TPM Vol. 32, No. S3, 2025
ISSN: 1972-6325
https://www.tpmap.org/

PSYCHOMETRIC PROPERTIES OF THE "COGNITIVE FUSION QUESTIONNAIRE: CFQ-7" IN PARENTS OF FAMILIES IN SOUTH LIMA

MAX CHAUCA-CALVO[1], ARTURO CATTER-NIÑO[2], JUAN CALLER-LUNA[3], VÍCTOR MIRANDA-VARGAS[4], LAURA VILLANUEVA-BLAS[5]

[1]HTTPS://ORCID.ORG/0000-0003-0909-5424
UNIVERSIDAD CÉSAR VALLEJO
mchaucac@ucvvirtual.edu.pe
[2]HTTPS://ORCID.ORG/0009-0002-8701-3121
UNIVERSIDAD CONTINENTAL
arturocatter19@gmail.com
[3]HTTPS://ORCID.ORG/0000-0001-6623-246X
UNIVERSIDAD CÉSAR VALLEJO
jcallerl@ucvvirtual.edu.pe
[4]HTTPS://ORCID.ORG/0000-0001-6372-2949
UNIVERSIDAD CÉSAR VALLEJO
vmirandava01@ucvvirtual.edu.pe
[5]HTTPS://ORCID.ORG/0000-0001-5862-2660
UNIVERSIDAD AUTÓNOMA DEL PERÚ
bvillanueva@autonoma.edu.pe

ABSTRACT
The Cognitive Fusion Questionnaire (CFQ-7) is a measure designed to evaluate the tendency to accept the literal content of thoughts and feelings as true. The present study aimed to analyze the psychometric properties of the CFQ-7 in an adult population from Lima, Peru. The sample consisted of 2,169 parents from South Lima, with 39.7% men and 60.9% women, selected through non-probabilistic convenience sampling based on age and residency criteria. The results demonstrate that the CFQ-7 exhibited robust psychometric properties through statistical and structural analyses. Item means ranged between 3.18 and 3.61, with high homogeneity and communalities (>0.40). Confirmatory factor analysis revealed high factor loadings (0.80–0.90) and an adequate fit (CFI = 0.99, RMSEA = 0.06). Furthermore, the model showed convergent relationships with other variables and no bias across genders. Reliability was excellent, with Cronbach's alpha (0.94), omega (0.94), and AVE (0.73). Exploratory and confirmatory analyses, invariance evaluations, and psychometric network assessments support the unidimensionality and validity of the instrument, ensuring its applicability in psychological contexts. In conclusion, the CFQ-7 demonstrates adequate validity and reliability indices.

Keywords: Cognitive Fusion, CFQ-7, Psychometric Evidence.

INTRODUCTION

Cognitive Fusion (CF), a central construct in Acceptance and Commitment Therapy (ACT), refers to the inability to distinguish between a verbal cognition and its true meaning, which affects the individual's actions when following rules dictated by their thoughts (Valencia & Falcón, 2019). This concept, introduced in third-generation therapies, highlights how private events, such as thoughts, are perceived from their literal content, which makes it difficult to become aware of their cognitive narrative (Hayes et al., 2011). In this framework, CF was configured as a conceptual model of experiential avoidance and psychological inflexibility considered central to

psychopathology and any treatment planning that underpins the ACT approach (Hayes et al., 2014). HR would probably mean that thoughts take precedence over behavior, functioning as dominant behaviors (Harris, 2009). Existing studies have also shown that it is not something that is only portrayed by clinical diagnoses, but also by non-clinical samples (Zacharia et al., 2021). Although evidence is scarce, its existence has been presented in several contexts. For example, studies have interlinked CF with pathological worry (Quinteros et al., 2020), psychological rigidity (Faustino et al., 2023), and mood disorders such as depression, anxiety, and insomnia, among others, including PTSD (Cox et al., 2018). In addition, correlational studies have identified a connection between mental pollution and HR, highlighting it as a significant predictor of anxiety (Clauss & Bardeen, 2022). The COVID-19 pandemic amplified stressors and triggered an increase in the incidence of psychological disorders such as anxiety, depression, and post-traumatic stress syndrome (Lozano-Vargas, 2020). These disorders were associated with events such as fear of contagion, loss of loved ones, and economic precariousness (Hernández, 2020). The WHO (2022) reported a 25% increase in anxiety and depression levels worldwide. Against this backdrop, the evaluation of CF becomes relevant to identify high risks early, which would allow the design of preventive and therapeutic interventions (Faustino & Branco, 2020).

The Cognitive Fusion Questionnaire (CFQ) has been shown to be a good instrument for measuring CF in various studies. In studies carried out in different countries, its one-dimensionality has been replicated, and the properties of psychometry are even consistent (Gillanders et al., 2014). From Korea, where the research had previously been carried out by Kim and Cho (2015), to Spain, where a translation into Catalan has been developed (Solé et al., 2016) and in countries such as France, Portugal and Germany, which have translated the original test into their languages (Dionne et al., 2016; Costa et al., 2017; China et al., 2018), there is wide international acceptance. As for the Spanish language, there is a surplus of research on issues such as discriminant and convergent validity (Romero-Moreno et al., 2014; Ruíz et al., 2017).

In Latin America, the CFQ, which measures cognitive fusion, has shown its effectiveness in various studies by evaluating this trait, which is closely linked to psychological suffering. This has generated the need to verify whether the original instrument has validity and reliability in other contexts, considering both its translation and the sample used (Ruíz et al., 2017; Donati et al., 2021). A clear example of this is observed when comparing smokers and non-smokers (Zacharia et al., 2021). In addition, other populations require adjustments in translation and adaptation (De Paula et al., 2018; Morais et al., 2019) in Brazil. Quinteros et al. (2020) also address this aspect. In Argentina, psychometric properties were assessed using scales related to cognitive fusion, along with experiential avoidance, mindfulness, life satisfaction, and psychological difficulties, in order to identify correlations between related and opposite variables. This analysis was performed on both a clinical and non-clinical sample of the Spanish version of the Assessment Questionnaire (VQ) (Ruíz et al., 2022).

In Peru, studies on the psychometric properties of the Cognitive Fusion Questionnaire (CFQ) are limited and mostly focus on university populations (Ruiton-Rivera, 2019). A validated Peruvian version that allows its wide and bias-free use has not yet been developed. This fact is particularly relevant in an intercultural context, where the appropriate adaptation of the instruments is essential to avoid errors in the assessment (Ruíz et al., 2017).

Specifically, the validation of these instruments leads not only to better possibilities of factor control but also to a lower amount of bias and subjectivity in the measurement of constructs. An interesting one is the measurement of cognitive fusion because different therapeutic orientations put changing elements at the center of the change process and, as such, consider them important mechanisms of change, particularly in personality pathologies (Ramos et al., 2018). High degrees of cognitive fusion have been found to be related to an increased risk of becoming ill with pathologies. However, a significant relationship with the underlying constructs that maintain depression through automatic thoughts is shown in other studies that did not confirm the direct effect of cognitive fusion on the variation of depression symptoms ($r = .368$, $p < 0.001$) (Ramos et al., 2018).

Therefore, HR is a fundamental construct for understanding psychological inflexibility, an underlying factor in multiple psychological disorders. The implementation of instruments such as the CFQ in Peruvian populations would not only allow early identification of risks, but also encourage local research and develop evidence-based interventions that take into account cultural particularities. In accordance with the arguments supported in previous paragraphs, the following work question was asked: What is the evidence of validity and reliability of the Cognitive Fusion Questionnaire (CFQ-7) in parents in southern Lima?

METHOD

Design

It was carried out using an instrumental design, since the study was aimed at obtaining evidence on the validity and reliability of a measurement tool (Ato et al., 2013).

Participants

The sample was made up of 2169 parents residing in South Lima, of which 39.7% (961) were men and 60.9% (1308) were women. A non-probabilistic convenience sampling was used, likewise, selection criteria were used that included age and place of residence.

Instruments

The *Cognitive Fusion Questionnaire (CFQ)* (Gillanders et al., 2014), both in the English version (original) and in the Spanish version (Ruíz et al., 2017), aims to assess the level of cognitive fusion in adults. It is one-dimensional made up of 7 items, it has response options in Likert format ranging from 1 (never) to 7 (always). Gillanders et al. (2014) used various samples to analyze the psychometric properties of CFQ, presenting an AFC in 5 samples: a) Community ($\chi 2/dl= 2.918$; CFI= .986; IFI= .986; RMSEA= .065; SRMR= .049), b) Stress management ($\chi 2/df= 3.171$; CFI= .971; IFI= .971; RMSEA= .095; SRMR= .072), c) Mixed mental health ($\chi 2/df= 1.452$; CFI= .991; IFI= .991; RMSEA= .046; SRMR= .060) d) Multiple sclerosis ($\chi 2/df= 1.847$; CFI= .983; IFI= .983; RMSEA= .080; SRMR= .086) and e) Caregivers of people with dementia ($\chi 2/dF= 3.216$; CFI= .962; IFI= .963; RMSEA= .101; SRMR= .081), whose values confirm one-dimensionality; likewise, the reliability coefficient was evaluated in the different samples, evidencing values ranging from .87 to .93, which assures the adequate internal consistency of the instrument.

Procedures

The procedures for this psychometric research include several key phases. It begins with the request for the use of the instrument and the contextualization of the problem, delimiting the problem and reviewing previous studies and theoretical aspects of the construct. Then, the instrument adapted to Spanish is selected, requesting the corresponding permit with institutional support. Subsequently, a form is prepared that includes the survey, informed consent and a sociodemographic file. Data collection will be carried out in person and virtually using a Google form. The data will be downloaded in Excel, where the answers will be coded and incomplete answers or those that do not meet the established criteria will be filtered. Finally, these data will support the pilot and the analysis of the psychometric properties of CFQ-7.

Data analysis

At first, the data was organized in Excel and later transferred to statistical analysis tools such as Jamovi, JASP and RStudio, using add-ons such as lavaan and semTools. The validity of the content was evaluated through the method of expert judges, with five specialists from the clinical field and with experience in the development of measurement instruments, applying Aiken's V and the binomial test. The descriptive analysis included the calculation of means, standard deviation, asymmetry, Fisher's kurtosis, item-item correlations, and communalities, using Jamovi (Goretzko et al., 2019). Likewise, tests such as KMO and Bartlett's sphericity test were carried out to verify the adequacy of the sample, taking KMO values $\geq .75$ and $p < .05$ as a reference. For Exploratory Factor Analysis (SFA), the method of unweighted least squares and oblimin rotation was applied, considering the ordinal nature of the data (Shrestha, 2021; Goretzko et al., 2019). The discrimination index of the items was analyzed to determine their ability to differentiate between high, medium, and low levels of the trait evaluated (Villamarín, 2017). In the Confirmatory Factor Analysis (CFA), the structural validity of the instrument was confirmed by fit indices such as x^2/gl, RMSEA, SRMR, CFI and TLI, using the robust estimator WLSMV and the polychoric correlation matrix (Sahoo, 2019). Criterion validity was examined through Pearson correlations, ensuring the normality of the data using the Shapiro-Wilk test (Khatun, 2021). The internal consistency of the instrument was evaluated with Cronbach's alpha and McDonald's omega indices (Sánchez-Meca et al., 2021), respectively. To identify differences between clinical and non-clinical samples, factor invariance analysis was used, considering variations in indices such as ΔCFI and ΔRMSEA, which should not exceed 0.01 (Cheung & Rensvold, 2002). Finally, scales based on percentile ranks were developed for the use of CFQ-7 in the detection of cognitive fusion. In addition, evidence of equity in relation to the sex variable was investigated through analysis of configurational, metric, strong, and strict contrasts (Wu & Estabrook, 2016).

RESULTS

Item Statistic

Table 1 presents the descriptive analysis of the cognitive fusion items. From left to right, it is observed that the mean (M) varies between 3.18 and 3.61, while the standard deviation (SD) ranges between 1.49 and 1.63. The values of asymmetry (g1) are positive and are between 0.11 and 0.33, and those of kurtosis (g2) vary from 0.58 to 0.81, both meeting the tolerance criterion of ±3 (Kline, 2016). In addition, the corrected homogeneity indices have values between 0.69 and 0.82, evidencing that all items have satisfactory correlations between them (ritc > .20) (Kline, 2016). Finally, the commonalities (h2) of the items towards one-dimensionality show adequate values (h2 > .40) (Lloret-Segura et al., 2014). In summary, this statistical description reflects optimal results to continue with the psychometric analyses.

Table 1
Statistical Analysis of CFQ-7 Items

CFQ-7	***M***	***OF***	***g1***	***g2***	***Ri-TC***	***h2***
Item 1	3.33	1.49	0.32	-0.58	0.69	0.60
Item 2	3.18	1.54	0.33	-0.62	0.77	0.70
Item 3	3.55	1.51	0.14	-0.69	0.72	0.63
Item 4	3.61	1.60	0.11	-0.81	0.77	0.70
Item 5	3.54	1.63	0.12	-0.81	0.79	0.73
Item 6	3.57	1.63	0.18	-0.74	0.82	0.76
Item 7	3.46	1.56	0.23	-0.61	0.77	0.70

Note. M: Medium; SD: Standard deviation; g[1]: asymmetry; g2: kurtosis; ri-tc: corrected item-test correlation; h2: Communalities.

Validity analysis based on internal structure

The model showed adequate values, being x2/gl= 2.5. As for the comparative index (CFI), it reflected an excellent value of .99, as well as in the Tucker-Lewis index (TLI) with .98, implying a theoretical and empirical adjustment of the model (Hu and Bentler, 1999). Regarding the standardized average indices (SRMR) it showed a value of 0.02, implying an adequate correlational fit (Kline, 2016), the approximation error (RMSEA) showed a value of 0.06, implying an excellent fit with its 90% confidence intervals with minimum values from 0.05 to 0.07 as the maximum value (Browne and Cudeck, 1993). Values shown in Table 2.

Table 2
Evidence of CFQ-7 instrument adjustment indices

x2	**Gl**	***x2*/gl**	**CFI**	**TLI**	**SRMR**	**RMSEA**	**90% CI RMSEA**	
							Minimal	**Maximum**
53530.36	21	2.5	0.99	0.98	0.02	0.06	0.05	0.07

Grade: x2: chi square; gl: degree of freedom; *x2*/gl: global fit index; CFI: Comparative Adjustment Index; TLI: Tucker & Lewis Index; SRMR: quadratic standardized residual; RMSEA: square root of mean error; I.C: Confidence interval.

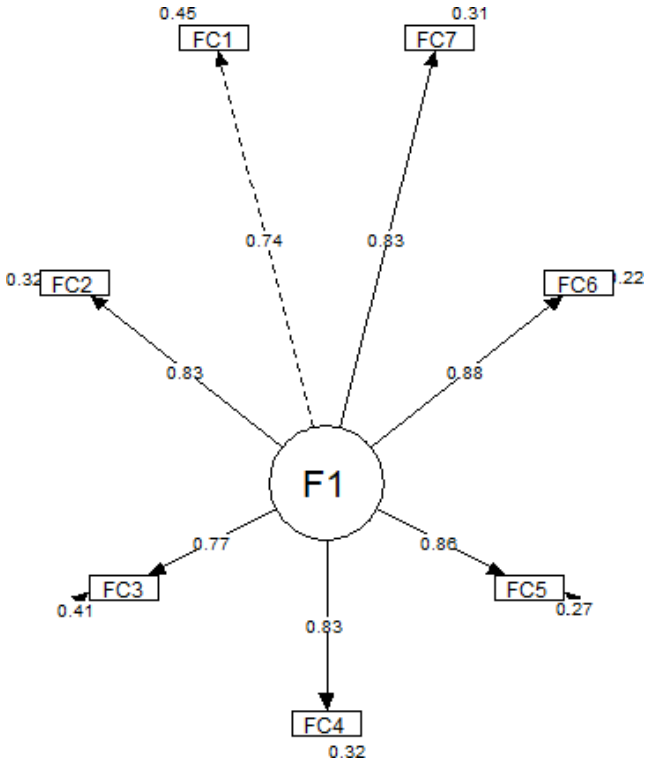
Table 3
Description of the loads of the one-dimensional model with 7 items of the cognitive fusion instrument (CFQ-7)

Items	*CF*	*P value*	*Estimator*
FG1	0.80	0.001	1.000
FG2	0.86	0.001	1.060
FG3	0.82	0.001	1.015
FG4	0.85	0.001	1.051
FG5	0.88	0.001	1.083
FG6	0.90	0.001	1.106
FG7	0.87	0.001	1.070

Note: CF: factor load; p value: statistical significance.

Confirmatory factor analysis (CFA) revealed the factor loads of the items of the cognitive fusion instrument, showing elevated values ranging from 0.80 to 0.90 (Gana & Broc, 2019). These results suggest that the model has a potentially one-dimensional structure.

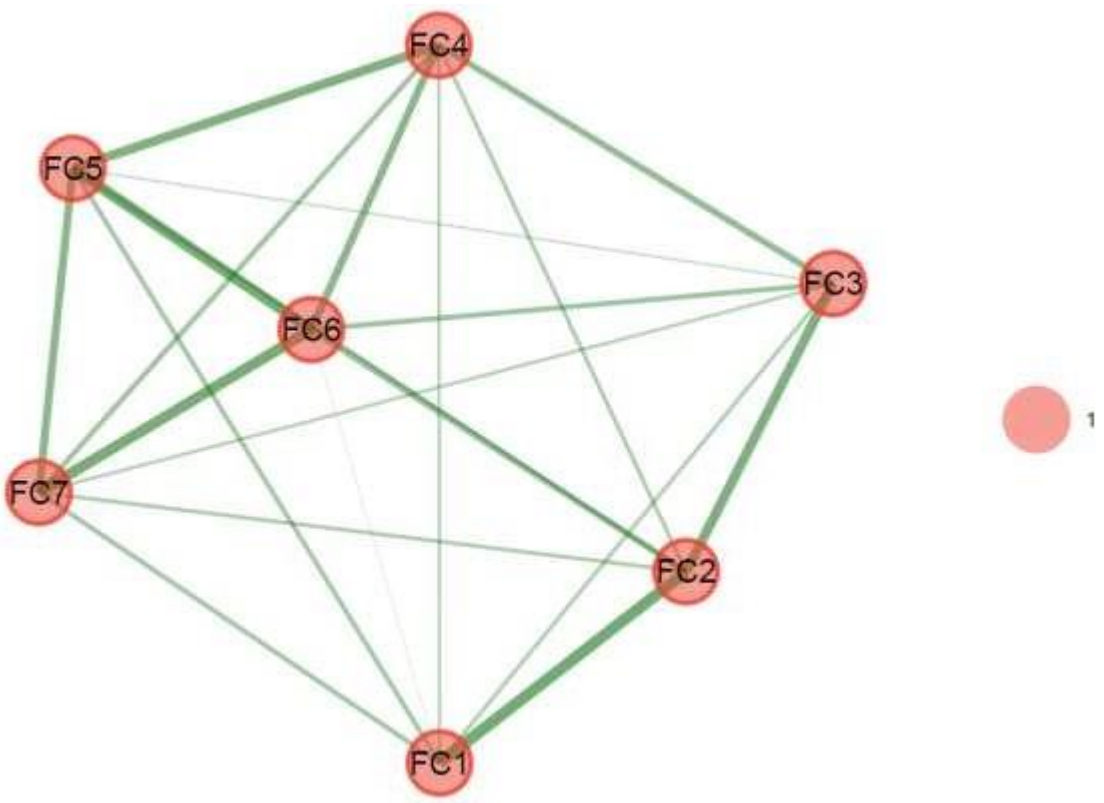
Figure 1
Model of the cognitive fusion instrument (CFQ-7) using confirmatory factor analysis based on the WLSMV estimator



Note: F1: Cognitive Fusion; the graph was made using the R *studio* software v.4.3.2 based on the scripts: *semplot* and *sempath.*

From a non-centrality perspective, the network graph between the items is presented based on a resampling carried out 500 times. The results show that the cognitive fusion instrument supports the one-dimensionality of the construct. The nodes or observable variables in red are closely related to the seven items (see Figure 2), suggesting that the observable variables fit the theoretical framework of the construct. In addition, it is observed that the nodes exhibit forces that vary in thickness, from minor to greater. Item 1 has weak connections with items 7, 5 and 4; however, it connects more strongly with them through items 2, 3 and 6. Item 2 has weaker connectivity to items 7 and 4, but is more closely connected to them by items 3 and 6. Item 3 shows weaker connectivity to items 7 and 5, although it connects to them through items 4 and 6. Item 4 has weaker connectivity with item 2, but is linked to it through item 3. Item 5 connects less to item 3, but establishes that connection through items 4 and 6. Item 6 has weaker connectivity with item 1, but is linked to it through item 2. Finally, item 7 shows weaker connectivity with items 3 and 1, but connects to them through items 5 and 6.

Figure 2
Exploratory Graphic Evidence of Psychometric Networks Using the 500 Sample Replicas (BootEGA)



Note: Graph made using R *studio* software v. 4.3.2

In relation to the descriptive data of the EGA, presented in Table 4, the 500 replicates used in the cognitive fusion instrument were described, which determined the unidimensionality from the median. This suggests that the weighted scores correspond to a single theoretical domain. The standard error (SE) presented a value of 0, which indicates the absence of variability in the dimensional estimates, reaffirming the one-dimensional consistency of the construct. Regarding the confidence intervals (CI), a value of 1 was observed in both the minimum and maximum range, which also supports one-dimensionality. Finally, the dimensional quartiles showed a value of 1 at the minimum and maximum limits.

Table 4
Dimensional descriptive analysis of the cognitive fusion instrument from 500 sample replicates

Boots	*median.dim*	*SE.dim*	*IC dim*	*Minimum CI*	*Maximum CI*	*C minimum*	*C max*
500	1	0	0	1	1	1	1

Note: Boots: Number of repetitions; median: median; dim: dimensional; SE: standard error; CI: Confidence interval; C: quartiles

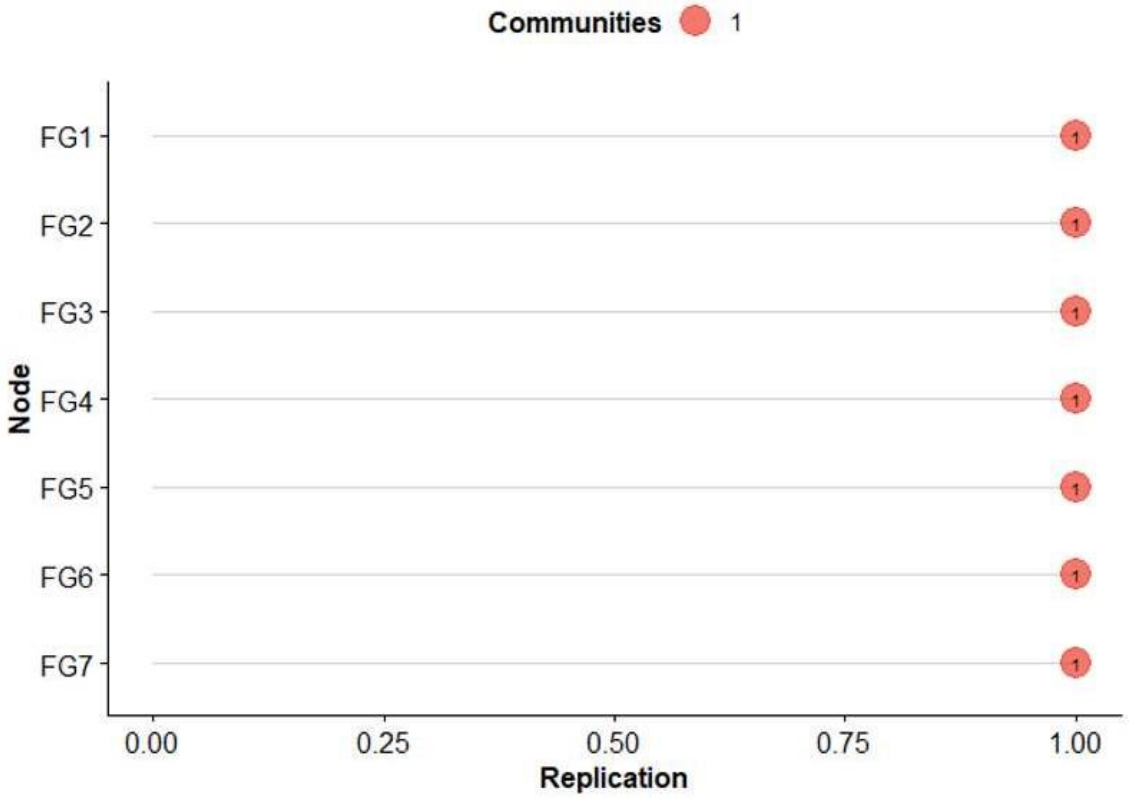
Table 5 shows the structural consistency of the cognitive fusion construct, where the values of its seven items are equal to 1 (see Figure 3), which indicates the stability towards a single domain that aligns with the theoretical construct.

Table 5
One-dimensional structural consistency of the cognitive fusion instrument (CFQ-7)

	Domain 1	Charge λ
Model: 7 items	item1	1
	item2	1
	item3	1
	item4	1
	item5	1
	item6	1
	item7	1

Note: Proficiency is equivalent to factor in the technical language of EGA; λ: lambda charge

Figure 4
Graphical evidence of the stability of the items towards a single domain



Note: Chart made in R Studio Software 4.3.2

Analysis of relationships with other variables
In Table 6, the results indicate that Cognitive Fusion has a negative effect on life satisfaction (estimator = -0.34, $p < 0.01$) and a significant positive effect on depression (estimator = 0.77, $p < 0.01$), anxiety (estimator = 0.73, $p < 0.01$), stress (estimator = 0.74, $p < 0.01$) and experiential avoidance measured by the AAQ-II (estimator = 0.80, $p < 0.01$). All relationships showed statistically significant values ($p < 0.05$), confirming the research hypotheses and evidencing convergent associations between the variables analyzed.

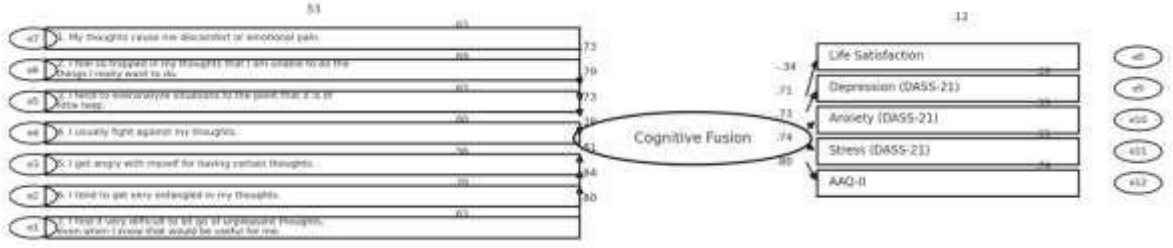
Table 6
Predictive analysis of CFQ-7 in the face of convergent variables

			Estimator	H.E.	C.R.	*p*
SWLS	<---	Cognitive fusion	-0.34	0.111	-15.719	0.01
Depression	<---	Cognitive fusion	0.77	0.077	38.973	0.01
Anxiety	<---	Cognitive fusion	0.73	0.074	36.266	0.01
Stress	<---	Cognitive fusion	0.74	0.073	37.284	0.01
AAQII	<---	Cognitive fusion	0.80	0.146	46.541	0.01

Note: SWLS: life satisfaction; AAQII: action and care questionnaire; S.E: standard deviation; C.R: critical ratio; *p* value: statistical significance

Figure 2 graphically illustrates the validity model of the CFQ-7 construct in relation to convergent variables. The standardized factor loads reflect significant associations, with values ranging from 0.53 to 0.84 for the CFQ-7 items, which supports the robustness of the construct measurement.

Figure 2



Construct validity evidence graph (CFQ-7) related to convergent variables.

Note: Graph made using Amos Software version 28.

Evidence of fairness
Table 7 progressively presents the configural, scalar (threshold), metric, and residual invariances (Wu & Estabrook, 2016), calculated using the WLSMV estimator (Brown, 2015). The results showed optimal adjustments in all invariances, with values of the comparative index (CFI) ranging between 0.970 and 0.976. Likewise, values of statistical significance below the tolerable cut-off point ($p < 0.05$) were observed, which supports the hypothesis proposed by indicating that the observed differences are not statistically significant. This implies that the scores of the instrument do not present bias of discrimination between men and women.

Table 7
Descriptive matrix of restrictive configural, scalar, metric, and residual invariance according to sex

Invariance	*x2*	*Gl*	*x2/gl*	*p*	CFI	RMSEA	ΔCFI	ΔRMSEA
Configural	275.96	28	9.855	—	0.976	0.090	—	—
Scalar	284.27	34	8.360	0.000	0.975	0.082	0.000	0.008
Metric	315.50	40	7.887	0.000	0.973	0.080	0.002	0.003
Residual	349.37	47	7.433	0.000	0.970	0.077	0.003	0.003

Grade: x2: chi-square; gl: degrees of freedom; p: value of statistical significance; CFI: Comparative Adjustment Index; RMSEA: square error of approximation; ΔCFI: CFI difference; ΔRMSEA: RMSEA difference.

Reliability
Table 8 shows that the model presented various reliability measures with adequate values (Sánchez-Meca et al., 2021), which supports the one-dimensionality of the instrument composed of seven items. The coefficients

obtained were: Cronbach's alpha (0.94), ordinal alpha (0.95), omega (0.94), omega2 (0.94) and extracted mean variance (AVE) of 0.73.

Table 8
Reliability through internal instrument consistency (FCQ-7)

	Cognitive Fusion
A	0.94
α ordinal	0.95
oh	0.94
Omega 2	0.94
Omega 3	0.94
AVE	0.73

Note: α: Alpha coefficient; ω: Omega coefficient; ω2: Omega 2 coefficient; ω3: Omega 3 coefficient; AVE: Avevar coefficient.

DISCUSSION

The purpose of this research was to verify the validity and reliability of the "Cognitive Fusion Questionnaire" in its 7-item version (CFQ-7), as well as to confirm the one-dimensional factor structure of the CFQ-7 in the Peruvian population. In addition, we searched for evidence from various sources of validity, including the relationship with other convergent variables, the analysis of invariances and reliability using different methods, such as ordinal alpha, omega and Avevar. An exploratory graphical analysis was also carried out using the network technique (EGA) to confirm the one-dimensional consistency of the CFQ-7 construct. Based on these aspects, specific objectives were established to achieve the general objective.

The descriptive analysis of the items of the CFQ-7 questionnaire showed adequate variability in the responses, with an answer format below 80% in each option of the ordinal scale. Dispersion measures revealed adequate results, with means between 3.18 and 3.61, standard deviations from 1.49 to 1.63, asymmetry from 0.11 to 0.33, and kurtosis from 0.58 to 0.81, within the range of a normal distribution (Cheng, 2015). The results were consistent with previous studies, showing similar values in asymmetry and kurtosis. The commonalities and correlations of the items were satisfactory, with values above 0.40 (ritc: 0.69 to 0.82), which coincides with previous research (Kline, 2016). Overall, the preliminary results indicated that the items are well associated with each other and with the latent variable, suggesting adequate responses from participants to the CFQ-7 instrument. Finally, 233 participants were excluded because they had outliers, identified through z-scores greater than 3 and Mahalanobis distances outside the tolerable limit ($p<0.01$).

The research used factor and psychometric network analysis to validate the unidimensionality of the Cognitive Fusion Questionnaire (CFQ-7). Factor analysis showed optimal indices (CFI= 0.99; TLI= 0.98; SRMR= 0.02; RMSEA= 0.06), which confirms a good fit to the hypothetical model (Schumacker & Lomax, 2016). These results are consistent with previous studies, such as Donati et al. (2021), Zacharia et al. (2021), Hekmati et al. (2020), and others, whose fit indices were consistent with the original version (Gillanders et al., 2014) and its adapted model (Ruíz et al., 2017). The study used the WLSMV estimator, suitable for ordinal data, in contrast to previous studies that employed estimators such as MLR, which may be unsuitable for this design (Brown, 2015). For the first time, the network psychometric approach was applied using Exploratory Graphical Analysis (EGA), which confirmed the one-dimensional consistency of CFQ-7. The instrument items (FC1 to FC7) showed significant loads and were interconnected in a network by nodes and edges, indicating the representation of a single latent domain. This analysis used the GLASSO method to estimate partial correlations and reduce spurious relationships (Tibshirani, 1996; Christensen & Golino, 2021). The wording of the items reflects the theoretical foundation of ACT (Hayes et al., 2021), which conceptualizes cognitive fusion as assuming thoughts as real events that negatively affect behavior.

In the study, the convergent and divergent validity of the CFQ-7 was evaluated, evidencing significant associations ($p < 0.05$) with five dependent variables: satisfaction with life (SWLS), depression, anxiety, stress (DASS-21) and acceptance and action (AAQ-II). SWLS showed a negative relationship with cognitive fusion, in line with previous studies (Donati et al., 2021; Hekmati et al., 2020; Morais et al., 2019; Flynn et al., 2018; Ruíz et al., 2017). On the other hand, DASS-21 and AAQ-II constructs showed positive associations with cognitive fusion, consistent with previous research (Donati et al., 2021; Zacharia et al., 2021; Hekmati et al., 2020; Oppo et al., 2019; Valencia & Falcón, 2019; China et al., 2018; Flynn et al., 2018; Ruíz et al., 2017). Specifically, Valencia

and Falcón (2019) reported CFI indices = 0.976, TLI= 0.964, RMSEA= 0.081 and SRMR= 0.033, with factor loads between 0.70 and 0.85, while Ruíz et al. (2017) also supported these findings. These results support the ability of CFQ-7 to measure cognitive fusion, defined as the inflexible integration of ruminating and negative thoughts that are assumed to be absolute truths that affect the perception of the self (Hayes et al., 2014; Gillanders et al., 2014). In short, the theoretical model of cognitive fusion is validated by showing coherent relationships with other related constructs.

The analysis of invariance of the CFQ-7 according to sex showed that there are no significant differences between men and women in the conceptualization of cognitive fusion. This finding coincides with previous research such as Donati et al. (2021), who evaluated invariance in the clinical population (M= 32.38; SD= 7.23) and non-clinical (M= 25.50; SD= 8.55) using the chi-square with statistical significance less than 0.05. Valencia and Falcón (2019) used differences in the CFI index and obtained: Configural (ΔCFI= 0.973), Metric (ΔCFI= 0.02), Scalar (ΔCFI= 0.02) and Strict (ΔCFI= 0.01). Other studies, such as that of Ruíz et al. (2017), also reported ΔCFI values ≤ 0.01, indicating equivalence in different demographic groups.

Invariance was evaluated following the model of Wu and Strabrook (2016), which classifies hierarchical levels of invariance as configural (factor structure), metric (equivalent factor loads), scalar (equivalent intercepts), and strict (equivalence in covariances and variances). This approach ensures consistent measurements across groups. Additionally, the criteria of Chen (2007) were considered, which recommend the use of CFI and RMSEA due to their robustness against the sample size, instead of the chi-square, which is more sensitive. These results and robust methodologies validate the equivalence of CFQ-7 in different sex groups and support its usefulness in measuring cognitive fusion, defined as excessive rumination of adverse thoughts that affect psychological well-being (Romero-Moreno et al., 2014; Gaudiano & Herbert, 2006).

The reliability of the CFQ-7 instrument was evaluated using Cronbach's alpha, McDonald's Omega and AVEVAR coefficients, showing optimal values (α = 0.96; AVE = 0.73). These results are consistent with previous studies: Donati et al. (2021) reported rTIF = 0.90; Zacharia et al. (2021), α = 0.96; Quintero et al. (2020), α = 0.89; Oppo et al. (2019), α = 0.82; Donati et al. (2021), α = 0.88; Valencia and Falcón (2019), ω = 0.91; China et al. (2018), α = 0.95 (clinical sample) and α = 0.94 (non-clinical sample); De Paula et al. (2018), α = 0.909; Flynn et al. (2018), α = 0.96; and Ruíz et al. (2017), α = 0.93. These results support the interpretative stability and minimization of false negatives in CFQ-7 (Ponterotto & Ruckdeschel, 2007). Cronbach's alpha coefficient, although widely used, assumes tau-equivalence, which may restrict its application when items exhibit variability (Dunn et al., 2014). In contrast, the Omega coefficient does not require tau-equivalence, being more flexible and robust to assess the internal consistency of the instrument (Revelle & Zinbarg, 2009; McDonald, 1999). This allows specific and common variances to be interpreted more accurately, overcoming the limitations of alpha in one-dimensional measurements. The average extracted variance (AVEVAR) presented acceptable values (AVE = 0.73), indicating a convergent reliability of the latent construct. This means that the variance explained by the items is greater than that attributed to measurement errors (Fornell & Larcker, 1981; Chin, 1998). In summary, the results confirm the stability of the CFQ-7 scores and associations, supporting its use in clinical contexts to evaluate cognitive fusion, with a cut-off point > 0.90 (Prieto & Delgado, 2010).

The main limitations of the study include the use of non-probability sampling for convenience, which limits external validity and restricts the generalizability of findings (Ato et al., 2013; Ñaupas et al., 2014). In addition, the cross-sectional design prevented the evaluation of the stability of the scores over time, suggesting longitudinal studies that use the test-retest coefficient (Prieto & Delgado, 2010). Although the sample was large (n = 2218), the scale was not evaluated using Item Response Theory (IRT), and its future application was recommended to analyze the difficulty and functioning of items at different trait levels (Lord, 1980). The lack of reporting on the statistical processes and software used in some previous studies was identified (Donati et al., 2021; Berrocal, 2019; Oppo et al., 2019; Ruíz et al., 2017). On the other hand, research such as that of Zacharia et al. (2021), Quintero et al. (2020), Morais et al. (2021) and Flynn et al. (2018) used SPSS and AMOS, while others opted for R Studio and its advanced packages, highlighting its flexibility, efficiency and free access for psychometric research (Rossseel, 2012).

Despite these limitations, the CFQ-7 demonstrated one-dimensionality and adequate results in validity (internal structure and convergent relationship), invariance by sex, and reliability (alpha ordinal, omega, and AVEVAR), evidencing its psychometric robustness.

CONCLUSIONS

In summary, based on the results, their analysis and interpretation, it is concluded that the CFQ-7 presents solid evidence of validity and reliability in a sample of Lima parents. Therefore, its use in future studies or in psychological screening processes is supported, guaranteeing the obtaining of data that allow the user to make accurate conclusions and inferences based on the results of the measurement.

Acknowledgment
The authors express their gratitude to all the people who participated and were part of the study sample, acknowledging their valuable contribution to the advancement of psychological science in the field of measurement.
Sources of funding:
Financed
Role of the authors:
MCHC: Design conception, manuscript writing, analysis and interpretation of results, and review.
ACN, JCL, VMV, LVB: Writing the manuscript, interpreting the results and proofreading.
Conflict of interest:
The authors assure, under formal declaration, that they have not incurred any conflict of interest during the preparation of this article.

REFERENCES

Ato, M., López, J., & Benavente, A. (2013). A classification system of research designs in psychology. *Annals of Psychology, 29*(3), 1038-1059. https://doi.org/10.6018/ANALESPS.29.3.178511

Brown, T. A. (2015). *Confirmatory factor analysis for applied* research (2a ed.). Nueva York: Guilford Press.

Browne, M. W., & Cudeck, R. (1992). Alternative Ways of Assessing Model Fit. *Sociological Methods & Research, 21*(2), 230–258. https://doi.org/10.1177/0049124192021002005

Chen, F. F. (2007). Sensitivity of Goodness of Fit Indexes to Lack of Measurement Invariance. *Structural Equation Modeling, 14*(3), 464-504. https://doi.org/10.1080/10705510701301834

Cheng, L. (2015). Confirmatory factor analysis with ordinal data: Comparing robust maximum likelihood and diagonally weighted least squares. *Behavior research methods, 48*(3), 936-949. https://doi.org/10.3758/s13428-0150619-7

Cheung, G., & Rensvold, R. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal, 9*(2), 233-255. https://doi.org/10.1207/S15328007SEM0902_5

Chin, W. W. (1998). The Partial Least Squares Approach to Structural Equation Modeling. En G. A. Marcoulides (Ed.), *Modern Methods for Business Research* (pp. 295-336). Mahwah, NJ: Lawrence Erlbaum Associates.

China, C., Hansen, L. B., Gillanders, D. T., & Benninghoven, D. (2018). Concept and validation of the German version of the Cognitive Fusion Questionnaire (CFQ-D). *Journal of Contextual Behavioral Science, 9*, 30–35. https://doi.org/10.1016/j.jcbs.2018.06.003

Christensen, A. P., & Golino, H. (2021). On the equivalency of factor and network loadings. *Behavior Research Methods, 53*(4), 1563–1580. https://link.springer.com/article/10.3758/s13428-020-01500-6

Clauss, K., & Bardeen, J. (2022). The interactive effect of mental contamination and cognitive fusion on anxiety. *Journal of Clinical Psychology, 78*(4), 517-525. https://doi.org/10.1002/jclp.23224

Costa, J. A., Marôco, J., & Pinto-Gouveia, J. (2017). Validation of the psychometric properties of cognitive fusion questionnaire. A study of the factorial validity and factorial invariance of the measure among osteoarticular disease, diabetes mellitus, obesity, depressive disorder, and general populations. *Clinical Psychology & Psychotherapy, 24*(5), 1121-1129. https://doi.org/10.1002/cpp.2077

Cox, R. C., Taylor, S., Strachan, E., & Olatunji, B. O. (2020). Insomnia and posttraumatic stress symptoms: Evidence of shared etiology. *Psychiatry research, 286*, 112548. https://doi.org/10.1016/j.psychres.2019.112548

De Paula, J. J., Costa, D. S., de Miranda, D. M., & Romano-Silva, M. A. (2018). Brazilian version of the Cognitive Failures Questionnaire (CFQ): cross-cultural adaptation and evidence of validity and reliability. *Revista Brasileira de Psiquiatria, 40*(3), 312–315. https://doi.org/10.1590/1516-4446-2017-2227

Dionne, F., Gagnon, J., Balbinotti, M., Peixoto, E. M., Martel, M. E., Gillanders, D., & Monestès, J. L. (2016). "Buying into thoughts": Validation of a French translation of the Cognitive Fusion Questionnaire. *Canadian Journal of Behavioural Science, 48*(4), 278-285. https://doi.org/10.1037/cbs0000053

Donati, M. A., Berrocal, C., Bernini, O., Gori, C., & Primi, C. (2021). Measuring cognitive fusion through the Cognitive Fusion Questionnaire-7: Measurement invariance in clinical and non-clinical psychological samples. *PLoS ONE 16*(2), e0246434. https://doi.org/10.1371/journal.pone.0246434

Dunn, T. J., Baguley, T., & Brunsden, V. (2014). From alpha to omega: A practical solu-tion to the pervasive problem of internal consistency estimation. *British Journal of Psychology, 105*(3), 399–412. https://doi.org/10.1111/bjop.12046

Faustino, B. & Vasco, A. (2020). Schematic Functioning, Interpersonal Dysfunctional Cycles and Cognitive Fusion in the Complementary Paradigmatic Perspective: Analysis of a Clinical Sample. *Journal of Contemporary Psychotherapy, 50*, 47–55. https://doi.org/10.1007/s10879-019-09422-x

Faustino, B., Vasco, A.B., Farinha-Fernandes, A. (2023). Psychological inflexibility as a transdiagnostic construct: relationships between cognitive fusion, psychological well-being and symptomatology. *Current Psychology. 42*, 6056–6061. https://doi.org/10.1007/s12144-021-01943-w

Flynn, M. K., Hernandez, J. O., Hebert, E. R., James, K. K., & Kusick, M. K. (2018). Cognitive fusion among hispanic college students: Further validation of the Cognitive Fusion Questionnaire. *Journal of Contextual Behavioral Science, 7*, 29–34. https://doi.org/10.1016/j.jcbs.2017.11.003

Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, *18*(1), 39-50.

Gana, K., & Broc, G. (2019). *Structural Equation Modeling with lavaan*. Wiley-ISTE. https://cutt.ly/Mwy1i0Wl

Gaudiano, B. A., & Herbert, J. D. (2006). Acute treatment of inpatients with psychotic symptoms using Acceptance and Commitment Therapy: pilot results. *Behaviour research and therapy*, *44*(3), 415–437. https://doi.org/10.1016/j.brat.2005.02.007

Gillanders, D. T., Bolderston, H., Bond, F. W., Dempster, M., Flaxman, P. E., Campbell, L., Kerr, S., Tansey, L., Noel, P., Ferenbach, C., Masley, S., Roach, L., Lloyd, J., May, L., Clarke, S., & Remington, B. (2014). The Development and Initial Validation of the Cognitive Fusion Questionnaire. *Behavior Therapy*, *45*(1), 83-101. https://doi.org/10.1016/j.beth.2013.09.001

Goretzko, D., Pham, T. T. H. y Bühner, M. (2019). Exploratory factor analysis: Current use, methodological developments, and recommendations for good practice. *Current Psychology*, *40*(7), 3510–3521. https://doi.org/10.1007/s12144-019-00300-2

Harris, M. J. (2009). *Bullying, rejection, and peer victimization: A social cognitive neuroscience perspective.* Springer Publishing Company.

Hayes, S. C., Barnes-Holmes, D., & Roche, B. (2021). *Relational Framework Theory: A Post-Skinnerian Approach to Human Cognition and Language.* ABA

Hayes, S. C., Strosahl, K. D. y Wilson, K. G. (2011). *Acceptance and commitment therapy. The process and practice of mindful change* (2ª ed.). Guilford Press

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2014). *Acceptance and commitment therapy. Process and practice of conscious change (Mindfulness).* Desclée de Brouwer. https://books.google.es/books?hl=es&lr=&id=IMjyDQAAQBAJ&oi=fnd&pg=PT3&dq=Hayes,+S.+C.,+Strosahl,+K.+D.,+%26+Wilson,+K.+G.+(2014).+Therapy+of+acceptance%C3%B3n+and+commitment.+Process+and+pr%C3%A1ctica+del+cambio+conscious+&ots=OY9nvCIyev&sig=rWBhjPChD7I3vCocL5iguLCVQnU#v=onepage&q&f=false

Hekmati, I., Ranjbar, H. A., & HajiSaghati, R. (2020). Persian adaptation of avoidance and fusion questionnaire for youth (AFQ-Y): A preliminary examination of its psychometric properties. *Journal of Contextual Behavioral Science, 17*, 46–54. https://doi.org/10.1016/j.jcbs.2020.05.004

Hernández, J. (2020). Impact of COVID-19 on people's mental health. *Medicentro Electrónica*, *24*(3), 578-594. http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1029-30432020000300578&lng=es&tlng=es.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Quintero, P. S., Rodríguez, R., Etchezahar, E., & Gillanders, D. T. (2020). The Argentinian version of the cognitive fusion questionnaire: Psychometric properties and the role of cognitive fusion as a predictor of pathological worry. *Current Psychology*, 1–12. https://doi.org/10.1007/s12144-020-00767-4

Khatun, N. (2021). Applications of normality test in statistical analysis. *Open Journal of Statistics*, *11*(1), 113–122. https://doi.org/10.4236/ojs.2021.111006

Kim, B. O., & Cho, S. (2015). Psychometric properties of a Korean version of the Cognitive Fusion Questionnaire. *Social Behavior and Personality: an international journal*, *43*(10), 1715-1723. https://doi.org/10.2224/sbp.2015.43.10.1715

Kline, B. R. (2016). *Principles and Practice of Structural Equation Modeling*. (4a ed). The Guilford Press.

Lloret-Segura, S., Ferreres-Traver, A., Hernández-Baeza, A., & Tomás-Marco, I. (2014). Exploratory factor analysis of items: a practical, revised and updated guide. *Annals of Psychology*, *30*(3), 1151–1169. https://doi.org/10.6018/analesps.30.3.199361

Lord, F. M. (1980). *Applications of item response theory to practical testing problems*. Lawrence Erlbaum Associates.

Lozano-Vargas, A. (2020). Impact of the Coronavirus (COVID-19) epidemic on the mental health of health personnel and the general population of China. *Journal of Neuro-Psychiatry, 83*(1), 51-56. https://doi.org/10.20453/rnp.v83i1.3687

McDonald, R. P. (1999). *Test Theory: A Unified Treatment*. Lawrence Erlbaum Associates.

Morais, E., Corte, G., Gagnon, J., Ataka da Rocha, G. M., de Cássia Nakano, T., Sacramento Zanini, D., & Balbinotti, M. A. A. (2019). Cognitive Fusion Questionnaire (CFQ): new evidence of cross-cultural validity and invariance. *PSYCHO, 50*(1), 1–11. https://doi.org/10.15448/1980-8623.2019.1.27851

Ñaupas, H., Valdivia, M., Palacios, J., & Romero, H (2014). *Methodology of quantitative-qualitative research and thesis writing* (5th ed.). Ediciones de la URP. https://corladancash.com/wpcontent/uploads/2020/01/Metodologia-de-la-inv-cuanti-y-cuali-HumbertoNaupas-Paitan.pdf

Oppo, A., Prevedini, A. B., Dell Orco, F., Dordoni, P., Presti, G., Gillanders, D. T., & Moderato, P. (2019). Fusion and Defusion. Adaptation and psychometric properties of the Italian version of the Cognitive Fusion Questionnaire (I-CFQ). *Psicoterapia Cognitiva e Comportamentale, 25*(1), 53–74. https://hdl.handle.net/11387/137508

World Health Organization (2022). The COVID-19 pandemic increases the prevalence of anxiety and depression worldwide by 25%. https://www.who.int/es/news/item/02-03-2022-covid-19-pandemic-triggers-25-increase-in-prevalence-of-anxiety-and-depression-worldwide

Ponterotto, J. G., & Ruckdeschel, D. E. (2007). An overview of coefficient alpha and a reliability matrix for estimating adequacy of internal consistency coefficients with psychological research measures. *Perceptual and motor skills, 105(*3), 997–1014. https://doi.org/10.2466/pms.105.3.997-1014

Prieto, G. & Delgado, A. R. (2010). Reliability and validity. *Psychologist Papers, 31*(1), 67-74. www.papelesdelpsicologo.es/pdf/1797.pdf

R Core Team (2021). R: A Language and environment for statistical computing. (Version 4.0) [Computer software]. https://cir.nii.ac.jp/crid/1370579814635375110

Ramos, J., Rodríguez, A., Sánchez, A., & Mena, A. (2018). Cognitive fusion in personality disorders: a contribution to research on mechanisms of change. *Clínica y Salud, 29*(2), 49-57. https://dx.doi.org/10.5093/clysa2018a8

Revelle, W., Zinbarg, R.E. (2009). Coefficients Alpha, Beta, Omega, and the glb: Comments on Sijtsma. *Psychometric, 74*, 145–154. https://doi.org/10.1007/s11336-008-9102-z

Romero-Moreno, R., Márquez-González, M., Losada, A., Gillanders, D., & Fernández-Fernández, V. (2014). Cognitive fusion in dementia caregiving: Psychometric properties of the Spanish version of the "Cognitive Fusion Questionnaire". *Behavioral Psychology/Psicología Conductual, 22*(1). https://www.researchgate.net/profile/Andres-Losada-3/publication/266030695_Cognitive_fusion_in_dementia_caregiving_psychometric_properties_of_the_Spanish_version_of_the_Cognitive_Fusion_Questionnaire/links/54d874bd0cf25013d03dfd62/Cognitive-fusion-in-dementia-caregiving-psychometric-properties-of-the-Spanish-version-of-the-Cognitive-Fusion-Questionnaire.pdf

Rosseel, Y. (2012). Lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software, 48*(2), 1–36.

Ruitón-Rivera, Y. M. (2019). *Psychometric properties of the cognitive fusion questionnaire (CFQ) in students of a public university in Metropolitan Lima* [Thesis, Universidad Nacional Federico Villarreal]. Institutional Repository – UNFV. https://alicia.concytec.gob.pe/vufind/Record/RUNF_0e3fa0a8bd1841d2b8936ff1ac4de202

Ruíz, F. J., Suárez-Falcón, J. C., Riaño-Hernández, D., & Gillanders, D. (2017). Psychometric properties of the Cognitive Fusion Questionnaire in Colombia. *Revista Latinoamericana de Psicología, 49*(1), 80-87. https://doi.org/10.1016/j.rlp.2016.09.006

Ruiz, F. J., Suárez-Falcón, J. C., Segura-Vargas, M. A., & Gil-Luciano, B. (2022). Psychometric properties of the spanish version of the Valuing Questionnaire in Colombian clinical and nonclinical samples. *Journal of Clinical Psychology, 78*(2), 233–248. https://doi.org/10.1002/jclp.23212

Sahoo, M. (2019). Structural Equation Modeling: Threshold Criteria for Assessing Model Fit. In S. Mishra y R. N. Subudhi (Eds.), *Methodological Issues in Management Research: Advances, Challenges, and the Way Ahead* (pp. 269-276). Emerald Publishing Limited. https://doi.org/10.1108/978-1-78973973-220191016

Sánchez-Meca, J., Marín-Martínez, F., López-López, J. A., Núñez-Núñez, R. M., Rubio-Aparicio, M., López-García, J. J., López-Piña, J. A., Blázquez- Rincón, D. M., López-Ibáñez, L. C., & López-Nicolás, R. (2021). *Improving the reporting quality of reliability generalization meta-analyses: the REGEMA checklist.* Research Synthesis Methods. https://doi.org/10.1002/jrsm.1487

Shrestha, N. (2021). Factor Analysis as a Tool for Survey Analysis. *American Journal of Applied Mathematics and Statistics, 9*(1), 4-11. https://doi.org/10.12691/ajams-9-1-2

Solé, E., Racine, M., Castarlenas, E., de la Vega, R., Tomé-Pires, C., Jensen, M., & Miró, J. (2016). The psychometric properties of the Cognitive Fusion Questionnaire in adolescents. *European Journal of Psychological Assessment, 32*(3), 181-186. https://doi.org/10.1027/1015-5759/a000244

Tibshirani, R. (1996). Regression Shrinkage and Selection via the Lasso. Journal of the Royal Statistical Society. *Series B (Methodological), 58*(1), 267–288. http://www.jstor.org/stable/2346178

Valencia, P., & Falcón, C. (2019). Factor structure of the Cognitive Fusion Questionnaire in university students from Lima. *Interacciones, 5*(2), e167. https://doi.org/10.24016/2019.v5n2.167

Wu, H. y Estabrook, R. (2016). Identification of confirmatory factor analysis models of different levels of invariance for ordered categorical outcomes. *Psychometrika, 81*(4), 1014–1045. https://doi.org/10.1007/s11336-016-9506-0

Zacharia, M., Ioannou, M., Theofanous, A., Vasiliou, V. S., & Karekla, M. (2021). Does Cognitive Fusion show up similarly across two behavioral health samples? Psychometric properties and invariance of the Greek–Cognitive Fusion Questionnaire (G-CFQ). *Journal of Contextual Behavioral Science, 21,* 212–221. https://doi.org/10.1016/j.jcbs.2021.01.003