French Validation of the Dimensional Anhedonia Rating Scale: Psychometric Properties of Digital and Paper Formats

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ABSTRACT

Introduction: Anhedonia, the diminished ability to experience pleasure, is a transdiagnostic symptom in several neuropsychiatric disorders. To comprehensively assess this symptom, the Dimensional Anhedonia Rating Scale (DARS) measures interest, motivation, effort, and consummatory pleasure across four reward types. **Aim:** Using three independent samples, we aimed to validate the French version of the DARS and evaluate its psychometric properties across digital (Samples 1 and 2) and paper-based (Sample 3) formats. **Methods:** A total of 1,437 French-speaking participants from the general population completed the DARS alongside measures of anhedonia, depression, and behavioral inhibition/activation. **Results:** Factor analyses confirmed the four-factor structure of the DARS with excellent model fit indices (CFI≥.962, RMSEA≤.036) and strong internal consistency (Cronbach's α=.74–0.93) across both formats. The French DARS showed good convergent validity, with weak-to-moderate correlations with other anhedonia and behavioral activation measures, and strong divergent validity, with weak correlations with depression. Measurement invariance across gender was established. Gender differences were found; women scored higher overall, while men scored higher on the hobbies subscale. Measurement invariance analyses supported configural and metric invariance across formats, though full invariance was not achieved due to a lack of scalar invariance. **Discussion/Conclusion:** These findings support the French DARS as a reliable and valid tool for assessing anhedonia.

Keywords: anhedonia, scale development, factor analysis, validity, reliability.

INTRODUCTION

Anhedonia, described as a loss of pleasure in previously satisfying activities in the DSM-V (APA, 2013), is a transdiagnostic symptom present across various neuropsychiatric conditions (Pizzagalli, 2022). It affects around 70% of patients with major depressive disorder (MDD; Cao et al., 2019) and around 52% of patients with bipolar disorder (Mazza et al., 2009) (Mazza et al., 2009). Anhedonia plays a central role in the clinical presentation of mood disorders and is linked to greater severity and recurrence (Gabbay et al., 2015). In adolescents with depression, higher anhedonia levels correlate with more frequent, prolonged, and severe depressive episodes (Dimick et al., 2021). It is also associated with increased suicidal thoughts (Ballard et al., 2017), even in individuals who are not diagnosed with depression (Ducasse et al., 2018), which increases the risk of suicide attempts (Sagud et al., 2021). Anhedonia can persist even after treatment, indicating a form of resistance or incompleteness in the remission of symptoms (Gutkovich et al., 2011). Furthermore, in individuals with depression, a high level of anhedonia at the start of treatment often predicts a reduced treatment response (Downar et al., 2014; Dunlop et al., 2020; McMakin et al., 2012; Uher et al., 2012).

Given the clinical significance of anhedonia, the development and validation of appropriate measurement tools are essential. Anhedonia may reflect impairment over various aspects of reward-related functioning, including consummatory pleasure (enjoyment of a reward), interest/desire (wanting a reward), motivation (initial energy expenditure to obtain a reward), effort (sustained energy expenditure to obtain a reward), and reward learning (Der-Avakian & Markou, 2012; Rizvi et al., 2015; Thomsen & Kristine, 2015). Indeed, Treadway & Zald (2011) dichotomized between “anticipatory anhedonia” (i.e., difficulty anticipating future pleasurable events) and “consummatory anhedonia” (i.e., reduced pleasure during rewarding activities). Rather than being a single, discrete symptom, anhedonia is increasingly conceptualized as a spectrum encompassing multiple, interrelated dimensions of hedonic functioning (Rizvi et al., 2016; Scheggi et al., 2018). This complexity underscores the need for measurement tools capable of capturing its multidimensional nature. However, previous scales have not sufficiently addressed this need. First-generation anhedonia questionnaires, such as the Snaith-Hamilton Pleasure Scale (SHAPS; Snaith et al., 1995), the Fawcett-Clark Pleasure Capacity Scale (FCPS; Fawcett et al., 1983), the Revised Chapman Physical Anhedonia Scale (CPAS; Chapman et al., 1976), and the Chapman Social Anhedonia Scale (CSAS; Chapman et al., 1976) have notable limitations (Rizvi et al., 2015), including cultural biases and a primary

focus on consummatory pleasure, neglecting other important reward processes. Second-generation tools such as the Temporal Experience of Pleasure Scale (TEPS; Gard et al., 2006), the Motivation and Pleasure Scale Report (MAP-SR; Llerena et al., 2013), the Specific Loss of Interest Scale (SLIPS; Winer et al., 2014), and the Anticipatory and Consummatory Interpersonal Pleasure Scale (ACIPS; Gooding & Pflum, 2014) begin to address these gaps by evaluating different aspects of anhedonia (e.g., anticipatory and consummatory pleasure, motivation, interest), yet all these dimensions had not been fully captured within a single instrument.

To comprehensively assess anhedonia, Rizvi et al. (2015) developed the Dimensional Anhedonia Rating Scale (DARS), a scale assessing the interest, motivation, effort, and consummatory pleasure dimensions of the hedonic process across four reward types: hobbies, food/drinks, social activities, and sensory experiences. Instead of using pre-established items, the DARS asks participants to list their own enjoyable activities, accounting for individual differences in what is perceived as pleasurable. The DARS has been validated in both clinical and non-clinical samples (Rizvi et al., 2015) and demonstrated strong internal reliability across various community-based (Cronbach's α=.92, with subscales mapping onto the four reward types ranging from .75–.90) and clinical samples of individuals with MDD (α=.96, with subscales ranging from .88–.94), and no significant gender differences (Rizvi et al., 2015). Moreover, its content validity has been established in adults with anhedonia in the context of MDD (Bean et al., 2025).

To the best of our knowledge, the DARS has been validated in Spanish (Arrua-Duarte et al., 2019), German (Wellan et al., 2021), Chinese (Ching et al., 2021; Gu et al., 2025; Wang et al., 2025; Xiao et al., 2022), Polish (Gorostowicz et al., 2023), and Farsi (Rajeh et al., 2022). Among these validations, Wellan et al. (2021) and Wang et al. (2025) focused on the general population, while other validations were conducted on clinical samples with depressive disorders (Ching et al., 2021 in adults; Xiao et al. 2022 in adolescents), bipolar disorder (Gorostowicz et al., 2023), and in patients with a wide range of psychiatric diagnoses (Arrua-Duarte et al., 2019). The Spanish, German, Chinese, and Polish DARS all demonstrated good internal consistency for the total score, with α=.86–.95, and from .74–.94 for the subscales (Arrua-Duarte et al., 2019; Ching et al., 2021; Gorostowicz et al., 2023; Wellan et al., 2021; Xiao et al., 2022). Additionally, the German and Chinese versions reported McDonald's Omega values ranging from .79–.92 (Ching et al., 2021; Wellan et al., 2021). The original and validated

versions of the DARS demonstrated convergent validity with other anhedonia scales, such as the SHAPS and the TEPS, as well as with behavioral activation measured by the Behavioral Activation System (BAS; Carver & White, 1994) scale (Ching et al., 2021; Gorostowicz et al., 2023; Rizvi et al., 2015; Wellan et al., 2021, Xiao et al., 2022). They also showed divergent validity with depression measured by the Centre for Epidemiological Studies in Depression (CESD; Radloff, 1977), and with behavioral inhibition as assessed by the Behavioral Inhibition System (BIS; Carver & White, 1994) scale (Rizvi et al., 2015; Wellan et al., 2021; Xiao et al., 2022). The four-factor structure of the scale, corresponding to the four reward types (i.e., hobbies, food/drinks, social activities, and sensory experiences) was consistently confirmed in every validation study (Arrua-Duarte et al., 2019; Ching et al., 2021; Gorostowicz et al., 2023; Wellan et al., 2021; Xiao et al., 2022). Furthermore, the paper-and-pencil and the digital formats of the Spanish DARS were compared in 69 patients (Arrua-Duarte et al., 2022). While both formats showed high internal consistency and similar fit indices, scores were higher for paper-based format, suggesting caution in assuming full equivalence.

These previous findings demonstrate that the DARS is a reliable and robust scale for assessing anhedonia across diverse populations and languages. However, a validated French version is lacking. The present study aimed to validate the DARS for French-speaking populations, across both digital and paper modalities. We expected the results to be consistent with previous DARS validations, demonstrating a four-factor structure and strong internal consistency. Based on findings from studies with non-clinical samples (Wellan et al., 2021; Xiao et al., 2022), we hypothesized that convergent validity would be supported by moderate correlations between the DARS and the SHAPS, TEPS, and BAS. For divergent validity, we expected weak correlations with the CES-D and no significant correlation with the BIS. Additionally, we hypothesized that no gender differences will be found in DARS scores, as observed by Rizvi et al. (2015). Finally, we aimed to test the measurement invariance across formats, although we do not have specific hypotheses regarding configural, metric, or scalar invariance, as these have not been previously evaluated for the DARS.

METHOD

1. Procedures

All participants (French-speaking Belgian residents) provided informed consent before completing the survey, and data anonymity of was ensured. No compensation was offered. The study was approved by the Ethics Committee of the Faculty of Psychology and Educational Sciences of the University of Mons. The initial approval for Sample 1 was granted on 19 October 2022 (project code: UMONS-2022.10.19-SS&FM-010). Ethical amendments were approved on 22 May 2024 to allow for the collection of Samples 2 and 3. Participants were asked to provide demographic information, including age, gender, education level, and professional status. Participants in Samples 1 and 2 were recruited via social media advertisements and completed online questionnaires, whereas those in Sample 3 were recruited in university classrooms and completed paper-based versions.

2. Population

Sample 1

A total of 520 participants completed the survey. Participants were screened based on the following exclusion criteria: non-native French speaker, history of or current substance/alcohol dependence, medical or psychiatric condition other than depression or anxiety, neurological problems, stroke, or head trauma. As a result, 77 participants were excluded. A threshold was set for the maximum number of unanswered items for all questionnaires in the survey (i.e., 7 items), leading to the exclusion of 19 participants. For participants with fewer than seven missing responses, missing values were handled in two ways depending on the analyses: (1) for descriptive and inferential statistics, the option na.rm = TRUE was applied to exclude missing cases; and (2) for exploratory factor analysis, na.omit() was used, resulting in listwise deletion of participants with missing responses on the DARS items. This approach was chosen to maximize the use of available data while maintaining rigorous standards for data quality. Using a conservative outlier detection threshold (±3 Median Absolute Deviations [MAD]; Leys et al., 2013), 3 outliers on the DARS were excluded. The final sample comprised n_1=421 participants (M_{age}=32.71, SD=14.48, $Range_{Age}$=18:79, 347 women). A subset of this dataset has been published previously to investigate associations

between irritability and anhedonia [MASKED FOR REVIEW]. Data on SHAPS and BIS/BAS have not been published.

Sample 2

A total of 575 participants completed the survey. The same exclusion criteria of Sample 1 were applied and explicitly stated in the advertisement flyer, resulting in the exclusion of 4 participants. Using the MAD method, 6 outliers on the DARS were excluded. The final sample consisted of n_2=565 participants (M_{age}=31.14, *SD*=13.25, $Range_{Age}$=18:69, 282 women).

Sample 3

A total of 476 students completed the survey. The same exclusion criteria for Sample 1 and 2 were applied, resulting in the exclusion of 11 participants. Additionally, 3 participants who left more than 7 items unanswered and 4 participants who provided multiple responses to a single item were excluded. Using the MAD method, 7 outliers on the DARS were excluded. The final sample consisted of n_3=451 participants (M_{age}=20.23, *SD*=3.13, $Range_{Age}$=17:53, 362 women).

The global characteristics of the three samples and list of administered questionnaires and modality are presented in **Table 1.**

Table 1. Socio-demographic characteristics of the study samples.

Sample	1	2	3
N	421	565	451
Questionnaires administered	DARS, SHAPS, BAS/BIS, CESD	DARS, CESD, TEPS	DARS, CESD, TEPS
Modality	Digital	Digital	Paper
Age, mean (SD)	32.71 (14.48)	31.14 (13.25)	20.23 (3.13)
Gender			
Women	82.42% (n=347)	49.91% (n=282)	80.27% (n=362)
Men	16.87% (n = 71)	49.20% (n=278)	17.29% (n=78)
Other	0.71% (n=3)	0.89% (n=5)	2.44% (n=11)
Education			
No diploma	0	0.53% (n=3)	0.22% (n=1)
Primary school	0.24% (n=1)	2.12% (n=12)	0.22% (n=1)
First 3 years of High School	2.61% (n=11)	5.66% (n=32)	0.22% (n=1)
High School	20.19% (n=85)	49.20% (n = 278)	95.79% (n=432)
Bachelor	40.85% (n=172)	28.50% (n=161)	2.88% (n=13)
Master	33.02% (n=139)	12.93% (n=73)	0.67% (n=3)
PhD	2.14% (n=9)	0.53% (n=3)	0
Missing data	0.95% (n=4)	0.53% (n=3)	0
Occupation			
Employee	40.38% (n=170)	52.21% (n=295)	/
Student	32.07% (n=135)	41.06% (n=232)	100% (n=443)
Unemployed	1.90% (n=8)	4.60% (n=26)	/
Retired	2.85% (n=12)	1.59% (n=9)	/
Missing data	22.80% (n=96)	0.54% (n=3)	/

Note. DARS= Dimensional Anhedonia Rating Scale; BIS/BAS= Behavioral Inhibition System and Behavioral Activation System; CESD= Centre for Epidemiological Studies in Depression; SHAPS= Snaith–Hamilton Pleasure Scale; TEPS= Temporal Experience of Pleasure Scale.

3. Questionnaires

The original DARS scale was translated from English into French by a French-English bilingual. This initial translation was reviewed and then back-translated into English by a second French-English bilingual. There were no discrepancies between the original and the back-translated DARS. The translators were not affiliated with the study to ensure the validity of the translation. Prior to the translation, we obtained permission to use the scale from the original first author (Dr. Sakina Rizvi) of the DARS. The finalized French version of the questionnaire is provided on OSF: https://osf.io/qtjsa/

The **Dimensional Anhedonia Rating Scale (DARS**; Rizvi et al., 2015) is a self-administered instrument consisting of 17 items divided into four reward types: hobbies, food/drinks, social activities, and sensory experiences. Within each reward type, respondents provide two or three examples and then answer standardized questions on a 5-point Likert scale (Not at all=0; Slightly=1; Moderately=2; Mostly=3; Very Much=4) to assess their desire, motivation, effort, and consummatory pleasure "at this moment". Total scores are calculated by summing all items, with possible scores ranging from 0 to 68. Higher scores indicate lower levels of anhedonia.

The 14-item **Snaith-Hamilton Pleasure Scale (SHAPS**; Loas et al., 1997; Snaith et al., 1995) is a self-administered questionnaire used to measure hedonic capacity or positive valence. Each item offers four response options: strongly agree, agree, disagree, and strongly disagree. The original coding scored both "agree" options as 0, and both "disagree" options as 1. We used a 1 to 4 ordinal scoring instead, which has been established to produce better dispersion in the data (Franken et al., 2007; Liu et al., 2012) and used in previous DARS validation studies (e.g., Wang et al., 2025; Wellan et al., 2021). Total scores range from 14 to 56, with higher scores indicating greater levels of anhedonia.

The **Temporal Experience of Pleasure Scale (TEPS**; Favrod et al., 2009; Gard et al., 2006) consists of 18 items self-report measurement of anticipatory (10 items) and consummatory (8 items) pleasure rated on a 6-point Likert scale (1=Very false; 2= Moderately false; 3=Slightly false; 4=Slightly true; 5=Moderately true; 6=Very true). The total TEPS scores range from 18 to 96, with higher scores reflecting greater trait hedonic capacity.

The **Behavioral Inhibition System and Behavioral Activation System (BIS/BAS) Scales** (Caci et al., 2007; Carver & White, 1994) assess trait sensitivities related to BIS and BAS systems. The BIS subscale evaluates punishment sensitivity and inhibition, while the BAS subscale is divided into three dimensions: drive, fun seeking, and reward responsiveness. Items are rated on a 4-point Likert scale (1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree), with higher scores indicating greater sensitivity.

The **Center for Epidemiologic Studies-Depression Scale (CESD**; Radloff, 1977; Verdier-Taillefer et al., 2001) was used to assess depressive symptoms (e.g., sadness, loss of appetite, and difficulty concentrating) over the past week. Items are rated on a 4-point Likert scale (0=Rarely or none of the time; 1=Some of the time; 2=Much of the time; 3=Most or all the time) with total scores ranging from 0 to 60. Higher scores indicate greater levels of depressive symptoms.

4. Statistical Analysis

Statistical analyses were performed with the statistical software RStudio (version 4.4.1). The data and code needed to reproduce all of the reported results are available at https://osf.io/qtjsa/

4.1.Descriptive analyses

Descriptive statistics, including means, standard deviations, frequencies, and proportions, were calculated separately for each sample to summarize their demographic and clinical characteristics. Mean and standard deviations of the DARS total and subscales scores and other questionnaires were computed separately for each sample. Normality of the scores were assessed using Shapiro-Wilk tests.

4.2.Validation of the digital format on Samples 1 & 2

4.2.1. Factor analyses

The factor structure of the DARS was investigated through exploratory and confirmatory factor analyses. EFA was conducted on Sample 1 using the Kaiser-Meyer-Olkin (KMO; (Kaiser, 1974) measure and Bartlett's sphericity test (Bartlett, 1951) to evaluate data suitability. Eigenvalues and Horn's parallel analysis were applied to determine the appropriate number of factors, followed by a promax rotation to examine factor loadings. The promax

rotation was chosen based on the assumption of intercorrelation among the components, which is characteristic of the DARS and consistent with previous studies (e.g., Arrua-Duarte et al., 2019; Rizvi et al., 2015). CFA was conducted on Sample 2 to test the hypothesized four-factor structure of the DARS. We used the mean- and variance-adjusted weighted least squares (WLSMV) estimator to account for the ordinal nature of the data (Brauer et al., 2023). Model fit criteria was assessed with the Comparative Fit Index and Tucker-Lewis Index (CFI and TLI≥.90) and Root Mean Square Error of Approximation (RMSEA≤.08), and Standardized Root Mean Square Residual (SRMR≤.08) to evaluate model adequacy (Bentler, 1990).

4.2.2. Measurement invariance between Sample 1 and 2

Measurement invariance between Sample 1 and Sample 2 was used to assess the psychometric equivalence of anhedonia as measured by the DARS across both samples. This was done to validate the feasibility of combining the two samples for subsequent testing of other psychometric properties (i.e., reliability and divergent validity, measurement invariance across administration modalities). Based on previous validations of the DARS and our factor analyses, we assessed the fit of a four-factor structure corresponding to the four reward types. Following guidelines (Putnick & Bornstein, 2016; Vandenberg & Lance, 2000), we tested four increasingly stringent levels of measurement invariance: (1) configural invariance – testing equivalent factor structure across groups; (2) metric invariance – testing the equality of the factor loadings; (3) scalar invariance – testing the equality of item intercepts, and (4) residual – testing the equality of item residuals across groups. Model fit criteria for the baseline configural four-factor model was assessed with CFI≥.90, RMSEA≤.08, and SRMR≤.08 to evaluate model adequacy (Bentler, 1990). For nested model comparison, we applied the thresholds of ΔCFI≥-.01 paired with ΔRMSEA≥.015 and ΔSRMR≥.030 (for metric invariance) or .015 (for scalar and residual invariance) as recommended by Chen (2007).

4.2.3. Reliability analyses

To evaluate the psychometric properties of the DARS, internal consistency was assessed using Cronbach's alpha and McDonald's omega for the total score and each of the four subscales in the combined Samples 1 & 2. Cronbach's α and McDonald's omega values above 0.7 were considered acceptable (DeVellis & Thorpe, 2021). Additionally, average inter-item correlations (AIC) analyses were conducted to further examine the reliability of the scale, with the AIC values expected to be >.30 to ensure unidimensionality (Hajjar, 2018).

4.2.4. Convergent and divergent validity

The convergent and divergent validity of the DARS was examined using Spearman's rank correlations between the DARS total score and related measures, as the scores did not follow a normal distribution. These correlations assessed the degree to which the DARS aligned with other anhedonia measures and behavioral activation and diverged from constructs such as depression and behavioral inhibition. In Sample 1, convergent validity was evaluated using the SHAPS and the BAS, while in Sample 2 it was evaluated using the TEPS. Divergent validity was assessed with the BIS in Sample 1 and with the CESD in the combined Samples 1 and 2.

4.2.5. Measurement invariance across gender

To examine whether the DARS functioned equivalently across gender, we conducted measurement invariance analyses using Sample 2, as it was the only sample with a balanced gender ratio. Following the same procedures described above, we tested for configural, metric, scalar and residual invariance: Finally, we constrained item residuals to test whether measurement error was equivalent across genders. Model fit was assessed using CFI, RMSEA, and SRMR, and changes in fit indices (ΔCFI, ΔRMSEA, ΔSRMR) were examined to determine whether the added constraints substantially affected model fit, using the previously specified thresholds.

4.2.6. Gender differences

Gender differences on the DARS total and subscales scores were analyzed in combined Samples 1 and 2 using Mann-Whitney U tests. Effects sizes for the Mann-Withney U tests are reported using *r*, calculated as $\frac{Z}{\sqrt{N}}$ and interpreted based on Cohen's guidelines.

4.3. Validation of the paper format on Sample 3

CFA was performed on Sample 3 to verify the four-factor structure. Reliability (Cronbach's alpha and McDonald's omega), convergent validity (through correlations with the TEPS) and divergent validity (through correlations with the CESD) were assessed. Additionally, gender differences were analyzed.

4.4. Measurement invariance between digital and paper format

We assessed measurement invariance across digital (i.e., combined Sample 1 and Sample 2) and paper format (i.e., Sample 3) using the same procedure described above (i.e., testing configural, metric, scalar, and residual invariance), and applying identical model fit criteria.

RESULTS

1. Descriptive results

Mean and standard deviations of the total and subscale scores of the DARS and other questionnaires are presented in **Table 2**. For the combined Samples 1 and 2, the total DARS score had a mean of 50.96 (*SD*=8.17). Subscale scores were as follows: hobbies (*M*=12.74; *SD*=2.49), foods/drinks (*M*=11.33; *SD*=2.94), social activities (*M*=11.36; *SD*=2.89), and sensory experiences (*M*=15.53; *SD*=3.65). The normality tests of the DARS, SHAPS, TEPS, and CESD total scores indicated a significant deviation from normality (W ranging from .77–0.99, all *p*s<.001).

Table 2. Means and standard deviations of the questionnaires across the 3 study samples.

	Sample 1 (n=421)	**Sample 2 (n=565)**	**Sample 3 (n=451)**
	Mean (SD)	Mean (SD)	Mean (SD)
DARS			
Total	50.15 (7.85)	51.56 (8.36)	56.42 (8.49)
hobbies	12.11 (2.56)	13.11 (2.51)	13.52 (2.27)
food/drinks	11.02 (2.95)	11.46 (3.04)	14.34 (2.84)
social activities	11.17 (3.19)	11.41 (2.74)	11.98 (3.11)
sensory experiences	15.63 (3.77)	15.26 (3.85)	16.59 (3.53)
SHAPS	23.29 (4.88)	/	/
BIS/BAS	68.66 (6.78)	/	/
CESD	19.26 (14.50)	17.96 (11.12)	22.54 (8.98)
TEPS	/	78.79 (11.21)	80.90 (11.73)

Note. DARS= Dimensional Anhedonia Rating Scale; BIS/BAS= Behavioral Inhibition System and Behavioral Activation System; CESD = Centre for Epidemiological Studies in Depression; SHAPS= Snaith–Hamilton Pleasure Scale; TEPS = Temporal Experience of Pleasure Scale.

2. Digital version

Exploratory Factor Analysis (EFA) on Sample 1. The KMO measure of sampling adequacy was .83, indicating that the data were suitable for factor analysis. Bartlett's test of sphericity was significant, $\chi^2(136)=2985.33$, $p<.001$, confirming sufficient inter-item correlations for the analysis. Horn's parallel analysis suggested a four-factor solution, which was further supported

by eigenvalues greater than 1. The four factors corresponded to the theoretical four reward subscales of the DARS: hobbies, food/drinks, social activities, and sensory experiences. Factor loadings ranged from .54–.90.

Confirmatory Factor Analysis (CFA) on Sample 2. The four-factor model demonstrated an excellent fit (CFI=.965, TLI=.959, RMSEA=.036 [90% CI: .027-.045], SRMR=.042, $\chi^2(74)=195.06$, $p<.001$). Factor loadings are presented in **Table 3**.

Table 3. Factors loadings from CFA for each item in Sample 2 and Sample 3.

Items		**Sample 2 Digital format**				**Sample 3 Paper format**			
Number	Domain	H	F/D	Soc.	Sens.	H	F/D	Soc.	Sens.
1	Hobbies	.84				.75			
2	Hobbies	.64				.57			
3	Hobbies	.80				.78			
4	Hobbies	.85				.78			
5	Food/drinks		.61				.66		
6	Food/drinks		.76				.76		
7	Food/drinks		.83				.72		
8	Food/drinks		.61				.55		
9	Social activities			.71				.85	
10	Social activities			.41				.57	
11	Social activities			.54				.57	
12	Social activities			.72				.77	
13	Sensory experiences				.81				.75
14	Sensory experiences				.83				.83
15	Sensory experiences				.76				.78

16	Sensory experiences	.91	.81
17	Sensory experiences	.76	.81

Note. H=Hobbies, F/D= food/drinks, Soc.=Social, Sens.=Sensory experiences.

Measurement invariance between Sample 1 and 2

As **Table 4** shows, the incorporation of constraints in the factor loadings (metric invariance), intercepts (scalar invariance), and residuals (residual invariance) did not result in significant changes in the CFI, RMSEA, or SRMR values beyond the established threshold. The results support configural, metric, scalar, and residual invariance of anhedonia as measured by the DARS across our two independent samples. The psychometric equivalence of the DARS across samples was demonstrated, justifying the combination of these samples for testing of additional psychometric properties.

Table 4. Measurement invariance between Sample 1 and 2

Model	**χ^2 (*df*)**	**CFI**	**RMSEA**	**SRMR**	**Model comp**	**ΔCFI**	**Δ RMSEA**	**ΔSRMR**
M1: Configural invariance	380.09 (230)**	.956	.038	.044	-	-	-	-
M2: Metric Invariance	393.63 (246)**	.956	.036	.051	M1	.00	.002	-.007
M3: Scalar Invariance	414.87 (258)**	.954	.037	.052	M2	.002	-.001	-.001
M4: Residual Invariance	443.73 (275)**	.950	.037	.055	M3	.004	.00	-.003

Note: **p<.001

Reliability Analysis. Cronbach's alpha, McDonald's omega (total and hierarchical), and AIC of the DARS in digital and paper-based formats, indicating moderate to excellent internal consistency for the total scale and subscales, are presented in **Table 5**.

Table 5. Reliability coefficients and 95% confidence intervals in digital (Sample 1 and 2 combined) and paper-based (Sample 3) formats

	Cronbach's α				**Ω total**				**Ω hierarchical**				**AIC**			
Sample	Digital		Paper		Digital		Paper		Digital		Paper		Digital		Paper	
	Value	95% CI	Value	95% CI	Value	95% CI	Value	95% CI	Value	95% CI	Value	95% CI	Value	95% CI	Value	95% CI
Total scale	.86	.84-.86	.87	.84-.88	.82	.80-.84	.84	.79-.87	.71	.65-.76	.74	.63-.84	.29	.26-.31	.31	.27-.34
Hobbies	.84	.81-.85	.81	.77-.83	.83	.81-.85	.80	.76-.83	.83	.81-.85	.80	.76-.83	.59	.56-.62	.53	.48-.58
Food/Drinks	.79	.75-.80	.78	.72-.79	.78	.76-.81	.77	.73-.81	.78	.76-.81	.77	.73-.81	.49	.46-.53	.48	.43-.53
Social Activities	.74	.70-.76	.78	.72-.79	.74	.70-.77	.76	.72-.80	.74	.70-.77	.76	.71-.80	.41	.37-.45	.48	.43-.53
Sensory Experiences	.90	.89-.91	.90	.88-.91	.90	.88-.91	.90	.87-.92	.90	.88-.91	.90	.87-.92	.65	.62-.68	.62	.57-.66

Note. McDonald's ω and AIC's CIs were obtained using the percentile bootstrap procedure with 1000 resamples.

Convergent validity. In Sample 1, the DARS was negatively correlated with the SHAPS (r=-0.45, p <0.001). DARS subscales' correlations with the SHAPS were as follows: hobbies (r=-0.29, p<0.001), foods/drinks (r=-.22, p<.001), social activities (r=-.31, p<.001), and sensory experiences (r=-.31, p<.001). The DARS was also positively correlated with the BAS drive (r=.21, p<.001), BAS fun-seeking (r=.31, p<.001), and BAS reward responsiveness (r=.40, p<.001) subscales. In Sample 2, the DARS was positively correlated with the TEPS total (r=.43, p<.001), anticipatory (r=.41, p<.001), and consummatory (r=.30, p<.001) subscales. DARS subscales' correlations with the TEPS were also significant with coefficients ranging from .16 (for the hobbies subscale) to .40 (for the sensory experiences subscale), all ps<.001.

Divergent validity. In Sample 1 and 2 combined, significant negative correlations were observed between the DARS score and the CESD (r=-.12, p<.001). The CESD was weakly negatively correlated with hobbies (r=-.09, p<.01) and social activities (r=-.18, p<.001), but not with foods/drinks (r=-.02, p=.58) and sensory experiences (r=-.03, p=.30).

In Sample 1, the correlation between the DARS and the BIS was weak and not statistically significant (r=.08, p=.09). DARS subscales' correlations with the BIS were similarly weak and unsignificant, except with the Food/Drinks subscale (r=-.13, p<.01).

Measurement invariance across gender. As **Table 6** shows, the incorporation of constraints in the factor loadings (metric invariance), intercepts (scalar invariance), and residuals (residual invariance) did not result in significant changes in the CFI, RMSEA, or SRMR values beyond the established threshold. Full measurement invariance across gender is supported. The DARS measures anhedonia in the same way for men and women, allowing valid comparison of latent means across genders.

Table 6. Measurement Invariance of the French DARS Across Gender (Sample 2)

Model	χ^2 (df)	CFI	RMSEA	SRMR	Model comp	ΔCFI	Δ RMSEA	ΔSRMR
M1: Configural invariance	313.39 (230)**	.962	.037	.049	-	-	-	-
M2: Metric Invariance	316.01 (246)**	.968	.033	.055	M1	-.006	.004	-.006
M3: Scalar Invariance	334.64 (258)**	.965	.033	.057	M2	.003	.000	-.002
M4: Residual Invariance	352.80 (275)**	.965	.033	.059	M3	.000	.000	-.002

Note: **p<.001

Gender differences. The results of the Mann-Whitney U test revealed a significant difference in the DARS total score between men and women (W=93942, p<.001, r=.12); women scored significantly higher (M=51.60, SD=7.94) than men (M=49.70; SD=8.49). Women scored higher than men for food/drinks, social activities, and sensory experiences (Ws=99262, 100415, 82959, all ps<.05, rs = .08, .07, .20, respectively). For hobbies, men (M=13.00, SD=2.41) scored higher than women (M=12.60, SD=2.52), W=120839, p<0.01, r=.09.

3. Paper version

Confirmatory Factor Analysis (CFA) on Sample 3. The analysis demonstrated excellent model fit (CFI=.964, TLI=.957, RMSEA=.034 [90% CI: .023-.044], SRMR=.044, χ^2=173.05, p<.001). The factor loadings are reported in **Table 4**.

Reliability Analysis. Cronbach's alpha, McDonald's omega (total and hierarchical), and AIC of the DARS are presented in **Table 5**.

Convergent Validity. The DARS was positively correlated with the TEPS total score (r=.35, p<.001), anticipatory (r=.36, p<.001), and consummatory (r=.21, p<.001) anhedonia. The

hobbies, foods/drinks, social activities, and sensory experiences subscales showed positive correlations with the TEPS total, anticipatory, and consummatory scores, with coefficients ranging from .09–.33 (*ps*<.05 to <.001).

Divergent Validity. The DARS showed a significant weak negative correlation with the CESD (*r*=-.12, *p*<.05). For the subscales, the CESD had weak negative correlations with hobbies (*r*=-.10, *p*<.05) and social activities (*r*=-.19, *p*<.001), while foods/drinks and sensory experiences showed no correlation (*r*=-.00, *p*=.93, and *r*=-.05, *p*=.32).

Gender differences. The results of the Mann-Whitney U test showed no significant difference between genders (*W*=13484, *p*=.53), indicating that the total DARS scores were comparable for men (*M*=57.30, *SD*=8.50) and women (*M*=56.70, *SD*=7.82). The social activities, food/drinks, and sensory experiences subscales showed no gender differences (*W* ranging from 12530–14896, *p*s from .12–.99). The hobbies subscale showed a gender difference (*W*=12103, *p*<.05, *r*=.10), with men (*M*=14.10, *SD*=1.64) scoring higher than women (*M*=13.50, *SD*=2.10). These results should be interpreted with caution given the unbalanced gender ratio of Sample 3.

4. Measurement invariance between Digital and Paper formats

As **Table 7** shows, the fit of the configural model (M1) was good, suggesting equivalence in factor structure across formats. Metric invariance was also supported, as changes in fit indices between the configural and metric (M2) models remained within the recommended thresholds (Chen, 2007), indicating that factor loadings were equivalent across the digital and paper formats. Scalar invariance was not supported, as the comparison between the metric and scalar (M3) models showed a substantial decrease in model fit (ΔCFI = .054), indicating that item intercepts differed across the digital and paper formats. We examined the modification indices, but none were related to intercepts, suggesting that the lack of scalar invariance is not likely due to specific items. Given the lack of support for scalar invariance, we did not compare latent means across formats and did not proceed with the residual invariance testing.

Table 7. Measurement invariance between Digital and Paper-based formats.

Model	**χ^2 (*df*)**	**CFI**	**RMSEA**	**SRMR**	**Model comp**	**ΔCFI**	**Δ RMSEA**	**ΔSRMR**
M1: Configural invariance	393.39 (230)**	.967	.032	.037	-	-	-	-
M2: Metric Invariance	367.06 (246)**	.975	.027	.040	M1	-.008	.005	-.003
M3: Scalar Invariance	645.75 (258)**	.921	.047	.054	M2	.054	-.02	-.014

Note: **p<.001

DISCUSSION

The present study aimed to validate the French version of the Dimensional Anhedonia Rating Scale (DARS) and examine its psychometric properties across digital and paper-based formats using three independent samples. Results indicated that the French DARS demonstrates robust reliability, validity, and factor structure consistency across samples and formats.

The results of our exploratory and confirmatory factor analyses on the digital format of the DARS supported a four-factor structure corresponding to four reward types (i.e., hobbies, foods/drinks, social activities, and sensory experiences). This factorial structure was replicated in an independent paper-based sample. Furthermore, configural and metric invariance were established, indicating equivalent factor structure and factor loadings across both administration modalities. These findings support the stability of the four-factor structure across modalities and demonstrate the reliability of the French DARS for assessing anhedonia. The four-factor structure of the DARS confirmed in the present study has been consistently identified in all previous validation studies (Arrua-Duarte et al., 2019; Ching et al., 2021; Gorostowicz et al., 2023; Rajeh et al., 2022; Wellan et al., 2021; Xiao et al., 2022). In the present study, the factor loadings for the hobbies, foods/drinks, sensory experiences subscales of the French DARS aligned well with those reported in previous validations (Arrua-Duarte et al., 2019; Gorostowicz et al., 2023; Rajeh et al., 2022; Wellan et al., 2021). The social activities subscale exhibited the greatest variability, with lower loadings in this study compared to other validations (e.g., Arrua-Duarte et al., 2019; Gorostowicz et al., 2023). These differences may reflect cultural factors or variations in the perception of social engagement.

The French version of the DARS exhibited excellent internal consistency across both digital and paper formats, respectively with Cronbach's α (α=0.86 and 0.87) and McDonald's omega (Ω total=0.82 and 0.84) values well above the acceptable thresholds, indicating strong reliability for the total scale, as well as the subscales. AIC also demonstrated good internal coherence. These results align with previous validations of the DARS in other languages, supporting its robust psychometric performance in the French language.

Evidence for the convergent validity of the digital version of the French DARS was provided by moderate correlations with the SHAPS, the BAS and the TEPS. The correlations with the BAS subscales are consistent with the original study by Rizvi et al. (2015) and with

the findings of the German translation (Wellan et al., 2021). Similarly, the paper version demonstrated moderate correlations with the TEPS. These findings diverged from other studies that reported stronger correlations with the SHAPS and TEPS (Arrua-Duarte et al., 2019; Gorostowicz et al., 2023; Ching, 2021). Notably, our correlations with the SHAPS and TEPS are closer to those reported by Xiao et al. (2022) in their healthy control samples and by Wellan et al. (2021). This discrepancy may partly reflect differences in the populations studied. The present study, along with those by Wellan et al. (2021) and Xiao et al. (2022), involved non-clinical samples, whereas studies reporting stronger correlations typically included clinical populations with MDD (Arrua-Duarte et al., 2019; Gorostowicz et al., 2023; Ching, 2021), in which hedonic deficits are likely more pronounced.

Divergent validity in the French DARS was supported by weak and non-significant correlations with the BIS, further emphasizing its specificity in assessing anhedonia rather than behavioral inhibition. This is consistent with findings from past studies (Wellan et al., 2021; Xiao et al., 2022) in which the DARS also demonstrated good divergent validity. The French DARS also demonstrated weak negative correlations with the CESD across both digital and paper formats. These correlations are weaker than the moderate correlations reported by Rizvi et al., (2015) in community and MDD samples and by Wellan et al. (2021) in young adults during the COVID-19 pandemic. This could indicate that the French DARS is more effective in capturing anhedonia as a distinct construct separate from general depressive symptoms in the general population. Beyond these validity results, the present findings also resonate with contemporary frameworks that conceptualize anhedonia not as a unitary symptom but as a spectrum (Scheggi et al., 2018). The multidimensional structure of the DARS aligns with this perspective, reinforcing its relevance as a tool for capturing the complexity of anhedonia.

Measurement invariance analyses confirmed that the French DARS operates equivalently across gender, supporting valid comparisons of anhedonia scores between men and women. Gender differences were examined across both digital and paper-based formats of the DARS. In the digital version, women scored higher on hedonic functioning in the DARS, particularly in relation to food/drinks, social activities, and sensory experiences, whereas men reported higher hedonic functioning for hobbies. In the paper-based version, significant gender differences were only found for the hobbies subscale, with men again reporting higher hedonic functioning in this domain. These results differ from Rizvi et al. (2015) and Rajeh et al. (2022) who found no gender differences in DARS scores, but align partially with Wang et al., (2025),

who reported higher DARS scores for females compared to males. The gender differences found in the present study may be explained by different factors, including, for instance, the known gender differences in taste perception and eating habits (Feraco et al., 2024). Regarding hobbies, men's higher hedonic functioning may be explained by the greater time pressure women report during leisure activities, which can negatively impact their perceived leisure quality (Yerkes et al., 2020). Similarly, gender-differentiated social roles may account for differences in social hedonic functioning, as they influence the ways in which men and women engage in, enjoy, and report social activities (Finkel et al., 2018). Importantly, it should be noted that effect sizes were small and that the underrepresentation of men in our Samples 1 and 3 may have influenced the findings and limited their generalizability. However, the observed gender differences in total scores, as well as in the food/drinks, social activities, and sensory experiences subscales, were also present in Sample 2, which had a balanced gender ratio. These findings suggest that gender differences in the French DARS are likely domain-specific rather than global, further supporting the utility of the DARS in distinguishing between different aspects of hedonic functioning.

While the results of the measurement invariance analyses indicate that the French DARS demonstrated configural and metric invariance across the digital and paper formats, the scalar invariance was not supported. Item intercepts differed between the two formats, suggesting that participants may have systematically responded to items at different baseline levels depending on the mode of administration. Specifically, participants who completed the paper-based version reported higher scores than those who completed the digital version. Similarly, Arrua-Duarte et al. (2022) found higher DARS scores in the paper-based format compared to the digital version within the same clinical sample. Taken together, these findings indicate that caution is warranted when comparing absolute DARS scores across formats, as full measurement equivalence cannot be assumed. Future research should investigate potential sources of the lack of scalar invariance, and whether these differences are driven by specific subscales. One potential explanation is social desirability bias, as respondents completing paper questionnaires may be more inclined to report higher hedonic functioning due to perceived social expectations or reduced perceived anonymity (Zager Kocjan et al., 2023).

Limitations

Some limitations should be acknowledged. First, our study samples were non-clinical and further studies are needed to investigate the psychometric properties of the French DARS in individuals with neuropsychiatric disorders. Second, there was a gender imbalance in Samples 1 and 3, where men were underrepresented. This disproportion may have introduced biases in the observed gender differences and affects the generalizability of the results regarding gender-related variations in the DARS. Future research should aim for more balanced gender distributions and include diverse clinical populations to enhance the robustness and applicability of findings across different groups.

CONCLUSION

This study provides robust evidence for the psychometric validity of the French version of the DARS across three independent samples, confirming its reliability, convergent and divergent validity, gender invariance, and a consistent factor structure across both digital and paper formats. However, the lack of scalar invariance between formats underscores the need for caution when comparing absolute scores, as full measurement equivalence is not established. Overall, these findings support the French DARS as a reliable and valid tool for assessing anhedonia and for identifying specific hedonic difficulties across different reward domains.

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Open Science

The data and code needed to reproduce all of the reported results are available at https://osf.io/qtjsa/

Design and Analysis Transparency

We report all data exclusions, all data inclusion/exclusion criteria, all inclusion/exclusion criteria established prior to data analysis, all measures in the study, and all analyses including all tested models. For reliability and factor analyses, we report 90 or 95% confidence intervals. For inferential tests, we report exact p-values and effect sizes.

Publication Ethics

The study was approved by the Ethics Committee of the Faculty of Psychology and Educational Sciences of the University of Mons. The initial approval for Sample 1 was granted on 19 October 2022 (project code: UMONS-2022.10.19-SS&FM-010). Ethical amendments were approved on 22 May 2024 to allow for the collection of Samples 2 and 3. Informed consent was obtained from all participants included in the study.