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VALIDATION OF THE PORTUGUESE PACS-3 FREQUENCY SCALE: INDIVIDUAL DIFFERENCES IN APPEARANCE COMPARISON ACROSS PROXIMAL, DISTAL, AND MUSCULARITY CONTEXTS

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ABSTRACT

Background Social comparison processes focused on physical appearance are key mechanisms in body dissatisfaction and related psychopathology. However, no validated instrument exists to assess appearance comparison frequency in Portuguese adults, limiting research and clinical practice; **Objectives** This study examined the factor structure and psychometric properties of the Portuguese version of the Physical Appearance Comparison Scale-3 Frequency (PACS-3) in Portuguese adults; **Methods** A total of 406 Portuguese adults (52% female) aged 18–75 years completed the PACS-3 and measures of appearance-related distress (DAS-14), body appreciation (BAS-2), and body image salience and valence (CARSAL/CARVAL). The sample was randomly split for exploratory factor analysis (n = 193) and confirmatory factor analysis (n = 213). Multi-group confirmatory factor analysis tested measurement invariance across gender; **Results** Exploratory and confirmatory factor analyses supported an 8-item, three-factor structure (proximal, distal, muscularity-related comparisons). The model showed excellent fit (CFI = .99; RMSEA = .014; SRMR = .031). Internal consistency was excellent (α = .95). Convergent validity showed positive associations with appearance-related distress (r = .653) and body image salience (r = .458), while discriminant validity showed negative associations with body appreciation (r = -.556); **Conclusions** The Portuguese PACS-3 demonstrated good psychometric properties in a community-based online sample of Portuguese adults. While it shows promise for research and clinical screening, its generalizability to clinical populations and other Portuguese-speaking contexts requires further validation.

Keywords: appearance comparison; body image; muscularity; distal comparison; proximal comparison; individual differences

RESUMO

Contexto Os processos de comparação social focados na aparência física são mecanismos chave na insatisfação corporal e na psicopatologia relacionada. No entanto, não existe nenhum instrumento validado para avaliar a frequência da comparação de aparência em adultos portugueses, limitando a investigação e a prática clínica; **Objetivos** Este estudo analisou a estrutura fatorial e as propriedades psicométricas da versão portuguesa da Escala de Comparação de Aparência Física-3 Frequência (PACS-

3) em adultos portugueses; **Métodos** Um total de 406 adultos portugueses (52% mulheres) com idades entre os 18 e os 75 anos completaram o PACS-3 e as medidas de sofrimento relacionado com a aparência (DAS-14), apreciação corporal (BAS-2) e saliência e valência da imagem corporal (CARSAL/CARVAL). A amostra foi dividida aleatoriamente para análise fatorial exploratória (n = 193) e análise fatorial confirmatória (n = 213). A análise fatorial confirmatória multi-grupo testou a invariância da medição entre géneros; **Resultados** As análises fatoriais exploratórias e confirmatórias apoiaram uma estrutura de 8 itens e três fatores (proximal, distal, comparações relacionadas com a musculatura). O modelo mostrou excelente ajuste (CFI = .99; RMSEA = .014; SRMR = .031). A consistência interna foi excelente (α = .95). A validade convergente mostrou associações positivas com sofrimento relacionado com a aparência (r = .653) e saliência da imagem corporal (r = .458), enquanto a validade discriminante mostrou associações negativas com a apreciação corporal (r = -.556); **Conclusões** A versão portuguesa PACS-3 demonstrou boas propriedades psicométricas numa amostra online comunitária de adultos portugueses. Embora mostre potencial para investigação e rastreio clínico, a sua generalização para populações clínicas e outros contextos de língua portuguesa necessita de validação adicional.

Keywords: comparação de aparência; imagem corporal; musculatura; comparação distal; comparação proximal; diferenças individuais

1 INTRODUCTION

Body image dissatisfaction has been widely identified as a significant public health concern in Westernised societies, affecting individuals across different age groups and genders (Abdoli et al., 2024; Grogan, 2022). The internalisation of sociocultural valued aesthetic ideals – namely extreme thinness for women and muscularity for men – is promoted by traditional media (e.g., television, magazines, cinema) and intensified by digital platforms and social media (Fardouly et al., 2015; Holland & Tiggemann, 2016; Hussain et al., 2025)

Empirical evidence consistently indicates that such sociocultural pressure is associated with several negative psychological outcomes, including eating disorders, muscle dysmorphia, anxious and depressive symptomatology, as well as reduced levels of self-esteem and psychological well-being (Leonforte et al., 2026; Tavoloni et al., 2026). Beyond these general psychological outcomes, appearance-related comparisons have been identified as key mediators between internalisation of thin ideals and body-image shame (Markham et al., 2005). In the Portuguese context, previous studies have also identified high prevalence rates of body dissatisfaction, particularly among adolescents and young adults (Francisco et al., 2015; Marta-Simões, Ferreira, et al., 2016), highlighting the need for psychometrically robust and culturally appropriate assessment instruments for research and clinical practice.

According to Social Comparison Theory, individuals evaluate their opinions, abilities, and personal attributes by comparing themselves with others (Festinger, 1954). Early work in this field established the psychometric foundations for assessing social comparison orientation and its relationship with psychopathology (Allan & Gilbert, 1995). Subsequent research demonstrated that the frequency of social comparisons is associated with lower self-concept clarity and higher levels of anxiety and depression (Boulter et al., 2023). In the domain of physical appearance, these comparisons can take different directions depending on whether the comparison target is perceived as superior, inferior, or similar to oneself (Crusius et al., 2022). The literature has identified these processes as central

mechanisms in the genesis and maintenance of body dissatisfaction (Rodgers et al., 2022). Individual differences in appearance comparison tendencies have been linked to lower self-concept clarity and greater body dissatisfaction (Vartanian & Dey, 2013). Empirical evidence suggests that frequent comparisons with idealised appearance standards are associated with more negative body image, whereas downward comparisons may have a neutral or protective effect (Rousseau, 2024). Accordingly, the tendency to engage in social comparisons focused on appearance constitutes a core construct in body image research, health psychology, and eating behaviours (Sierra et al., 2026; Yu et al., 2026).

The study of individual differences in social comparison processes has a long tradition in personality research. A systematic review concluded that neuroticism, extraversion, and conscientiousness are consistently associated with body image outcomes (Nickerson & Brown, 2016). Regarding muscularity, personality traits such as perfectionism and neuroticism have been linked to the drive for muscularity (Davis et al., 2005), and more recent work has extended these findings to include associations with narcissism (Boulter et al., 2023). Collectively, this body of work highlights the need for psychometrically sound measures of appearance comparison frequency that can be used in personality-oriented research.

Among the available instruments for assessing appearance-related social comparison, the Physical Appearance Comparison Scale stands out as one of the most widely used measures internationally. The original version of the scale (Thompson et al., 1991) was a unidimensional measure consisting of five items, focused on the general tendency to compare physical appearance in social contexts. Subsequently, the Physical Appearance Comparison Scale-3 (PACS-3) was developed to broaden the assessment of this construct by integrating three distinct contextual dimensions: (a) proximal comparison, concerning comparisons made with people in one's immediate social environment; (b) distal comparison, referring to comparisons with media figures (e.g., actors, models, celebrities); and (c) muscularity comparison, specifically focused on the evaluation of muscle mass and definition, particularly relevant for male populations although applicable to both sexes (Schaefer & Thompson, 2018).

Despite the theoretical relevance and widespread use of the PACS-3 in international contexts, there is, to date, no validated version for the Portuguese population. This gap is particularly significant for several reasons. First, national studies have identified high levels of body dissatisfaction and concerning prevalence rates of eating disorders (Dixe, 2007; Melo & Tapadinhas, 2012; Reis et al., 2021). Second, sociocultural factors, including differences in body ideals, patterns of media exposure, and social norms surrounding appearance comparison, may influence how these processes manifest across different cultural contexts (Abdoli et al., 2024; Merino et al., 2024). Third, providing a brief, psychometrically robust, and culturally adapted Portuguese version of the PACS-3 represents an important contribution to advancing national research on body image in Portugal. Finally, such a validation would enable more rigorous cross-cultural studies and provide methodological support for clinical assessment and the development of interventions targeting body dissatisfaction and maladaptive eating behaviours.

The primary aim of the present study was to adapt and validate the PACS-3 for the Portuguese population, considering only the items about comparison frequency. First, we aimed to examine the factor structure of the scale using Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA), and to compare competing models. Second, we sought to evaluate the reliability and convergent and discriminant validity of the obtained solution, using theoretically related measures, including the

Derriford Appearance Scale-14 (DAS-14), the Body Appreciation Scale-2 (BAS-2), and the Salience and Valence subscales of the CARSAL, which assess the cognitive relevance and emotional valence of body image, respectively. Based on the original nine-factor model of the PACS-3 (Schaefer & Thompson, 2018), we hypothesised that a correlated three-factor structure (proximal, distal, and muscularity comparisons) would provide a better fit to the data than a unidimensional model. Furthermore, we expected that higher scores on the PACS-3 subscales would be positively associated with appearance-related distress (DAS-14) and negatively associated with body appreciation (BAS-2).

2 Method

2.1 Participants

A total of 406 participants took part in the study. Participants' ages ranged from 18 to 75 years (M = 28.49, SD = 11.02), with 60.6% aged 25 years or younger. The sample was relatively balanced by sex, with 211 female participants (52.0%) and 195 male participants (48.0%). Regarding sexual orientation, 68.7% (n = 279) identified as heterosexual, 14.5% (n = 59) as bisexual, 14.3% (n = 58) as homosexual, and 2.5% (n = 10) as other. Most participants were single (78.3%; n = 318), followed by married (9.1%; n = 37), in a consensual union (7.6%; n = 31), divorced (4.4%; n = 18), and widowed (0.5%; n = 2). Regarding education, 44.3% (n = 180) had completed secondary education, 33.5% (n = 136) held a bachelor's degree, 14.3% (n = 58) held a master's degree, and 2.2% (n = 9) held a doctoral degree. A smaller proportion had completed lower secondary education (3rd cycle; 4.4%; n = 18), basic education (2nd cycle; .5%; n = 2), or primary education (1st cycle; .7%; n = 3).

2.2 Measures

2.2.1 Sociodemographic questionnaire

Participants completed a brief sociodemographic questionnaire assessing age, sex, sexual orientation, marital status, and educational level.

2.2.2 Physical Appearance Comparison Scale - 3

The Physical Appearance Comparison Scale-3 (PACS-3), developed by Schaefer & Thompson (2018), is a 27-item self-report measure that assesses appearance comparison processes across three dimensions: frequency, direction (upward vs downward comparisons), and immediate emotional impact. Items are rated on a 5-point Likert scale. The scale includes nine subscales: Proximal: Frequency (3 items); Distal: Frequency (3 items); Muscularity: Frequency (3 items); and the corresponding Direction and Impact subscales (3 items each). Total scores can also be calculated for Frequency, Direction, and Impact. Higher scores indicate a greater frequency of appearance comparisons, a stronger tendency toward upward comparisons, and a more negative emotional impact. The PACS-3 demonstrates good internal consistency (α = .76 – .94 across subscales). In the present study, the PACS-3 demonstrated excellent internal consistency, with a Cronbach's alpha of .91 for the total scale and .86, .91, and .87 for the Proximal, Distal, and Muscularity subscales, respectively.

2.2.3 Derriford Appearance Scale – 14 items

Mendes and Pereira (2018) validated the shortened version of the original DAS-24 instrument (Mendes et al., 2016; Moss & Rosser, 2012). It aims to assess self-awareness of appearance, specifically the way individuals feel and behave regarding aspects of their appearance that bother them. The scale consists

of 14 items, with response options varying according to the statement posed: (1-Nothing, 2-Slightly, 3-Moderately, 4-Extremely; or 0-Not applicable; or 1-Never/Rarely, 2-Sometimes, 3-Often, 4-Almost Always). The version adapted for the Portuguese population showed excellent internal consistency for the clinical sample (α = .88) and for the non-clinical sample (α = .91). In the present study, the DAS-14 showed excellent internal consistency, with a Cronbach's alpha of .91.

2.2.4 Body Appreciation Scale – Revised

The Body Appreciation Scale-2 (BAS-2) was originally developed by Tylka and Wood-Barcalow (2015) and later validated for the Portuguese population by Marta-Simões and colleagues (2016). The BAS-2 is a unidimensional self-report measure consisting of 10 items (e.g., "I respect my body"), rated on a 5-point Likert scale ranging from 1 (Never) to 5 (Always). Total scores are calculated as the mean of the 10 items, with higher scores indicating greater body appreciation. The original scale has demonstrated excellent internal consistency, test–retest reliability over 3 weeks, and convergent and discriminant validity. Measurement invariance across gender has been established, allowing for meaningful comparisons between men and women. In the present study, the BAS-2 showed excellent internal consistency, with a Cronbach's alpha of .93.

2.2.5 CARSAL and CARVAL

The CARSAL and CARVAL scales were originally developed by Moss and Rosser (2012) and later adapted for the Portuguese population by Mendes et al. (2019). The instrument comprises 13 items assessing two dimensions of body image: *salience* (the extent to which appearance and the physical self are brought into consciousness) and *valence* (the degree to which individuals evaluate their appearance positively or negatively). Salience is assessed by 5 items and demonstrated acceptable internal consistency in the Portuguese validation study (α = .77), whereas 7 items assess valence and showed excellent internal consistency (α = .93). All items are rated on a 6-point Likert scale ranging from 1 (Strongly disagree) to 6 (Strongly agree). In the present study, internal consistency was acceptable for the CARSAL (α = .77) and excellent for the CARVAL (α = .95).

2.3 Procedures

The validation process of the Portuguese version of the Physical Appearance Comparison Scale-3 Frequency Scale (PACS-3 Frequency Scale) followed international guidelines for the cross-cultural adaptation and validation of psychometric instruments. After obtaining permission from the original authors, the scale was independently translated into Portuguese by two bilingual translators fluent in Portuguese and English, resulting in a preliminary consensus version. This version was subsequently back translated into English by an independent bilingual translator unfamiliar with the original instrument. Any discrepancies were discussed and resolved to ensure semantic, idiomatic, and conceptual equivalence between the original and translated versions. A pilot study was then conducted with a community sample of 40 adults aged 18 years or older, with varying educational backgrounds, to assess the comprehensibility and clarity of the translated items. No major difficulties or ambiguities were identified during this phase.

Data collection was conducted online using the Microsoft Forms platform. Participants were informed about the study's aims, the voluntary nature of participation, and the confidentiality and anonymity of their responses. Informed consent was obtained electronically prior to participation. All survey

responses were mandatory, resulting in no missing data across the total sample. The study was approved by the Ethics Committee of the University of the Azores (Ref. 04/2026).

2.4 Statistical analysis

A series of statistical analyses were performed using IBM SPSS for Macintosh, version 31 (Armonk, NY, USA), and IBM SPSS AMOS for Windows, version 30 (Armonk, NY, USA).

The sample was randomly split into two subsamples. Exploratory Factor Analysis (EFA) was conducted on Sample A (n = 193) using principal axis factoring (PAF) as the extraction method, with direct oblimin rotation, given the expected correlations among factors. Factor retention was guided by the Kaiser criterion (eigenvalues > 1), examination of the scree plot, and theoretical interpretability. Communalities were inspected to ensure adequate shared variance (≥ .50).

Confirmatory Factor Analysis (CFA) was performed on Sample B (n = 213) using maximum likelihood estimation (ML). Model fit was evaluated using the following indices and cut-offs: $\chi^2/df \leq 3$ (acceptable) or ≤ 2 (good); Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) ≥ .90 (acceptable) or ≥ .95 (good); Root Mean Square Error of Approximation (RMSEA) ≤ .08 (acceptable) or ≤ .06 (good); and Standardised Root Mean Square Residual (SRMR) ≤ .08 (Marôco, 2021a).

Construct reliability was assessed using Cronbach's alpha and Composite Reliability (CR), with values ≥ .70 considered adequate (Hair et al., 2019). Convergent validity within the measurement model was assessed using Average Variance Extracted (AVE), with values ≥ .50 indicating adequate convergent validity (Fornell & Larcker, 1981).

Convergent and discriminant validity were examined through Pearson correlations between the PACS-3 subscales and the validation measures (DAS-14, BAS-2, CARSAL, CARVAL). Correlation magnitudes were interpreted following Marôco (2021b): r ≥ .10 as small, r ≥ .30 as moderate, and r ≥ .50 as strong.

Measurement invariance across gender was tested through Multi-Group Confirmatory Factor Analysis (MG-CFA), following a sequential procedure: configural (same factor structure), metric (equal factor loadings), and scalar (equal intercepts) invariance. Model comparison was based on changes in CFI (ΔCFI ≤ .01) and RMSEA (ΔRMSEA ≤ .015) as recommended by Chen (2007) and Cheung and Rensvold (2002). Internal consistency was assessed using Cronbach's alpha (α), with values ≥ .70 considered acceptable (Marôco, 2021b).

3 Results

3.1 Exploratory Factor Analysis and Reliability (Sample A, n = 193)

No significant missing data patterns were identified. Univariate distributions revealed acceptable levels of skewness and kurtosis across all PACS-3 items. Inter-item correlations suggested adequate factorability without evidence of problematic multicollinearity. The analysis of the 27-item PACS-3 showed variable homogeneity (KMO = .87), indicating that it was adequate for the sample under analysis. Bartlett's test of sphericity ($\chi^2(351) = 8565.768$, $p < .001$) demonstrated that the variables were sufficiently correlated.

The Kaiser criterion (eigenvalues > 1) initially suggested a four-factor solution (eigenvalues: 14.46, 3.32, 2.17, 1.19), accounting for 78.29% of the total variance. However, the Kaiser criterion is known to overestimate the number of factors, particularly with many items (Costello & Osborne, 2005). Examination of the scree plot revealed a pronounced elbow after the third factor, with the fourth

factor falling on an almost horizontal plateau. Furthermore, in the four-factor rotated matrix, items 7, 7a, and 7b exhibited nearly identical cross-loadings on two factors (differences < .10), indicating problematic saturation. The fourth eigenvalue was also marginal (1.19). Given the theoretical foundation of the original scale (three-factor structure; Schaefer & Thompson, 2018), the evidence from the scree plot, and the cross-loading pattern, a three-factor solution was imposed.

The three rotated factors explained 73.89% of the total variance (post-rotation eigenvalues: 7.05, 6.68, and 6.22), substantially exceeding the 50% minimum criterion recommended for social sciences. The rotated component matrix revealed robust factor loadings: all items loaded above .60 on their respective factors (predominantly > .70), meeting the commonly accepted .40 threshold for saturation. No problematic cross-loadings (> .30) were observed. Critically, items 7, 7a, and 7b are now loaded unequivocally on Factor 2 (loadings > .70), resolving the cross-loading issue observed in the four-factor solution (Marôco, 2021b). Communalities ranged from .64 to .81, all above the .50 threshold, indicating that a substantial proportion of each item's variance was explained by the retained three-factor solution (Matos & Rodrigues, 2019).

The three factors aligned with the original PACS-3 theoretical structure: Factor 1 (Proximal comparison; α = .90), with items comparing appearance in close social contexts; Factor 2 (Distal Comparison; α = .90), with items comparing appearance in broader social contexts; and Factor 3 (Muscularity; α = .91), with items assessing affective reactions to appearance comparisons. Internal consistency was excellent for the total scale (α = .95). Composite reliability (CR) was also computed to assess the internal consistency of the 27-item model. The results demonstrated appropriate construct reliability for all three dimensions: Proximal comparison (CR = .94), Distal comparison (CR = .97), and Muscularity (CR = .95). According to established guidelines (Hair et al., 2019; Marôco, 2021b), CR values above .70 indicate appropriate construct reliability.

3.2 Confirmatory Factor Analysis (Sample B, n= 213)

The original version of the Physical Appearance Comparison Scale-3 (PACS-3) consists of 27 items, organised into nine comparison situations. For each situation, three facets are assessed: frequency of comparison (items 1–9), direction of comparison (items 1a–9a), and feeling resulting from the comparison (items 1b–9b). Given the study's focus on the frequency dimension, we first tested the three-factor structure on the 27 items first to evaluate the full instrument's performance and then proceeded to analyse the nine frequency items.

A confirmatory factor analysis (CFA) was first tested with the hypothesised three-factor structure (General Appearance, Weight/Shape, Muscularity) using all 27 items. The model showed very poor fit to the data: $\chi^2(321) = 4580.969$, $p < .001$; $\chi^2/df = 14.271$; CFI = .55; TLI = .51; GFI = .43; RMSEA = .250; SRMR = .089. Modification indices revealed very high correlations between errors across items from the same situation (e.g., between "a" and "b" items), suggesting strong method effects related to direction and feeling responses.

Given the strong method variance associated with the direction ('a') and feeling ('b') items, we proceeded to test the three-factor structure exclusively on the nine frequency items (items 1–9), as these items directly assess the behavioural component of appearance comparison without the additional response variance.

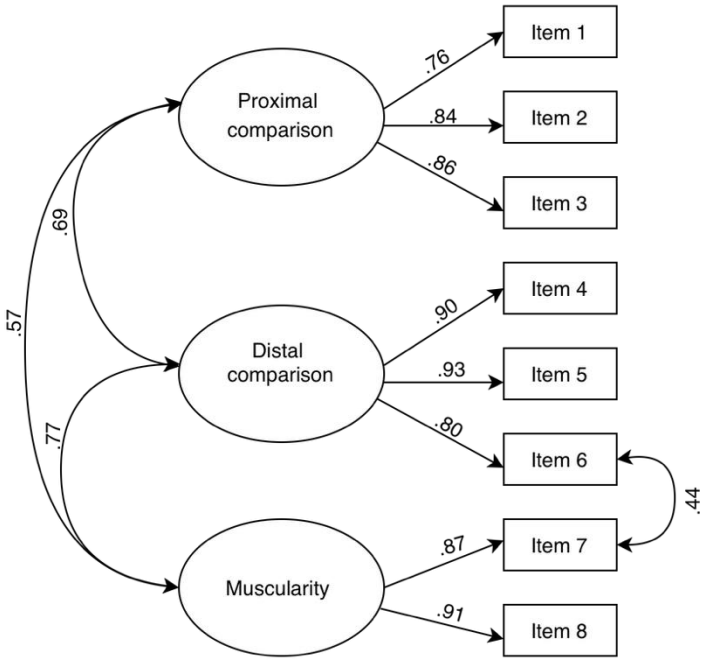
The initial three-factor model with nine frequency items yielded acceptable but suboptimal fit: $\chi^2(24) = 84.672$, $p < .001$; $\chi^2/df = 3.528$; CFI = .96; TLI = .92; GFI = .92; RMSEA = .109; SRMR = .05. While CFI, TLI, and GFI were adequate (all ≥ .92), the RMSEA exceeded the recommended cutoff of .08.

Given that the PACS-3 was originally developed as a multidimensional instrument, we also tested a unidimensional model for comparison purposes, to verify whether the nine frequency items could be better represented as a single general factor. The unidimensional model showed very poor fit: $\chi^2(27) = 375.332$, $p < .001$; $\chi^2/df = 13.901$; CFI = .77; TLI = .69; GFI = .69; RMSEA = .247; SRMR = .095. The inferior fit of the unidimensional model supported the retention of the three-factor structure.

Inspection of modification indices indicated that item 9 ("When I am in public, I compare my muscularity to the muscularity of others") showed high cross-loadings with the Appearance factor (M.I. = 62.84 with Distal comparison). This item was therefore removed. Internal consistency was excellent for the total scale (α = .92). The model with eight items (items 1–8) was re-estimated. After removal of item 9, the model fit improved substantially: $\chi^2(17) = 39.820$, $p < .001$; $\chi^2/df = 2.342$; CFI = .98; TLI = .97; GFI = .96; RMSEA = .080; SRMR = .03.

Examination of modification indices suggested a correlated residual between item 6 ("When I see a model in a magazine, I compare my weight/shape to his/her weight/shape") and item 7 ("When I see a model in a magazine, I compare my muscularity to his/her muscularity"). Both items using the same stimulus context. This correlation was theoretically justified and added to the model. The final model with eight items (1 - 8) and one correlated error (e6 <-> e7) showed excellent fit: $\chi^2(16) = 16.63$, $p < .001$; $\chi^2/df = 1.039$; CFI = .99; TLI = .99; GFI = .99; RMSEA = .014; SRMR = .031 (see Figure 1).

Figure 1 *- The final model of the Portuguese PACS-3 Frequency Scale.*



The final solution revealed an empirical factor structure that partially differs from the original theoretical grouping. Although the factor labels remain similar (Proximal, Distal, and Muscularity), the item composition of each factor shifted: rather than grouping items primarily by content domain (overall appearance, weight/shape, muscularity), the data suggested that items clustered by

comparison context—face-to-face interactions (Proximal), media exposure (Distal), and muscularity-focused comparisons (Muscularity) (see Table 1).

Table 1 *- Standardised Factor Loadings for the Final 8-Item Three-Factor Model of the PACS-3 Frequency Scale*

Factor	Items (English / Portuguese)	(λ)
Proximal comparison (face-to-face contexts)	1. When I'm at a party or social gathering, I compare my overall appearance to the appearance of others. / *Quando estou numa festa ou num convívio social, comparo a minha aparência geral com a aparência dos outros.*	.762
	2. When I'm out in public, I compare my weight/shape to the weight/shape of others. / *Quando estou em público, comparo o meu peso/forma com o peso/forma dos outros.*	.835
	3. When I meet a new person (same sex), I compare my weight/shape to his/her weight/shape. / Quando conheço uma nova pessoa (do mesmo sexo), comparo o meu peso/forma com o peso/forma dela.	.864
Distal Comparison (media contexts)	4. When I watch a movie, I compare my overall appearance to the appearance of the actors/actresses. / *Quando vejo um filme, comparo a minha aparência geral com a aparência dos atores/atrizes.*	.898
	5. When I watch television, I compare my weight/shape to the weight/shape of the actors/actresses. / *Quando vejo televisão, comparo o meu peso/forma com o peso/forma dos atores/atrizes.*	.932
	6. When I see a model in a magazine, I compare my weight/shape to his/her weight/shape. / *Quando vejo um(a) modelo numa revista, comparo o meu peso/forma com o peso/forma dele(a).*	.803
Muscularity	7. When I see a model in a magazine, I compare my muscularity to his/her muscularity. / *Quando vejo um(a) modelo numa revista, comparo a minha musculatura com a musculatura dele(a).*	.870
	8. When I watch a movie, I compare my muscularity to the muscularity of the actors/actresses. / Quando vejo um filme, comparo a minha musculatura com a musculatura dos atores/atrizes.	.905

Note. All factor loadings were statistically significant at $p < .001$. λ = standardised factor loading.

Composite reliability (CR) for the final 8-item model was adequate for all factors: Proximal comparison (.86), Distal comparison (.91), and Muscularity (0.88). Average variance extracted (AVE) was likewise satisfactory (.68, .77, and .79, respectively), indicating good convergent validity (Fornell & Larcker, 1981).

3.3 Convergent and Discriminant Validity of the PACS-3 (Sample A and Sample B, N = 406)

To assess the convergent and discriminant validity of the Physical Appearance Comparison Scale-3 (PACS-3), Pearson correlations were calculated between its three subscales (Proximal Comparison, Distal Comparison, and Muscularity) and measures of psychopathological symptoms (DAS14), body satisfaction/dissatisfaction (CARSAL), body appreciation (CARVAL), and total body appreciation (BAS-2). Results are presented in Table 2.

Table 2 *- Pearson correlation between PACS-3 subscales and validity measures (N = 406)*

Variable	1	2	3	4	5	6	7
1. Proximal Comparison	_	.605***	.493***	.653***	.458***	.578***	-.556***
2. Distal Comparison		_	.723***	.421***	.364***	.322***	-.315***
3. Muscularity			_	.284***	.348***	.222***	-.211***
4.DAS14				_	.394***	.739***	-.726***
5. CARSAL					_	.199***	-.216***
6. CARVAL						_	-.846***
7.BAS-2							_

Note. *p < .05; **p < .01; ***p <.001. DAS14 = Derriford Appearance Scale – 14 items; DAS-2 = Body Appreciation Scale – Revised

Internal convergent validity. The three PACS-3 subscales correlated positively and significantly with each other. The correlation between Proximal Comparison and Distal Comparison was strong, r = .605, p < .001, as was the correlation between Distal Comparison and Muscularity, r = .723, p < .001. The correlation between Proximal Comparison and Muscularity was moderate to strong, r = .493, p < .001. These results indicate that the subscales share common variance, consistent with the multidimensional nature of the appearance comparison construct.

External convergent validity. As expected, Proximal Comparison correlated positively with the DAS14 total score, r = .653, p < .001, and with CARSAL, r = .458, p < .001. Distal Comparison also showed positive correlations with DAS14, r = .421, p < .001, and with CARSAL, r = .364, p < .001. The Muscularity subscale demonstrated lower, but still significant, correlations with DAS14, r = .284, p < .001, and with CARSAL, r = .348, p < .001. These patterns corroborate the convergent validity of the PACS-3, showing that higher levels of appearance comparison are associated with greater general psychopathology and greater body dissatisfaction.

Discriminant validity. To test discriminant validity, we examined the correlations between the PACS-3 subscales and BAS-2 (body appreciation), a theoretically opposite construct. As expected, all correlations were negative and significant: Proximal Comparison, r = -.556, p < .001; Distal Comparison, r = -.315, p < .001; Muscularity, r = -.211, p < .001. As expected, the negative correlations with BAS-2 were consistently lower than the positive correlations with DAS-14, supporting the discriminant validity of the PACS-3. However, the difference was less pronounced for the Proximal subscale (r = -.556 vs. r = .653), suggesting that proximal comparisons may be particularly relevant for both negative and positive body image outcomes.

3.5 Measurement Invariance

Invariance analysis in gender

Before testing measurement invariance across gender, we first examined whether the final 8-item three-factor model fitted the data adequately in each group separately. As shown in Table 3, the model

demonstrated excellent fit for both men (CFI = .993; RMSEA = .048; SRMR = .027) and women (CFI = .995; RMSEA = .043; SRMR = .0231), supporting the adequacy of the model for invariance testing in both groups. Multi-group confirmatory factor analysis (MG-CFA) was conducted to test the measurement invariance of the PACS-3 frequency scale across gender (male = 195, female = 211). A sequential procedure tested configural, metric, and scalar invariance (Chen, 2007; Cheung & Rensvold, 2002).

The configural model (same factor structure across groups) showed good fit: $\chi^2(32) = 45.239$, CFI = .994, RMSEA = .032, SRMR = .027. The metric model (equal factor loadings) did not result in substantial deterioration of fit ($\Delta\chi^2(37) = 57.867$, $p = .016$; ΔCFI = .003), supporting metric invariance. The scalar model (equal intercepts) also held ($\Delta\chi^2(6) = 15.09$, $p = .09$; ΔCFI = −.003), supporting scalar invariance. These results indicate that the PACS-3 frequency scale demonstrated measurement invariance across gender at the scalar level, allowing meaningful comparisons of latent factor means between men and women.

Table 3 *- Goodness-of-Fit Indices for the Final 8-item Model by Gender*

Group	X^2	DF	CFI	RMSEA	SRMR
Men (n = 195)	23.126	16	.993	.048	.0274
Woman (n = 211)	22.083	16	.995	.043	.0231

DISCUSSION

The present study aimed to adapt and validate the Portuguese version of the Physical Appearance Comparison Scale-3 (PACS-3), focusing specifically on the frequency-related items assessing appearance comparison behaviours. Overall, the findings provide supportive evidence for the psychometric adequacy of the Portuguese version of the scale, demonstrating high levels of internal consistency, convergent and discriminant validity, and measurement invariance across gender. However, the results also suggest that the factor structure observed in the Portuguese population differs partially from the organisation originally proposed by Schaefer & Thompson (2018), pointing instead toward a structure primarily organised according to the context in which appearance comparisons occur.

The exploratory factor analysis initially suggested a four-factor solution. Nevertheless, both statistical and theoretical criteria supported the adoption of a three-factor structure. In particular, the scree plot revealed a clear inflection after the third factor, whereas the four-factor solution presented problematic cross-loadings, especially among muscularity-related items. The three-factor solution proved to be more parsimonious, theoretically coherent, and psychometrically robust, accounting for a substantial proportion of the total variance. These findings suggest that appearance comparison processes in the Portuguese population may be organised around three relatively distinct domains: proximal comparisons, distal media-related comparisons, and muscularity-focused comparisons. This pattern is consistent with previous research indicating that different social and media contexts activate distinct forms of body-related self-evaluation and appearance comparison processes (Fardouly & Vartanian, 2016; Rodgers & Melioli, 2016).

Despite the overall adequacy of the three-factor solution, confirmatory factor analysis demonstrated that the original 27-item model showed poor fit to the data. The high modification indices observed

between items substantial method effects associated with the comparison direction and emotional impact dimensions. This finding may indicate that participants do not clearly differentiate among the frequency of comparisons, the direction of the comparison, and the resulting emotional reaction, leading to considerable redundancy across responses. Previous research has suggested that multidimensional social comparison measures may present substantial conceptual overlap between cognitive and emotional components, particularly when items share similar wording or contextual framing (Marsh et al., 2020; Schaefer & Thompson, 2018). Consequently, only the frequency items were retained, as they appear to capture the behavioural core of the appearance comparison construct more directly.

The final version consisted of eight items distributed across three correlated factors: proximal comparison, distal comparison, and muscularity. This solution demonstrated excellent global fit indices, as well as satisfactory composite reliability and average variance extracted values. Importantly, the resulting structure appeared to organise primarily according to comparison context rather than the specific appearance domain being evaluated. Comparisons occurring in face-to-face interpersonal contexts clustered within a proximal factor, whereas comparisons involving actors, models, and media figures clustered within a distal factor. This pattern suggests that, within the Portuguese context, the social and media environment in which comparisons occur may be psychologically more salient than distinctions between overall appearance, weight/shape, or muscularity. This interpretation aligns with sociocultural models of body image, which emphasise the central role of social and media exposure in the internalisation of appearance ideals and the activation of appearance-based comparison processes (Holland & Tiggemann, 2016; Thompson et al., 1999; Tiggemann & Slevec, 2012).

Interestingly, the findings appear conceptually closer to the logic underlying the original Physical Appearance Comparison Scale developed by Thompson and colleagues (1991), which focused primarily on the general frequency of appearance comparisons in social contexts. Although subsequent developments of the PACS-R and PACS-3 sought to expand the construct by incorporating multiple contexts, comparison directions, and emotional impact dimensions, the present findings suggest that comparison frequency appears to be a psychometrically robust component of appearance comparison, at least within the context of the present study. However, it should be noted that we did not separately evaluate the psychometric performance of the direction and impact components in the current sample. Future research should examine the full PACS-3 structure, including these dimensions, in Portuguese samples. In this regard, the method effects observed in the direction and emotional impact items may reflect the greater cognitive and affective complexity associated with these dimensions, particularly in cross-cultural adaptation processes. This possibility is consistent with psychometric literature suggesting that evaluative and emotionally laden components are often more sensitive to linguistic and cultural variation in self-report instruments (Van De Vijver & Leung, 2021).

The findings regarding convergent validity broadly support the existing literature on appearance comparison and body dissatisfaction. As expected, higher levels of appearance comparison were associated with greater appearance-related distress and higher cognitive salience of body image. These findings are consistent with the Social Comparison Theory proposed by Festinger (1954), which holds that individuals evaluate themselves by comparing themselves with others, particularly in socially valued domains. Furthermore, previous research has consistently demonstrated that frequent appearance comparisons are associated with increased body dissatisfaction, eating pathology, and psychological distress (Myers & Crowther, 2009; Rodgers et al., 2022). Particularly noteworthy was the stronger association between proximal comparison and indicators of psychological distress, suggesting

that comparisons occurring in direct interpersonal contexts may exert a greater emotional impact than media-based comparisons. This finding aligns with previous studies suggesting that comparisons involving peers and socially proximal targets are often perceived as more realistic, personally relevant, and threatening to self-evaluation (Frith, 2012; Tsai et al., 2014).

Similarly, the findings regarding discriminant validity revealed significant negative associations between PACS-3 dimensions and positive body appreciation. These results reinforce the notion that a greater tendency to engage in appearance comparisons is associated with a more critical and negative relationship with one's body. Although the observed correlations varied in magnitude across subscales - ranging from weak to strong - the overall pattern is consistent with contemporary models of positive body image, according to which body appreciation may function as a protective factor against the negative consequences of appearance-based social comparison (Tylka & Wood-Barcalow, 2015).

Another particularly relevant finding concerns the measurement invariance observed across gender. The confirmation of configural, metric, and scalar invariance suggests that the scale structure is interpreted similarly by men and women, thereby allowing meaningful comparisons of latent means across groups. This finding is especially relevant given the growing evidence that appearance comparison and body image concerns affect not only women but also men, particularly in domains related to muscularity and body composition (Bach et al., 2014; Karazsia et al., 2017). In this sense, the inclusion of a muscularity dimension represents an important contribution to the contemporary assessment of male body image concerns and muscular ideal internalisation.

Implications for Individual Differences Research

The present findings also have important implications for research on personality and individual differences in appearance comparison processes. Social comparison orientation has long been regarded as a relatively stable dispositional characteristic (Gibbons & Buunk, 1999), and the current results suggest that the frequency dimension of the PACS-3 may be particularly responsive to enduring psychological traits such as neuroticism, low self-esteem, and perfectionistic self-presentation. The three-factor structure of the scale – distinguishing between proximal, distal, and muscularity-related comparisons – may reflect different personality-related mechanisms underlying appearance comparison behaviour. Specifically, proximal comparisons may be more closely associated with interpersonal sensitivity and concerns about social evaluation, whereas distal comparisons involving media figures may be more strongly linked to the internalisation of appearance ideals and perfectionistic tendencies.

Moreover, the demonstration of measurement invariance across gender indicates that the PACS-3 assesses comparable psychological constructs in both men and women. This provides a robust foundation for future research examining whether the effects of frequent appearance comparisons on personality-related outcomes vary as a function of gender. From an individual difference's perspective, the PACS-3 Frequency Scale represents a concise and psychometrically sound instrument for situating appearance comparison tendencies within broader nomological networks encompassing temperament, self-concept, and maladaptive appearance-related beliefs.

Limitations

Despite these promising findings, several limitations should be acknowledged. First, the use of a convenience sample limits the generalizability of the findings to the broader Portuguese population.

Second, the cross-sectional design prevents causal conclusions regarding the relationship between appearance comparison and psychological adjustment variables. Additionally, all measures relied on self-report methodology, which may introduce biases associated with social desirability and common method variance. Future studies should attempt to replicate the present structure in independent samples and examine the temporal stability of the scale through test–retest analyses.

It is also important to acknowledge that the final version obtained corresponds specifically to the frequency dimension of the PACS-3 rather than the full original instrument. The exclusion of the direction and impact items suggests that these dimensions may be more susceptible to method effects or cultural influences. Future research should therefore explore the functioning of these components more thoroughly across different sociocultural contexts.

Despite these limitations, the present study meaningfully contributes to body image research in Portugal by providing a brief, psychometrically robust, and theoretically coherent measure of appearance-comparison frequency. The Portuguese version of the PACS-3 Frequency Scale may prove useful in both clinical and research settings, particularly in studies examining body image, eating pathology, media influence, and the impact of social media on psychological well-being. Future research should extend the present validation by examining the PACS-3 Frequency Scale alongside comprehensive personality measures, particularly neuroticism, extraversion (given social comparison's reliance on social contexts), and perfectionism. Such work would clarify whether proximal vs. distal comparison frequency load onto distinct higher-order personality factors.

CONCLUSION

The present study provides initial evidence supporting the reliability and validity of the Portuguese version of the Physical Appearance Comparison Scale-3 Frequency Scale (PACS-3 Frequency Scale). Overall, the findings suggest that the adapted version is a psychometrically sound instrument for assessing the frequency of appearance comparisons among the sample of Portuguese adults recruited online. The final eight-item structure demonstrated strong internal consistency, satisfactory convergent and discriminant validity, and measurement invariance across gender, supporting its use in both men and women.

Importantly, the resulting structure appeared to organise primarily according to comparison context rather than the specific appearance domain being evaluated. Although the factor labels remained similar to the original (Proximal, Distal, Muscularity), the item composition shifted, with items clustering by comparison context rather than by content domain. Furthermore, the results suggest that the frequency dimension appears to be a psychometrically robust component of appearance comparison, at least within the context of the present study. However, it should be noted that we did not separately evaluate the psychometric performance of the direction and impact components in the current sample. Future research should examine the full PACS-3 structure, including these dimensions, in Portuguese samples to determine whether the frequency dimension indeed represents the most stable component across all facets of the scale.

Given the well-established association between appearance comparison, body dissatisfaction, eating pathology, and psychological distress, the availability of a culturally adapted Portuguese measure may facilitate future research examining sociocultural influences on body image and mental health. In addition, the scale may prove clinically useful for identifying maladaptive appearance comparison tendencies associated with body image disturbance and eating-related psychopathology.

Future research should continue examining the psychometric performance of the PACS-3 Frequency Scale across more diverse Portuguese samples, including adolescent and clinical populations, while also exploring longitudinal stability and sensitivity to intervention-related change. Further investigation into the role of comparison direction and emotional impact dimensions across cultural contexts also appears warranted.

Overall, the present study represents an important contribution to body image assessment research in Portugal by providing a brief, theoretically meaningful, and empirically supported measure of the frequency of appearance comparisons.

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