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The Functional Body Questionnaire: Development and Evaluation of Psychometric Properties

Cuestionario de Cuerpo Funcional: Desarrollo y Evaluación de Propiedades Psicométricas

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Abstract. Objective: To develop and evaluate the Functional Body Questionnaire (FBQ), a measure of the Functional Body construct, which reflects adaptive use of the body beyond body image dissatisfaction or distortion, incorporating cognitive, motor, emotional, and hedonic dimensions. Item generation was based on in-depth interviews with women diagnosed with eating disorders (n = 30) and refined through feedback from a multidisciplinary expert panel. This iterative process produced a preliminary item pool. The FBQ was then evaluated in a larger sample (n = 402) using exploratory and confirmatory factor

analyses to establish its internal structure. Internal consistency was assessed, and convergent validity was tested against the Body Shape Questionnaire. From the initial item pool, a 16-item Likert-type questionnaire was drafted. Exploratory factor analysis refined it to a 15-item, three-factor structure. The FBQ demonstrated high internal consistency (McDonald's ω = .93; Cronbach's α = .93) and moderate-to-strong negative correlations with the Body Shape Questionnaire, indicating that greater body dissatisfaction was associated with lower FBQ scores. The FBQ emerges as a reliable tool for evaluating the Functional Body construct and its dimensions. It is applicable across different weights and eating disorder diagnoses, and holds promise for assessing the impact of interventions targeting body image disturbances in clinical and research contexts.The Functional Body Questionnaire is a novel tool to assess individuals' ability to use their bodies in a functional and coherent manner. Unlike traditional body image measures focused on satisfaction or distortion, the FBQ emphasizes adaptive engagement with the body across cognitive, motor, and emotional domains.

Keywords: Body Image; Body Image Disturbances, Body Shape, Eating Disorders.

Resumen. Objetivo: Desarrollar y evaluar el Cuestionario de Cuerpo Funcional (CCF), una medida del constructo de Cuerpo Funcional que refleja el uso adaptativo del cuerpo más allá de la insatisfacción o distorsión de la imagen corporal, incorporando dimensiones cognitivas, motoras, emocionales y hedónicas. La generación de ítems se basó en entrevistas en profundidad con mujeres diagnosticadas con trastornos de la conducta alimentaria (n = 30) y se perfeccionó mediante la retroalimentación de un panel multidisciplinario de expertos. Este proceso iterativo produjo un banco preliminar de ítems. Posteriormente, el CCF se evaluó en una muestra más amplia (n = 402) mediante análisis factorial exploratorio y confirmatorio para establecer su estructura interna. Se evaluó la consistencia interna y se comprobó la validez convergente comparándola con el Cuestionario de Forma Corporal. A partir del banco inicial de ítems, se elaboró un cuestionario tipo Likert de 16 ítems. El análisis factorial exploratorio lo refinó a una estructura de 15 ítems y tres factores. El Cuestionario de Cuerpo Funcional (FBQ) demostró una alta consistencia interna (ω de McDonald = .93; α de Cronbach = .93) y correlaciones negativas de moderadas a fuertes con el Cuestionario de Forma Corporal, lo que indica que una mayor insatisfacción corporal se asoció con puntuaciones más bajas en el FBQ. El FBQ se presenta como una herramienta fiable para evaluar el constructo de Cuerpo Funcional y sus dimensiones. Es aplicable a diferentes pesos y diagnósticos de trastornos de la conducta alimentaria, y resulta prometedor para evaluar el impacto de las intervenciones dirigidas a las alteraciones de la imagen corporal en contextos clínicos y de investigación. El Cuestionario de Cuerpo Funcional es una herramienta novedosa para evaluar la capacidad de las personas para usar sus cuerpos de manera funcional y coherente. A diferencia de las medidas tradicionales de imagen corporal centradas en la satisfacción o la distorsión, el FBQ enfatiza la interacción adaptativa con el cuerpo en los dominios cognitivo, motor y emocional.

Palabras clave: Imagen corporal; Trastornos de la imagen corporal, Forma corporal, Trastornos de la alimentación.

Introduction

Body image can be defined as an individual's perceptions, feelings, and thoughts about his or her body disregarding how the body looks. It includes body size estimation, evaluation of body attractiveness and emotions associated with body shape and size (Grogan, 2006). Therefore, it is a complex multidimensional

construct that includes cognitive, perceptual, affective, and behavioral domains (Hosseini & Padhy, 2021). This construct is dynamic and it is influenced by several factors throughout the lifespan, such as, physiological changes (Hodgkinson et al., 2014), mood (Silva et al., 2019), age (Lee & Damhorst, 2020, 2021; McKinley & Lyon, 2008; Tiggemann & McCourt, 2013), body mass index (Ahadzadeh et al., 2018; Kaminsky & Dewey, 2014), physical activity (Kaminsky & Dewey, 2014), gender (He et al., 2020), culture, religiosity, and spirituality (Akrawi et al., 2015; Shoraka et al., 2019), amongst others (Kremer et al., 2013).

Body image disturbances include perception disturbances (failure to evaluate one's body size accurately) and concept disturbances (negative emotions and cognitions related to the perception of one's own body). Behavioral manifestations of body image disturbances include body exposure avoidance (avoidance of public situations), body checks (mirror checking, body measuring, self-weighing) or weight control methods (dieting)(Kearney-Cooke & Tieger, 2015). These disturbances are common in the general population and several health conditions, such as eating disorders (ED), body dysmorphic disorder, and breast cancer survivors (Bolton et al., 2010; Paterson et al., 2016; Sadibolova et al., 2019). However, the level of impairment associated with them varies greatly and it is not fully understood.

Over the past decades, there has been substantial growth in body image research in clinical and non-clinical populations, including individuals with eating disorders. However, due to the multifaceted nature of this construct, research exhibits considerable diversity. This diversity poses challenges in assessing the clinical and non-clinical significance of the results (Krawczyk et al., 2012). Current work is informed by prior research emphasizing the pivotal role of body image disturbances in eating disorders. Moreover, it draws insights from the unsatisfactory outcomes observed in clinical interventions that primarily target changes in body image distortion.

The traditional approach to treating body image disturbances in eating disorders has focused on correcting perceptual distortions of the body (Dalhoff et al., 2019). The evolving perspective, however, advocates for a shift towards nurturing an adaptive experience of the body in daily life. This updated framework emphasizes the Functional Body concept, highlighting the importance of using the body adaptively in response to situational demands. The Functional Body is conceptualized as the adaptive use of the body in everyday life, encompassing motor, cognitive, emotional, and hedonic domains. This construct is independent of satisfaction or dissatisfaction with the body and does not rely on the presence or absence of body image distortion. It explicitly excludes purely physiological functions (e.g., homeostatic regulation) and aesthetic judgments of physical attractiveness. By contrast with "body functionality," which emphasizes physical abilities, and "body image flexibility," which focuses on the acceptance of aversive body-related thoughts, the Functional Body integrates psychosocial engagement with the body in diverse contexts. This conceptualization integrates a balanced pattern of cognitive, motor, and physiological responses, mirroring the natural reactions of individuals without such disturbances and does not refer to philosophical or phenomenological distinctions, but rather to a psychological and clinical framework for understanding body experience in everyday functioning (Gempeler Rueda, 2004).

This conceptual pivot introduces the Functional Body as a novel construct and outcome measure. Research in this area has highlighted that the Functional Body transcends the narrow focus on body image dissatisfaction or distortion (Gempeler et al., 2016), marking a progression towards a broader understanding of body image that is relevant for both clinical and non-clinical populations. This expanded view not only enriches the discourse on body image disturbances but also broadens the scope of potential therapeutic interventions and research inquiries, emphasizing the importance of functional and adaptive body experiences across diverse contexts.

Existing body image disturbances measures

A recent systematic review summarized the evidence of measurement properties of body image measures (Kling et al., 2019). It found over 150 body image measures designed and used in recent years, but focused on the evaluation of eight measures: 1) the Body

Appreciation Scale (original BAS and BAS-2) (Tylka & Wood-Barcalow, 2015), 2) the Body Esteem Scale for Adolescents and Adults (Mendelson et al., 2010), 3) the Body Shape Questionnaire(P. J. Cooper et al., 1987), 4) the Centre for Appearance Research Valence Scale (Moss & Rosser, 2012), 5) the Drive for Muscularity Scale (McCreary et al., 2004), 6) two subscales of the Eating Disorders Examination Questionnaire (Z. Cooper & Fairburn, 1987; Mond et al., 2004), 7) one subscale of the Eating Disorder Inventory 3 (Garner, 2004), and 8) two subscales of the Multidimensional Body Self Relations Questionnaire (Brown et al., 2011; Cash, 2000); that were considered a priority on a systematic expert priority ranking.

While these instruments provide valuable insights and demonstrate satisfactory reliability and validity, they fall short of capturing the comprehensive essence of what we define as the "functional use of the body." In contrast to prevailing measures that primarily focus on elements such as motor ability, strength, stamina, coordination, or explore cognitive facets like body appreciation, self-esteem, beliefs, perceptions, attitudes towards, and respect for the body, the conceptualization of the functional body used in this study extends beyond these conventional constructs. Here the emphasis lies on understanding the body's experience in a broader, phenomenological sense, encompassing not only physical functionalities but also the intricate interplay of cognitive, emotional, and perceptual dimensions.

We therefore wanted to develop an instrument to measure the Functional use of the body to offer a more inclusive and nuanced exploration of how individuals engage with and adapt their bodies in diverse real-life situations, differing from the body functionality construct as stated by Alleva et al. (2021) that refers to the motor ability, strength, stamina, coordination, etc.

Current Study

Building upon the preceding discussion, our objective was to develop and evaluate some psychometric properties of a novel measure aligned with the conceptualization of the Functional Body – the Functional Body Questionnaire (FBQ). Although this conceptualization originated from clinical interactions with individuals grappling with eating disorders, it is crucial to note that the FBQ was not crafted exclusively as a diagnostic tool for clinical populations. Instead, it was meticulously designed to gauge the extent to which individuals, encompassing both general and clinical populations, can adeptly employ their bodies in a functional and cohesive manner. Current research unfolded across two distinct studies. Study 1 aimed at developing an item pool for the Functional Body Questionnaire (FBQ). Study 2 delved into exploring and validating the factor structure of the FBQ. In addition, it sought to ascertain the internal consistency and convergent validity of the FBQ's scores.

Study 1. Scale development

Study 1 was designed to generate a comprehensive item pool representative of the multifaceted dimensions encapsulated by the construct of the functional body. In our pursuit of this goal, we engaged in an iterative process that fostered consensus among the study authors and experts in the field of psychometrics. The experts were constituted by psychiatrists and psychologists, experts in eating disorders treatment, as well as epidemiologists.

Participants and procedures

Participants in Study 1 (N = 72) were individuals diagnosed with an eating disorder (ED) based on DSM-5 criteria, enrolled in an intensive outpatient program for eating disorder treatment. Two distinct samples with comparable characteristics were employed. For the qualitative segment, interviews were conducted with 30 female individuals undergoing outpatient treatment for eating disorders.

Subsequently, we undertook a patient involvement initiative to enhance the quality of our research. To achieve this, we incorporated an additional convenience sample comprising 42 individuals who had successfully completed treatment to evaluate the second draft of the questionnaire.

Ethical clearance for this and all subsequent studies was granted by the research ethics committee at the first author's institution. All participants for Study 1, both in the qualitative segment and the patient initiative, were recruited from the intensive outpatient program. Participants in the qualitative part were in the final phase of their treatment, and participants who had completed treatment for the second part were contacted via telephone. They provided consent and were invited to complete the online survey with the questionnaire. No incentives were offered for participation in the studies. Parents provided consent for participants between 14 and 18 years old, while participants in that age range gave assent. Participants over 18 provided consent when completing the questionnaire.

Item pool development

The development of the item pool involved a sophisticated approach, blending traditional content analysis of interviews and cutting-edge natural language processing (NLP) techniques. Starting with in-depth interviews with females diagnosed with eating disorders, we incorporated a novel methodology for content analysis and item generation: traditional qualitative text analysis augmented by natural language processing (NLP) techniques. Our methodology was similar to that reported by Guetterman et al. (2018): textual analysis, in which two researchers read and assigned code labels to data, and iteratively developed findings, it was improved by Cluster analysis and word clouds for a visual representation of the results.

We performed unsupervised text clustering using natural language processing methods for the assessment. We used word frequency and similarity measures over all nouns to automatically identify five clusters using Ward's method and tf-idf. The results were summarized in word clouds, which were iteratively and inductively reviewed by members of the research team. This collaborative process led to the development of a pool of items reflecting the Functional Body construct, in which research team members enhanced contextual understanding and aid in the interpretation of responses through consensus.

The five initial clusters (motor, cognitive, emotional, hedonic, and generalization) were defined a priori based on the theoretical conceptualization of the Functional Body construct and a review of the literature on body image and adaptive body use. They served as a guiding framework for item generation and refinement during the scale development process.

This resulted in the first draft, comprising 21 items: 16 items featured a Likert-type scale format, frequency-based scale from 1=Never to 5=Always, and five items that were not included in the final score but served to evaluate answer quality. The items gauged avoidance behaviors, exposure to daily life situations, and consistency and coherence across five dimensions: motor, cognitive, emotional responses, hedonic aspects, and generalization. The responses of the 16 items were aggregated to yield a total Functional Use of the Body score, ranging from a potential minimum of 16 to a maximum of 80. A higher score denotes greater functional use of the body by the participant.

We presented the first draft, along with instructions to participants, and elicited item responses from six experts. Eight items from the initial draft were accepted with modifications, and these modifications were reviewed based on qualitative feedback from the experts' panel. Team members refined the wording and phrasing of the eight items until a consensus was reached. In addition, eight items were accepted without modification. The five items that did not contribute to the final score were excluded due to redundancy.

This resulted in the version of the FBQ that was utilized in the evaluation by the subsequent sample of 42 participants. As part of the pilot evaluation, 42 participants received a digital version of the FBQ. In addition to selecting their response for each item, participants were asked to provide written feedback in an adjacent field, indicating how they interpreted the item and any difficulties they encountered while responding. This procedure generated qualitative information on item comprehension and clarity. The feedback revealed that most items were interpreted consistently with the intended construct, while minor wording issues in two items were identified and subsequently corrected during the refinement phase. Additional feedback highlighted minor challenges with certain items, expressing

Table 1. FBQ Items: Original Spanish and Author-Translated English Versions.

N°	Original Spanish FBQ Items	Author-Translated English Version
1	Puedo realizar actividades, a pesar de la incomodidad que me genera mi cuerpo	I can carry out activities, despite the discomfort my body causes me
2	Puedo usar la ropa que me gusta, aunque me preocupe lo que puedan pensar los demás sobre mi apariencia	I can wear the clothes I like, even if I'm worried about what others might think of my appearance
3	Soy consciente de los cambios de mi cuerpo con el paso de los años	I am aware of the changes in my body over the years
4	Entiendo que mi cuerpo tiene una forma y tamaño que no dependen totalmente de mí	I understand that my body has a shape and size that don't entirely depend on me
5	Hago actividades como bailar o hacer ejercicio, a pesar de que no me guste del todo mi cuerpo	I do activities like dancing or exercising, even though I don't entirely like my body
6	Me centro más en las cosas que me permite hacer mi cuerpo, que en cómo se ve mi cuerpo	I focus more on what my body allows me to do than on how it looks
7	Hago ejercicio por una razón distinta a la insatisfacción con mi cuerpo	I exercise for a reason other than dissatisfaction with my body
8	No necesito sentirme o verme "perfecta/o" para poder hacer ejercicio	I don't need to feel or look "perfect" to be able to exercise
9	Disfruto de las actividades que realizo con mi cuerpo a pesar de la incomodidad o disgusto que éste me genera	I enjoy the activities I do with my body despite the discomfort or displeasure it causes me
10	Puedo disfrutar cualquier actividad de la vida diaria con el cuerpo que tengo	I can enjoy any daily activity with the body I have
11	Me comporto de acuerdo con la situación, aunque sienta miedo o incomodidad con mi cuerpo	I behave according to the situation, even if I feel fear or discomfort with my body
12	Si me invitan a un evento, me visto y me comporto acorde a la situación	If I am invited to an event, I dress and behave according to the situation
13	Puedo tolerar el contacto físico conmigo misma(o) con otros	I can tolerate physical contact with myself or others
14	Puedo tolerar sensaciones incómodas como hinchazón abdominal, hambre, pesadez o llenura	I can tolerate uncomfortable sensations such as abdominal swelling, hunger, heaviness, or fullness
15	Puedo identificar en mi experiencia cotidiana, que el mundo no gira alrededor de la apariencia de mi cuerpo	I can recognize in my daily experience that the world does not revolve around the appearance of my body
16	Puedo diferenciar la manera en la que percibo la forma y el tamaño de mi cuerpo, del cuerpo que tengo en realidad	I can differentiate the way I perceive the shape and size of my body from the body I actually have

Note: The English versions of the FBQ items have been translated by the authors for the purpose of this study and are provided to aid understanding for non-Spanish-speaking readers.

concerns about the use of technical language that might not be fully comprehensible to individuals without prior eating disorder treatment experience. Hence, we made slight revisions to the questionnaire to address these concerns. At this point, we retained 16 items for analysis with a 5-point response option. Table 1 presents the Spanish items of the FBQ alongside their English versions, translated by the authors for the purpose of this study. These translations are intended to facilitate understanding for non-Spanish-speaking readers.

Study 2. Validity evidence based on internal structure, confirmatory factor analysis and indices of validity

Following scale construction, we aimed to examine the psychometric properties of the FBQ in both clinical (eating disorders) and non-clinical samples comprising adolescents and adults. Initially, we investigated the validity evidence based on the internal structure of

the FBQ using exploratory factor analysis (EFA). Subsequently, our goal was to confirm the factor structure of the FBQ using confirmatory factor analysis (CFA). Finally, we explored various psychometric properties of the FBQ by assessing the questionnaire's internal consistency and convergent validity.

Method

Procedure and participants

Participants in Study 2 (N = 403) consisted of 221 individuals from a community sample and 182 individuals from a clinical sample of patients diagnosed with an ED. We included a community sample to ensure a heterogeneous representation, envisioning the Functional Body as a component of the Body Image construct that could be disturbed in both the general and other clinical populations.

For the community sample, recruitment was carried out through RedPapaz, a nonprofit organization advocating for the rights of children and adolescents in Colombia and Latin America, with a mailing list of over 700,000 affiliated members. Participants from the community sample were over 18 years old and willing to provide informed consent for study assessments, which were conducted through an electronic link to the questionnaire sent via text message or email.

The clinical sample constituted a convenience sample of participants diagnosed with ED from our outpatient program, encompassing individuals with varying severity who had either completed their treatment or were actively receiving it. The treatment interventions were unaffected by the questionnaire results, as the clinical team providing treatment remained unaware of the outcomes. Recruitment for the clinical sample involved sending a text message or an email with an electronic link to the questionnaire. Study data were collected online using REDCap, a secure web-based software platform for online data collection. Demographic and condition-related information, including age, gender, weight, and height, was also collected. Participants from the intensive outpatient program were over 14 years old and willing to provide informed consent for study assessments. Parents provided consent for participants between 14 and 18 years old, while participants over 18 provided consent when completing the questionnaire.

Following the ERA, APA, and NCME *Standards for Educational and Psychological Testing* (Eignor, 2013) as a foundational framework, we also incorporated more recent, domain-specific guidance best-practice recommendations on body image for scale development (Boateng et al., 2018) and validation (Swami et al., 2021; Swami & Barron, 2019). These more recent publications build upon the Standards and provide updated, field-specific recommendations that address methodological considerations particularly relevant to body image research. In line with these best practices and given that the Functional Body is a novel construct without an established gold standard, we sought validity evidence based on relations to conceptually related constructs. A subset of the Body Shape Questionnaire (BSQ) items most closely aligned with the FBQ content was selected to reduce participant burden, a methodological choice particularly important in clinical samples. The selection of the BSQ as the sole measure for assessing convergent validity in our study was strategic, given the FBQ's focus on attitudes and behaviors related to body image disturbances, we predicted that it would be associated with measures of concerns about body shape, without fully overlapping.

To perform EFA and CFA, participants were randomly split into two groups: the first half (n =201) and the second half (n =202), maintaining a 1:1 ratio. For the EFA process, we followed the guidance to recruit the largest sample size possible to confirm sample adequacy, a decision optimally made post hoc, with communalities ≥ .50 serving as a critical benchmark (Swami & Barron, 2019). For CFA, the sample size was guided by power estimation criteria based on the Root Mean Square Error of Approximation (RMSEA) to ensure the model's approximation accuracy (MacCallum et al., 1996a). Table 2 details the demographic distribution and Body Mass Index (BMI) data for the participants, segregated into the two randomly assigned subsamples.

Table 2. Demographic and Body Mass Index (BMI) Characteristics of Study Participants

Demographics	Total (n=403)	Subsample 1 (n=201)	Subsample 2 (n=202)
Age (Mean ± SD)	28.5 ± 11.5	27.9 ± 10.5	29.1 ± 12.5
Gender			
Male	195 (48.4%)	99 (49.3%)	96 (47.5%)
Female	206 (51.1%)	102 (50.7%)	104 (51.5%)
Other	2 (0.5%)	-	2 (1%)
BMI (Mean ± SD)	22.9 ± 5.2	23.1 ± 5.3	22.7 ± 5.2

*Note: The "-" indicates data not available or not applicable for the category.

** Additional demographic variables (e.g., education level, marital status) were not collected, and the community sample was not screened for ED diagnoses; this is acknowledged as a study limitation.

Measures

Functional Body Questionnaire

The FBQ was designed to assess aspects of body image disturbances associated with the use of the body in daily life situations (See Table 1 for the translated version of the items). Items assessed avoidance behaviors, exposure to daily life situations, and consistency and coherence in five areas: motor, cognitive, emotional responses, hedonic aspects, and the generalization of the ability to expose the body to new situations and experiences. The original item pool was developed and refined by a panel of experts (4 expert psychiatrists, 4 psychologists and 2 nutrition experts) and used an iterative process to develop the initial item pool. The experts were selected based on their qualification and experience in ED and Functional Body research. Two panel members prepared the first draft of the instrument. The same panel of 10 experts participated in all phases of item development and refinement.

The first draft of the FBQ was e-mailed to the panel of experts to review the relevancy of the items. We used qualitative feedback from the experts to assess the content and face validity of the questionnaire. They were asked to review the items and make their suggestions on the tool on whether the items are relevant, changed or omitted. The experts shared opinions about wording, phrasing, intelligibility, and appropriateness of the items in a group meeting and reached consensus. The FBQ was further improved using the feedback from 42 ED patients who reviewed the items and commented on the ease of understanding each item, and to identify ambiguity in wording or phrasing. The tool used to capture the data also captured the length of time used to complete it. All items asked participants to report how frequently they experienced each item with response options ranging from 1=never experienced to 5=always experienced. Higher scores denote greater and more desirable functional use of the body.

Body Shape Questionnaire

The Body Shape Questionnaire (BSQ) is a 34-item self-report questionnaire that assesses concerns about body shape (P. J. Cooper et al., 1987). Participants report how strongly they have experienced dissatisfaction of discomfort with the body experience. Each item is answered using a 6-point Likert-type scale from 1=never to 6=always. A higher score indicates more dissatisfaction and discomfort. We selected seven items that closely resembled the attitudes and behaviors assessed with the FBQ, and we calculated the correlation between our scale with these items to assess the convergent validity: a) "Have you avoided running because your flesh might wobble?", b) "Have you worried about your thighs spreading out when sitting down?", c) "Have you avoided wearing clothes which make you particularly aware of the shape of your body?", d) "Have you not gone out to social occasions (e.g. parties) because you have felt bad about your shape?", e) "Have you felt ashamed of your body?", f) "Have you worried about other people seeing rolls of fat around your waist

or stomach?", g) "Have you avoided situations where people could see your body (e.g., communal changing rooms or swimming baths)?".

Data analysis

We analyzed the data using the R software package (version 4.3.1). Continuous variables were reported as mean ± SD or median (interquartile range [IQR]), and categorical variables were expressed as frequency and percentage. Our dataset contained no missing values.

To assess multivariate normality, we utilized the MVN package (Korkmaz et al., 2018), applying Mardia's multivariate test (Mardia, 1970). For the EFA, we employed Principal Axis Factoring (Fabrigar et al., 1999) with Oblimin rotation, acknowledging assumed correlated factors. We assessed data factorability using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (ideally ≥ .80) and Bartlett's test of sphericity (which should be significant) (Hair, 2009).

The determination of the number of factors retained employed parallel analysis (Horn, 1965), examination of the scree plot (Cattell, 1966), Kaiser-Guttman criterion (i.e., retention of factors with eigenvalues ≥ 1.0) (Guttman, 1954; Kaiser, 1960), and inspection of the pattern matrix. Both theoretical and data-driven decisions were made regarding the retention of items. Decisions regarding item retention were informed by both theoretical considerations and data-driven insights. During factor extraction, items were scrutinized for poor primary-factor loading (< .40) or small communalities (< .40), cross-loading (secondary factor loadings ≥ .30 or a difference ≤ .20 between primary- and secondary-factor loadings), lack of conceptual/face validity, and whether they formed part of a non-robust factor (i.e., a factor with fewer than three items).

In the process of validating the factor structure, we also computed the Average Variance Extracted (AVE) (Malhotra et al., 2006) for each factor in the confirmatory factor analysis (CFA). This metric was calculated to assess the level of convergent validity within each factor, providing insight into the amount of variance captured by the constructs relative to the variance due to measurement error. For internal consistency, we employed Cronbach's alpha (α) and McDonald's omega (ω) coefficients were computed, with values above .70 indicative of acceptable reliability (Dunn et al., 2014). We examined discriminant validity using the criterion proposed by Fornell and Larcker (1981). This approach involves comparing the square root of the AVE for each latent construct to the correlations between that construct and all other constructs in the model.

To ensure a comprehensive yet considerate approach, we selectively correlated the FBQ Total score with specific BSQ items (b8, b10, b15, b18, b20, b24) and the BSQ Total score, using Spearman's rank correlation coefficient. This methodological choice allowed us to explore the nuanced relationship between general body shape concerns and specific functional body image aspects. The correlations showed significant relationships, underscoring the interconnectedness of these constructs. This alignment between the FBQ and BSQ not only substantiated the robustness of our assessment but also addressed the need to minimize participant burden, a consideration particularly critical in clinical contexts. By focusing on select, relevant BSQ items, we respected the time and psychological well-being of our participants, especially those from clinical backgrounds, ensuring our research was both ethically responsible and scientifically rigorous.

Results

Exploratory factor analysis

As the first split-half subsample did not satisfy the assumption of multivariate normality (Mardia's skewness = 1512.9, $p < .001$, Mardia's kurtosis = 15.01, $p < .001$), we conducted EFA using principal-axis factoring with an oblimin rotation. The significance of Bartlett's test of sphericity ($\chi^2 = 1471.27$, $df = 120$, $p < .001$) and the KMO measure of sampling adequacy of 0.91 indicated that the data were suitable for factor analysis.

The results of the EFA suggest a three-factor structure (three factors with $\lambda > 1$), and these findings were supported by Parallel Analysis, which also identified three factors with eigenvalues greater than 1. In the EFA, we found that most items had significant loadings (above 0.4) on one of the three identified factors, demonstrating a clear factor structure. Therefore, the

three factors were: Distress Tolerance, Body in Context and Body in Motion. Communalities for most items were moderate to high, indicating that the factors accounted for a significant proportion of each item's variance. The average communality across all items was approximately 0.78, indicating that the factors explain a considerable amount of variance in the observed variables. The cumulative variance explained by the factors was 49%, with individual proportions of 19% (Factor 1: Distress Tolerance), 16% (Factor 3: Body in Context), and 14% (Factor 2: Body in Motion). Factor loadings are presented in Table 3. The factors were found to be correlated with moderate relationships between the factors and correlation coefficients of 0.61 (Factor 1 – Factor 3), 0.54 (Factor 1 – Factor 2), and 0.46 (Factor 2 – Factor 3).

Item #3 exhibited a negative loading on Factor #1 Distress Tolerance and a low positive loading on Factor #3: Body in Context (0.28), along with an exceptionally low communality (h2 = 0.047), suggesting that it did not align well with the underlying factor structure. Consequently, item #3 was excluded from the scale, as its contribution to the measurement model is negligible, and its retention could potentially weaken the overall validity evidence based on relations to other variables.

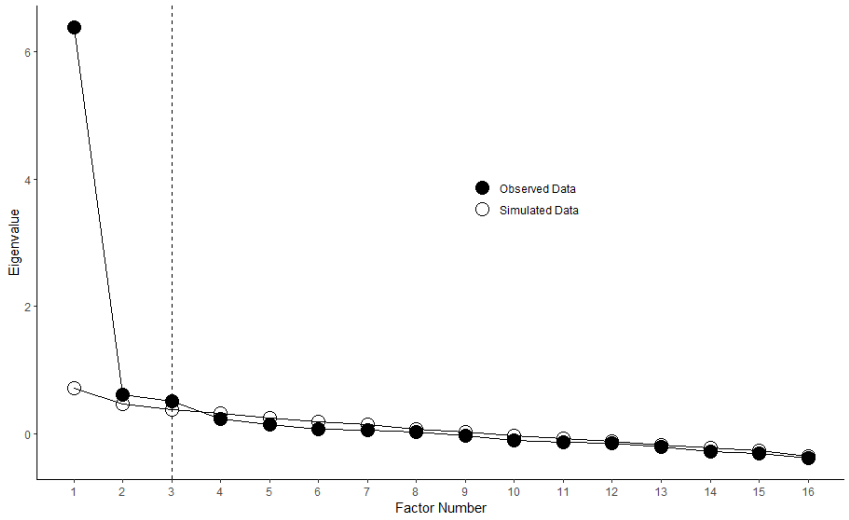
Then, we assessed the goodness of fit, and we found good fit in our models: $\chi = 139.7$ $p < .001$, TLI = .923

Table 3. Factor Loadings for the Functional Body Questionnaire in Spanish

Item	Factors					
	1	2	3	h2	(u2)	Complexity
I can carry out activities, despite the discomfort my body causes me	.4	.11	.28	.41	.59	2.2
I can wear the clothes I like, even if I'm worried about what others might think of my appearance	.46	.07	.25	.46	.54	1.6
I am aware of the changes in my body over the years	- .16	.28	- .02	.047	.95	1.6
I understand that my body has a shape and size that don't entirely depend on me	- .05	.56	.23	.40	.60	1.4
I do activities like dancing or exercising, even though I don't entirely like my body	.03	- .11	.75	.54	.46	1.1
I focus more on what my body allows me to do than on how it looks	.17	.4	.37	.57	.43	2.3
I exercise for a reason other than dissatisfaction with my body	.01	.08	.72	.59	.41	1.0
I don't need to feel or look "perfect" to be able to exercise	.03	.23	.48	.41	.59	1.5
I enjoy the activities I do with my body despite the discomfort or displeasure it causes me	.4	.26	.3	.65	.35	2.6
I can enjoy any daily activity with the body I have	.5	.33	.14	.70	.30	2.0
I behave according to the situation, even if I feel fear or discomfort with my body	.56	.12	.1	.48	.52	1.3
If I am invited to an event, I dress and behave according to the situation	.73	- .23	.04	.41	.59	1.2
I can tolerate physical contact with myself or others	.68	.12	- .01	.58	.42	1.0
I can tolerate uncomfortable sensations such as abdominal swelling, hunger, heaviness, or fullness	.51	.3	- .2	.41	.59	1.9
I can recognize in my daily experience that the world does not revolve around the appearance of my body	.11	.68	.05	.64	.36	1.0
I can differentiate the way I perceive the shape and size of my body from the body I actually have	.04	.76	- .03	.60	.40	1.0

Note: 'h2' indicates the proportion of variance each item shares with all factors (communalities), and 'u2' indicates the proportion of variance unique to each item (uniquenesses). Item 3 was excluded post-analysis.

Figure 1. Factor retention: Parallel analysis suggest a 3-factor structure.

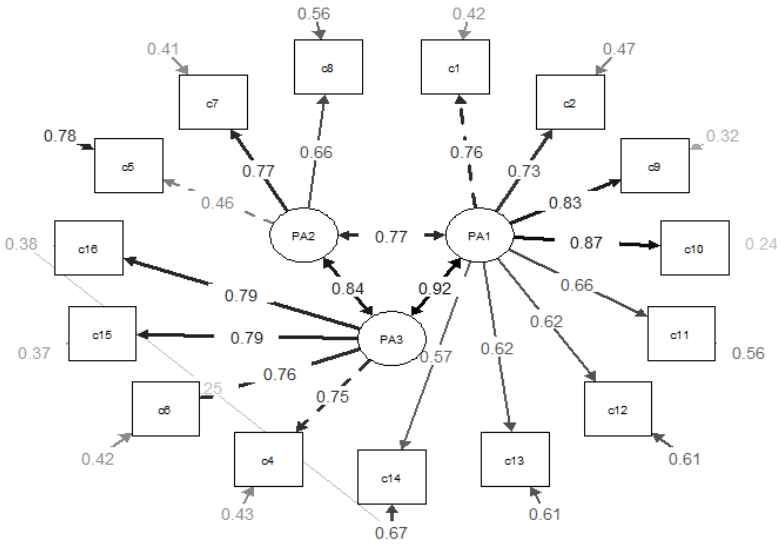


(slightly below the preferred threshold of 0.95 but still indicative of a reasonable fit), RMSEA = .065 (90% CI = .049, .082), RMSR = .04. Furthermore, the BIC value was negative (-258.05), further confirming the model's adequacy. Additionally, the inter-item correlations, analyzed using Spearman's rank correlation, revealed a moderate average correlation of 0.41, indicative of a sufficiently diverse item pool. McDonalds's ω showed excellent internal consistency (ω = .91, 95% CI = .89, .93) and the Cronbach's α also reflected good internal consistency (α= .76, 95% CI = .70, .80).

Confirmatory Factor Analysis of the Functional Body Questionnaire (FBQ

We conducted a CFA of the 15-item model on the second subsample, using the factor structure identified from the EFA of the first subsample. The sample size for this analysis was 202, surpassing the minimum requirement of 162 as suggested by MacCallum et al. (MacCallum et al., 1996b), thus providing a robust basis for the analysis. The CFA results provide empirical support for the proposed three-factor structure. The model fit indices were suggestive of an acceptable fit to the data, despite the significant chi-square statistic: $\chi^2(87) = 168.43$ p-value < 0.001, SRMR = 0.044, RMSEA = .068 (90% CI: .053 - .083), CFI = .949, TLI = .938. An inspection of the modification indexes (M.I.) depicted a high correlation between Item 14 ("Puedo tolerar sensaciones incómodas como hinchazón abdominal, hambre, pesadez o llenura") and Item 16 ("Puedo diferenciar la manera en la que percibo la forma y el tamaño de mi cuerpo, del cuerpo que tengo en realidad") (M.I. = 10.244). We freed the error covariance between these two items not only because of the statistical indication but also due to conceptual overlap: both items refer to the tolerance of potentially discomforting bodily experiences, one in the sensory/physical domain and the other in the perceptual/cognitive domain. This shared content likely produces residual correlations not fully captured by the latent factor, making the adjustment theoretically and empirically justified. This modification resulted in improved model fit indices: $\chi2(86) = 158.06$ p-value < 0.001, RMSEA = .064 (90% CI: .048 - .08), SRMR = .043, CFI = .955, TLI = .945. The standardized parameters (factor loadings, factor correlations) for the re-specified model are presented in Figure 2. All factor loadings were statistically significant (p < .001) and > .30 (standardized parameters). The AVE results indicated adequate convergent validity for the proposed factor structure. Specifically, the AVE for Factor 1 (PA1) was 0.514, for Factor 2 (PA3) was 0.600, and for Factor 3 (PA2) was 0.427. These values suggest a satisfactory level of variance captured by the model's constructs (AVE per factor: F1 = 0.514, F2 = 0.600,

Figure 2. Confirmatory factor analysis of the re-specified retained 3-factor model for the FBQ. Factor 1 (PA1) = Distress Tolerance, Factor 2 (PA2) = Body in Motion, Factor 3 (PA3) = Body in Context.



F3 = 0.427, consistent with acceptable thresholds for convergent validity). We observed adequate levels of internal consistency as McDonalds's ω was .93 (95% CI = .91, .94) and Cronbach's α was .93 (95% CI = .91, .94). Finally, for Discriminant Validity, all cases, the square root of the AVE exceeded the correlations with other constructs, indicating adequate discriminant validity according to Fornell and Larcker's criterion, showing indices of 0.717, 0.775 and 0.653, for factor 1, 2 and 3, respectively.

Convergent Validity

We conducted bivariate correlations to assess the validity evidence based on relations to other variables of the 3-factor model of the FBQ in clinical population second split-half subsample. Our focus was on the relationship between the FBQ Total score and overall body dissatisfaction (BSQ Total), as well as specific body image concerns (BSQ items b8, b10, b15, b18, b20, and b24), as shown in Table 4. The findings revealed

Table 4. Associations between FBQ and BSQ total scores and selected items included in clinical subsample 2.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) FBQ Total		- .26*	- .25*	- .22*	- .28*	- .38**	- .17	- .40**
(2) BSQ - 8			.63**	.31*	.61**	.47**	.50**	.67**
(3) BSQ -10				.39**	.57**	.59**	.46**	.73**
(4) BSQ - 15					.55**	.60**	.27*	.53**
(5) BSQ - 18						.66**	.47**	.76**
(6) BSQ - 20							.50**	.82**
(7) BSQ - 24								.65**
(8) BSQ Total								

Note: * indicates $p < 0.05$, ** indicates $p < 0.001$. This table presents the correlation coefficients between the FBQ total score and selected items, alongside the total BSQ score, highlighting the degree to which these variables share a linear relationship.

significant negative correlations between the FBQ Total and BSQ Total. This indicates that individuals with higher body dissatisfaction tend to score lower on the FBQ. Similarly, the selected BSQ items displayed varying degrees of negative correlations with the FBQ Total. These results highlight an inverse significant relationship between body image dissatisfaction and the factors measured by the FBQ, underscoring the FBQ's importance in evaluating critical aspects of body image and satisfaction.

General Discussion

The development and validation of the FBQ mark a significant advancement in the assessment of body image and its functional use, distinguishing this tool from existing measures focused solely on satisfaction, distortion, or appreciation of body image. This study crafted a 15-item questionnaire through rigorous psychometric evaluation, demonstrating its reliability and validity across a mixed community and clinical sample. The instrument's internal consistency, underscored by McDonald's omega and Cronbach's alpha values, attests to its robustness and applicability in both clinical and non-clinical settings.

The refinement of the FBQ entailed a data-driven exclusion of an item that, upon statistical analysis, was deemed misaligned with the instrument's overall construct. Item 3 was initially included, but statistical indicators—such as low factor loadings—suggested it did not fit the intended model of Functional Body. Subsequent qualitative review of this item revealed its divergence in thematic focus, primarily due to its cognitive nature and reference to a longer time frame, which differed from the predominantly behavioral orientation of other items. This underscores the iterative nature of psychometric validation, where empirical analysis informs the nuanced development of measurement tools, ensuring each item faithfully represents the targeted constructs.

Although there are many tools designed to assess different body image domains, none of the available instruments capture or assess the construct presented in this study. We recognize the need for the development of valid body image tools that go beyond satisfaction or distortion and can be used in both clinical and non-clinical populations (Kling et al., 2019). Body image disturbances are a core ED symptom, often overlooked in acute treatment but a predictor of onset and relapse (Junne et al., 2019; Sattler et al., 2020). The usual focus of treatment is on managing body image distortion or dissatisfaction and is based only on cognitive aspects, leaving the motor responses excluded; however, these interventions have shown limited effectiveness (Cornelissen & Tovée, 2021). In non-clinical populations, body image disturbances are common and while this might indicate weak forms of the disturbances present in various diseases, the real extent of the complications is unknown. Research studies have shown body image disturbances are associated with an increased prevalence of risky behaviors for ED and other conditions (Alleva et al., 2015; Voelker et al., 2015), as well as impaired sexual functioning (Alleva et al., 2015). The assessment of the functional body could be important in some populations to determine further psychological or clinical interventions aimed at either preventing the appearance of a more serious disease, decreasing the risk of relapse of ED, improving overall health outcomes, or identifying subsyndromal states.

Since there are many constructs related to body image, it is not unexpected that there are conceptually similar constructs with overlapping features. Importantly, what we call Functional use of the body differs from the concept of Body Functionality. Body functionality refers to recognizing and appreciating the various functions that the body provides (Webb et al., 2015); therefore, it is focused on the body functions from a physiological perspective and the cognitive appreciation of them. The functional body we evaluate with the FBQ makes a greater reference to the psychosocial functions of the body than its biological ones, which are only assessed in a general way.

The Functional body concept is closer to *Body image flexibility*, but they are not equal. *Body image flexibility* is defined as "a compassionate response to embrace rather than avoid, escape, or otherwise alter the content or form of aversive body-related thoughts and feelings" (Sandoz et al., 2013). In the same line, Bandura (1977) proposed to strengthen self-efficacy to improve coping behavior, and so on, to challenge activities that are perceived as threatening to him, further than focusing on

the BMI or the diagnosis. Also, his hypothesis fosters the reformulation of therapies, directed to facilitate the treatment. This is similar to the Functional Body in that both assess maladaptive regulation strategies while experiencing body dissatisfaction, but they differ in that Functional Body is focused on behavioral responses coherently supported by cognitive, emotional, and physiological responses. Functional Body construct is far more comprehensive.

The study highlights the FBQ's significant role in exploring body image disturbances, evident from its meaningful correlations with the BSQ items. These correlations not only underscore the FBQ's conceptual robustness but also its capacity to delve into previously unexplored dimensions of body image concerns. The findings suggest that the FBQ can significantly enhance our comprehension of body image by emphasizing functional use, an aspect traditionally neglected. The significant association between the FBQ and selected BSQ items underscores the emergence of the Functional Body as a crucial, yet distinct dimension, advocating for a measurement tool that evaluates constructs beyond mere body image distortion (Gempeler Rueda, 2004) or BMI (Porras-Garcia et al., 2020). While Factors 1 and 2 exhibited AVE values above the recommended threshold of .50, Factor 3 (PA2) yielded a slightly lower value (.427), which could suggest a modest shortfall in convergent validity according to the criterion proposed by Fornell and Larcker (1981). However, we have considered that the standardized factor loadings for PA2 were all statistically significant and above the minimum recommended level of .30, indicating that each item meaningfully contributes to the latent construct. Also, AVE values slightly below .50 can still demonstrate adequate convergent validity when composite reliability exceeds .60. Considering the above, we retained PA2 in the final model, added to its theoretical importance and the overall satisfactory pattern of psychometric indicators across factors.

Further, the FBQ demonstrated excellent internal consistency, with Cronbach's α and McDonald's ω values exceeding .90 for the total score, indicating that the items measure a highly coherent construct. While such high reliability is desirable, it may also suggest some degree of item redundancy, and future studies should be developed to explore whether a shorter version could maintain psychometric robustness without loss of conceptual coverage. Regarding the factor structure, both EFA and CFA supported a theoretically consistent three-factor model, despite the slightly lower AVE for Factor 3. Concurrent validity analyses revealed moderate to strong negative correlations with the BSQ total and selected items, consistent with expectations that higher functional body use would be associated with lower body dissatisfaction. Although these correlations support the FBQ's validity, they do not imply redundancy with existing measures, as the FBQ targets a broader functional dimension not fully captured by the BSQ. Overall, the results suggest that the FBQ possesses strong psychometric properties, though future studies should aim to replicate the structure in independent samples, further refine the "Body in Context" factor, and explore predictive validity.

Limitations

The results of this study should consider a few limitations. First, a substantial proportion of participants were female and were diagnosed with an ED, hence, the results may not fully represent the entire population. Nevertheless, this population is known to have a higher prevalence of ED and concerns about body image. Second, the community sample was not screened for ED or other conditions that would affect the functional use of the body, also we did not collect certain demographic variables and did not assess ED diagnoses in the community sample, which limits subgroup analyses. Third, responsiveness was not analyzed in this study due to its cross-sectional design. Nonetheless, further studies are recommended to complete the psychometric assessment of the questionnaire. Fourth, factorial invariance between clinical and general populations was not assessed. This analysis is essential to ensure measurement equivalence across groups and is therefore proposed as a priority for future phases of validation. Finally, we used the method of Maximum Likelihood, considering that our instrument is a 5-point Likert scale. While WLSMV can be preferred for categorical variables, previous evidence suggests that ML performs adequately with ordinal indicators having five or more categories and approximately normal distributions (Bentler &

Chou, 1987). Nonetheless, we acknowledge that using WLSMV could be considered in future studies to further account for the ordinal nature of the data.

Conclusion

In sum, this study demonstrated the FBQ is a reliable tool for evaluating the functional use of the body, offering new perspectives on body image research and clinical practice. Our findings suggest the FBQ is a reliable and relevant tool across various conditions, including different weights and eating disorder diagnoses. While the findings hint at its broader clinical applications, such as aiding individuals with physical limitations, this requires further exploration to fully grasp its implications in enhancing body image research and therapeutic practices.

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