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► **To cite this version:**

Rachel Rachel F Rodgers, Lauren Schaefer, Maude Seneque, Adrián Alacreu-Crespo, Maria Moreno-Padilla, et al.. Sociocultural Attitudes Towards Appearance Questionnaire-4: Psychometric properties among a French clinical eating disorder sample and normative comparisons. *Eating Behaviors*, 2021, 40, pp.101466. 10.1016/j.eatbeh.2020.101466 . hal-03665360

HAL Id: hal-03665360

<https://hal.science/hal-03665360>

Submitted on 3 Feb 2023

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**Sociocultural Attitudes Towards Appearance Questionnaire-4: psychometric properties
among a French Clinical Eating Disorder Sample and normative comparisons**

Rachel F. Rodgers, Lauren M Schaefer, Maude Seneque, Adrián Alacreu-Crespo, Maria
Moreno-Padilla, Philippe Courtet, J. Kevin Thompson, & Sebastien Guillaume

Abstract

Although the Sociocultural Attitudes Towards Appearance Questionnaire-4 (SATAQ-4) has been shown to be a reliable and valid tool for assessing appearance pressures and appearance ideal internalization among French college students, to date its psychometric properties among French clinical populations have not been examined. The aim of this study was to evaluate the factor structure, reliability, and validity of the SATAQ-4 among a French female clinical eating disorder sample, and to compare the mean SATAQ-4 scores from this clinical sample to previously published means observed among French female college women. The current sample included 192 French women consecutively recruited from an outpatient eating disorders unit in France. Participants completed the SATAQ-4, as well as validated measures of body image and eating pathology. Confirmatory factor analysis revealed that the original 22-item five-factor solution provided less than adequate fit to the data. In contrast, the reduced 20-item five-factor solution identified among French college students provided a good fit to the data. The SATAQ-4 subscales generally exhibited moderate positive associations with convergent measures of body image and eating disturbance, consistent with expectations. Differences in SATAQ-4 subscale means across diagnostic groups were observed. In addition, the clinical group reported higher scores on the *Internalization: Thin/Low Body Fat* and *Internalization: Muscular/Athletic* subscales compared to a non-clinical French sample. Findings support the SATAQ-4 as a valuable tool for assessing sociocultural influences on body image and eating concerns among French women with eating disorders.

Keywords: internalization, thin-ideal, muscular-ideal, media, peers, family, body image

Introduction

Sociocultural models highlight the role of appearance pressures from media and one's interpersonal environment in the etiology and maintenance of body image and eating concerns (Rodgers, Chabrol, & Paxton, 2011). Individuals' internalization of these appearance ideals is theorized to result in body image concerns and disordered eating behaviors (Rodgers et al., 2011; Thompson, & Stice, 2001). Consistent with this model, strong evidence has been found for appearance pressures and the internalization of appearance ideals as risk/maintenance factors for body image and eating concerns (Stice, 2004; Thompson, & Stice, 2001).

Nevertheless, existing research is limited in critical ways. First, the majority of the work among women has exclusively focused on pressures towards thinness (Thompson, & Stice, 2001). While thinness is at the core of female appearance ideals, in recent years, idealized depictions of women have become very toned and muscular, and young women have increasingly reported a concurrent desire for muscularity (e.g., Rodgers et al., 2018). Second, the limited work focused on this emerging thin and toned ideal, even in English-speaking groups, has mainly been conducted among non-clinical populations, in which it has been suggested that the internalization of these ideal may be less strongly related to eating pathology compared to the thin idea (Bell, Donovan, & Ramme, 2016; Homan, 2010; Martin & Racine, 2017). As sociocultural theories explicitly hypothesize that appearance pressures and internalization contribute to the onset and maintenance of eating pathology, and the utility of directly targeting these factors in treatment (Stice, Rohde, Butryn, Menke, & Marti, 2015), work in clinical samples is needed. Third, data regarding these relationships among non-English speaking groups are scarce, highlighting a need for further investigation in these groups to extend findings regarding the importance of sociocultural pressures to other cultural contexts.

The goal of this study was to contribute to bridging this gap by evaluating the psychometric properties of the Sociocultural Attitudes Towards Appearance Questionnaire-4 (Schaefer et al., 2014) among a clinical eating disorder sample of French women. The SATAQ-4, a measure of appearance pressures from the media, peers, and family members, and the internalization of both the thin- and the muscular-ideal, has previously been shown to be a valid and useful tool for assessing these dimensions among English and French speaking non-clinical populations (Rodgers et al., 2016; Schaefer et al., 2014). Establishing the scale's psychometric properties among French women with eating disorders would support further exploration of the contribution of these sociocultural factors to eating pathology in non-English-speaking samples. The aim of this study was therefore to evaluate the factor structure and reliability of the SATAQ-4 among a French female clinical sample, and the scale's convergence with measures of body image and eating pathology. A secondary aim was to compare the mean SATAQ-4 scores obtained by this clinical sample to previously published data among French female college women, as higher scores among clinical groups would provide further support for the importance of these dimensions in eating disorder pathology.

Method

Participants and Procedure

Participants were 192 French women consecutively recruited from an outpatient eating disorders unit before treatment initiation in Montpellier, France, between 2015 and 2018. Inclusion criteria are reported elsewhere (Rodgers et al., 2019). Participants ranged in age from 15 to 55 years old, with a mean age of 27.8 years ($SD = 11.1$). The average body mass index (BMI; kg/m^2) of the sample was 20.5 ($SD = 6.3$), ranging from 12.0 to 48.0. The majority of the sample (60.4%) were diagnosed with Anorexia Nervosa (AN), followed by Bulimia Nervosa

(BN, 19.3%), Binge-Eating Disorder (BED, 9%), and other specified or unspecified eating disorders (11.3%).

Measures

Demographic and clinical information. Data were collected through an interdisciplinary clinical assessment and structured diagnostic interview (MINI, Version 5.0.0, Lecrubier et al., 1997), conducted by an experienced senior practitioner previously trained to collect data using the MINI. Patient diagnosis was established using the best-estimate procedure, which utilizes medical records, information from relatives, and direct patient interview/assessment to arrive at a clinical diagnosis.

Sociocultural Attitudes Towards Appearance Questionnaire-4 (SATAQ-4). To assess internalization of appearance ideals and appearance-related pressures, participants completed the full 22-item French translation of the SATAQ-4 (Rodgers et al., 2016; Schaefer et al., 2014). Items were rated on a 5-point Likert scale ranging from 1 (*definitely disagree*) to 5 (*definitely agree*). In prior work, an abbreviated 20-item 5-factor version of the scale demonstrated good reliability and convergent validity in a sample of French college women (Rodgers et al., 2016). In both the original and the abbreviated 5-factor versions of the scale, the subscales include: *Internalization: Thin/Low Body Fat, Internalization: Muscular/Athletic, Pressures: Media, Pressures: Peer, Pressures: Family.*

Eating Disorder Examination – Questionnaire (EDE-Q). The French translation of the 22-item EDE-Q, as used in the validation study of the SATAQ4 in female college students (Fairburn & Beglin, 2008) assessed eating disorder symptoms during the prior 28 days. Item ratings ranged from 0 (*no days/not at all*) to 6 (*every day/markedly*) with four subscales assessing Restraint, Eating Concern, Shape Concern, and Weight Concern. EDE-Q scores have

demonstrated good reliability and validity in clinical samples (Peterson et al., 2007) and French college samples (Rodgers et al., 2016). In the current sample, Cronbach's alpha for the EDE-Q global score was .94, and alphas for the subscales ranged from .81 (Eating Concern) to .91 (Shape Concern).

Eating Disorder Inventory – Body Dissatisfaction (EDI-BD) and Interpersonal Insecurity subscales. The French translation of the 9-item body dissatisfaction, and the 7-item interpersonal insecurity subscale of the EDI (Archinard, Rouget, Painot, & Liengne, 1996; Garner, Olmsted, & Polivy, 1983; Lavoisy, Guelfi, Vera, Dardennes, & Rouillon, 2008) was used. Item ratings ranged from 1 (*never*) to 6 (*always*). EDI-BD scores have demonstrated good reliability in clinical samples (Fichter, Quadflieg, Crosby, & Koch, 2017), and among French women (Rodgers et al., 2011). Cronbach's alpha for the current sample was .78 and .77.

Physical Self-Perception Profile (PSSP). The French version of the PSSP (Fox & Corbin, 1989; Ninot, Delignieres, & Fortes, 2000) assessed self-esteem in the physical domain. This instrument contains 25 items rated from 1 (*not at all*) to 6 (*very much*), with higher scores reflecting more positive physical self-perception. Prior work supports the reliability and validity among French community samples (Ninot et al., 2000) and clinical samples (Vancampfort et al., 2014). Cronbach's alpha in the current sample was .91.

Statistical Analysis

Confirmatory factor analysis (CFA) using full information maximum likelihood estimation was conducted to examine the fit of the original 22-item five-factor structure of the SATAQ-4 (Schaefer et al., 2014), and the reduced 20-item five-factor structure identified among French college women (Rodgers et al., 2016) in Mplus version 8.1 (Muthén & Muthén, 2017). Consistent with best practice recommendations (Hu & Bentler, 1999; Markland, 2007), multiple

fit indices were examined, with values approaching the following cutoffs considered to indicate good fit: comparative fit index (CFI, $\geq .95$; Bentler, 1990; Hu & Bentler, 1999), root mean square error of approximation (RMSEA, $\leq .08$; Browne & Cudeck, 1993), and standardized root mean square residual (SRMR, $\leq .08$; Hu & Bentler, 1999) were used to assess model fit. The chi-square value was examined, however, it is highly influenced by sample size, and was therefore primarily used to assess changes in fit across models (Bentler & Bonnet, 1980; Jöreskog & Sörbom, 1993). Modification indices were also examined to identify sources of misfit. Following identification of the optimal factor structure, internal consistency reliability for each of the subscales was assessed via Cronbach's alpha, and intercorrelations between subscales were computed. Alpha values of .70 or higher indicate acceptable internal consistency (George & Mallery, 2003). The EDE-Q, EDI-BD subscale, and PSPP were used as indicators of convergent validity, while the EDI Interpersonal Insecurity subscale was used as an indicator of divergent validity. Pearson product-moment correlations were examined to assess convergent validity. Correlations of .1, .3, and .5 indicate small, medium, and large effects (Cohen's, 1988).

MANOVA and follow-up pairwise comparisons were conducted to examine differences in mean SATAQ-4 scores across diagnostic groups. For the diagnostic group comparisons, eta-squared was used as the measure of effect size of the overall group difference, with values of .01, .06, and .14 indicating small, medium, and large effects (Cohen, 1988). For the comparisons with the French college sample, Cohen's D was used to assess effect size. Independent samples *t*-tests were performed to compare the SATAQ-4 subscale scores in the current French clinical sample with previously published mean scores among French female college students (Rodgers et al., 2016). When the homogeneity of variance assumption was not met (i.e., Hartley's test for equal variance was significant), we reported results correcting for this violation, resulting in reduced

degrees of freedom. Cohen's d was used to assess effect size, with values of .2, .5, and .8 indicating small, medium, and large effects (Cohen, 1988).

Results

Missing Data

Item-level missingness on the SATAQ-4 was less than 3%, and data were missing at random based on Little's MCAR test, $\chi^2(150) = 175.86, p = .07$. Therefore, missing data were handled with full information maximum likelihood.

Confirmatory Factor Analysis

CFA indicated that the 22-item five-factor solution provided less than adequate fit to the data ($\chi^2 [199] = 546.45, p < .05$; CFI = .89; RMSEA = .10 [90% CI: .09, .11]; SRMR = .07), while the reduced 20-item five-factor solution provided acceptable fit to the data ($\chi^2 [160] = 327.31, p < .05$; CFI = .94; RMSEA = .07 [90% CI: .06, .09]; SRMR = .06). Modification indices did not suggest changes to the structure of the scale. Given the improved fit, the 20-item five factor version of the French SATAQ-4 was examined in the remaining analyses.

Internal Consistency and Intercorrelations between Subscales

The reduced SATAQ-4 subscales demonstrated adequate to excellent internal consistency with Cronbach's alpha values ranging from .70 to .95 (see Table 1). Correlations between the SATAQ-4 subscales were generally small to medium in size, with the exception of the *Internalization: Muscular/Athletic* and *Pressures: Media* subscales which both exhibited large positive associations with the *Internalization: Thin/Low Body Fat* subscale (see Supplemental Material).

Convergent and Divergent Validity

The SATAQ-4 subscales generally exhibited moderate to large positive associations with EDE-Q subscales assessing disordered eating, with the exception of the *Pressures: Family* subscale, which tended to demonstrate smaller associations with EDE-Q subscales (see Table 1). Body dissatisfaction assessed via the EDI-BD subscale demonstrated a positive large association with the SATAQ-4 *Internalization: Thin/Low Body Fat* subscale, and small to medium positive associations with all other SATAQ-4 subscales. Physical self-perception assessed by the PSSP exhibited small negative associations with the SATAQ-4 *Internalization: Thin/Low Body Fat* subscale, *Pressures: Media* subscale, and *Pressures: Peer* subscale, as well as a small positive association with the SATAQ-4 *Internalization: Muscular/Athletic* subscale. The SATAQ-4 subscales all revealed no relationship with interpersonal insecurity suggesting good divergent validity.

Diagnostic Comparisons

MANOVA was conducted to explore mean level differences in SATAQ-4 subscale scores across AN-restricting (AN-R), AN-binge-purge (AN-BP), BN, and BED diagnostic groups (Supplementary Table 2). Findings revealed significant group differences for the *Internalization: Thin/Low Body Fat* (medium effect), *Pressures: Family* (medium effect), *Pressures: Peers* (large effect) and *Pressures: Media* (small effect) subscales. Pairwise comparisons revealed that the AN-R group reported lower *Internalization: Thin/Low Body Fat* scores than the AN-BP and BN groups, while the BED group reported lower scores than the BN group. The AN-R group reported lower *Pressures: Family* scores compared to all other groups. Finally, for the *Pressures: Peers* subscale, the AN-R group reported lower scores than the AN-BP group, who reported lower scores than the BN and BED groups. Although the overall

ANOVA results were significant for the *Pressures: Media* subscale, none of the pairwise comparisons were significant.

Comparison with a French College Sample

Results from the independent sample *t*-tests comparing SATAQ-4 subscale means between the current French clinical sample and French college women revealed that women receiving treatment for eating pathology reported significantly higher scores on the *Internalization: Thin/Low Body Fat* subscale (large effect) and *Internalization: Muscular/Athletic* subscale (medium effect; see Table 2). French college women reported significantly higher scores on the *Pressures: Family* subscale (small effect). No significant group differences were observed for the *Pressures: Peer* or *Pressures: Media* subscales.

Discussion

The present findings support the SATAQ-4 as a valid and reliable tool for the assessment of sociocultural risk factors for body image and eating concerns among French female clinical populations. The SATAQ-4 revealed an identical factor structure to that among French female college students (Rodgers et al., 2016), supporting an identical version of the scale across clinical and non-clinical groups. Previous work had identified a 20-item factor structure among French-speaking young adults that omitted two items, one from *Pressures: Family* and one from *Pressure: Peers* (Rodgers et al., 2016). In addition, the SATAQ-4 subscales demonstrated good internal reliability. The intracorrelations among the SATAQ-4 subscales supported relationships between perceived appearance pressures and internalization of the thin and muscular ideals. Interestingly, perceived appearance pressures from family members were not associated with internalization in this sample. It may be that family members of individuals receiving treatment for an eating disorder have modified their communication styles to support treatment and

recovery (Hillegge, Beale, & McMaster, 2006). This would be consistent with the mean scores on the *Pressures: Family* subscale being significantly lower among the clinical sample as compared to the college sample, and among the AN group compared to other diagnoses. However, it is also noteworthy that the clinical sample was older, which may further attenuate perceived family pressures.

Our findings also supported the convergent validity of the SATAQ-4, providing further evidence for the scale's usefulness as a measure of sociocultural risk factors for body image and eating concerns. Furthermore, women in the clinical sample reported higher levels of thin and muscular ideal internalization compared to the college sample, consistent with theory that appearance ideal internalization may be an important etiological and/or maintenance factor for body image and eating disturbance. Notably, physical self-esteem was negatively associated with appearance pressures from the media and peers, as well as internalization of the thin ideal, but positively associated with internalization of the muscular ideal, perhaps due to women with higher investment in muscularity engaging in more strengthening behaviors and therefore being more confident in their physical abilities (Varnes et al., 2013). In addition, differences in subscale scores across eating disorder diagnoses, suggest unique associations between clinical presentation and sociocultural risk factors.

Study limitations include the use of an exclusively female sample, and the lack of test-retest data. Nevertheless, these findings provide support for the reliability and validity of the SATAQ-4 among French women with eating pathology, and pave the way for further investigations of sociocultural risk and maintenance factors for eating disorders in French samples.

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SATAQ-4 IN FRENCH CLINICAL WOMEN

Table 1

Cronbach's Alpha and Correlations Between SATAQ-4 Subscales and Convergent Measures

Variable	Internalization		Pressures		
	Thin/Low Body Fat ($\alpha = .89$)	Muscular/ Athletic ($\alpha = .93$)	Family ($\alpha = .79$)	Peers ($\alpha = .70$)	Media ($\alpha = .95$)
EDE-Q-Global	.74***	.38***	.20*	.31***	.51***
EDE-Q-Restraint	.70***	.44***	.05	.12	.47***
EDE-Q-Eating Concern	.58***	.30***	.11	.24**	.42***
EDE-Q-Shape Concern	.69***	.31**	.23**	.36***	.48***
EDE-Q-Weight Concern	.63***	.32***	.26***	.38***	.47***
EDI-BD	.49***	.24**	.32***	.29**	.39***
PSSP	-.22**	.18*	-.04	-.21**	-.21**
EDI-II	.08	.04	.00	-.02	-.06
BMI	.06	-.11	.28***	.37***	.11

Note. EDE-Q-Global = Eating Disorder Examination-Questionnaire-Global score; EDE-Q-Restraint = Eating Disorder Examination-Questionnaire-Restraint subscale; EDE-Q-Eating Concern = Eating Disorder Examination-Questionnaire-Eating Concern subscale; EDE-Q-Shape Concern = Eating Disorder Examination-Questionnaire-Shape Concern subscale; EDE-Q-Weight Concern = Eating Disorder Examination-Questionnaire-Weight Concern subscale; EDI-BD = Eating Disorder Inventory-Body Dissatisfaction subscale; PSSP = Physical Self-Perception Profile; EDI-II = Eating Disorder Inventory-Interpersonal Insecurity subscale; BMI = body mass index.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

SATAQ-4 IN FRENCH CLINICAL WOMEN

Table 2

Comparison of SATAQ-4 Subscale Means Between French Clinical and College Women

	Current Clinical Sample (<i>n</i> = 192)	College Sample ^a (<i>n</i> = 227)	Independent samples <i>t</i> -test			Cohen's <i>d</i>
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>t</i>	<i>df</i>	<i>p</i>	
1. Internalization: Thin/Low Body Fat	3.61 (1.23)	2.70 (1.06)	8.09	379	< .001***	.80
2. Internalization: Muscular/Athletic	2.71 (1.22)	2.13 (0.92)	5.37	350	< .001***	.53
3. Pressures: Family	1.86 (1.02)	2.10 (1.17)	2.25	416	.025*	.22
4. Pressures: Peers	1.93 (0.92)	1.77 (0.85)	1.89	417	.059	.18
5. Pressures: Media	3.12 (1.40)	3.37 (1.31)	1.91	417	.057	.19

^a Means and standard deviations obtained from Rodgers et al., 2016.

* *p* < .05.

** *p* < .01.

*** *p* < .001.