive problem-solving activity. It is an instrument with high reliability.

Having a psychological assessment instrument such as this one could improve the diagnosis of CF in patients with anxiety attending the mental health institution, as well as increase the quality of the treatment provided to them.

From this, mental health professionals could design more effective



tive and personalized treatment plans for each patient, which could improve their quality of life, reduce stress and anxiety, and allow them to return to full participation in society. In addition, this technique can be used in conjunction with other measurement instruments that allow the specialist, through clinical triangulation, to have more elements about the patient's psychological situation.

### Limitations

The main limitation is that our sample is not representative. We would address this aspect in further research. This fact implies that we cannot derive standardized scores for the Cognitive Fusion Scale on the Cuban population. Another drawback is that we didn't perform convergent/divergent validation, for example, using scales for rumination, or experiential avoidance, because those scales aren't adapted to the Cuban cultural context. This aspect will be addressed in further research.

### Conclusion

According to our best knowledge, this research is the first adaptation of the Cognitive Fusion Scale on Cuban context. We performed a context validity with clinical psychology and linguistics experts, pilot study and application phase. We analyze the correlation of this scale with IDARE test, as an external validity. After this research, the first author is using the CFS in his psychological practice on the Health Center, together with others psychological tests.

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Pedro García Rojas: Conceptualization, Data curation, Research, Resources, Visualization, Original draft,

Damian Valdés Santiago: Conceptualization, Formal analysis, Research, Methodology, Supervision, Validation, Writing, proofreading and editing.

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### CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest that could affect this study.

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Not applicable.

### REVIEW PROCESS

This study has been reviewed by external peers in double-blind mode. The editor in charge was David Villarreal-Zegarra. The review process is included as supplementary material 1.

### DATA AVAILABILITY STATEMENT

Interested researchers could contact the corresponding author (dvs89cs@gmail.com) to have access to the data.

### STATEMENT ON THE USE OF GENERATIVE ARTIFICIAL INTELLIGENCE

No artificial intelligence-generated tools were used in the creation of the manuscript.

### DISCLAIMER

The authors are responsible for all statements made in this article.

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