



## Psychometric properties of a Spanish translation of the Functionality Appreciation Scale (FAS) in adults from Colombia

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### ABSTRACT

The 7-item Functionality Appreciation Scale (FAS) measures the extent of an individual's appreciation of their body for what it can do and is capable of doing. Although the FAS has been widely used in diverse linguistic contexts, it has not been previously translated into Spanish. Here, we examined the psychometric properties of a novel Spanish translation of the FAS in Colombian adults. A total of 1420 university students from Colombia (804 women, 616 men) completed the FAS, as well as additional validated measures. Exploratory and confirmatory factor analyses in separate subsamples supported a unidimensional model of FAS scores. The FAS evidenced scalar invariance across gender identity, with men having significantly higher FAS scores than women (Cohen's  $d = 0.18$ ). FAS scores were also found to have adequate composite reliability, as well as adequate convergent (significant associations with body appreciation, appearance evaluation, and eating disorder psychopathology) and concurrent validity (significant associations with self-esteem, life satisfaction, and gratitude). Functionality appreciation incrementally predicted life satisfaction in women, but not in men. Overall, these results suggest that the Spanish FAS is a psychometrically valid and reliable tool for the assessment of functionality appreciation in university-aged populations from Colombia.

### 1. Introduction

Over the past two decades, research and research-informed practice on the construct of *positive body image* – which Tylka (2018, p. 9) defined as an “overarching love and respect for the body” – has grown dramatically (Andersen & Swami, 2021). One important conclusion of this body of work is that positive body image is a multifaceted construct (Tylka & Wood-Barcalow, 2015a). While much of the extant research has focused on the facet of body appreciation (for a review, see Tylka, 2019), recent work has also identified functionality appreciation as a core facet of the positive body image construct (Alleva & Tylka, 2021; Swami et al., 2020). In a seminal contribution, Alleva and colleagues (2017, p. 29) defined *functionality appreciation* as “appreciating, respecting, and honouring the body for what it is capable of doing”

(Alleva et al., 2017, p. 29). In this view, functionality appreciation goes beyond simple awareness and evaluation of the functions of the body (i. e., *body functionality*, such as being aware and satisfied that one's body is able to walk) to encompass gratitude for the body-as-process (e.g., appreciating and being grateful that one's body is able to walk; Alleva & Tylka, 2021; Alleva et al., 2017,2019).

To measure the construct of functionality appreciation, Alleva et al. (2017) developed the 7-item Functionality Appreciation Scale (FAS). To achieve this, the authors first constructed a pool of 26 items that reflected body functionality holistically (i.e., without referring to specific functions) and inclusively (i.e., capturing the overall appreciation of the body's ability to function the best it can). Following exploratory factor analysis (EFA) with data from an online sample of adults from the United States, 19 items were eliminated (e.g., by removing items that

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overlapped in terms of content or that had poor item-factor loadings). Both a second EFA and a confirmatory factor analysis (CFA) with adults from the United States supported a unidimensional, 7-item model of FAS scores and the invariance of scores across gender identity. Additionally, [Alleva et al. \(2017\)](#) reported that FAS scores showed adequate test-retest reliability up to three weeks, adequate composite reliability, and adequate construct validity (convergent, criterion-related, divergent, and predictive validity).

Recent work has supported the unidimensionality of FAS scores in adults of minoritised sexual identity from the United States ([Soulliard & Vander Wal, 2021, 2022](#)) and an international sample of English-speaking adults ([Linardon et al., 2020](#)). In addition, the factorial validity of the FAS has also been assessed in a wide range of national and linguistic contexts. Thus, the 7-item, unidimensional model of FAS scores has been supported in samples of adults from Brazil (in Brazilian Portuguese; [Faria et al., 2020](#)), Cyprus (in Greek; [Anastasiades et al., 2023](#)), Italy (in Italian; [Cerea et al., 2021](#)), Japan (in Japanese; [Namatame et al., 2022](#)), Lebanon (in Arabic; [Swami et al., 2022](#)), Malaysia (in Malaysian Malay; [Swami et al., 2019](#)), the Netherlands (in Dutch; [Rekkers et al., 2023](#)), and Romania (in Romanian; [Swami et al., 2021](#)), a sample of different age groups (adolescents to older adults) in China (in Chinese; [He et al., 2022](#); see also [Wang et al., 2022](#)), as well as adolescents from the United Kingdom (in English; [Todd et al., 2019](#)) and Iran (in Persian; [Sahlan et al., 2022](#)). One study has also demonstrated that the FAS is partially invariant across adults in two national contexts (i.e., Malaysia and the United Kingdom; [Todd & Swami, 2020](#)), suggesting at least preliminarily that the FAS may be suitable for use in cross-cultural research.

Beyond factorial validity, most test adaptation studies have also shown that the FAS is invariant across gender identity (see also [Marmara & Zarate, 2022](#)), with gender differences in functionality appreciation generally non-significant or negligible (see [Linardon et al., 2023](#)). Moreover, where additional indices of validity have been tested (see also [Yurtsever et al., 2021](#)), studies have robustly supported the concurrent (e.g., positive associations with other facets of positive body image and negative associations with eating disorder psychopathology), convergent (e.g., positive associations with indices of psychological well-being, such as self-esteem and life satisfaction), and incremental validity of the scores on the FAS (e.g., functionality predicts psychological well-being over-and-above other indices of positive body image). Overall, these findings across national groups are consistent with the conclusions of a recent meta-analysis of the correlates of functionality appreciation, which found that functionality appreciation is consistently associated with fewer body image problems, lower levels of disordered eating, and more positive mental health ([Linardon et al., 2023](#)).

### 1.1. The Colombian context

As a contribution to ongoing intranational work, the present study examined the psychometric properties of a novel Spanish translation of the FAS in a sample of adults from Colombia (officially the Republic of Colombia), in South America. There are several reasons why doing so is important. First, despite having been adapted for use in diverse linguistic contexts, the FAS has not to date been translated into Spanish, the official language of 20 nations worldwide and the fourth-most spoken language internationally ([Statista, 2023a](#)). The availability of a Spanish translation of the FAS would, therefore, open up possibilities for including a wider array of national groups in research than is currently possible. Additionally, research on body image in general and positive body image specifically remains limited in Colombia ([Góngora et al., 2020](#); [Mebarak Chams et al., 2019](#)), which in turn limits scholarly understanding of the nature and meaning of facets such as functionality appreciation in this national group. The availability of a translated and validated measure of functionality appreciation can be expected to begin the process of filling this gap in knowledge.

Beyond these practical reasons, there are additional reasons why

focusing on Colombia vis-à-vis the FAS may be informative. For instance, although comparative studies have generally concluded that Colombian adults have similar rates of body satisfaction to adults in Europe (e.g., [Odinga & Kasten, 2020](#)), there is some suggestion that understandings of the physical self in Colombia remain highly gendered (e.g., [Viveros-Vigoya, 2016](#)). More specifically, whereas conceptions of idealised masculinity in Colombia prioritise physical prowess and ability in boys and men, girls and women are socialised to idealise “delicate” and “feminine” roles ([Cardona Álvarez et al., 2012](#), p. 171) that actively de-prioritise their physical abilities (e.g., in sport; [Oxford & Spaaij, 2019](#)). Indeed, [Giraldo \(2016, p. 65\)](#) has suggested that societal understandings of the female body in Colombia prioritise a “spectacularly feminine” ideal (e.g., as exemplified by Sofia Vergara and Shakira) that decentres women and girls as physical beings.

Such gendered norms of physical ability may, in turn, shape appreciation of the body’s functionality in Colombian populations. For example, qualitative research with Colombian adolescents has shown how girls primarily value their bodies for conforming to appearance ideals (being “cute as a doll”), whereas boys are socialised to be as “strong as a champion” and are rewarded when they find ways to surpass the physical limits of their bodies and punished when they refuse to do so ([Ochoa Hoyos, 2007](#), p. 118). Moreover, high levels of criminality and violence, a history of armed conflict, and disruptions of neoliberal economics have all cemented masculinised normative expectations, which demand self-understandings that prioritise physical prowess, bravery, and physical ability for boys and men ([Vogoya, 2001](#)). At the same time, however, Colombian children and adults are increasingly adopting sedentary lifestyles and only about a half of adults achieve recommended daily physical activity levels ([Gaffney et al., 2019](#)). This, in turn, has led to calls from scholars and practitioners to improve physical activity behaviours in Colombia ([Hernandez et al., 2022](#)), which may be supported through both better theoretical understanding of functionality appreciation in this national context, as well as the availability of appropriate psychometric tools.

### 1.2. The present study

In the present study, we sought to assess the psychometric properties of a novel Spanish translation of the FAS in a sample of adults from Colombia. To do so, we followed current best-practice recommendations in utilising an EFA-to-CFA strategy ([Swami & Barron, 2019](#); [Swami, Todd, & Barron, 2021](#)). This strategy meant that we were first able to examine the most suitable model of FAS scores in our sample without any modelling limitations (i.e., using EFA) and, next, to cross-validate this model using CFA (as well as the original unidimensional model, if discrepant) in a separate subsample. Given that all previous test adaptation studies have supported a unidimensional model of FAS scores with all 7 items retains, we expected to be able to replicate this model in the Colombian context.

Additionally, we examined whether the final model of FAS scores would achieve measurement invariance across Colombian women and men. Again, given that previous test adaptation studies have generally indicated that the FAS achieves scalar invariance across gender identity, we expected to be able to replicate this finding here. Assuming that scalar invariance – a minimum threshold for comparison of mean scores ([Chen, 2007](#); [Putnick & Bornstein, 2016](#)) – is achieved, we also aimed to assess gender differences in FAS scores. Although previous studies have indicated there are no significant gender differences in FAS scores (for a review, see [Linardon et al., 2023](#)), based on the review in [Section 1.1](#), we preliminarily expected that men would have significantly greater functionality appreciation than women, albeit likely of a small effect size. Finally, to assess construct validity of the FAS, we examined association with constructs that have been previously shown to be significantly associated with functionality appreciation (e.g., [Alleva et al., 2017](#)).

More specifically, to assess convergent validity, we examined associations between functionality appreciation and a facet of positive body

image (i.e., body appreciation), with the expectation of a positive and moderate association. Additionally, we examined associations with appearance satisfaction (with the expectation of a small, positive association) and eating disorder psychopathology (i.e., restrained eating and eating concerns, respectively), with the expectation of small-to-moderate and negative associations. To estimate concurrent validity, we examined associations with self-esteem, gratitude, life satisfaction, respectively, with positive and small-to-moderate associations being expected. In each of these cases, we selected variables that have previously been shown to be psychometrically robust in Spanish. Finally, incremental validity would be supported to the extent that FAS scores predict life satisfaction over-and-above body appreciation, appearance satisfaction, and eating disorder psychopathology.

## 2. Method

### 2.1. Participants

The initial sample consisted of 2398 respondents, but we excluded participants who failed to complete the survey ( $n = 399$ ), who failed attention check items ( $n = 542$ ), who provided duplicate responses ( $n = 24$ ), and – because of the small number and to maximise sample homogeneity – participants who identified their gender in a way other than as a woman or man ( $n = 12$ ) or preferred not to indicate their gender identity ( $n = 1$ ). The final sample, therefore, consisted of 1420 participants, of whom 804 were women and 616 were men. Participants had a mean age of 20.90 years ( $SD = 3.18$ ) and a mean self-reported body mass index (BMI) of 23.30  $kg/m^2$  ( $SD = 3.84$ ). The majority of participants reported their race as Mestizo, had completed secondary schooling, were single and unpartnered, and did not identify as deaf or disabled or having a long-term health condition. Full demographic details of the sample are provided in Table 1.

**Table 1**  
Participant Demographics.

Item	
Age	Range = 18–49 ( $M = 20.90, SD = 3.18$ )
Body mass index	Range = 15.22–44.58 ( $M = 23.30, SD = 3.84$ )
Gender identity	Woman: $n = 804$ (56.6%) Man: $n = 616$ (43.4%)
Race	Mestizo: $n = 724$ (51.0%) White/Caucasian: $n = 507$ (35.7%) Afro-Colombian: $n = 139$ (9.8%) Indigenous: $n = 43$ (3.0%) San Andrean: $n = 4$ (0.3%) Roma: $n = 2$ (0.1%) Asian: $n = 1$ (0.1%)
Highest educational qualification	Secondary schooling: $n = 805$ (56.7%) Technical college: $n = 199$ (14.0%) Undergraduate degree: $n = 399$ (28.1%) Postgraduate degree: $n = 9$ (0.7%)
Identify as deaf or disabled person, or have a long-term health condition	Prefer not to say: $n = 8$ (0.6%) Yes: $n = 37$ (2.6%) No: $n = 1374$ (96.8%)
Marital status	Prefer not to say: $n = 9$ (0.6%) Single and unpartnered: $n = 879$ (61.9%) Partnered but not married: $n = 508$ (35.8%) Married: $n = 16$ (1.1%) Divorced: $n = 3$ (0.2%) Other: $n = 14$ (1.0%)

### 2.2. Materials

#### 2.2.1. Functionality appreciation

Participants were asked to complete a novel Spanish translation of the 7-item FAS (Alleva et al., 2017), with items rated on a 5-point scale ranging from 1 (*strongly disagree*; Spanish: *muy en desacuerdo*) to 5 (*strongly agree*; Spanish: *totalmente de acuerdo*). The FAS was translated into Spanish following the 5-step procedure recommended by Beaton et al. (2000). Specifically, two translators – one informed, and one uninformed – first independently forward-translated the FAS instructions, items, and response options from English to Spanish. Next, the two translations were examined by a third, independent translator who resolved any discrepancies and produce a synthesised translation. Third, the synthesised translation was then back-translated by two translators naïve to the FAS back into English. Fourth, the forward- and back-translations were compared by an expert committee comprising all the translators, as well as all Spanish-speaking authors of the present study, who resolved any minor inconsistencies between versions. In the final stage, the translated FAS was pre-tested in a sample of 31 individuals (women = 32.3%) who broadly matched the target sample. Participants in the pre-test study were asked to rate their understanding of the FAS items on a 5-point scale (1 = *do not understand at all*, 5 = *understand completely*). Although mean responses were uniformly high, means for Item #7 were slightly deflated relative to other items. As such, this item was returned to the expert committee, who recommended minor semantic revisions to this item. The items of the final translation used in the present study are reported in Table 2.

#### 2.2.2. Body appreciation

Participants were asked to complete the Body Appreciation Scale-2 (BAS-2; Tylka & Wood-Barcalow, 2015b; Spanish translation: Swami et al., 2017). The 10-item BAS-2 assesses acceptance of one’s body, respect and care for one’s body, and protection of one’s body from unrealistic beauty standards. Items were rated on a 5-point scale (1 = *never*, 5 = *always*) and an overall score was computed as the mean of all items, so that higher scores reflect greater body appreciation. Scores on the Spanish version of the BAS-2 have been shown to have a unidimensional factor structure and to have adequate composite reliability and construct validity (Swami et al., 2017). In the present study, McDonald’s

**Table 2**

Items of the Functionality Appreciation Scale in English and Spanish and Factor Loadings Derived from the Exploratory Factor Analyses (EFA) with Women and Men in the First Split-Half Subsample, and Standardised Estimates of Factor Loadings from the Confirmatory Factor Analysis (CFA) in the Second Split-Half Subsample.

Item	EFA		CFA
	Women	Men	Total
(1) I appreciate my body for what it is capable of doing / <i>Aprecio mi cuerpo por lo que es capaz de hacer.</i>	.75	.64	.75
(2) I am grateful for the health of my body, even if it isn’t always as healthy as I would like it to be / <i>Agradezco por la salud de mi cuerpo, aun si no siempre es tan saludable como a mí me gustaría que fuera.</i>	.70	.63	.68
(3) I appreciate that my body allows me to communicate and interact with others / <i>Aprecio que mi cuerpo me permite comunicarme e interactuar con otros.</i>	.71	.70	.83
(4) I acknowledge and appreciate when my body feels good and/or relaxed / <i>Reconozco y aprecio cuando mi cuerpo se siente bien y/o en calma (relajado).</i>	.69	.65	.69
(5) I am grateful that my body enables me to engage in activities that I enjoy or find important / <i>Agradezco que mi cuerpo me permita involucrarme en actividades que disfruto o encuentro importantes.</i>	.77	.77	.83
(6) I feel that my body does so much for me / <i>Siento que mi cuerpo hace mucho por mí.</i>	.77	.69	.73
(7) I respect my body for the functions it performs / <i>Respeto mi cuerpo por las funciones que desempeña.</i>	.82	.74	.77

$\omega$  for scores on this scale was .95 (95% CI = .94, .95).

### 2.2.3. Appearance evaluation

The survey package also included the 7-item Appearance Evaluation (AE) subscale of the Multidimensional Body-Self Relations Questionnaire-Appearance Subscales (MBSRQ-AS; Cash, 2000; Spanish translation: Roncero et al., 2015). The AE subscale of the MBSRQ-AS measures of one's feelings of physical attractiveness and satisfaction with one's looks. All items on this measure were rated on a 5-point scale ranging from 1 (*definitely disagree*) to 5 (*definitely agree*), with higher mean scores reflecting higher satisfaction with one's appearance. CFA-based work has upheld the 5-factor structure of the Spanish MBSRQ-AS, with the AE subscale demonstrating adequate composite reliability and construct validity (Roncero et al., 2015). In the present study, McDonald's  $\omega$  for scores on this subscale was .86 (95% CI = .82, .90).

### 2.2.4. Eating disorder psychopathology

Participants were asked to complete the Restraint (5 items) and Eating Concern (5 items) subscales of the Eating Disorders Examination Questionnaire (EDE-Q; Fairburn & Harrison, 2003; Spanish translation: Peláez-Fernández et al., 2012), which measure eating attitudes and behaviours over the previous 28 days. Items were rated on a 7-point scale ranging from 0 (*no days*) to 6 (*every day*), and 0 (*not at all*) to 6 (*markedly*) and subscale scores were computed as the mean of all items, with higher scores reflecting greater disordered eating symptomatology. Adequate composite reliability and construct validity have been reported for scores on the Spanish version of the EDE-Q (Peláez-Fernández et al., 2012). In the present study, McDonald's  $\omega$  was .85 (95% CI = .83, .85) for Restraint and .84 (95% CI = .81, .87) for Eating Concern.

### 2.2.5. Self-esteem

To measure self-esteem, we used the 10-item Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965; Spanish translation: Martín-Albo et al., 2007), a widely used measure of global self-esteem, with items rated on a 4-point scale (1 = *strongly disagree*, 4 = *strongly agree*). Higher mean scores reflect greater self-esteem. Scores on the Spanish version of the RSES have been shown to have adequate composite reliability and construct validity (Martín-Albo et al., 2007). In the present study, McDonald's  $\omega$  for RSES scores was .77 (95% CI = .72, .83).

### 2.2.6. Life satisfaction

Life satisfaction was measured using the Satisfaction with Life Scale (SWLS; Diener et al., 1985; Spanish translation: Vásquez et al., 2013). This is a 5-item scale that taps individuals' assessments of the quality of their lives on the basis of their own unique criteria. All items were rated on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*), and an overall score was computed as the mean of all items. Scores on the Spanish version of the SWLS have been shown to have adequate internal consistency and good construct validity (Vásquez et al., 2013). In the present work, McDonald's  $\omega$  for scores on this scale was .85 (95% CI = .84, .86).

### 2.2.7. Gratitude

Participants were asked to complete the Gratitude Questionnaire-6 (GQ-6; McCullough et al., 2002; Spanish translation: Langer et al., 2016), a 6-item instrument that measures one's disposition toward gratitude. All items were rated on a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The Spanish version of the GQ-6 has been shown to have a unidimensional factor structure in adults, with adequate composite reliability and construct validity (Langer et al., 2016). In the present study, McDonald's  $\omega$  for GQ-6 scores was .76 (95% CI = .74, .78).

### 2.2.8. Demographics

All participants completed a demographics questionnaire, which

included questions on age, gender identity, highest educational qualification, marital status, race, and whether they identified as a deaf or disabled person or whether they had a long-term health condition. Participants were also asked to provide self-reported height and weight, which were used to calculate BMI ( $\text{kg}/\text{m}^2$ ).

## 2.3. Procedures

The study was carried out in accordance with the principles of the Declaration of Helsinki and Ethics approval was obtained from both the ethics committee at the first author's institution (approval code: 2305-5239) and the final author's School ethics committee (approval code: ETH2223-6703). All data were collected between April and June 2023. The sample was recruited using direct invitations to university students made via internal advertising systems at three universities in Colombia. Inclusion criteria included being a Colombian resident and citizen, being fluent in Spanish (the official language of Colombia), and being over 18 years of age. As noted above, we excluded data from participants who identified their gender in a way other than as a woman or man or preferred not to indicate their gender identity. Those who met the inclusion criteria were required to provide digital informed consent after being presented with additional information regarding the study and the survey package. All instruments in the online survey were presented in a pre-randomised order and the survey package included two attention check items. All participants took part on a voluntary basis and without remuneration. Participants received written debriefing information upon completion of the survey.

## 2.4. Analytic Strategy

### 2.4.1. Data treatment

There were no missing responses in the retained dataset. To examine the factor structure of the FAS, we used an EFA-to-CFA strategy (Swami & Barron, 2019). To ensure adequate sample sizes for both EFA and CFA, we split the total sample using a computer-generated random seed, resulting in one split-half for EFA (women  $n = 406$ , men  $n = 305$ ) and a second split-half for CFA (women  $n = 398$ , men  $n = 311$ ). There were no significant differences between the two subsamples in terms of mean age,  $t(1418) = 0.03$ ,  $p = .975$ , Cohen's  $d < .01$ , and self-reported BMI,  $t(1418) = 1.97$ ,  $p = .057$ , Cohen's  $d = .06$ . There were also no significant differences between subsamples in the distribution of gender identities, race, educational qualifications, and marital status (all  $\chi^2 < 2.76$ ).

### 2.4.2. Exploratory factor analysis

To explore the factor structure of FAS scores, we computed a principal-axis EFA with the first split-half subsample using the *psych* package (Revelle, 2019) in R (R Core Team, 2021). Our sample size satisfied Worthington and Whittaker's (2006) item-communality requirements (a sample size of about 150–200 is sufficient when item communalities  $\geq .50$ ), as well as assumptions for EFA based on item distributions, average item correlations, and item-total correlations (Clark & Watson, 1995). Data factorability was assessed using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (which should ideally be  $\geq .80$ ) and Bartlett's test of sphericity (which should be significant; Hair et al., 2009). Because EFA provides limited opportunity to assess measurement invariance, we conducted EFAs separately for women and men. Principal-axis factoring was used for the EFAs as it yields results similar to commonly used maximum likelihood estimation without assuming multivariate normality (Fabrigar et al., 1999; Goretzko et al., 2021). Given the expectation of a single orthogonal factor, a quartimax rotation was applied (Pedhazur & Schmelkin, 1991).

To estimate the number of factors to extract and factor structure adequacy, we examined fit statistics using commonly used fit indices (Finch, 2020). Specifically, we used the normed model chi-square ( $\chi^2/\text{df}$ ; values  $< 3.0$  considered indicative of good fit), the Steiger-Lind root mean square error of approximation (RMSEA) and its 90% CI

(values close to .06 considered to be indicative of good fit and up to .08 indicative of adequate fit), the standardised root mean square residual (SRMR; values  $< .09$  indicative of good fit), the Tucker-Lewis index (TLI; values close to or  $> .95$  indicative of good fit), and the comparative fit index (CFI; values close to or  $> .95$  indicative of adequate fit) (Hu & Bentler, 1999; Swami & Barron, 2019). Corrections to fit indices were not required as EFA is robust to violations of univariate and multivariate normality (Curran et al., 1996). However, because EFA cannot account for item covariance and fit indices are generally sensitive to correlated residuals and non-specific error, we followed the recommendation of Swami, Todd, and Barron (2021) to also examine the results of parallel analysis (Hayton et al., 2004). Parallel analysis works by creating a random dataset with the same number of cases and variables as the actual dataset. Factors in the actual data are only retained if their eigenvalues are greater than the eigenvalues from the random data (Hayton et al., 2004).

Item retention was based on the recommendation that items with “fair” loadings and above (i.e.,  $\geq .33$ ) and with low inter-item correlations (suggestive of low item redundancy) as indicated by the anti-image correlation matrix should be retained (Tabachnick & Fidell, 2019). We also assessed the degree of factor similarity across women and men using Tucker’s (1951) congruence coefficient of agreement, with values between .85 and .94 corresponding to fair similarity across groups and values  $\geq .95$  suggesting that factor structures can be considered equal across groups (Lorenzo-Seva & ten Berge, 2006).

#### 2.4.3. Confirmatory factor analysis

We used data from the second split-half to conduct a CFA using the *lavaan* (Rosseel, 2012), *semTools* (Jorgensen et al., 2018), and *MVN* packages (Korkmaz et al., 2014) with R (R Core Team, 2021). Previous Monte Carlo simulations with different seed values and based on factor loadings reported by Alleva et al. (2017) have indicated that a sample size of about 180 would be sufficient for this analysis (Cerea et al., 2021), which was surpassed in this subsample. Our intention was to test the parent model of FAS scores (i.e., a unidimensional model; Alleva et al., 2017) and, if divergent, any models extracted from our EFAs. Assessment of the data for normality indicated that they were neither univariate (Shapiro-Wilks  $p < .001$ ) nor multivariate normal (Mardia’s skewness = 2006.89,  $p < .001$ , Mardia’s kurtosis = 54.23,  $p < .001$ ), so parameter estimates were obtained using the robust maximum likelihood method and fit indices (see Section 2.4.2) were interpreted with the Satorra-Bentler correction applied (Satorra & Bentler, 2001). Additionally, evidence of convergent validity was assessed in this subsample using the Fornell-Larcker criterion (Fornell & Larcker, 1981), with average variance extracted (AVE) values of  $\geq .50$  considered adequate (Malhotra & Dash, 2011) and meaning that a latent variable is able to explain more than half of the variance of its indicators on average (i.e., items converge into a uniform construct).

#### 2.4.4. Gender invariance

To examine gender invariance of FAS scores, we conducted multi-group CFA (Chen, 2007) using the second split-half subsample. Measurement invariance was assessed at the configural, metric, and scalar levels (Vandenberg & Lance, 2000). Configural invariance implies that the latent FAS variable(s) and the pattern of loadings of the latent variable(s) on indicators are similar across gender (i.e., the unconstrained latent model should fit the data well in both groups). Metric invariance implies that the magnitude of the loadings is similar across gender; this is tested by comparing two nested models consisting of a baseline model and an invariance model. Lastly, scalar invariance implies that both the item loadings and item intercepts are similar across gender and is examined using the same nested-model comparison strategy as with metric invariance (Chen, 2007). Following the recommendations of Cheung and Rensvold (2002) and Chen (2007), we accepted  $\Delta CFI \leq .010$  and  $\Delta RMSEA \leq .015$  or  $\Delta SRMR \leq .010$  (.030 for factorial invariance) as evidence of invariance. We aimed to test for gender differences

on latent FAS scores using an independent-samples *t*-test only if scalar or partial scalar invariance were established.

#### 2.4.5. Further analyses

Composite reliability in both subsamples was assessed using McDonald’s (1970)  $\omega$  and its associated 95% CI, with values greater than .70 reflecting adequate composite reliability (Dunn et al., 2014). McDonald’s  $\omega$  was selected as a measure of composite reliability because of known problems with the use of Cronbach’s  $\alpha$  (e.g., McNeish, 2018). Hierarchical  $\omega$  was computed using the *semTools* package for R (Jorgensen et al., 2018) and allows for models that do not fit the data perfectly (Kelley & Pornprasertmanit, 2016). To assess between-group differences, we use independent-samples Welch *t*-tests, with Cohen’s *d* used to interpret effect sizes ( $d \sim .20$  = small,  $\sim .50$  = medium,  $\sim .80$  = large; Cohen, 1988). To assess construct validity, we examined bivariate correlations between FAS scores and scores on the additional measures included in the survey using the total sample. The total sample was used to maximise power, but the overall pattern of results held in each subsample separately. Based on Cohen (1992), values  $\leq .10$  were considered weak,  $\sim .30$  were considered moderate, and  $\sim .50$  were considered strong correlations. Incremental validity was assessed by examining whether FAS scores predicted life satisfaction over-and-above the variance accounted for by body appreciation, eating disorder psychopathology, and appearance evaluation, and would be supported if we found a statistically significant increment in Adj.  $R^2$  in the regression.

### 3. Results

#### 3.1. Exploratory Factor Analysis

##### 3.1.1. Factor analysis with women

For women, Bartlett’s test of sphericity,  $\chi^2(21) = 1430.80$ ,  $p < .001$ , and the KMO (.91) indicated that the FAS items had adequate common variance for factor analysis. The results of the EFA revealed a single factor with  $\lambda > 1$  ( $\lambda_1 = 4.33$ ,  $\lambda_2 = 0.61$ ) and parallel analysis confirmed that only one factor from the actual data had  $\lambda$  greater than the criterion  $\lambda$  generated from the simulation ( $\lambda_1 = 4.33 > 1.20$ ). As such, we retained one factor, which explained 56.8% of the common variance. The fit indices for this model were adequate:  $\chi^2(14) = 44.04$ ,  $p < .001$ ,  $\chi^2_{\text{normed}} = 3.15$ , CFI = .979, TLI = .968, RMSEA = .073 (90% CI = .049, .098), SRMR = .03. All 7 items loaded strongly onto the extracted factor (item-factor loadings  $\geq .69$ ; see Table 2).

##### 3.1.2. Factor analysis with men

For men, Bartlett’s test of sphericity,  $\chi^2(21) = 808.01$ ,  $p < .001$ , and KMO (.89) again indicated that the FAS items had adequate common variance for factor analysis. The results of the EFA revealed one factor with  $\lambda > 1.0$  ( $\lambda_1 = 3.85$ ,  $\lambda_2 = 0.67$ ) and parallel analysis confirmed that only one factor from the actual data had  $\lambda$  greater than the criterion  $\lambda$  generated from the simulation ( $\lambda_1 = 3.85 > 1.22$ ), which explained 48.6% of the common variance. The fit indices for this model were adequate:  $\chi^2(14) = 36.65$ ,  $p < .001$ ,  $\chi^2_{\text{normed}} = 2.62$ , CFI = .971, TLI = .957, RMSEA = .073 (90% CI = .045, .102), SRMR = .04. All 7 items loaded strongly onto the extracted factor (item-factor loadings  $\geq .63$ ; see Table 2).

##### 3.1.3. Factor structure congruence and composite reliability

The factor loadings reported in Table 2 for women and men separately suggest strong similarity across factor structures. Indeed, Tucker’s congruence coefficient ( $> .99$ ) indicated that there was factor structure equivalence across the models for women and men. McDonald’s  $\omega$  was adequate in women (.90, 95% CI = .87, .92), men (.86, 95% CI = .82, .90), and the total subsample (.89, 95% CI = .87, .91).

### 3.2. Confirmatory Factor Analysis and Composite Reliability

CFA indicated that fit of the unidimensional model of FAS scores was acceptable:  $SB\chi^2(14) = 30.85, p = .006, SB\chi^2_{normed} = 2.20, robust RMSEA = .055 (90\% CI = .028, .081), SRMR = .022, robust CFI = .989, robust TLI = .983$ . The standardised estimates of factor loadings were all adequate (see Table 2). The convergent validity for this model was adequate, as  $AVE = .56$ . Composite reliability of scores was adequate in women (.92, 95% CI = .89, .94), men (.87, 95% CI = .83, .90), and the total sample (.90, 95% CI = .87, .92).

### 3.3. Gender Invariance

Next, we tested for gender invariance based on the unidimensional model of FAS scores. As reported in Table 3, all indices suggested that configural, metric, and scalar invariance was supported across gender. Given these results, we computed an independent-samples Welch *t*-test to examine gender differences in FAS scores using the second split-half subsample. The results showed that men ( $M = 4.38, SD = 0.64$ ) had significantly higher functionality appreciation than women ( $M = 4.25, SD = 0.80$ ) in this split-half subsample,  $t(706.37) = 2.37, p = .018, Cohen's d = 0.18$ .

### 3.4. Construct Validity

To assess the validity of FAS scores, we examined bivariate correlations with all other measures included in the present study separately for women and men using the total sample. As can be seen in Table 4, functionality appreciation was significantly, positively, and moderately associated with body appreciation and appearance evaluation, respectively, in both women and men. Additionally, functionality appreciation was significantly, negatively and weakly-to-moderately associated with eating disorder psychopathology in women and men. These findings support the convergent validity of FAS scores in our sample. Across both women and men, functionality appreciation was also significantly, positively, and weakly-to-moderately associated with self-esteem, life satisfaction, and gratitude, respectively. These findings uphold the concurrent validity in our sample. For exploratory reasons, we also assessed correlations between functionality appreciation and participant age and BMI, respectively. We found that functionality appreciation was only significantly, negatively, and weakly associated with BMI in women.

### 3.5. Incremental Validity

To test for incremental validity, we conducted separate hierarchical regressions for women and men with life satisfaction as the criterion variable and body appreciation, eating disorder psychopathology, and appearance evaluation entered as predictors variables in a first step and functionality appreciation added in a second step. For women, the first step of this regression was significant,  $F(4, 799) = 107.03, p < .001, Adj. R^2 = .346$ , as was the second step,  $F(5, 798) = 88.69, p < .001, Adj. R^2 = .353$  (see Table 5 for full regression coefficients). The addition of functionality appreciation in the second step accounted for a significant incremental change in  $Adj. R^2, F(1, 798) = 10.33, p = .001, \Delta R^2 = .07$ . In men, first step of the regression was significant,  $F(4, 611) = 61.46, p <$

$.001, Adj. R^2 = .282$ . The second step of the regression was also significant,  $F(5, 610) = 49.76, p < .001, Adj. R^2 = .284$  (see Table 5). However, the addition of functionality appreciation in the second step did not account for a significant incremental change in  $Adj. R^2, F(1, 610) = 2.40, p = .122, \Delta R^2 = .002$ .

## 4. Discussion

In the present study, we examined the psychometric properties of a novel Spanish translation of the FAS in a sample of university students from Colombia. Consistent with findings in other national and/or linguistic contexts (Alleva et al., 2017; Anastasiades et al., 2023; Cerea et al., 2021; Faria et al., 2020; He et al., 2022; Namatame et al., 2022; Swami, Todd & Goian, Tudorel, et al., 2019, 2021, 2022), age groups (Sahlan et al., 2022; Todd et al., 2019), and social identity groups (Soulliard & Vander Wal, 2021, 2022), the results of the present work supported the unidimensional model of the FAS using both EFA and CFA, with all 7 items retained in the final model. Additionally, we found that the FAS achieved scalar invariance across gender identity and that scores on the instrument evidenced adequate composite reliability and adequate convergent, concurrent, and (in women, but not men) incremental validity. Overall, these findings broadly uphold the psychometric properties of the Spanish FAS in Colombian adults.

In terms of factorial validity, our EFA-based results supported the extraction of a unidimensional model with all seven items in both women and men. Likewise, our CFA-based results also supported a unidimensional model of FAS scores, with standardised estimates of factor loadings showing that all seven items loaded strongly onto the hypothesised FAS factor. These findings are consistent with previous work in other national and linguistic contexts (Alleva et al., 2017; Anastasiades et al., 2023; Cerea et al., 2021; Faria et al., 2020; He et al., 2022; Namatame et al., 2022; Sahlan et al., 2022; Swami, Todd & Goian, Tudorel, et al., 2019, 2021, 2022). Taken together, therefore, the available evidence suggests that the FAS consistently measures a common, latent functionality appreciation construct in diverse linguistic contexts. This is important because it will likely facilitate cross-national or cross-linguistic comparisons of functionality appreciation, which in turn may allow scholars to better understand how cultural factors shape the development and maintenance of functionality appreciation. As part of such cross-cultural work, it will be important for scholars to first demonstrate that the FAS achieves scalar or partial scalar invariance across national or linguistic groups, although preliminary evidence suggests this may be a supportable assumption (Todd & Swami, 2020).

The results of the present study also showed that the unidimensional model of the FAS was equivalent (in terms of our EFA-based results) and achieved full scalar invariance (in terms of our CFA-based results) across gender identity. Given these findings, we examined gender differences in functionality appreciation, finding that men had significantly higher scores than women (Cohen's  $d = 0.18$ ). Although this specific finding stands in contrast to the majority of previous studies, which have reported no significant gender differences in FAS scores (for a review, see Linardon et al., 2023), it was an effect we had hypothesised. As we noted earlier, understandings of the physical self are highly gendered in Colombia (Cardona Álvarez et al., 2012; Ochoa Hoyos, 2007; Viveros-Vigoya, 2016), which may in turn shape the lived experience of functionality appreciation. Specifically, the "spectacularly feminine"

**Table 3**  
Measurement Invariance Across Gender in the Second Split-Half Subsample.

Model	$SB\chi^2$	<i>df</i>	Robust CFI	Robust RMSEA	SRMR	Model Comparison	$\Delta SB\chi^2$	$\Delta$ Robust CFI	$\Delta$ Robust RMSEA	$\Delta$ SRMR	$\Delta$ <i>df</i>	<i>p</i>
Configural	43.43	28	.989	.052	.024							
Metric	68.53	34	.988	.049	.027	Configural vs metric	25.10	.001	.003	.003	6	.001
Scalar	75.42	40	.988	.044	.028	Metric vs scalar	6.89	< .001	.005	.001	6	.715

Note. SB = Satorra-Bentler; CFI = Comparative fit index; RMSEA = Steiger-Lind root mean square error of approximation; SRMR = Standardised root mean square residual.

**Table 4**

Bivariate Correlations Between Functionality Appreciation, Scores on Other Measures Included in the Study, and Age in Women (Top Diagonal) and Men (Bottom Diagonal).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Functionality appreciation		.59 **	.40 **	-.19 **	-.29 **	.17 **	.42 **	.41 **	.06	-.14 **
(2) Body appreciation	.66 **		.64 **	-.37 **	-.51 **	.24 **	.58 **	.44 **	.13 **	-.19 **
(3) Appearance evaluation	.40 **	.58 **		-.18 **	-.29 **	.16 **	.44 **	.30 **	.08 *	-.15 **
(4) EDEQ – Restraint	-.09 *	-.18 **	-.12 *		.72 **	-.07 *	-.15 **	-.15 **	.05	.29 **
(5) EDEQ – Eating Concern	-.27 **	-.40 **	-.26 **	.64 **		-.13 **	-.23 **	-.23 **	-.06	.31 **
(6) Self-esteem	.13 **	.21 **	.11 *	-.16 **	-.20 **		.24 **	.18 **	.02	-.06
(7) Life satisfaction	.39 **	.53 **	.36 **	-.10 *	-.18 **	.20 **		.53 **	.10 **	.01
(8) Gratitude	.40 **	.47 **	.29 **	-.09 *	-.17 **	.14 **	.52 **		.15 **	.03
(9) Age	.06	.03	.01	.09 *	.01	-.07	.04	.01		.16 **
(10) Body mass index	-.07	-.15 **	-.11 *	.28 **	.31 **	-.11 **	.02	-.07	.20 **	

Note. EDEQ = Eating Disorders Examination Questionnaire. \*  $p < .05$ , \*\*  $p < .001$ .

**Table 5**

Results of Multiple Hierarchical Regression Analyses for the Prediction of Self-Esteem.

Step	Variable	Women (n = 804)					Men (n = 616)				
		B	SE	$\beta$	t	p	B	SE	$\beta$	t	p
1	Body appreciation	.81	.06	.55	13.20	< .001	.84	.07	.50	11.33	< .001
	Appearance evaluation	.36	.12	.11	3.00	.003	.28	.14	.08	2.01	.045
	EDEQ - Restraint	.04	.04	.05	1.09	.276	-.04	.04	-.04	-0.97	.331
	EDEQ – Eating Concern	.04	.04	.05	1.08	.281	.09	.06	.08	1.62	.106
2	Body appreciation	.71	.07	.48	10.49	< .001	.77	.09	.46	8.67	< .001
	Appearance evaluation	.35	.12	.11	2.93	.003	.27	.14	.08	1.97	.050
	EDEQ - Restraint	.03	.04	.04	0.99	.325	-.05	.04	-.05	-1.06	.291
	EDEQ – Eating Concern	.05	.04	.05	1.13	.261	.10	.06	.08	1.67	.095
	Functionality appreciation	.19	.06	.11	3.21	.001	.14	.09	.07	1.55	.122

ideal for Colombian women (Giraldo, 2016) may decentre women and girls as physical beings, leading to the active de-prioritisation of their physical abilities (Oxford & Spaaij, 2019) and dampening opportunities to develop functionality appreciation. Conversely, the specific geopolitical context in Colombia (e.g., high levels of criminality and violence, a history of armed conflict, disruptions of neoliberal economics) may centre masculinised normative expectations of the body, which in turn allows men to more fully develop appreciation of their masculinised bodies (Vogoya, 2001). Nevertheless, it should be borne in mind that the gender difference in FAS scores uncovered in the present study was of a small effect size.

Overall, the results of the present study also supported the construct validity of the FAS in our sample. In terms of convergent validity, the FAS was moderately associated with body appreciation, which supports the distinctiveness of these facets of positive body image. We also found that FAS scores were moderately associated with appearance evaluation and weakly-to-moderately associated with eating disorder psychopathology, which again supports the convergent validity of FAS scores. One notable finding was that associations between FAS scores and the EDE-Q Restraint subscale were comparably weaker in men than women, although this may merely reflect the fact that restrictive eating patterns are less common in men than in women (Lavender et al., 2010). In terms of concurrent validity, we found that FAS scores were weakly-to-moderately associated with scores on measures of self-esteem, life satisfaction, and gratitude, respectively. Overall, then, these findings support the construct validity of FAS scores across women and men in our study.

In contrast, evidence of incremental validity was more equivocal on two counts. First, we found that incremental validity was supported in women, but not men (i.e., functionality appreciation did not account for significant incremental change in Adj.  $R^2$  in men). It is unclear what was driving this gendered discrepancy, although it should be noted that direct associations between functionality appreciation and life satisfaction were in the expected direction in both women and men. It may be that, in men, understandings of body and functionality appreciation are more strongly coupled than they are in women – a finding supported by

our correlational results. Second, although FAS scores were a significant, incremental predictor of life satisfaction in women, they accounted for only a very small portion of incremental variance (< 1%). In contrast, body appreciation was a substantively stronger predictor of life satisfaction across both women and men. This finding is consistent with previous work (e.g., Anastasiades et al., 2023) and is consistent with the suggestion that body appreciation is a more central or core facet of positive body image (Swami et al., 2020). This being the case, it may be unsurprising that body appreciation accounts for substantively greater portions of variance in outcome variables (see also Linardon et al., 2022), such as life satisfaction.

There are a number of issues that need to be considered when interpreting our findings. First, our reliance on a sample of university students may mean that our findings lack generalisability, given that the tertiary education enrolment ratio is about 54% of the Colombian population (Statista, 2023b). In particular, students enrolled in higher education in Colombia are more likely than the broader population to be affluent and from urbanised areas (Jaramillo, 2005), and possibly also more likely to be physically active (Vernaza-Pinzón et al., 2017). As such, it will be important to replicate our work with a broader cross-section of the Colombian population, with particular attention to variation in urbanicity, socioeconomic status, and levels of education – all of which may impact corporeal experiences in Colombian adults (Gilbert-Diamond et al., 2009; Jimenez-Mora et al., 2020). Likewise, given that we excluded participants who identified their gender in a way other than as a woman or man and that we did not collect information about sexual orientation, it will be important to extend our findings to minoritised groups. This is especially important given evidence that minoritised gender and sexual identity groups may exhibit differences in positive body image compared to non-minoritised groups (e.g., Soulliard & Vander Wal, 2022; Swami et al., 2023).

Additionally, we note that although we validated a Spanish version of the FAS, our results are limited to the Colombian context and may not generalise to other Spanish-speaking populations (e.g., adults in Spain and other Latin American nations). As such, it would be useful in future work to assess measurement invariance of the FAS across Spanish-

speaking populations, as well as across other linguistic groups. While we might expect that the factorial validity of the FAS will be upheld across populations from Spanish-speaking nations, it would be interesting to more fully understand whether there are substantive differences in functionality appreciation across such populations. By way of comparison, a recent cross-national study found notable differences in latent body appreciation across several Spanish-speaking nations (Swami et al., 2023), but it is not presently known whether such findings would also extend to functionality appreciation.

Beyond recruitment limitations, the present study also did not assess test-retest reliability, which is important component of test adaptation work. Other studies have shown that scores on the FAS remain stable across a period of several weeks (e.g., Alleva et al., 2017; Cerea et al., 2021), but this is something that will need to be tested directly in the Colombian context in the future. Likewise, the present study could be extended by considering associations between functionality appreciation and other constructs that are hypothesised to fall within its nomological network, such as adaptive eating styles, indices of positive body image beyond body appreciation (e.g., body pride, body image flexibility), self-compassion, and interoceptive awareness (for a review, see Linardon et al., 2023). However, to do so will be dependent on the availability of validated measures to assess said construct in Spanish. Finally, we caution that the present study adopted a sequential approach (Anderson et al., 1996), where we translated and validated an instrument that was originally designed for use in English-speaking populations. Adopting an emic approach (Brislin et al., 1973), where an instrument is developed specifically for a particular cultural or linguistic group (in this case, Colombian adults), may help scholars better understand possible cross-cultural variations in the meaning and manifestation of functionality appreciation.

Despite these ways in which the present work could be improved, we conclude that the Spanish FAS is psychometrically valid when used with Colombian adults. This is important from both theoretical and practical points-of-view. In terms of the former, the present study adds to a growing body of literature showing that the FAS measures a unidimensional construct of functionality appreciation in diverse national contexts. Based on this evidence, as well as the finding that scores on the FAS are reliable and valid across national contexts, we call for future research that more fully examines cross-national invariance of the FAS (cf. Todd & Swami, 2020). In terms of practical implications, the availability of the Spanish FAS may offer opportunities to develop and broaden research and practice in a hitherto neglected national context (Góngora et al., 2020; Mebarak Chams et al., 2019). In particular, the availability of this translated measure may prove particularly useful in helping scholars and practitioners gauge the utility of physical activity interventions – such as the national Hábitos y Estilos de Vida Saludable (Healthy Life Habits) programme (Gaffney et al., 2019) – at improving functionality appreciation specifically and positive body image more generally.

#### CRedit authorship contribution statement

**Moisés Mebarak:** Conceptualization, Methodology, Investigation, Data curation, Writing – review & editing, Project administration; **Jennifer Todd:** Data curation, Formal analysis, Writing – review & editing; **Ana María Chamorro Coneo:** Investigation, Writing – review & editing; **Andrés Muñoz-Alviz:** Investigation, Writing – review & editing; **Jean David Polo-Vargas:** Investigation, Writing – review & editing; **Carlos De Los Reyes Aragón:** Investigation, Writing – Reviewing and editing; **Maura Herrera:** Investigation, Writing – review & editing; **Martha Martínez:** Investigation, Writing – review & editing; **Olga Lucía Hoyos De Los Ríos:** Investigation, Writing – review & editing; **Juan C. Mendoza:** Investigation, Data curation, Writing – review & editing; **Angélica Carrasquilla:** Investigation, Writing – review & editing; **Viren Swami:** Methodology, Data curation, Formal analysis; Writing – original draft.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Data Availability

Data will be made available on request.

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#### Conflicts of Interest Statement

The authors certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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