

## The New York Scale of Anhedonia: Development and Validation of a New Measure

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### Abstract

Anhedonia is conceptualized as a lack of interest or pleasure in hobbies, sensory experiences, and social activities. The aim of this research was to develop and validate an instrument to screen for the presence of and change in the experience of anhedonia. An initial set of 23 items assessing intensity and change in lack of pleasure and loss of interest in various hedonic domains was created to form the New York Anhedonia Scale (NYSA). Study 1 explored the reliability, factor structure and item quality of the NYSA, which assessed the 23 items in two parts: Part A focused on identifying the presence and intensity of anhedonia, while Part B assessed change in anhedonia. A sample of 265 adults responded to the instrument via social media platforms. Exploratory factor analysis of the 23-item NYSA revealed that 15 items clustered into two factors: sensory and physical anhedonia and social anhedonia. Study 2 evaluated the psychometric properties of the final version of the NYSA using a sample of 238 adults. The concurrent and convergent validity of the final version of the NYSA was examined with the Snaith-Hamilton Pleasure Scale (SHAPS) and the Social Interaction Anxiety Scale (SIAS). Good concurrent validity was found with the SHAPS and convergent validity with the SIAS. Reliability of the NYSA subscales was high across both studies. The NYSA is a tool different from other measures of anhedonia as it is not only quick to administer but also provides information regarding anhedonia intensity and change. The NYSA is a useful and promising instrument for screening and assessing anhedonia in the general population and in clinical settings.

**scale development; anhedonia intensity; anhedonia change; depression; social anxiety**

### THE NEW YORK SCALE OF ANHEDONIA: DEVELOPMENT AND VALIDATION OF A NEW MEASURE

Anhedonia is an emotional and motivational deficit [1] reflected by a reduced interest in or pleasure from engagement in activities that would typically be experienced as enjoyable. Re-

cent research [2] has documented the association of anhedonia with three psychological components of reward processing, *reward liking*, *reward wanting* and *reward learning* [3]. This reduction in hedonic capacity has been observed in many psychiatric and neurological disorders including uni – and bipolar depression [4], PTSD [5], substance use disorders [6], schizophrenia [7], eating disorders [8], Alzheimer’s disease [9], Parkinson’s disease [10] and epilepsy [11]. Anhedonia has been associated with several unfavorable outcomes such as sleep quality [12], functional impairment [13, 14], suicidal ideation [15], and

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quality of life [16, 17]. The significance of anhedonia as a transdiagnostic factor underscores the value of clinical screening for the presence of anhedonia, necessitating the reliable and valid measurement of anhedonia.

Consensus regarding anhedonia as a trait or state is still lacking though recent research provides support for regarding it as a trait in schizophrenia [18]. Yet, the conceptualization of anhedonia as a multidimensional construct is undisputed Chapman et al. [19] were among the earliest researchers to describe anhedonia as including three pleasure domains: physical pleasure reflecting sensory enjoyment, interpersonal pleasure reflecting enjoyment from social activities, and other pleasures that are neither physical nor interpersonal, such as enjoyment from achievement or success. And recently, Case et al. [20] reported anhedonia as composed of four dimensions: social reward, social disinterest, status/achievement, and physical/natural reward.

Currently, there are four self-report scales generally employed to assess anhedonia: the Snaith-Hamilton Pleasure Scale (SHAPS; [21], Fawcett-Clark Pleasure Capacity Scale (FCPS; [22], Chapman Physical Anhedonia Scale (PAS) and Chapman Social Anhedonia Scale (SAS) [19]. The latter two have been revised to the Revised Physical Anhedonia Scale (RPAS) [23] and the Revised Social Anhedonia Scale (RSAS) [24]. Although validated and employed in various research settings, each scale exhibits certain drawbacks. The SHAPS is composed of 14 items, with participants' responses to pleasurable situations scored on a five-point scale ranging from *strongly disagree* to *strongly agree*. Measuring pleasure capacity, the SHAPS presumes its items are homogeneous and measure anhedonia as a unidimensional construct. Furthermore, inconsistencies in participants' interpretations of the items are likely because the instructions require participants to report their ability to experience pleasure *in the last few days*, while the items are worded so as to assess anticipatory pleasure [20]. The FCPS was developed to assess anhedonia in psychiatric patients with depression [22] and comprises 36 items rated on a nine-point scale ranging from *extreme and lasting displeasure* to *extreme and lasting pleasure*. Although the items cover a range of domains, they yield a single score, which implies that anhedonia can be de-

scribed as a single underlying dimension. The RPAS (61 items) and RSAS (40 items) scales were developed to assess anhedonia in patients with schizophrenia and differ in many ways from the SHAPS and the FCPS. Unlike the SHAPS and FCPS, the RPAS and RSAS use a true-false response format and have some items that are reverse scored. Items in each of these scales are also summed to produce one total score of low pleasure capacity, i.e., anhedonia rather than hedonic capacity. Additionally, the true-false nature of the two scales means that only the presence or absence of anhedonia can be measured, with no attention drawn to the severity/intensity of the anhedonia experienced [25]. In contrast to both the FCPS and SHAPS that measure state anhedonia, RPAS and RSAS assess trait anhedonia [25]. Of more serious concern is the validity of these scales which appears to be questionable [25, 26]. Items on the RSAS and the RPAS, as well as those on the FCPS, are reported to display cultural bias, limiting the applicability of the scales and rendering them unrelatable to those outside a specific population [25]. Criticisms have been voiced regarding the split factor nature of the scales, with many researchers suggesting that both factors of social and physical anhedonia be included in a single scale [25].

In recent years, with evidence accumulating about the neurobiological underpinnings of anhedonia [27], impairments in various facets of reward processing associated with anhedonia [25] have captured the interest of researchers. As a result, several new scales assessing facets of reward function have been developed. The Temporal Experience of Pleasure Scale (TEPS) [28] is an 18-item measure that has a two-factor structure reflecting anticipatory (10 items) and consummatory (8 items) aspects of reward. The psychometric properties of the instrument, including the internal reliability and external validity of the scale, are disputable [25]. Another new scale validated only in schizophrenia is the Motivation and Pleasure Scale-Self Report (MAP-SR) developed by Llerena et al. [29]. While the scale is unique in assessing the intensity, frequency, and anticipation of future reward and is reported to have sound psychometric properties, some items are too broad and general to elicit a strong reward response and many of the activities referred to in the items are work or school-relat-

ed [25]. Winer et al. [30] developed the Specific Loss of Interest Scale (SLIPS) to assess recent changes in anhedonia. The SLIPS considers the temporal facets of anhedonia by differentiating loss of interest from loss of pleasure, focusing on the former. Although high reliability and validity have been reported by the authors, all 23 items tend to load on to a single factor reflecting social anhedonia [25]. Taking into consideration neurological evidence of anhedonia as reflecting four components of reward processing (desire, motivation, effort and consummatory pleasure), Rizvi et al. [31] developed the 17-item Dimensional Anhedonia Rating Scale (DARS), specifically to assess anhedonia in patients diagnosed with major depressive disorder (MDD). The authors reported high internal consistency and validity for the scale and claimed its superiority over the SHAPS in predicting treatment resistant cases of MDD. Finally, there is the Anticipatory and Consummatory Interpersonal Pleasure Scale (ACIPS) developed by Gooding and Pflum [32]. As the name of the scale indicates, it assesses anticipatory and consummatory social pleasure rather than anhedonia. The underlying rationale is that extremely low pleasure scores may be indicative of social anhedonia. Although the ACIPS was developed with the purpose of a two-factor solution, factor analysis revealed that the items mapped on to 3 factors: *intimate social interactions*, *social interactions within a group context*, and *pleasure derived from social bonding and making connections with others*. High reliability and validity indices have been reported for this 17-item scale.

From the above review, it is clear that existing scales of anhedonia either assess physical anhedonia (e.g., TEPS and RPAS) or social anhedonia (e.g., CSAS, SLIPS, and ACIPS), have been developed for use in clinical settings or with specific populations (e.g., FCPS, RPAS, RSAS, MAPSR, DARS, and ACIPS), or assess anhedonia as a unitary construct (e.g., SHAPS). Taking these limitations into account, we intended to develop a short rating scale that would 1) assess the current intensity of both physical and social anhedonia as consummatory pleasure 2) assess perceived change in anhedonia from the past and 3) be usable with both clinical and non-clinical populations. This new scale will provide a rapid measure of anhedonia which is important when

used to clinically screen individuals with varying levels of anhedonia.

## OVERVIEW OF SCALE DEVELOPMENT

To create the NYSA scale, items of existing scales of anhedonia were reviewed for their relevance in measuring anhedonia. The user practicality of each scale, whether respondents could finish the survey in a timely manner, understand the questions with ease, and successfully complete the survey through full comprehension of their respective formats, was considered. The researchers collaborated to isolate the effective features from the elements deemed less effective, verbalizing justifications for retaining, dismissing, or editing any items. A final list of 23 items resulted which were then edited for stylistic uniformity. Finally, a Likert scale was selected to rate the 23 items. The decision was made to present the set of 23 items twice, first to measure anhedonia intensity and subsequently, to measure anhedonia change.

## DATA ANALYSES

To develop a reliable and valid measure of anhedonia, several analyses were conducted including Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), reliability, and validity assessment. Firstly, using data from Sample 1, a series of EFAs with Promax rotation was used to both explore the structure of the NYSA and to eliminate inappropriate items. Based on the eigenvalues of each factor, two to three factors were extracted successively (eigenvalues >1). Item deletion was undertaken through conducting EFA multiple times, with only one item being deleted each time. Items with loading value less than 0.4 and items with cross-loadings were deleted [33]. If at any one time, more than one item met the deletion criteria, the content of each item was taken into consideration. Analysis continued until there was no item that met the deletion criteria and the goodness-of-fit indices were acceptable.

Next, using Sample 2, CFA was conducted to verify the structure of the NYSA scale. Fit indices and factor loadings were calculated, with

good fit indices and significant factor loadings indicating the acceptability of the final version of the NYSA derived from EFA. The ideal model was chosen according to goodness-of-fit indices, including Comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). To evaluate the acceptability of the model, the following criteria were used: an RMSEA  $< 0.08$  = an acceptable fit for model, and RMSEA  $< 0.05$  = a good fit for model [34]; a TLI value  $> 0.90$  = an acceptable fit [35]; a CFI value more than 0.95 combined with a SRMR value less than 0.08 also correspond to an acceptable fit [36, 37]. Finally, the reliability and validity of the final scale were assessed. McDonald's Omega coefficients were computed to determine the reliability of the scale and subscales and validity was examined by obtaining coefficients for concurrent validity and construct validity. The statistical analyses were completed using SPSS v. 27 and Jamovi.

### Study 1

The first study was designed to develop the preliminary version of the NYSA and evaluate its factor structure, internal consistency, and item quality. No specific number of factors were anticipated *a priori* although the scale items were arranged in two sections: Part A consisting of a list of situations with a response format intended to assess the intensity of anhedonia, and Part B consisting of the same list of situations but with a response format intended to assess the degree of change in feelings of anhedonia from the past to the present.

## METHOD

### Questionnaire Development and Item Selection

The researchers first decided that the instrument should be structured in two parts, Part A presenting situations in order to assess the magnitude of anhedonia, and Part B assessing change in feelings of anhedonia. This was done to ensure that the instrument could be used in the assessment of the impact of any intervention targeting anhedonia.

The items in the instrument were constructed from information about anhedonia that has been published in scientific journals. All situations including sensory stimuli, environmental settings, and interpersonal interactions that have been reported as descriptive of anhedonia were included. Therefore, solitary and social activities were included.

First, all empirical research reports on anhedonia published in academic journals between the years 2011 and 2022 were scanned and a pool of items describing anhedonia was generated. In keeping with the review of literature, the information was categorized as physical or social and then evaluated by each author independently using a rating scale. Next, all the top-ranked items were evaluated in terms of content validity by all the authors together. These categories are also consistent with the definition of anhedonia as lack of pleasurable experiences and loss of interest to act [37]. Next, all the existing tools for the assessment of anhedonia were examined and their items compared against the items created. After elimination of duplicate and synonymous entries, a total of 30 items assessing a lack of pleasure (see Table 2 for the complete list of the 23 items) and rated as best by all the authors were retained. The items included both physical and social stimuli. Since anhedonia can vary in magnitude and over time, the decision was made to include options that would assess both varying degrees of anhedonia and change in anhedonia. This necessitated the development of the instrument in two parts. Therefore, the research team decided to present in the first part, responses arranged on a continuum of increasing frequency that would be reflective of the intensity of anhedonia. A 5-point Likert scale ranging from 1 = *Strongly agree* to 4 = *Strongly disagree* was considered as the response format for the 30 situations. For Part B, it was decided that the same situations would be presented with a different 5-point Likert scale assessing amount of change in anhedonia. Responses ranging from 1 = *have always felt like this* to 4 = *used to but not anymore* were considered.

These items were then submitted to a pilot study on a sample of 25 participants in order to confirm that the items are easily comprehensible. The self-report survey was administered to a group of undergraduates who volunteered to

participate in response to announcements made through the institution's learning management system. Feedback was solicited through two open-ended questions posed after each part of the questionnaire. Slight modifications were made in the wording of some items and 6 items which reflected specific interests and/or situations not applicable to all individuals such as *I enjoy getting compliments from colleagues* and items that appeared to be redundant with other items were dropped. For example, the item, *Good food gives me pleasure* was dropped as it was redundant with the item *I enjoy my favorite food or drink*. The final set of 23 items were randomly ordered and represented the first version of the NYSA scale. We intended to develop a final set of items that could be used to assess the current degree of anhedonia as well as the amount of perceived change in anhedonia. To achieve this objective, the final scale would need to have identical items in both Parts A and B.

## PARTICIPANTS

Participants were recruited online from different parts of the world. The sample consisted of 265 individuals, 93 men (35.1%), 156 women (58.9%) and 16 nonbinary individuals (6%) with a mean age of 27.1 years (SD = 9.1). However, the removal of 17 multivariate outliers resulted in a final sample of 248 individuals, 83 men (33.5%), 151 women (60.9%) and 14 nonbinary individuals (5.6%) with a mean age of 27.3 years (SD = 9.3). According to Kline (33), a sample size of 200 individuals is often adequate for factor analysis as an absolute criterion. The uneven gender distribution is common in most online surveys [38]. Demographic variables such as marital status, ethnicity, education level and employment status were also collected. The data are displayed in Table 1.

**Table 1.** Demographic Characteristics of Participants in Study 1 and Study 2

	Levels	Study 1		Study 2	
		f	%	f	%
Gender	Male	93	35.1	79	34.2
	Female	156	58.9	150	64.9
	Non-binary	16	6.0	2	.9
Marital Status	Single, never married	148	55.8	130	56.3
	In a relationship, unmarried	66	24.9	65	28.1
	Married	39	14.7	28	12.1
	Divorced, Separated or Widowed	12	4.5	8	3.5
Educational Status	Less than high school degree	5	1.9	4	1.7
	High school degree or equivalent (e.g., GED)	40	15.1	42	18.2
	Some college but no degree	71	26.8	70	30.3
	Associate degree	20	7.5	36	15.6
	Bachelor's degree	75	28.3	59	25.5
	Graduate degree	54	20.4	20	8.7
Employment Status	Disabled, unable to work	16	6.0	7	3.0
	Not employed, NOT looking for work	45	17.0	45	19.5
	Not employed, looking for work	43	16.2	37	16
	Employed, working 1-39 hours per week	87	32.8	83	35.9
	Employed, working 40 or more hours per week	73	27.5	57	24.7
	Retired	1	0.4	2	.9
Ethnicity	White	177	66.8	137	59.1

	Asian	31	11.7	41	17.7
	Black or African American	7	2.6	7	3.0
	Latino	26	9.8	26	11.2
	From multiple Races	15	5.7	19	8.2
	Other	9	3.4	1	.4

## MEASURES

### The New York Scale of Anhedonia (NYSAs)

The preliminary version of the NYSA consisted of 23-items designed to measure anhedonia intensity and change. Participants were presented with the same 23 items twice. In the first part labeled Part A, they were asked to rate their agreement with each item using a 5-point Likert scale, ranging from 1 = "Strongly agree" to 4 = "Strongly disagree" In the second part, they were asked to indicate how much their feelings of pleasure from each of the activities described in the items had changed using a 5-point Likert scale (1 = Have always felt like this to 5 = used to but not anymore).

### Snaith Hamilton Pleasure Scale (SHAPS) [21]

The Snaith–Hamilton Pleasure Scale (SHAPS) [21] is a 14-item self-report measure used to measure hedonic experience or positive valence. The items assess pleasure experiences in four domains: interest/pastimes, social interaction, sensory experience, and food/drink. Participants rate each item by selecting one of five response options ranging from 0 = Strongly agree

to 3 = Strongly disagree. A total score is computed by summing ratings given to all 14 items and ranges from 0 to and 42, with higher scores indicating a lower level of hedonic experience or a higher level of anhedonia. The SHAPS has been adapted and used widely and high internal consistency (Cronbach's  $\alpha$ ) ranging from .89 [39] to .90 [40] have been reported. In the current sample, the internal consistency of the SHAPS was found to be Cronbach's  $\alpha$  = .90.

### Social Interaction Anxiety Scale (SIAS) [41]

The SIAS developed by Mattick and Clarke [41] is a 20-item measure to assess social interaction anxiety. Each item is rated on a five-point Likert scale, ranging from 0 (*not at all characteristic of me*) to 4 (*extremely characteristic of me*). Three items (item number 5, 9, and 11) are positively worded and require reverse scoring. All the others are negatively worded. Total scores range from 0 to 80, with higher scores indicating higher levels of social anxiety. In a recent study [42], the SIAS was reported to have good internal consistency (Cronbach's  $\alpha$  = .92). In the current study, the Cronbach's alpha internal consistency values of the SIAS was .94.

**Table 2.** The Items in the Preliminary Version of the NYSA Representing Physical and Social Anhedonia

	NYSA Items
1	I enjoy watching something I like on television or radio*
2	It feels good being with my family or close friends*
3	I find pleasure in my hobbies and pastimes. (PA)
4	I enjoy my favorite meal or drink. (PA)
5	I get satisfaction from a refreshing bath or shower. (PA)
6	I feel pleasure when I smell something nice. (PA)
7	It feels good when I'm looking good*
8	I enjoy reading something of interest to me*

9	I like it when the weather is nice. (PA)
10	I enjoy being in or a view of my favorite location. (PA)
11	It feels good when I receive praise or compliments from people I like. (SA)
12	I like seeing my loved ones happy. (SA)
13	It is pleasurable to be gifted with something nice. (SA)
14	I get satisfaction when I achieve a goal I set for myself. (PA)
15	I can enjoy something funny*
16	I like it when I make others happy. (SA)
17	I feel pleasure when I am being supported by someone I like. (SA)
18	Touching smooth or soft things feels satisfying. (PA)
19	I enjoy sitting outdoors on a nice day or feeling a cool breeze on a hot day. (PA)
20	I think fondly of happy or pleasurable memories. (PA)
21	It feels good when my clothes are comfortable. (PA)
22	It feels good when I breathe in fresh air. (PA)
23	I enjoy sleeping*

\*Items not included in the final scale, Note. PA = Physical Anhedonia; SA = Social Anhedonia

## RESULTS

### Reliability Analysis of Preliminary Scale

First the internal consistency of the items in Parts A and B were examined to identify any items that may need to be dropped. This initial examination revealed excellent internal reliability for Part A (Cronbach's  $\alpha = .95$ ), Part B (Cronbach's  $\alpha = .93$ ), and for the full scale (Cronbach's  $\alpha = .94$ ).

### Exploratory Factor Analysis

The obtained data were first tested in terms of the assumptions for EFA. There was no missing data and using Mahalanobis distances, 17 multivariate outliers were identified and removed from the analysis. The obtained KMO value of 0.945 and Bartlett's test of sphericity ( $\chi^2 (253) = 3277.91, p < 0.001$ ) indicated that the sample size in this study was sufficient for EFA [43]. A test of multivariate normality suggested that the assumption was not met. The anti-image correlation matrix diagonals were all greater than .5 (between .914 and .977), revealing smaller off-diagonal partial pairwise correlations [44] and significant proportion of variance in an item unrelated to another item [45]. The inter-item re-

lationships were found to be between .18 and .67, with the majority being greater than .37, implying that many items have acceptable inter-item relationships. The matrix determinant was .0026, indicating the legitimacy of factor analysis. Additionally, tolerance values were found to be greater than .10 (ranging between .333 and .677), and VIF values were found to be less than 10 (ranging between 1.477 and 3.042), indicating that multicollinearity was not a concern.

Since the data set met the assumptions of the EFA, but not the assumption of multivariate normality, the analysis was carried out using principal axis factoring as the extraction method. Promax was used as the factor rotation method in this procedure given that oblique rotation creates a pattern matrix including the factor or item loadings, as well as a factor correlation matrix including the factor correlations. First, the EFA was conducted on the 23 items in Part A. All items that failed to load on to any single factor were to be eliminated sequentially beginning with the item with the lowest loading and the EFA process would be repeated until only items loading on to a single factor would be retained. The initial EFA process conducted on items from Part A with factor loadings of a value greater than 0.40 using eigen values greater than 1 re-

vealed two factors explaining a total of 51.63% of the variance, with 16 items loading on to Factor 1, and 7 on to factor 2. Cattell's scree test also suggested the presence of only two components. Next, EFA was carried out on the 23 items in Part B. Two factors emerged explaining a total of 44.20%, but items 15b and 1b did not load on to any factor. These items were removed sequentially, which resulted in two more items, 2b and 3b, failing to load on to any factor. Therefore, they were also eliminated. However, item 14b cross-loaded and that item was also removed. The remaining 18 items 22, 19, 18, 6, 21, 20, 9, 5, 4, 10, 23 (factor 1) and 16, 13, 11, 12, 17, 8, 7 (factor 2) were retained.

Next, in order that both Parts A and B have the same items, EFA was once again run on the items in Part A that were identical to those in

Part B. All the items loaded on to two factors except for item 8a and 23a which failed to load on to either factor. The remaining 16 items accounted for 58.02% of the variance. Finally, EFA was carried out on the items in Part B with the exclusion of item 8b and 23b. This resulted in item 7b failing to load on to either factor. A final EFA on both Parts A and B produced the loadings of items 4, 5, 6, 9, 10, 18, 19, 20, 21, and 22 on Factor 1 and items 11, 12, 13, 16, and 17 on factor 2. The items explained 58.26% of the variance in Part A (intensity of anhedonia) and 50.10% of the variance in Part B (change in anhedonia). Table 3 details the factor loadings of the retained items. Examination of the content of the items loading on to the two factors indicates that Factor 1 represents sensory anhedonia while factor 2 reflects social anhedonia.

**Table 3.** Factor Solutions Obtained for Part A and Part B of the NYSA Using Principal Axis Factoring Analyses with Oblique Rotation (Promax)

Item	Components of Part A Physical Anhedonia		Item	Components of Part B Social Anhedonia	
	1	2		1	2
22a	0.950		22b	0.878	
19a	0.856		19b	0.745	
5a	0.780		6b	0.692	
9a	0.705		18b	0.692	
6a	0.643		9b	0.657	
10a	0.637		20b	0.654	
21a	0.606		21b	0.631	
18a	0.591		5b	0.582	
20a	0.559		10b	0.548	
4a	0.511		4b	0.512	
11a		0.944	16b		0.871
16a		0.898	11b		0.762
12a		0.701	13b		0.749
13a		0.584	12b		0.616
17a		0.581	17b		0.521

### Reliability of the Final Scale

Internal consistency and item-total correlations were calculated to evaluate the reliability of the NYSA scale. For the items in Part A, the internal consistency indexed by Cronbach's  $\alpha$  was .93, while item-total correlations varied between

.29 (between item 9 and 18) and .66 (between item 12 and 16). No increases in reliability could be obtained through the withdrawal of items as no other item had an item-total correlation less than the criterion of .35. The internal consistency of both Factor 1 (Cronbach's  $\alpha$  = .91) and factor 2 (Cronbach's  $\alpha$  = .85) in Part A was high. For Part



B, the Cronbach's  $\alpha$  was .90 for all 15 items and .87 and .78 for Factors 1 and 2, respectively. The item–total correlations ranged from .20 (between item 16 and 18) to .52 (between item 6 and 20).

In sum, the findings from Study 1 suggest the NYSA is a reliable tool for the measurement of anhedonia as it provides information about the intensity of physical and social anhedonia as well as the degree of change perceived by the individual. Based on the factor loadings, reliability analyses (item–total correlations), and descriptive statistics for the items (means and standard deviations), 17 items of the preliminary version were retained for the final version of the NYSA scale. The items comprising physical and social anhedonia were then randomly reordered to create the final version of the NYSA scale.

## VALIDITY OF THE FINAL SCALE

### Concurrent Validity.

The analysis revealed that Factors 1 and 2 and full-scale scores of the NYSA showed significant moderate to high correlations with total scores on the SHAPS, confirming that the NYSA correlates with constructs associated with the SHAPS. The correlation between the total NYSA score and total SHAPS score was strong, indicating good concurrent validity. In addition, the total scores on Factor 1 of the NYSA, the items that assess sensory or physical anhedonia correlated strongly with the score on the SHAPS, which assesses pleasure in various situations. Furthermore, total scores on Factor 2 of the NYSA, the items that capture social anhedonia, correlated strongly with the total score on the SHAPS. All correlations are presented in Table 4.

**Table 4.** Reliability Estimates of the NYSA and Correlations between the NYSA Subscales and Total Scale Scores, the SHAPS Total Scale Score and the SIAS Total Score (Study 1) and PHQ=9 Total Score (Study 2)

NYSA	Cronbach's $\alpha$		M	SD	SHAPS	SIAS	PHQ-9
	Study 1	Study 2					
Physical Anhedonia Intensity	.91	.86	10.79	7.18	.772***	.389***	.374***
Social Anhedonia Intensity	.85	.77	3.69	3.06	.672***	.355***	.339***
Total Anhedonia Intensity	.93	.90	14.48	9.73	.781***	.400***	.381***
Physical Anhedonia Change	.87	.80	9.97	7.44			
Social Anhedonia Change	.78	.73	3.48	3.14			
Total Anhedonia Change	.90	.86	13.45	9.87			

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

### Convergent Validity

Pearson's correlations were also calculated between the factor scores and total score on the NYSA and the total SIAS scores. As hypothesized, all correlation coefficients were moderately strong and significant ( $p < .001$ ). These correlations are also displayed in Table 4.

### Study 2

The goal of Study 2 was to verify the psychometric properties of the final version of the NYSA

scale. Therefore, in this study, a confirmatory factor analysis, validity, and reliability analysis was carried out to evaluate and confirm the factor structure and acceptability of the instrument. Based on the results from Study 1, we hypothesized that factor analyses of both Parts A and B would yield a two-factor structure.

### Method

**Participants and Procedure.** A sample of 231 American adults (148 women, 78 men and 3 nonbinary individuals), ranging in age from 18 to 60 years

participated in the study. The mean age was 25.3 years (S.D. = 7.75). Recruitment was conducted online using social media platforms.

## MEASURES

### New York Scale of Anhedonia (NYSA)

Participants completed the final 17-item version of the NYSA (17 items for Part A and Part B), as well as a sociodemographic information questionnaire (administration duration was less than 10 minutes). The same five-point (0 to 4) response formats were used. Scales for each subscale, section, and total scale were computed. This scoring procedure allows for the assessment of intensity of and change in physical and social anhedonia.

### Patient Health Questionnaire-9 (PHQ-9)

The PHQ-9 is a self-administered measure that identifies the presence and severity of depressive symptoms experienced in the preceding two weeks. The instrument has nine items focusing on symptoms descriptive of major depressive disorder as listed in the 4<sup>th</sup> edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). Each item of the PHQ-9 is rated on a scale of 0–3 (0 = not at all; 1 = several days; 2 = more than a week; 3 = nearly every day). A total score ranging from 0 to 27 is obtained with scores of 5–9 classified as mild depression, scores 10–14 as moderate depression, scores 15–19 as moderately severe depression, and scores greater than 20 as severe depression [46]. The PHQ-9 is reported to have high internal consistency and good sensitivity and specificity for identifying cases of major depression [47].

## Results and Discussion

### Descriptive Statistics

Table 4 presents the means and standard deviations obtained by participants on the two parts of the NYSA, as well as on each of the instrument's components. No sex differences emerged in any of the components of the NYSA. There-

fore, the subsequent validation analyses were conducted on the whole sample.

**Confirmatory Factor Analyses.** As a final step, confirmatory factor analyses were conducted. One model aimed to confirm a two-factor solution representing all 16 items in both Parts A and B of the NYSA: (1) intensity (2) change.

Fit indices included the comparative fit index (CFI), the Tucker Lewis Index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). For Part A (anhedonia intensity), examination of the CFI (.92) and TLI (.90), reveal a fairly good model fit [48] and the SRMR value of .04 and RMSEA value (.06, CI [.05, .07]) represent an acceptable fit. Similarly, for Part B, CFI (.89) and TLI (.87) reveal a fairly good model fit [48], and SRMR value of .05 and the RMSEA value (.05, CI [.04, .07]) also represent a good fit. Furthermore, the estimated factor loadings are all significant ( $p < .001$ ), suggesting a feasible structure.

### Convergent Validity

Pearson's correlations were calculated between the factor scores and total scores of the NYSA and the total PHQ-9 scores, which assesses depression. As hypothesized, all correlation coefficients were small to moderate. These correlations are displayed in Table 4.

### Reliability

The Cronbach's  $\alpha$  coefficient obtained for all items in Part A (Physical Anhedonia) was .92, and the item–total correlations varied between .20 and .58. For Part B (Anhedonia Change), Cronbach's  $\alpha$  was .86, and the item–total correlations varied between .17 and .50. In both Parts A and B, withdrawal of items did not result in an increase in the obtained reliability coefficients. The Cronbach's  $\alpha$  coefficients for the subscales of the instrument were also high (Anhedonia intensity, Physical = .89, Anhedonia intensity, Social = .82; Anhedonia change, Physical = .84, Anhedonia change, Social = .77).

In sum, this second study provided overall support for the factor validity and reliability of the NYSA scale. A two-factor structure for

both Part A (Anhedonia Intensity) and Part B (Anhedonia Change) appeared to be adequate to represent the items of the scale. The analyses confirmed that the instrument's items are valid and reliable for evaluating the intensity of and change in physical and social anhedonia.

## CONCLUSION

The above studies were developed to evaluate the psychometric properties of the NYSA scale. The instrument consists of 15 items and measures anhedonia based on two components, labeled Part A and Part B, which capture the two dimensions of intensity and change in anhedonia, respectively. In both components, two factors emerged and were labeled as physical anhedonia, which relates to lack of pleasure in physical and sensory experiences, and social anhedonia, which relates to lack of pleasure in interpersonal relationships. The instrument demonstrated adequate psychometric qualities through testing of convergent and concurrent validity. Correlations between the NYSA total scale and subscales and other anhedonia-related constructs were examined. It was found that the subscales within each component correlated with depression, indicating strong convergence. The assessment of concurrent validity revealed that the NYSA strongly correlated with the SHAPS. Both convergent and concurrent validity results imply that the NYSA properly and effectively measures anhedonia, as the scale positively correlates with common anhedonic features such as depression, as well as existing anhedonia scales.

The limitations of this study may require future research to expand and clarify our findings. Due to there being only five items measuring social anhedonia on the NYSA scale, future research may be required to determine if more items are necessary for accurate measurement. Additionally, this study tested the correlations between anhedonia and psychological problems commonly associated with anhedonia, such as anxiety and depression. However, there are other disorders that have anhedonia as a symptom, such as schizophrenia-spectrum disorders and substance abuse disorder. Therefore, future studies may be required to deter-

mine if anhedonia measured by the NYSA correlates with those psychological disorders, which will strengthen the convergent validity and clinical utility of the scale. Furthermore, anhedonia is highly correlated with symptoms of suicidal ideation and poor affective processing, and future research is warranted to determine the association of the two using the NYSA scale.

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