# Construction and Psychometric Properties of a Scale to Measure the Influence of Digital Filters on Cognitive Distortions in Female University Students from Trujillo

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## ABSTRACT

**Background/Objectives:** Cognitive distortions are errors in thinking that lead individuals to misinterpret reality; they are beliefs perceived as true, although they may, in some cases, be inaccurate. The primary objective of this study was to develop and determine the reliability and validity of a scale designed to measure the impact of digital filters on cognitive distortions among women aged 18 to 25 years in Trujillo. **Methods:** This was an instrumental study focused on the construction and psychometric evaluation of the instrument. A total of 550 female university students from Trujillo participated, ranging in age from 18 to 25 years (M = 21.3; SD = 2.1). **Results:** Exploratory factor analysis revealed three dimensions: *Use and Exposure to Filters*, *Self-Image and Social Comparison*, and *Emotional Impact*. Confirmatory factor analysis indicated an adequate fit for the three-factor model (CFI = 0.93, RMSEA = 0.08, SRMR = 0.03). Reliability indices were satisfactory, with omega = 0.97 and alpha = 0.97. **Conclusions:** The *Scale of Distorted Cognitions Related to the Use of Digital Filters (ECDFD)* was developed based on solid theoretical foundations and demonstrated strong psychometric properties for use in university settings. It provides evidence of content and construct validity, as well as high reliability, supporting its utility in assessing different dimensions of cognitive distortions in female university students.



**Keywords:** Use and exposure to filters, Self-image and social comparison, Cognitive distortions related to the use of filters.

## I. Introduction

Cognitive distortions are errors in thinking that lead individuals to misinterpret reality; they are beliefs perceived as true, although they may in fact be inaccurate. These distorted ideas influence how people perceive the world and may affect their behavior, including the way they view themselves. In particular, such distortions can foster a negative perception of one's body, undermining emotional well-being and self-image (García & Linares, 2020).

Empirical evidence has shown that 56% of women aged 21 to 25 report symptoms associated with body image concerns, including insecurity, low self-esteem, and anxiety. Among female university students, appearance-related worries are often concentrated on the face and abdomen, as these are perceived as the most visible parts of the body. These symptoms are significantly influenced by social media exposure (Dipré Ortiz & Font Peláez, 2022).

This study is aligned with Sustainable Development Goal (SDG) 3, which focuses on health and well-being, specifically Target 3.d, aimed at strengthening capacities particularly in developed countries to enhance early warning systems, reduce health risks, and effectively manage threats at both national and global levels. Within this framework, the present research addresses how cognitive distortions strongly affect body image, particularly among women, leading to consequences such as insecurity, social withdrawal, negative self-concept, and maladaptive behaviors. Social media plays a crucial role in this process by promoting idealized body types and unrealistic beauty standards that intensify these distortions.

In recent years, international research has consistently reported that the use of digital filters on social media significantly impacts the self-esteem and emotional well-being of young people aged 19 to 25. A study conducted in Asturias, Spain, with 825 adolescents found that 90.3% used Instagram, with the majority accessing the platform several times per day (70.3%). While 65% reported never applying filters to their posts, 37.3% acknowledged using them occasionally in stories. The study also revealed that women engage more frequently with Instagram to consume and publish content, as well as to apply filters to their photos. Moreover, Instagram use was found to increase with age,

although no significant differences were observed in filter use by age group (Gonzalez et al., 2025).

Similarly, a study in Concepción, Chile, focusing on female Instagram users, showed that 68% of participants experienced body image dissatisfaction due to constant comparison with filtered and stereotyped images. In addition, 62% reported low self-esteem directly linked to social media use, and 57% expressed a negative self-concept associated with pressure to conform to unrealistic beauty standards promoted on Instagram. These findings highlight how frequent exposure to idealized content negatively affects the mental and emotional health of young women, leading to feelings of anxiety, stress, and body dissatisfaction (Placencia & Zalaquett, 2024).At the national level, research has also begun to document the effects of social media and digital filter use on emotional health and body image perception, particularly among young people. In Trujillo, Peru, studies have addressed this issue directly. For instance, a 2023 investigation in Alto Moche involving 92 adolescents found that 65.2% reported high levels of social media use and 53.3% reported low self-esteem, confirming a statistically significant relationship between these variables. The study suggests that the more time young people spend online, the more vulnerable their self-concept becomes (Moreno & Perez, 2023).

Currently, some of the most widely used instruments to assess the influence of digital filters on cognitive distortions among female university students include the *Social Media Engagement Questionnaire* (SMEQ; Americana, 2021), the *Problematic Internet Use Questionnaire* (PIUQ; Pulido-Rull et al., 2011), the *Photo Editing Scale* (EFE; O'Neill, 2021), the *Bergen Instagram Addiction Scale* (BIAS; Chavez Santamaría & Vallejos-Flores, 2021), and the *Fear of Missing Out Scale* (FoMO; Martin & Simkin, 2023). While these tools are useful for identifying problematic patterns of digital addiction or fear of social exclusion, they do not specifically address the influence of digital filters on cognitive distortionsa key aspect of the mental health of young women exposed to unrealistic beauty standards. For this reason, the present instrument is justified by its integration of this underexplored dimension, allowing for the assessment of dysfunctional thoughts related to digital filters, body image, and social comparison, dimensions that are not fully captured by traditional tools.

In this study, the *Cognitive Distortions Scale* (CDS) conceptualizes the variable *Cognitive Distortions* as a set of negative thoughts that alter how an individual interprets reality. In the context of social media, digital filters conceal women's perceived physical

imperfections in order to display only an enhanced version of reality. In doing so, individuals either consciously or unconsciously abandon their authentic self, constructing an incomplete and distorted self-image while fostering a persona detached from reality. This process is often reinforced by the pursuit of social validation through likes, comments, or followers, and it promotes constant comparison with others as a way to feel superior (Mercado et al., 2023). According to Gómez (2024), cognitive distortions are composed of five dimensions:

Use and exposure to filters, is defined as the extent to which individuals use digital tools and the frequency with which they modify their appearance in photos or videos. This reflects a habitual search for a more idealized image, highlighting the sense of security these tools provide and the influence of beauty standards promoted on social media. Excessive use of filters becomes a routine in the way individuals present themselves and how they are perceived in their digital environment.

Self-image and social comparison, refers to the process by which an individual evaluates their physical appearance through comparisons with others, particularly on social media. This generates body dissatisfaction, critical and negative thoughts about one's body and face. Self-image is affected by the discrepancy between real and idealized appearance, leading to insecurity and frustration.

Cognitive distortions associated with filter use, influence the way a person thinks about themselves and their self-worth. Nowadays, women are the main users of filters, believing that only by looking perfect in photos will they be accepted or valued. These distorted thoughts may include the belief that without filters others will judge their appearance negatively. Such beliefs harm self-esteem and generate emotional dependence on edited images, causing individuals to feel insecure or dissatisfied with their real appearance.

Emotional impact, arises from the discrepancy between real appearance and the idealized image created by digital filters, which can trigger intense negative emotions such as sadness, anxiety, frustration, and insecurity. These emotions may become so strong that individuals avoid social situations or refuse to be photographed unless filters are applied.

Behaviors derived from filter use, emerge as a result of the emotions and thoughts associated with filters. Individuals often develop behaviors aimed at maintaining a perfect image on social media, such as taking numerous photos and sharing only compulsively edited ones. This pursuit of constant perfection limits authenticity, freedom, and

spontaneity in real-life experiences, creating a cycle where digital appearance becomes more important than everyday life and personal relationships.

On the other hand, psychometric properties are essential to ensure that an assessment instrument in psychology is accurate, consistent, and useful. These properties make it possible to determine whether a test measures the intended construct in a valid and reliable manner, thereby guaranteeing the quality of the data obtained (Galindo-Vázquez et al., 2022).

Reliability testing indicates whether a psychometric tool truly measures the characteristic for which it was designed, underscoring the importance of employing assessments adapted to a specific objective. Validity, however, refers to the extent to which these assessments align with established theories rather than being inherent qualities of the tests themselves. This distinction highlights the importance of accurately interpreting results, a critical aspect emphasized by Ávalos and Mendiola (2022), Different types of validation tests are considered in this process. Content validity reflects the degree to which an instrument adequately captures the concept under study. This is often confirmed through expert judgment, which stresses the importance of clarity, coherence, and relevance of each item (Maldonado & Santoyo, 2024), thereby ensuring alignment with the measurement objectives. Ultimately, the instrument must measure what it is intended to assess. Construct validity is examined using statistical methods such as exploratory factor analysis, which allows for the identification of factors or dimensions, creating a framework that aligns with the theoretical model of the test.

Finally, reliability refers to the degree of internal consistency of the instrument, that is, the stability of scores across items. A common method to evaluate this property is Cronbach's Alpha coefficient, which estimates the homogeneity among items within the same dimension (Romero et al., 2024).

Based on the aforementioned considerations, the following research question is proposed for this study: *Does the instrument developed to measure the influence of digital filters on cognitive distortions in women aged 18 to 25 from Trujillo meet the necessary psychometric properties to ensure a valid and reliable assessment?*

This research has merit from several perspectives. The tool provides psychologists, counselors, and educators with support in recognizing when individuals exhibit unhealthy thoughts about their behavior, which may affect the way they perceive themselves, their

self-esteem, and their ability to manage emotions. From a social standpoint, studies indicate that increasing numbers of young people reject the distorted images created by excessive use of filters, leading to negative emotions such as anxiety and low self-esteem. In conclusion, the aim of this research is to develop a validated and reliable assessment tool that can be used to thoroughly examine the phenomenon, ensuring consistent results across multiple studies.

The conceptual framework of this study integrates Beck's cognitive theory (1976), which defines cognitive distortions as systematic errors in thinking that alter reality perception; Festinger's (1954) theory of social comparison, emphasizing individuals' tendency to evaluate themselves based on others; and Goffman's (1959) notion of self-presentation, which posits that individuals manage their appearance to align with perceived social expectations. Together, these theories provide the foundation for understanding how digital filters intensify self-evaluative processes, reinforce perfectionistic standards, and contribute to the internalization of distorted self-perceptions in online environments.

The present research aims to construct and determine the reliability and validity of the scale designed to measure the impact of digital filters on cognitive distortions among women aged 18 to 25 in Trujillo. Following this approach, the specific objectives were: (1) to verify the content quality of the test through expert judgment, (2) to examine construct validity through exploratory and confirmatory factor analyses, and (3) to determine reliability using Cronbach's Alpha and McDonald's Omega coefficients. Although the initial theoretical model included five dimensions, empirical evidence from the factor analyses supported a parsimonious three-factor structure encompassing Use and Exposure to Filters, Self-Image and Social Comparison, and Emotional Impact.

## METHOD

### 2.1. Study Design

The present study is categorized as instrumental research. Its primary objective was to develop a scale to measure the influence of digital filters on cognitive distortions among university women in Trujillo, ensuring that this tool was specifically targeted at young adult Peruvian female university students (Mamani et al., 2023).

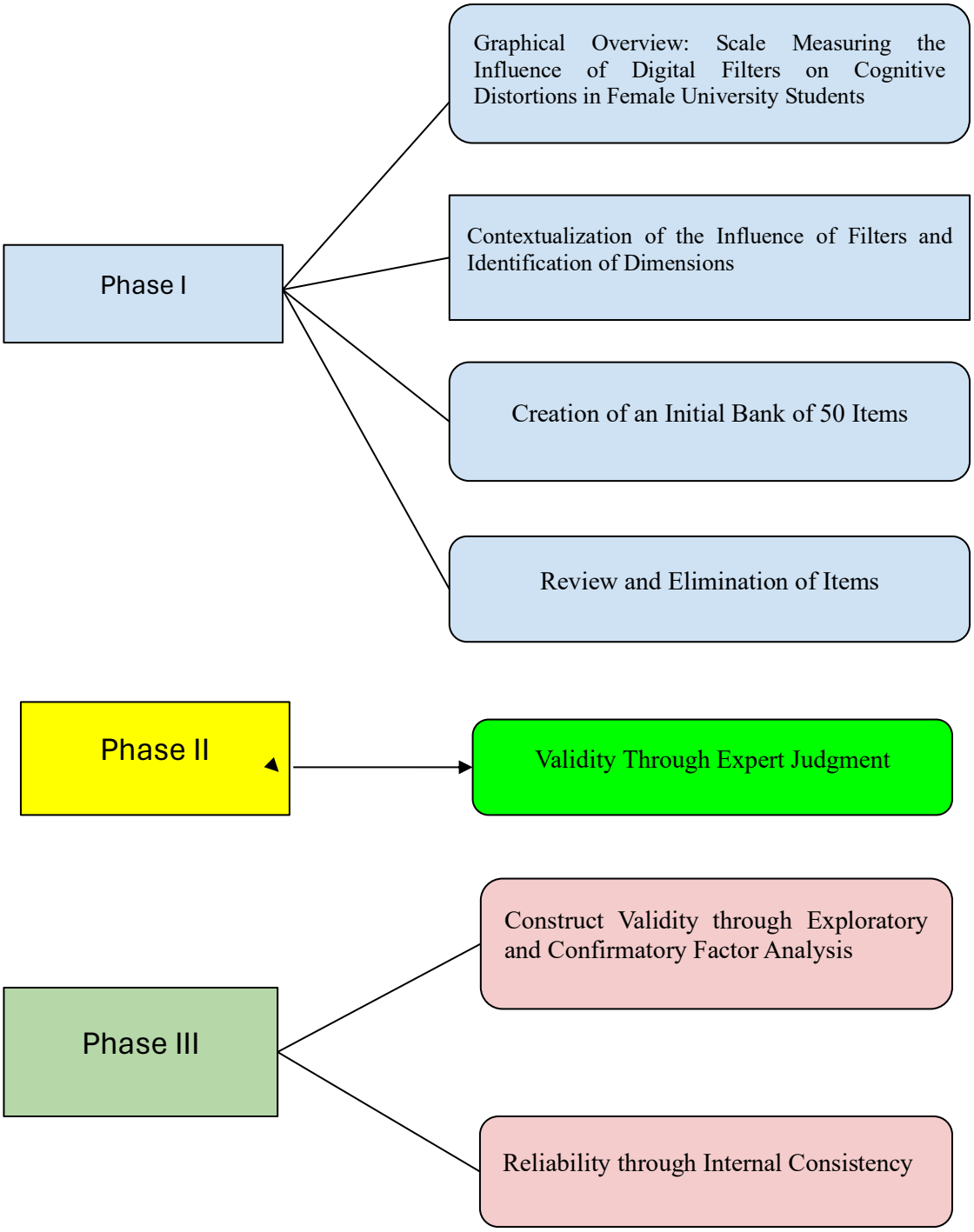
### 2.2. Procedure and Participants

The study was conducted in three sequential phases, which are described in detail in Figure 1. Throughout the process, 50 participants were included in the pilot test. These participants were carefully selected according to predefined inclusion criteria (female, aged 18 to 25 years) and exclusion criteria. The rigorous application of these criteria aimed to ensure the relevance and validity of the sample, which are further detailed in Phase III of the study. This methodological structure allowed for a systematic organization of each stage of the research process, ensuring internal coherence and the robustness of the results obtained.

Although the snowball sampling method facilitated access to the target population of university women aged 18 to 25, it also introduced potential self-selection bias and limited representativeness. Participants may have shared similar sociodemographic characteristics and social media habits, restricting the generalizability of findings to other contexts or populations. Future studies should consider applying probabilistic or stratified sampling procedures that include diverse age ranges, socioeconomic levels, and educational backgrounds to improve external validity.

**Figure 1**

Workflow of the development and psychometric properties of the ECDFD.


Phase I
Graphical Overview: Scale Measuring the Influence of Digital Filters on Cognitive Distortions in Female University Students
Contextualization of the Influence of Filters and Identification of Dimensions
Creation of an Initial Bank of 50 Items
Review and Elimination of Items
Phase II
Validity Through Expert Judgment
Phase III
Construct Validity through Exploratory and Confirmatory Factor Analysis
Reliability through Internal Consistency

## I. First Phase: Development of the ECDFD Items

In the initial phase of the study, a preliminary draft of the assessment tool was created based on a review of the literature on the subject and the analysis of previously designed instruments aimed at evaluating related constructs, such as social media use, body image, cognitive distortions, and the influence of digital filters. From this review, the construct *"Cognitive Distortions Associated with the Use of Digital Filters"* was conceptually defined, and its theoretical dimensions were identified, serving as the foundation for the development of the initial items of the instrument.

Initially, the inventory consisted of 50 items, developed by half of the research team, following the methodological recommendations of Kline (2023), who suggests starting with a larger pool of items than ultimately required for the final version. Subsequently, the other half of the team undertook the task of reviewing, refining, and streamlining the items, eliminating those that were redundant, contained more than one idea, were excessively lengthy, or presented ambiguous meanings for the target population. As a result of this review procedure, an initial pool of 50 items was established, which was later evaluated through expert judgment to determine their accuracy and content validity.

## II. Second Phase: Content Validity of the ECDFD Items

In the second phase of the research, we verified the quality of the items in the instrument by requesting evaluations from subject-matter experts. To accomplish this, five experts from relevant fields voluntarily participated. These experts were selected according to the criteria established by the American Educational Research Association (American Educational Research Association et al., 2018). Specifically, participants were required to be mental health professionals, preferably psychologists, holding a master's or doctoral degree, with substantial teaching and professional experience.

The experts conducted a single-round evaluation, assessing each item based on three main criteria: clarity, coherence, and relevance. Subsequently, Aiken's V coefficient was applied to analyze the ratings, with the aim of determining the consistency and appropriateness of the items within the scale. The instrument employed a four-point Likert-type scale, offering the following response options: 1 = strongly disagree, 2 = disagree, 3 = neutral, and 4 = strongly agree. Each dimension was obtained by summing the scores of the items included within it, allowing for the identification of how well each dimension represented the theoretical framework underlying the construct under study.

**Phase III: Evaluation of Psychometric Properties**

In the third phase, the psychometric properties of the *Scale of Distorted Cognitions due to the Use of Digital Filters* (ECDFD) were examined, focusing on construct validity and reliability. The study included 250 female university students from Trujillo, aged 18–25 years (M = 21.3; SD = 2.1).

Inclusion criteria required participants to be women within the specified age range, enrolled in university, with active social media accounts and frequent use of digital filters. Exclusion criteria comprised incomplete responses, recent bereavement, prior psychological or psychiatric diagnoses related to body image disorders, excessive substance use, or severe chronic illness. These criteria were applied to minimize confounding variables that could influence perceptions of digital filter use and compromise the validity of the findings.

The total sample consisted of two groups of 250 participants each. The exploratory factor analysis (EFA) group, composed of 250 women aged 18–25 years, had a mean age of 21.4 years (SD = 2.1), while the confirmatory factor analysis (CFA) group, also comprising 250 women in the same age range, had a mean age of 21.3 years (SD = 2.0). The similarity in age distribution between the two groups supports their comparability and suitability for the corresponding analyses.

Recruitment was conducted using a snowball sampling technique and social media dissemination. A unique Google Forms link was distributed by the research team via WhatsApp, Facebook, and Instagram. Initially, the link was shared with personal contacts who subsequently forwarded it, allowing gradual expansion of recruitment. Additionally, it was posted in general-interest groups, excluding those directly related to psychology or mental health to reduce bias and minimize social desirability effects. When group administrators requested authorization, permission was obtained and the study objectives were explained. Participation was entirely voluntary, with no incentives or financial compensation.

Before responding, participants received instructions to complete the questionnaires in a distraction-free environment. The estimated completion time was approximately 20 minutes. Electronic informed consent was obtained, ensuring anonymity and confidentiality. Participants then completed the ECDFD along with an additional instrument assessing cognitive distortions, both administered via the same Google Forms

link.After data collection, response quality was reviewed. Questionnaires with incomplete answers or irregular patterns (e.g., selecting the same option for all items) were considered for exclusion. No questionnaires met the exclusion criteria; therefore, all 250 responses were included in the statistical analyses.

### 2.3 Instruments

#### 2.3.1 Scale of Distorted Cognitions due to the Use of Digital Filters (ECDFD)

The ECDFD was specifically developed for this study to measure the influence of digital filters on the emergence of cognitive distortions and their associated effects in female university students. The questionnaire consisted of twenty items, organized on a four-point Likert-type scale: 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree.

The scale assesses five core dimensions. The first dimension, Use and Exposure to Digital Filters, examines the frequency, intensity, and purpose of filter use on social media platforms such as Instagram and TikTok. The second dimension, Self-Image and Social Comparison, investigates how filters affect participants' perceptions of their body and face, as well as the comparisons made with others. The third dimension, Cognitive Distortions Associated with Filter Use, focuses on the presence of automatic thoughts and irrational beliefs generated by exposure to digitally altered images. The fourth dimension, Emotional Impact, evaluates negative emotions resulting from filter use, including anxiety, insecurity, frustration, and sadness. Finally, the fifth dimension, Behaviors Derived from Filter Use, examines avoidant behaviors, the constant pursuit of social approval, and compulsive photo editing before posting on social media.

Scale scores were obtained by summing the points for each dimension, allowing for a differentiated assessment of the influence of digital filters in each area. Higher scores indicate greater presence of cognitive distortions, emotional distress, or behaviors derived from filter use, while lower scores reflect a reduced impact of these factors on participants' lives.

This instrument demonstrated adequate content validity through expert judgment and will undergo reliability and construct validity testing in the present study, ensuring its psychometric appropriateness for the target population.

### 2.4 Statistical Analysis

A descriptive analysis of the ECDFD items was conducted to evaluate data normality and suitability. Means, variances, skewness, and kurtosis were calculated using JASP (version 0.19.0). Mardia's test of multivariate normality was also applied, with p-values > 0.05 indicating a normal distribution.Suitability for exploratory factor analysis (EFA) was assessed using Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) index in JASP (version 0.19.0). EFA was performed using a polychoric correlation matrix and the minimum residual method, with oblique rotation (Oblimin) appropriate for correlated factors. Factor loadings below 0.50 were considered for elimination. This procedure allowed the identification of a dimensional structure explaining a significant proportion of total variance.

Confirmatory factor analysis (CFA) was conducted to test the factorial structure. Model fit was evaluated using chi-square (non-significant), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). Two models were compared: (i) a unidimensional model, and (ii) a three-factor model. CFA analyses were performed using SPSS 30 and AMOS 30. Reliability was examined through internal consistency using Cronbach's alpha and McDonald's omega coefficients, analyzed in JASP (version 0.19.0).

To strengthen the construct validity of the ECDFD, convergent and discriminant validity analyses were conducted. Convergent validity was examined by correlating ECDFD scores with the Cognitive Distortions Scale (CDS; Beck, 1976) and the Dysfunctional Attitudes Scale (DAS; Weissman & Beck, 1978), instruments theoretically related to cognitive distortions. Significant positive correlations were expected between ECDFD dimensions and the CDS and DAS subscales, supporting the convergent validity of the new measure. Discriminant validity was assessed through the square root of the Average Variance Extracted (AVE) and the inter-factor correlations, ensuring that each ECDFD dimension shared more variance with its indicators than with other factors. These analyses provide stronger empirical support for the construct validity of the instrument.

### 2.5 Ethical Considerations

This study was conducted in strict compliance with the ethical and methodological guidelines established for instrument validation, in accordance with the *Guide for the Preparation of Degree and Thesis Work* of the Research Vice-Rectorate at Universidad

César Vallejo, approved by Resolution No. 062-2023-VI-UCV. Additionally, the procedure outlined in Annex 2, corresponding to expert judgment evaluation, was applied.Following the Research Vice-Rectorate (2020) guidelines, information was collected and reviewed from multiple bibliographic sources to ensure a comprehensive understanding of the topic. The study adhered to methodological standards and procedures in accordance with APA guidelines. Data were gathered from academic articles, previous studies, theses, and scientific journals, with all sources properly cited and fully referenced. Throughout the research process, ethical conduct was maintained, including respect and courtesy toward participants, ensuring the confidentiality of their data, and obtaining informed consent.

## II. Results

### 3.1 Content Validity of the ECDFD

The first version of the ECDFD, consisting of 45 items, was reviewed by experts who evaluated three key aspects: clarity, coherence, and relevance. Their ratings were analyzed using Aiken's V, yielding positive results. None of the experts suggested adding new items, indicating that the scale sufficiently covers the construct it intends to measure. Overall, the results support adequate content validity for the instrument.

### 3.2 Descriptive Analysis of the Items

Table 1 presents the results of Mardia's multivariate normality test. The values obtained for skewness (873.766, $p < 0.001$) and kurtosis (2,857.975, $p < 0.001$) were significantly high, indicating substantial deviation from multivariate normality. These findings demonstrate that the data exhibit skewness and kurtosis significantly different from what is expected under normality. Consequently, a polychoric correlation matrix was employed for factor analysis, as it is more appropriate for handling data that do not follow a normal distribution.

**TABLE 1.**

*Descriptive Statistics of the ECDFD Items*

| Item | Mean | 95% IC | Variance | Skewness | Kurtosis | Uniqueness |
|---|---|---|---|---|---|---|
| 1 | 3.00 | (2.933 - 3.075) | 0.325 | -0.654 | 2.464 | 0.392 |
| 2 | 3.19 | (3.086 - 3.298) | 0.726 | -1.007 | 0.553 | 0.477 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | 2.69 | (2.587 - 2.789) | 0.657 | 0.128 | -0.723 | 0.325 |
| 4 | 2.76 | (2.649 - 2.879) | 0.848 | -0.541 | -0.453 | 0.435 |
| 5 | 2.68 | (2.551 - 2.809) | 1.078 | 0.021 | -1.287 | 0.452 |
| 6 | 2.96 | (2.856 - 3.056) | 0.645 | -0.53 | -0.035 | 0.515 |
| 7 | 2.40 | (2.301 - 2.499) | 0.627 | 0.333 | -0.285 | 0.456 |
| 8 | 2.83 | (2.705 - 2.951) | 0.978 | -0.226 | -1.118 | 0.428 |
| 9 | 2.80 | (2.699 - 2.901) | 0.659 | -0.209 | -0.493 | 0.291 |
| 10 | 2.82 | (2.702 - 2.930) | 0.833 | -0.265 | -0.805 | 0.449 |
| 11 | 2.60 | (2.512 - 2.696) | 0.545 | -0.424 | -0.072 | 0.260 |
| 12 | 2.70 | (2.599 - 2.801) | 0.661 | -0.167 | -0.458 | 0.300 |
| 13 | 2.76 | (2.673 - 2.855) | 0.534 | -0.409 | 0.139 | 0.422 |
| 14 | 2.73 | (2.632 - 2.826) | 0.616 | -0.432 | -0.068 | 0.303 |
| 15 | 2.86 | (2.776 - 2.952) | 0.495 | -0.5 | 0.496 | 0.330 |
| 16 | 3.00 | (2.912 - 3.096) | 0.542 | -0.736 | 0.885 | 0.315 |
| 17 | 2.68 | (2.559 - 2.793) | 0.887 | -0.097 | -0.925 | 0.405 |
| 18 | 2.83 | (2.734 - 2.931) | 0.622 | -0.286 | -0.314 | 0.355 |
| 19 | 2.65 | (2.554 - 2.742) | 0.566 | 0.055 | -0.426 | 0.446 |
| 20 | 2.96 | (2.858 - 3.062) | 0.673 | -0.762 | 0.394 | 0.444 |
| 21 | 2.66 | (2.552 - 2.761) | 0.692 | 0.169 | -0.76 | 0.267 |
| 22 | 3.05 | (2.948 - 3.148) | 0.648 | -0.646 | 0.094 | 0.275 |
| 23 | 2.97 | (2.856 - 3.088) | 0.863 | -0.399 | -0.907 | 0.173 |
| 24 | 2.71 | (2.606 - 2.812) | 0.665 | -0.132 | -0.511 | 0.300 |
| 25 | 2.98 | (2.607 - 3.107) | 0.98 | -0.494 | -0.944 | 0.411 |
| 26 | 3.04 | (2.608 - 3.139) | 0.633 | -0.602 | 0.049 | 0.370 |
| 7 | 3.06 | (2.609 - 3.147) | 0.535 | -0.832 | 1.182 | 0.482 |
| 28 | 3.03 | (2.610 - 3.135) | 0.682 | -0.578 | -0.175 | 0.383 |
| 29 | 2.59 | (2.611 - 2.704) | 0.87 | -0.079 | -0.855 | 0.468 |
| 30 | 2.83 | (2.612 - 2.949) | 0.887 | -0.181 | -1.045 | 0.246 |
| 31 | 3.03 | (2.613 - 3.144) | 0.871 | -0.624 | -0.551 | 0.474 |
| 32 | 2.46 | (2.614 - 2.582) | 0.956 | -0.095 | -1.013 | 0.362 |
| 33 | 2.57 | (2.615 - 2.677) | 0.76 | 0.229 | -0.759 | 0.652 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 34 | 2.81 | (2.616 - 2.916) | 0.691 | -0.565 | -0.043 | 0.336 |
| 35 | 2.89 | (2.617 - 3.008) | 0.86 | -0.484 | -0.605 | 0.460 |
| 36 | 2.51 | (2.618 - 2.611) | 0.62 | -0.04 | -0.41 | 0.480 |
| 37 | 3.02 | (2.619 - 3.114) | 0.566 | -0.718 | 0.698 | 0.514 |
| 38 | 2.64 | (2.620 - 2.764) | 0.929 | 0.06 | -1.063 | 0.413 |
| 39 | 3.14 | (2.621 - 3.232) | 0.568 | -0.798 | 0.742 | 0.813 |
| 40 | 2.53 | (2.622 - 2.649) | 0.876 | 0.35 | -0.92 | 0.554 |
| 41 | 2.26 | (2.623 - 2.351) | 0.577 | 0.254 | -0.189 | 0.550 |
| 42 | 2.23 | (2.624 - 2.336) | 0.747 | 0.181 | -0.692 | 0.431 |
| 43 | 2.69 | (2.625 - 2.784) | 0.551 | -0.74 | 0.379 | 0.609 |
| 44 | 2.22 | (2.626 - 2.326) | 0.78 | 0.162 | -0.799 | 0.524 |
| 45 | 2.15 | (2.627- 2.261) | 0.756 | 0.476 | -0.353 | 0.397 |

| Mardia's Multivariate Normality Test | Value | Statistic | df | p |
|---|---|---|---|---|
| Skewness | 873.766 | 36,406.932 | 16,215 | <0.001 |
| Skewness Small samples | 873.766 | 36,862.971 | 16,215 | <0.001 |
| Kurtosis | 2,857.975 | 90.312 | | <0.001 |

Note. N = 250. The skewness statistic is assumed to follow a standard normal distribution. To evaluate the multivariate distribution of the data, Mardia's multivariate normality test was applied. Results indicated significant skewness ($\chi^2(16,215) = 36,406.93$, $p < 0.001$) and significant kurtosis ($z = 90.312$, $p < 0.001$), suggesting that the data do not meet the assumption of multivariate normality. Furthermore, the small-sample correction for skewness was also significant ($\chi^2(16,215) = 36,862.971$, $p < 0.001$), further supporting this conclusion.

### 3.3. Exploratory Factor Analysis (EFA)

The Exploratory Factor Analysis (EFA) was conducted using a polychoric correlation matrix. The extraction method employed was minimum residuals with oblique rotation (Oblimin). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.90, and Bartlett's test of sphericity was statistically significant ($p < 0.001$), indicating that the data were suitable for factor analysis. The factor loadings are presented in Table 2.

During the initial phase of the ECDFD development, five theoretical dimensions were proposed: (a) Use and Exposure to Digital Filters, (b) Self-Image and Social Comparison,

(c) Cognitive Distortions Related to Filter Use, (d) Emotional Impact, and (e) Behaviors Derived from Filter Use. However, after conducting the Exploratory Factor Analysis (EFA), the data revealed a more parsimonious three-factor structure. Two of the original dimensions—Cognitive Distortions and Behavioral Manifestations—were integrated into broader factors, as their items showed overlapping conceptual content and moderate cross-loadings. Consequently, the final structure was simplified to three empirically supported factors: (1) Use and Exposure to Filters, (2) Self-Image and Social Comparison, and (3) Emotional Impact. This refinement aligns with psychometric principles recommending theoretical coherence and statistical parsimony in instrument construction.

**Table 2**

*Exploratory Factor Analysis (EFA) Results for the ECDFD*

| ECDFD ITEM | Factor Loading | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | U |
| 26. Sometimes I feel I am worth less if I don't look like I do on social media. | 0.744 | | | 0.318 |
| 35. Sometimes I avoid social activities because of how I physically look. | 0.737 | | | 0.459 |
| 31. I feel sad when I see my face without filters. | 0.73 | | | 0.468 |
| 38. Even though I feel guilty, I cannot stop editing my photos. | 0.524 | | | 0.557 |
| 47. I have avoided social events for fear of not looking good in photos. | 0.501 | | | 0.671 |
| 5. Sometimes I transform my face so much that I look like someone else. | 0.36 | | | 0.758 |
| 19. I worry that my real appearance is different from my filtered image. | | 0.675 | | 0.487 |
| 11. I compare myself to women I see on social media. | | 0.655 | | 0.53 |
| 2. My sense of security increases when I use tools to alter my image. | | 0.54 | | 0.618 |
| 6. I wish my everyday appearance resembled my edited photos. | | 0.519 | | 0.653 |
| 3. I spend time experimenting with different effects on my photos. | | 0.458 | | 0.768 |
| 8. I use digital filters even in private video conversations. | | 0.413 | | 0.742 |
| 44. I edit my photos before uploading them to social media. | | 0.303 | | 0.689 |
| 33. I get frustrated when I don't look good in a photo. | | | 0.795 | 0.28 |

| | | |
|---|---|---|
| 36. I get nervous if someone wants to take my photo without a filter. | 0.705 | 0.509 |
| 42. I prefer to review and approve photos before others post them. | 0.693 | 0.491 |
| 18. I prefer not to upload photos if I don't feel "perfect". | 0.426 | 0.755 |
| 15. I critically analyze myself when I see my unfiltered image. | 0.355 | 0.793 |
| 34. I use filters to feel better about myself. | 0.326 | 0.748 |

Note. N = 250, U = Uniqueness.

The Exploratory Factor Analysis (EFA) of the ECDFD revealed a three-factor structure that explains the influence of digital filter use on the development of cognitive distortions in female university students. These factors group items with high factor loadings, allowing the dimensions assessed to be clearly defined and contributing to a more precise understanding of the phenomenon.

Each factor is described as follows. The first factor comprises items related to the frequency, intensity, and motivations behind the use of filters on social media. Notably, items 26 (loading = 0.74), 35 (loading = 0.73), and 38 (loading = 0.52) highlight that participants habitually use these digital tools to modify their appearance in virtual environments, reflecting a well-established practice in their daily lives.

The second factor is related to negative thoughts concerning self-evaluation and social comparison when using digital filters. Items 19 (0.67), 11 (0.65), and 2 (0.54) indicate that exposure to unrealistic beauty standards can affect how participants perceive their own image, generating feelings of inadequacy or the need for constant modification.

The third factor reflects how filters influence self-worth based on others' approval. Items 33 (0.79), 36 (0.70), and 42 (0.69) demonstrate that participants tend to assess their self-esteem according to acceptance and feedback received on social media, which intensifies comparisons with those around them.

Together, the three identified factors provide a comprehensive view of the phenomenon, showing how digital filter use not only represents a widespread practice but also acts as a trigger for cognitive distortions and social comparison processes that impact young women's self-image and psychological well-being.

### 3.4. Confirmatory Factor Analysis

For the Confirmatory Factor Analysis (CFA) of the ECDFD, two models were evaluated: one with a single factor and the other with the three theoretical dimensions. Both models produced significant results in the chi-square test. Additional indices indicate a favorable fit for the three-dimensional model (CFI = 0.94, RMSEA = 0.08, SRMR = 0.03). Similarly, the single-factor model demonstrated an adequate fit (CFI = 0.93, RMSEA = 0.08, SRMR = 0.03), as shown in Table 3. The structural equation model diagram is illustrated in Figure 2.

**Table 3.**

*Confirmatory Factor Analysis Results of the ECDFD*

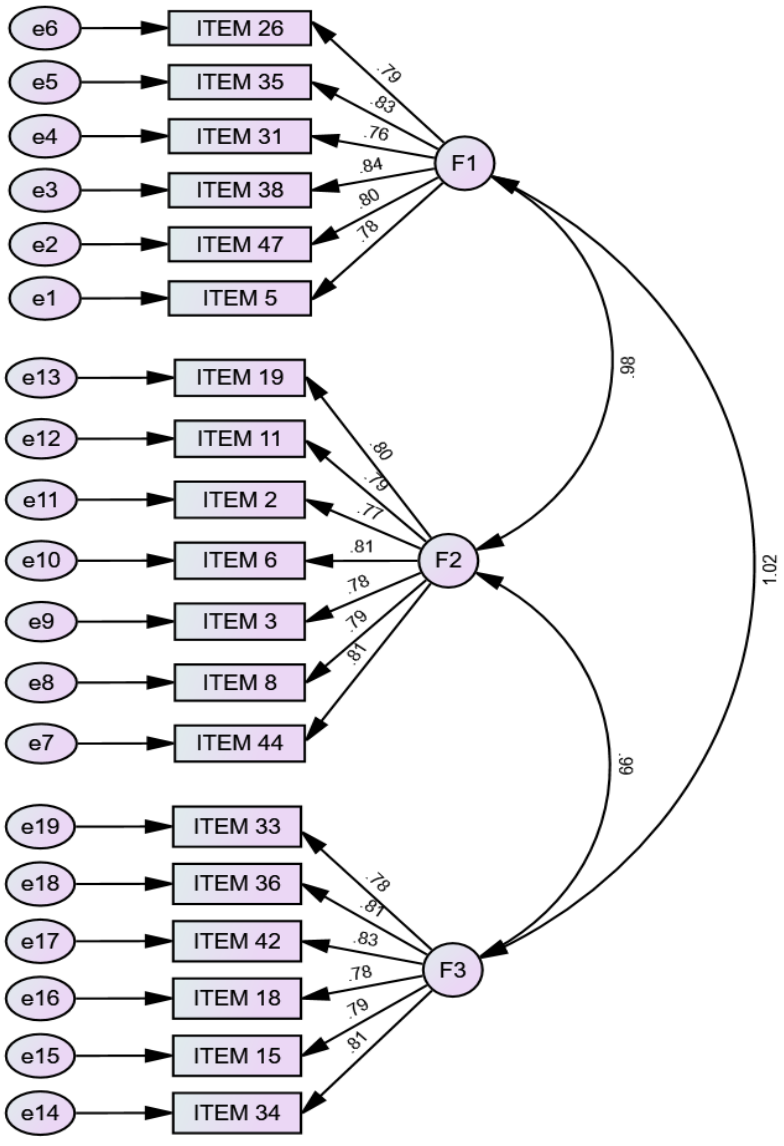
| Model | $\chi 2$ | *df* | CFI | RMSEA | SRMR |
|---|---|---|---|---|---|
| A: Unidimensional Model[a] | 42.1 | 152 | 0.93 | 0.08 | 0.03 |
| B: Three Dimensional Model[b] | 40.1 | 148 | 0.94 | 0.08 | 0.03 |

*Note. N = 250*. $\chi^2$ = chi-square value for model fit; df = degrees of freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual.In Model A, the 19 items were grouped into a single factor.In Model B, the items were distributed across three factors: the first 6 items loaded on Factor 1, the next 7 items on Factor 2, and the remaining 6 items on Factor 3, $p < 0.01$.

The three-factor model was selected based on both theoretical coherence and statistical adequacy. Although the unidimensional model presented similar fit indices (CFI = 0.93, RMSEA = 0.08), the three-factor structure (CFI = 0.94, RMSEA = 0.08, SRMR = 0.03) offered better interpretability and alignment with the conceptual framework. The standardized factor loadings ranged from 0.58 to 0.83, indicating strong relationships between observed items and their corresponding latent variables. Furthermore, the total variance explained by the model reached 68.2%, supporting its factorial stability. These results confirm that the ECDFD captures interrelated but distinct aspects of digital filter use, self-image distortion, and emotional impact.

Figure 2 graphically illustrates the factorial structure model of the ECDFD. The model displays three primary factors, each with their respective factor loadings represented by unidirectional arrows. The relationships between factors are indicated by numerical values alongside bidirectional arrows. This representation supports the multidimensional perspective of the construct under study.

**Figure 2.**



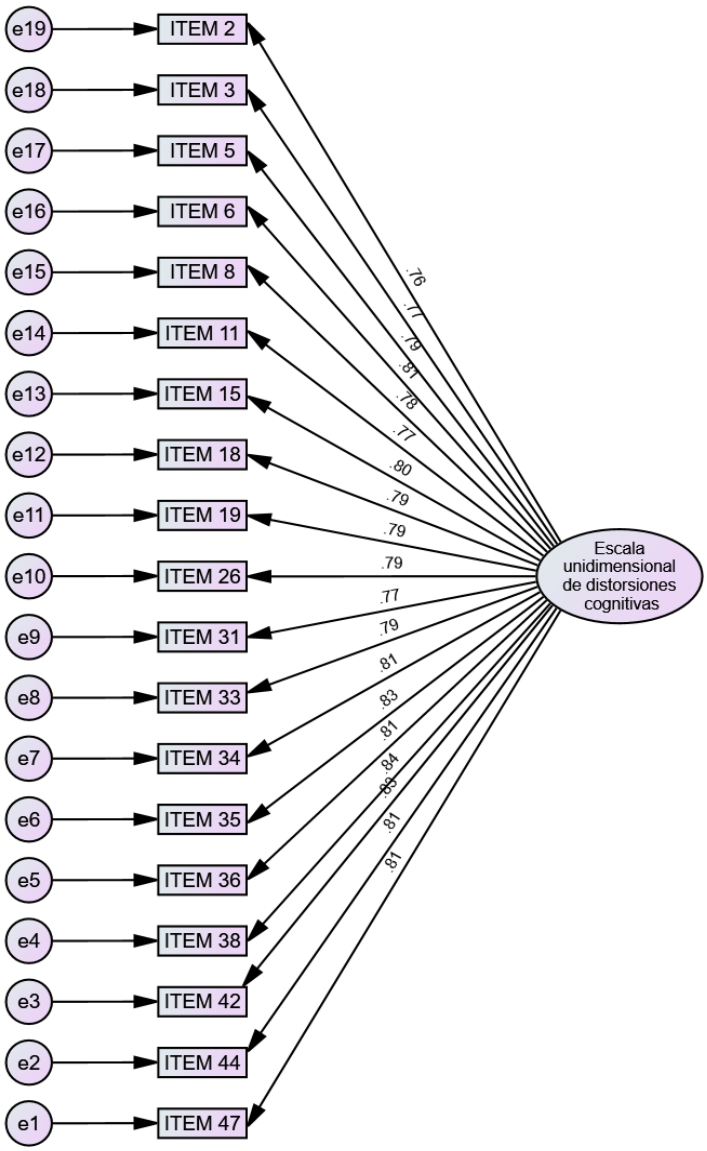

*Graphical Representation of the Factorial Structure Model of the ECDFD*

*Note.* Three dimensional structural equation model. Figure developed using AMOS version 30.

Figure 3 graphically illustrates the factorial structure model corresponding to the Unidimensional Scale of Cognitive Distortions. In this model, all items (items 2 to 47) are grouped into a single latent factor labeled *Cognitive Distortions*. The factor loadings for each item are represented by unidirectional arrows pointing from the latent factor to each item, with standardized coefficients ranging from .76 to .84.

**Figure 3.**

Graphical Representation of the Factorial Structure Model for the ECDFD




*Note.* Unidimensional structural equation model. Figure developed with AMOS software, version 30.

### 3.5 Reliability

The reliability results of the ECDFD indicate that the three dimensions that compose the scale demonstrated adequate levels of internal consistency. Factor 1, labeled *Use and Exposure to Filters*, obtained an omega coefficient of 0.91 and a Cronbach's alpha of 0.91. Factor 2, labeled *Self-Image and Social Comparison*, showed high values as well, with an omega of 0.92 and an alpha of 0.92. Finally, Factor 3, *Emotional Impact*, reached an omega coefficient of 0.91 and an alpha of 0.91, matching the reliability indices of Factor 1. These results confirm that the ECDFD is a reliable instrument for assessing the different dimensions of cognitive distortions in female university students (see Table 4).

**Table 4**

*Reliability Results of the ECDFD*

| Variable | ω | α |
|---|---|---|
| ECDFD | 0.97 | 0.97 |
| Factor 1: Use and Exposure to Filters | 0.91 | 0.91 |
| Factor 2: Self Image and Social Comparison | 0.92 | 0.92 |
| Factor 3: Emotional Impact | 0.91 | 0.91 |

***Note.*** $\omega$ = McDonald's omega coefficient; α = Cronbach's alpha coefficient.

### 3.6. Conversion of Raw Scores to Percentiles

Table 5 presents the conversion of raw scores into percentiles for the dimensions assessed by the ECDFD: *Use and Exposure to Filters*, *Self-Image and Social Comparison*, and *Emotional Impact*. Based on these values, cutoff points were established to classify the levels as low, medium, and high. Scores at or below the 33rd percentile are considered low, those between the 34th and 66th percentiles are classified as medium, and those above the 67th percentile are categorized as high (Huayna, 2022). This classification provides a clear interpretation of results and facilitates the identification of cases at each level, representing a valuable resource for psychological and educational research. According to González (2023), the use of divisions such as terciles to determine low,

medium, and high levels based on percentiles is a widely accepted criterion in the construction and validation of psychometric instruments.

**Table 5**

*Conversion of Raw Scores to Percentiles for the ECDFD Dimensions*

| Percentile | Use and Exposure to Filters | Self Image and Social Comparison | Emotional Impact | Cognitive Distortions University Students |
|---|---|---|---|---|
| 5 | 5 | 5 | 9 | 19 |
| 10 | 7 | 9 | 11 | 30 |
| 15 | 9 | 10 | 18 | 40 |
| 20 | 10 | 11 | 21 | 43 |
| 25 | 11 | 12 | 22 | 47 |
| 30 | 12 | 13 | 23 | 48 |
| 35 | 12 | 13 | 24 | 50 |
| 40 | 13 | 14 | 24 | 51 |
| 45 | 13 | 14 | 25 | 52 |
| 50 | 14 | 15 | 26 | 54 |
| 55 | 14 | 15 | 27 | 55 |
| 60 | 15 | 15 | 27 | 57 |
| 65 | 15 | 15 | 27 | 57 |
| 70 | 15 | 15 | 27 | 57 |
| 75 | 15 | 15 | 27 | 57 |
| 80 | 15 | 16 | 28 | 58 |
| 85 | 16 | 17 | 29 | 60 |
| 90 | 17 | 18 | 31 | 63 |
| 95 | 20 | 20 | 36 | 75 |
| 100 | 25 | 25 | 45 | 95 |

## III. DISCUSSION

Currently, the use of filters on social media has transformed the way individuals perceive both their environment and themselves. In addition, the use of tools that alter how we appear physically and within our surroundings increases concerns about their impact on mental health. These filters distort photos and videos to appear perfect, influencing how people see themselves and others, which leads to errors in thinking, such as making excessive assumptions about someone's character or actions. The excessive use of digital filters results in lower self-esteem, more negative social comparisons, and greater emotional dependence on online validation. This raises the possibility of anxiety, depression, and other mental health problems. Moreover, these filters reinforce negative thoughts that influence emotions and keep individuals trapped in unhelpful thinking patterns (Sireli et al., 2023; Esquivel Cisneros, 2024).The growing impact of digital filters on the construction of personal image and the creation of cognitive distortions highlights the need for the development of specialized tools to assess this phenomenon. In psychological assessment, the integration of the digital environment provides deeper insights into the problem and offers new methods for the prevention and treatment of difficulties, adapted to current societal demands (Vera et al., 2023; Kline, 2023).

Currently, many individuals use the Cognitive Distortions Scale (CDS) and the Dysfunctional Attitudes Scale (DAS). The CDS adequately measures various cognitive distortions, while the DAS focuses on common depressive attitudes, such as the need for approval. Despite this, recent research has facilitated a more detailed observation of how technology affects people's lives. Rutter et al. (2025) identified cognitive distortions in the language of social media users, noting their increasing intensity alongside higher levels of anxiety or depression. In a 2023 study, researchers found that cognitive distortions act as mediators between problematic social media use and young people's self-esteem, demonstrating their role as an intermediary factor. Current research highlights the need for an innovative tool that incorporates elements such as exposure to digital filters and visual social comparison.

To overcome the limitations of existing instruments in the assessment of cognitive distortions, recent proposals have incorporated "digital conditions." The purpose of this dimension is to evaluate how technological and social factors related to digital platforms contribute to the emergence and maintenance of cognitive distortions. The inclusion of this perspective allows for a more comprehensive evaluation and adaptation to the current

digital context, fostering the development of preventive and therapeutic strategies that address the needs of the digital era. In this regard, the importance of tailoring psychological tools to account for specific aspects of the digital environment such as interactions on social media, exposure to filtered or retouched content, and the impact of online social dynamics becomes evident in order to achieve more accurate and contextually grounded assessments (Rodríguez Zamora et al., 2024).

The primary objective of this study was to design and validate a novel psychometric instrument aimed at identifying how digital filters influence the emergence of cognitive distortions by analyzing five key dimensions: the use and exposure to digital filters, self-image and social comparison, cognitive distortions related to filter usage, emotional impact, and behaviors resulting from such exposure. The need for this instrument arises from the limitations of conventional scales such as the Cognitive Distortions Scale (CDS) and the Dysfunctional Attitudes Scale (DAS), which do not account for the specific characteristics of the current digital environment. In this context, the use of digital filters on social media has significantly altered both personal and social perceptions, fostering unrealistic comparisons, the persistent pursuit of external approval, and the development of distorted thought patterns. Since these elements are not specifically addressed by traditional instruments, early identification of cognitive and emotional alterations associated with intensive use of visual technologies becomes more difficult. Therefore, the development of this tool responds to the urgent need for an instrument adapted to the realities of the digital age, enabling more accurate and contextualized assessments of the psychological impact of digital filters and facilitating the implementation of preventive or therapeutic interventions tailored to this emerging phenomenon (Vera & Ramírez, 2023; Gómez & Martínez, 2022).

The ECDFD aims to assess the effects of digital filters on cognitive distortions and demonstrates solid psychometric properties supporting its validity and reliability. The Exploratory Factor Analysis (EFA) initially tested five theoretical dimensions but yielded a refined and empirically supported three-factor solution. This structure—comprising Use and Exposure to Filters, Self-Image and Social Comparison, and Emotional Impact—demonstrates theoretical coherence and statistical parsimony, aligning with contemporary psychometric recommendations.

These psychometric properties represent a significant advancement over traditional tools, as they incorporate factors within a digital context, thereby allowing for a more precise

and contextualized assessment of cognitive distortions associated with the use of digital filters (Gómez & Martínez, 2022; Rodríguez Zamora et al., 2024).

Compared with prior international research, the ECDFD advances current psychometric evidence by specifically integrating digital conditions as determinants of cognitive distortions. Similar findings were reported by Özparlak and Karakaya (2022), who observed that online exposure intensifies maladaptive thinking, and by O'Neill (2021), who demonstrated that photo-editing practices are associated with increased anxiety levels. Unlike traditional instruments such as the CDS and DAS, the ECDFD captures these digital-specific processes, providing a culturally and contextually sensitive assessment tool. (Manotti, 2023).

### 4.1. Limitations

First, a snowball sampling strategy was employed, which facilitated access to the target population of young women aged 18 to 25 years and allowed for efficient recruitment. However, this type of sampling may have limited the diversity of the sample, thereby reducing the representativeness of other age groups or individuals from different sociocultural contexts. For this reason, it is recommended that future research employ probabilistic sampling techniques, such as random sampling, to ensure greater heterogeneity and enhance the generalizability of the findings.

Another limitation concerns the absence of convergent and discriminant validity analyses. Although the ECDFD demonstrated satisfactory internal structure and reliability, future research should examine its relationships with established instruments such as the Cognitive Distortions Scale (CDS) or the Dysfunctional Attitudes Scale (DAS). Assessing these associations would strengthen evidence of construct validity and clarify whether the ECDFD uniquely captures distortions related to digital filter use rather than overlapping cognitive or emotional constructs.

Moreover, although the sample size was adequate for the proposed psychometric analyses, its restriction to young women between 18 and 25 years old constitutes an important limitation for extrapolating the results to men or other age ranges. Therefore, subsequent studies should include participants of different genders and ages in order to assess whether the psychometric properties of the scale remain stable across diverse populations.

In this study, data were collected through a self-report questionnaire, which may introduce certain biases, such as responding in line with socially desirable patterns or interpreting items subjectively. To address this limitation, future research could complement self-report measures with additional techniques, such as semi-structured interviews or external observer assessments, to provide more comprehensive information.

Additionally, although the three-factor model demonstrated an adequate statistical fit and supported the psychometric properties of the scale, alternative models—such as bifactor or second-order models—were not examined. These could provide a deeper understanding of the construct's structure. Furthermore, convergent validity was not assessed in this study, which represents another limitation. It is therefore recommended that future research include such analyses using instruments similar to the ECDFD, as this would reinforce the validity of the questionnaire and expand its applicability in different contexts.

From a sociocultural perspective, these findings reflect the specific digital landscape of young Peruvian women, who are increasingly exposed to Westernized beauty ideals through social media. The influence of such standards contributes to the internalization of unrealistic expectations and reinforces maladaptive comparison patterns. Therefore, the ECDFD not only provides a psychometric tool but also invites reflection on cultural narratives surrounding beauty, identity, and digital self-presentation. Addressing these contextual factors is essential for designing interventions that promote critical media literacy and healthier self-concept development in Latin American populations.

### 4.2. Implications for Practice

The *Escala sobre Uso de Filtros Digitales y Distorsiones Cognitivas* (ECDFD) constitutes an innovative contribution to professional practice, as it enables precise evaluation of the impact of digital filter use on cognitive processes in young women. Supported by its three-factor model and robust psychometric properties, the scale provides relevant information that can guide psychoeducational interventions, digital literacy programs, and strategies aimed at preventing dysfunctional thought patterns. In this way, it facilitates the identification of cognitive distortion patterns requiring attention and promotes the design of actions to mitigate the negative effects of exposure to unrealistic standards on social media, thereby enhancing psychological well-being. Torras

(2021) highlights that photo editing on social networks is linked to physical comparisons, which negatively influence self-perception. Similarly, Rosario Espinar (2024) emphasizes the relationship between social comparison, distorted body image perceptions, and self-esteem.

In the context of mental health promotion, the ECDFD can be used to detect early cognitive distortions associated with digital filter use. Recent studies demonstrate that social media addiction affects body image satisfaction among female university students (Garcés & Taboada, 2024). Likewise, inadequate social media use has been associated with increased anxiety in university students, highlighting the importance of early detection to design psychological interventions that improve emotional well-being and mental health before significant deterioration occurs (Arias, 2020).

At the institutional level, employing an instrument such as the ECDFD can provide data to guide university policies that encourage conscious social media use, strengthen psychological support programs, and prevent problems such as anxiety, low self-esteem, or body dissatisfaction (Garcés & Taboada, 2024). Thus, this tool not only contributes to individual assessment but also fosters a broader social understanding of the impact of digital filters on self-image and well-being among female university students. In doing so, it supports the development of collective actions by specialized professionals that promote mental health and the construction of a more realistic and positive self-image.

## IV. Conclusion

In conclusion, the ECDFD was developed on the basis of solid theoretical frameworks and demonstrated strong psychometric properties for its application in university settings. Content validity was confirmed through expert judgment, who agreed that the items were clear, relevant, and appropriate. Furthermore, both exploratory and confirmatory factor analyses supported the organized structure and differentiated dimensions of the scale, reinforcing its utility as a reliable assessment tool. Finally, the ECDFD demonstrated high reliability, with both alpha and omega coefficients exceeding recommended standards, ensuring adequate internal consistency across all dimensions.

**CRediT Author Statement**

Solorzano, M.: Conceptualization, Methodology, Formal Analysis, Writing – Review & Editing. Huaman, A.: Methodology, Software, Investigation, Data Curation, Writing – Original Draft. Peña, J.: Validation, Visualization, Investigation, Writing – Review & Editing. Fernández, S.: Supervision, Resources, Project Administration.

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