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ORIGINAL RESEARCH

Psychometric Properties of the Chinese Version of the Anhedonia Scale for Adolescents and Identification of the Subpopulation with Prominent Anhedonia

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Objective: Adolescent anhedonia (AA) exhibits distinct characteristics. Currently available anhedonia scales in Chinese are designed solely for adult populations. This investigation assessed the psychometric characteristics of the Chinese Anhedonia Scale for Adolescents (ASA-C) across clinical, subthreshold, and typically developing adolescent cohorts, while establishing its optimal cut-off for prominent anhedonia identification. The relationship between adverse childhood experiences (ACEs) and adolescent anhedonia was concurrently examined.

Methods: Random allocation divided participants into exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) validation sets. While internal consistency was evaluated in all groups, other psychometric properties were examined exclusively in major depressive disorder (MDD) participants. Latent profile analysis (LPA) was conducted on the full sample to identify distinct subgroups. Receiver Operating Characteristic (ROC) analysis determined the optimal diagnostic threshold based on derived classifications. The Adverse Childhood Experiences International Questionnaire (ACE-IQ) quantified dimensional characteristics of childhood adversity.

Results: Exploratory factor analysis (EFA) revealed a bifactor structure for the ASA-C (ie, positive and negative factors). Confirmatory factor analysis (CFA) demonstrated that this two-factor model exhibited satisfactory fit and achieved measurement invariance across all three groups. The scale displayed satisfactory internal consistency, test-retest reliability, convergent validity, discriminant validity, and concurrent validity. Latent profile analysis (LPA) classified the full sample into two distinct subgroups. A cut-off value of 20.5 was determined to be most effective for identifying marked anhedonia. Moreover, significant correlations were observed between adverse childhood experiences and total scores on the ASA-C.

Conclusion: The ASA-C demonstrates robust reliability and validity for assessing anhedonia in Chinese adolescents, serving as a valuable tool for community screening, clinical assessment, and research applications.

Keywords: anhedonia, Chinese adolescents, depression, reliability, validity

Introduction

Major depressive disorder (MDD) is recognized by the World Health Organization (WHO) as an urgent global mental health issue, with an estimated prevalence affecting 4.4% of the world's population.[1] In the past 10 years, survey data from the world and many countries have shown that the incidence of MDD in adolescents has increased faster than that in adults,[2,3] becoming a common cause affecting the mental health of adolescents. According to a meta-analysis conducted in

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China in 2020, the proportion of children and adolescents aged 6 to 15 with elevated depressive symptoms among was as high as 17.2%.[4]

Anhedonia, a key symptom of MDD, is characterized by the DSM-5 as a notable daily reduction in interest and enjoyment. Anhedonia is reported in more than 50% of adolescents with MDD.[3] Anhedonia is an indicator of a poor outcome in MDD[5] and is strongly linked to suicide in adolescents.[6] Notably, adolescence represents a critical period of substantial maturation within the brain's reward circuitry, rendering it particularly sensitive to the effects of anhedonia. Emerging evidence indicates that exposure to childhood adversity may modulate the influence of pubertal development on neural mechanisms underlying anhedonia.[7] Childhood adversity heightens anhedonia risk, particularly during adolescence, likely through disrupting frontostriatal circuitry and promoting chronic inflammation (elevated TNF-α, IL-6, etc)., which impair reward processing and dopamine signaling. Early trauma also accelerates puberty, increasing hormonal sensitivity. Effects vary by timing, with prepubertal trauma linked to depression and pubertal trauma to anxiety.[7] Thus, there is a need for improved understanding and research on anhedonia in adolescents with MDD.

Anhedonia is a multi-dimensional clinical symptom related to an impaired reward system, including deficits in consumption, expectation, and motivational reward.[8] Previous studies have emphasized that the characteristics of adolescent anhedonia include lack of pleasure, boredom, emotional dullness, low motivation, lack of interpersonal connection, and lack of goals, which are significantly different from negative emotions such as low mood. Some studies have found that a decreased motivation to obtain rewards is a significant characteristic of adolescent anhedonia.[9] Research has indicated that depressed adolescents' descriptions of anhedonia closely resemble schizophrenia's negative symptoms, such as diminished motivation, emotional flatness, and social withdrawal.[10] Researchers have developed various self-rating scales to assess the severity of anhedonia. However, existing anhedonia scales have exclusively focused on adult patients, with no specific scales available for adolescents.

The Snaith-Hamilton Pleasure Scale (SHAPS) is widely utilized for assessing deficits of pleasure.[11] However, some items of the scale may not be suitable for modern adolescents, and there may be potential cultural and racial differences in the SHAPS.[12] The Temporal Experience of Pleasure Scale (TEPS), created by Gard and et al in 2007, shares the same limitations.[13] To quantify impairments in social hedonic capacity across both anticipatory and consummatory pleasure domains, Gooding et al formulated the Anticipatory and Consummatory Interpersonal Pleasure Scale (ACIPS).[14] It was adapted for the adolescent population.[15] However, the researchers modified the wording of the questions without conducting actual interviews with adolescent subjects, ignoring the adolescents' direct experience of social pleasure. The Dimensional Anhedonia Rating Scale (DARS) was established by Rizvi et al (2015) to comprehensively characterize hedonic deficits related to major depressive disorder (MDD).[16] The psychometric properties of the Chinese adaptation of the DARS were evaluated by Wen et al among adolescent participants in China.[17] The DARS, however, requires participants to identify specific activities for rating, a process demanding cognitive effort that may pose particular challenges for depressed adolescents with working memory deficits.[18]

In 2021, Watson and et al initially developed the Anhedonia Scale for Adolescents (ASA).[18] Through comprehensive qualitative interviews with depressed teenagers, the items were developed and later assessed by an independent panel of adolescents and experts in adolescent mental health. Designed for adolescents aged 11–18 years, this instrument employs a 4-point Likert scale to measure symptom presentation over the preceding two weeks, including three factors: (i) pleasure, excitement, and emotional indifference; (ii) enthusiasm, connection, and purpose; and (iii) effort, motivation, and drive. Reliability analyses were completed in the UK adolescent population with good psychometric properties.[18] Watson et al suggested that the ASA's emphasis on assessing a lack of motivation may provide a more nuanced and accurate reflection of the differences between adolescent and adult anhedonia.[18]

Adolescents exhibit heightened reward sensitivity, poor self-control, and increased vulnerability to stress and social evaluation, leading to unique anhedonic profiles distinct from adults.[19] Existing scales (eg, TEPS, SHAPS, ACIPS) lack age- and culture-specific adaptation for Chinese adolescents, overlooking typical behaviors and sociocultural stressors. Although various anhedonia rating scales such as the SHAPS, TEPS, ACIPS, and DARS have been widely used in research and clinical settings, these instruments were originally developed for adults and may not adequately capture the unique developmental and emotional characteristics of adolescents. In China, while several of these tools have been translated and applied in adolescent populations,[17,20] their psychometric properties in this age group remain insufficiently

validated. For instance, the SHAPS has demonstrated general utility but lacks culturally adapted items tailored to Chinese adolescents' everyday experiences. Given the absence of a validated adolescent anhedonia scale in China, we introduced the ASA into Chinese clinical and community samples. This study aimed to examine the psychometric properties of the Chinese version of the ASA (ASA-C) across clinical, subthreshold, and typically developing adolescents, and to establish a valid cut-off score for identifying prominent anhedonia. Additionally, we explored the relationship between adverse childhood experiences and anhedonia severity to better inform early screening strategies and risk identification in the Chinese context.

This study encompassed two principal aims: firstly, to validate the psychometric properties of the Chinese adaptation of the Anhedonia Scale for Adolescents (ASA-C) among both typically developing and clinically depressed adolescents; secondly, to investigate associations between adverse childhood experiences and adolescent anhedonia. Exploratory (EFA) and confirmatory factor analyses (CFA) were utilized to evaluate structural validity. Internal consistency coefficients were calculated for all samples, while test-retest reliability, along with convergent, divergent, and parallel validity, was evaluated in a subsample of adolescents with depression. Secondly, latent profile analysis (LPA) was applied to distinguish hidden subgroups with varying degrees of anhedonia, aiming to facilitate early detection of problematic anhedonia levels in both community screenings and clinical contexts. Subsequently, the most suitable cut-off score was determined through ROC curve analysis.

Methods

Participants

Clinical Participants

To ensure participants had the necessary cognitive maturity for reliable questionnaire responses, particularly for the additional measures included in our study protocol, and to maintain consistency with the age ranges of our other assessment tools, adolescents aged 13 to 18 diagnosed with MDD were recruited as inpatients from Peking University Sixth Hospital and Beijing HuiLongGuan Hospital. Written informed consent was secured from all participants and their legal guardians prior to baseline assessment. MDD diagnoses were confirmed via the Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID) in accordance with DSM-5 criteria, administered by board-certified psychiatrists. Exclusion criteria included: (1) receipt of modified electroconvulsive therapy within the preceding six months; (2) current or lifetime comorbidity of other major psychiatric disorders; (3) significant systemic diseases.

Non-Clinical Participants

Healthy controls (HC) and subthreshold depression (SD) participants were enrolled from Shandong secondary schools through an online survey implemented via Wenjuanxing (www.wjx.cn). Electronic informed consent was acquired from all adolescents and their legal guardians. Inclusion criteria required: (1) age 13–18 years; (2) no lifetime psychiatric diagnoses. SD group eligibility necessitated: (a) scoring ≥9 on the Chinese 11-item Kutcher Adolescent Depression Scale (KADS);[21] (b) no history of major depressive disorder (MDD).

After excluding substandard responses (missing/repetitive answers: MDD=13, SD=6, HC=31), the final cohort retained 159 MDD, 113 SD, and 380 HC participants. These 652 eligible individuals were randomly allocated to Sample A and Sample B for validation and analysis purposes. The higher proportion of middle school participants relative to high school students resulted from recruitment logistics and cooperation with participating schools. This distribution does not reflect actual prevalence differences in depression between education levels. The study was conducted in accordance with the Declaration of Helsinki and was approved by the Institutional Review Board of Peking University Sixth Hospital (Approval No: [(2021) Ethical Review No. (68)]).

Measures and Procedures

Permission to utilize the original English version of the ASA scale was granted by Watson. This 14-item instrument comprises three dimensions: (a) Enjoyment, Excitement, and Emotional Flattening (negatively framed); (b) Enthusiasm, Meaning, and Purpose (positively framed); (c) Effort, Motivation, and Drive (negatively framed).[18] Items employ a 4-point Likert scale (0=never to 3=always), with positively framed items reverse-scored such that elevated total scores

indicate heightened anhedonia severity.[18] The Chinese adaptation (ASA-C) underwent standardized translation: initial translation by a board-certified psychiatrist, followed by independent back-translation by a bilingual scholar. Final item phrasing demonstrates appropriate linguistic accessibility for the target population.

The version Chinese adaptation of the 11-item Kutcher Adolescent Depression Scale (KADS-11) was implemented. This scale, known for its strong reliability and validity, assesses depressive symptoms.[22] Scores ≥9 indicate clinically significant depressive symptoms, with escalating severity corresponding to higher total scores.[22] Depressive symptom severity among MDD participants was evaluated using the Chinese adaptation of the 17-item Hamilton Depression Rating Scale (HAMD-17). We used both KADS and HAMD-17 to assess concurrent validity. The Snaith-Hamilton Pleasure Scale (SHAPS) Chinese version serves as the criterion standard for anhedonia assessment and is extensively implemented in domestic clinical practice.[23] While it demonstrates strong validity and reliability in adolescents,[12] it has yet to be specifically validated for Chinese adolescents. Anhedonia symptoms were quantified using the Snaith-Hamilton Pleasure Scale (SHAPS), with higher aggregate scores indicating greater anhedonia severity. The Chinese version of the Dimensional Anhedonia Rating Scale (DARS) was employed, encompassing four hedonic domains: Leisure Activities, Culinary Consumption, Social Interaction, and Sensory Perception,[16] demonstrated strong validity and reliability among Chinese adolescents.[17] Due to the overly simplistic nature of the SHAPS evaluation of the pleasure deficiency dimension,[11] We used both SHAPS and DARS to assess convergent validity. Employing the Chinese adaptation of the Behavioral Inhibition/Activation System (BIS/BAS) scale to assess the absence of qualitative pleasure, as a tool for evaluating convergent validity and discriminant validity—which demonstrates well-established reliability and validity in Chinese cohorts aged 12–24 years—this study evaluated core components including reward responsiveness, behavioral drive, and hedonic processing.[24] The Adverse Childhood Experiences International Questionnaire (ACE-IQ) was administered to quantify the prevalence and typology of adverse childhood exposures.[25] This instrument assesses 13 adversity categories—including maltreatment, familial dysfunction, and community violence—through a composite scoring methodology integrating dichotomous and Likert-scale response formats.[25] The test-retest reliability of the ASA-C was evaluated in 75 clinical participants over a one-week period.

Data Analysis

Data analysis utilized the Statistical Package for Social Sciences (SPSS) (IBM SPSS Statistics for Windows, Version 27.0) and Mplus (Muthén & Muthén, released 2017; Muthén & Muthén Structural Equation Modeling Software for OS, version 8.0). The detailed procedure is shown in the Supplementary Methods.

Results

Descriptive Statistics and Demographics

Table 1 summarizes the descriptive statistics. The final cohort comprised 652 respondents (age = 15.6 years, SD = 0.72; sex female: male = 447:205) completed the survey. As expected, the total ASA scores were significantly different among the three groups (Table 1 and Figure S1).

EFA and CFA

Samples A and B showed no statistically significant gender differences (χ^2 = 0. 168, p = 0. 797), age (t = 1. 02, p = 0. 319), and ASA total scores (t = 1. 68, p = 0. 355). The dataset demonstrated suitability for factor analysis, indicated by a Kaiser-Meyer-Olkin (KMO) value of 0.94 and a significant Bartlett's test of sphericity ($p < 0.001$). Implementation of principal component analysis (PCA) on the ASA-C in Sample A using Mplus 8.0 yielded a two-factor solution (Table 2), accounting for 60.447% of the cumulative variance. Factor 1, comprising items 1–7, 9, 10, 12, and 13, can be labeled as the "negative factor", while Factor 2, consisting of items 8, 11, and 14, can be termed the "positive factor" (Table 2). The ASA-C scale's factor structure differed from the original, prompting a reanalysis using SPSS 27.0, which confirmed a two-factor structure (Table S1).

Standardized factor loadings and correlations between factors for the two-factor ASA model in Sample B are presented in Figure 1. This model exhibited favorable fit indices: CFI = 0.959, TLI = 0.951, RMSEA = 0.065 (90%

Table 1 Descriptive Statistics and Demographic Information

	Total Sample (n=652)	MDD Group (n=159)	SD Group (n=113)	HC Group (n=380)	
Age (years)	15.46	15.68	15.14	15.47	*F=1.025 p=0.359*
Sex					χ^2*=0.109 p=0.947*
Male (%)	31.44	29.6	30.1	30.8	
Female (%)	68.56	70.4	69.9	69.2	
Education					χ^2*=2.138 p=0.412*
Middle school	385	99	68	218	
High school	267	60	45	162	
Nation					χ^2*=2.143 p=0.568*
Han (%)	92.9	92.45	92.92	93.32	
Others (%)	7.1	7.55	7.08	6.68	
Parental marital status					χ^2*=1.819 p=0.873*
Normal (%)	80.86	80.5	81.17	80.91	
Divorce (%)	17.78	18.2	17.81	17.95	
Lost father/mother (%)	1.15	1.3	1.02	1.14	
Course of depression (months)	–	18.77±16.49	–	–	
The first episode (%)		59.1			
The recurrent episode (%)		40.9			
Severity of depression	–		–	–	
Mild (%)		7.5			
Moderate (%)		23.3			
Severe (%)		51.6			
With psychotic features (%)		17.6			
KADS score	8.83	18.37	10.15	4.44	*F=268.104 p<0.001*
ASA score	16.02	26.14	16.34	11.7	*F=199.461 p<0.001*
ACE-IQ score	3.44	6.99	3.24	2.03	*F=156.955 p<0.001*

Notes: KADS, Chinese version of the eleven-item Kutcher Adolescent Depression Scale (KADS).
Abbreviations: ASA, Anhedonia Scale for Adolescents; MDD, Major Depressive Disorder; SD, Subthreshold Depression; HC, Healthy Control; ACE-IQ, Adverse Childhood Experiences; International Questionnaire. Participants with KADS scores greater than or equal to 9 and who reported no history of MDD diagnosis were recruited as the SD group. "middle school" corresponds to ages 13–15 and "high school" to ages 16–18.

Table 2 Factor Structure and Estimated Factor Loadings of the ASA

Items		Factors	
		1	2
ASA1	I had no motivation to get started on things	0.704	
ASA2	Nothing made me feel excited	0.773	
ASA3	I should have been enjoying things, but I could not	0.813	
ASA4	I felt detached from other people	0.708	
ASA5	I did not look forward to anything	0.876	
ASA6	Nothing felt fun or enjoyable	0.897	
ASA7	I could not see myself enjoying things in the future	0.714	
ASA8	I felt enthusiastic (R)		0.865
ASA9	I did not want to do anything	0.765	
ASA10	I pretended things excited me, but actually I found them boring	0.707	
ASA11	I felt connected to the world around me (R)		0.685
ASA12	I did not feel any emotion	0.796	
ASA13	Everything felt like a lot of effort to do	0.751	
ASA14	I felt like my life had meaning and purpose (R)		0.685

Notes: Exploratory factor analysis of the Chinese version of the ASA in Sample A. Principal component analysis with GEOMIN rotation. variance explained = 60.447%. The two factors identified were as follows: Factor 1, negative factor, and Factor 2, positive factor. MDD, Major Depressive Disorder.

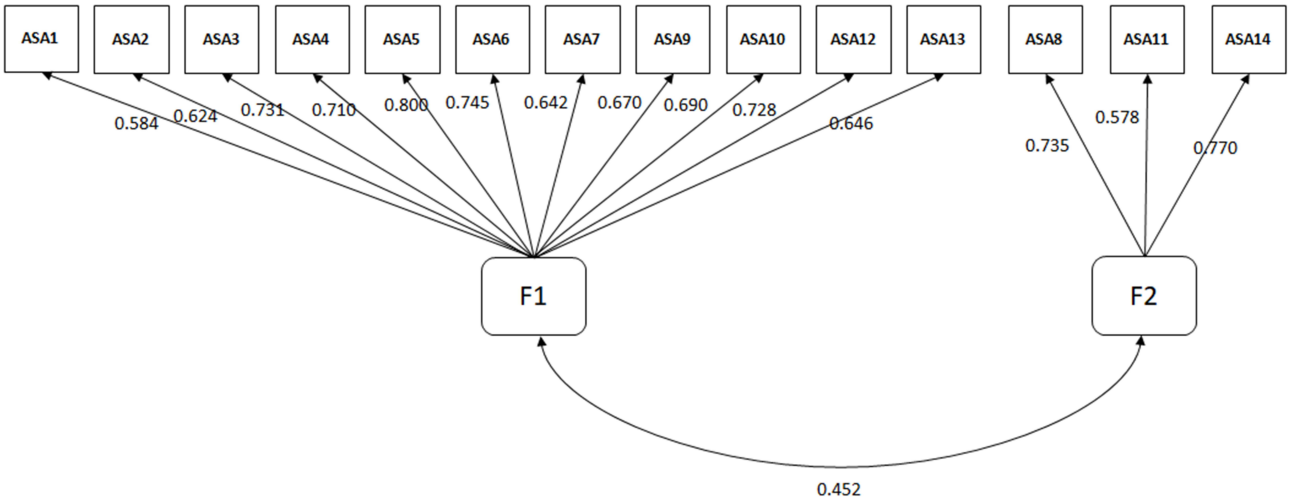

Figure 1 The Confirmatory Factor Analysis of ASA in Sample B. F1 and F2 represent the two factors of negative factor and positive factor, respectively. The degree of model fit was good: χ^2/df was 2.13, RMSEA was 0.055, CFI was 0.945, TLI was 0.934, SRMR was 0.044.

CI: 0.061–0.069), χ^2/df = 1.67, collectively indicating acceptable-to-good model fit. Each item demonstrated a loading above 0.50 on its respective factor, confirming the adequacy of the two-factor model (Figure S2).

The final results of the multigroup CFA showed that the models were well fitted, and that the ASA two-factor structure was measurement-invariant across the three groups (Table S2). Initial configural invariance testing established equivalent factor loading structures across groups (Table S2). This well-fitting baseline model (CFI = 0.956, TLI = 0.942, RMSEA = 0.068) enabled sequential parameter constraints in nested models to detect measurement/structural non-invariance. The metric invariance model exhibited comparable fit to the configural model, with modification indices indicating no localized strain in constrained loadings. Metric invariance ("weak invariance") confirms consistent item-factor relationships across groups, ensuring equivalent latent constructs. Given ΔCFI > 0.1 between metric and scalar equivalence models, partial scalar invariance was examined. This model demonstrated superior fit to full scalar invariance and non-inferior fit to metric invariance. Partial scalar invariance ("strong invariance") signifies that observed differences in item means between groups are entirely attributable to differences in latent factor means. This is because groups exhibit identical expected responses to items at comparable levels of the underlying trait.

Reliability Analysis

ASA reliability outcomes are summarized in Table 3. Excellent internal consistency was observed for the ASA scale in all diagnostic groups (MDD: α = 0.924; SD: α = 0.888; HC: α = 0.881). Good internal consistency was also found for all subscales, with coefficient alpha values spanning 0.711 to 0.891 (MDD), 0.754 to 0.851 (SD), and 0.734 to 0.812

Table 3 Reliability of the ASA and It's Subscale in Three Groups

	Cronbach's α		
	MDD Group	**SD Group**	**HC Group**
ASA score	0.924	0.888	0.881
ASA F1 score	0.891	0.851	0.812
ASA F2 score	0.711	0.754	0.734

Abbreviations: ASA, Anhedonia Scale for Adolescents; MDD, Major Depressive Disorder; SD, Subthreshold Depression; HC, Healthy Control; ASA F1, negative factor; ASA F2, positive factor.

(HC). Test-retest reliability over a one-week interval was good, reflected by a total scale ICC of 0.789 and subscale ICCs between 0.583 and 0.774.

Validity Analysis

Analyses for concurrent validation demonstrated a marked positive correlation between ASA and KADS scores ($r = 0.84$, $p = 0.014$). For convergent validity, ASA exhibited moderate negative correlations with DARS ($r = -0.54$, $p = 0.010$) and BAS ($r = -0.33$, $p = 0.022$), while demonstrating a medium-strength positive correlation with SHAPS ($r = 0.41$, $p = 0.012$). Conversely, only weak correlations emerged between ASA and BIS ($r = 0.23$, $p = 0.003$), indicating acceptable divergent validity. The correlation coefficient matrix diagram between the total ASA score and other scales is shown in Figure 2.

LPA and ROC Analysis

LPA results identified the 2-class model as optimal (Table S3). This model displayed slightly elevated AIC, BIC, and sample-size-adjusted BIC values relative to alternatives. Although demonstrating moderate entropy, the 2-class solution was consistently favored over 3-class and 4-class models by both the Vuong-Lo-Mendell-Rubin likelihood ratio test and its adjusted LRT counterpart. Participants were classified into two distinct groups exhibiting differential ASA total scores. Based on the results, the first group was identified as the subpopulation with significant anhedonia, while the second group was identified as the subpopulation without significant anhedonia.

An ASA total score cut-off of 20.5 was derived from ROC analysis for anhedonia screening, yielding exceptional diagnostic performance: AUC=0.99 (95% CI: 0.98–1.00), sensitivity=96.86%, specificity=99.2% (Fig. S3). The results showed that 72.3% of the MDD patients, 22.1% of the SD group, and 8.4% of the HC group had prominent anhedonia according to this cut-off value.

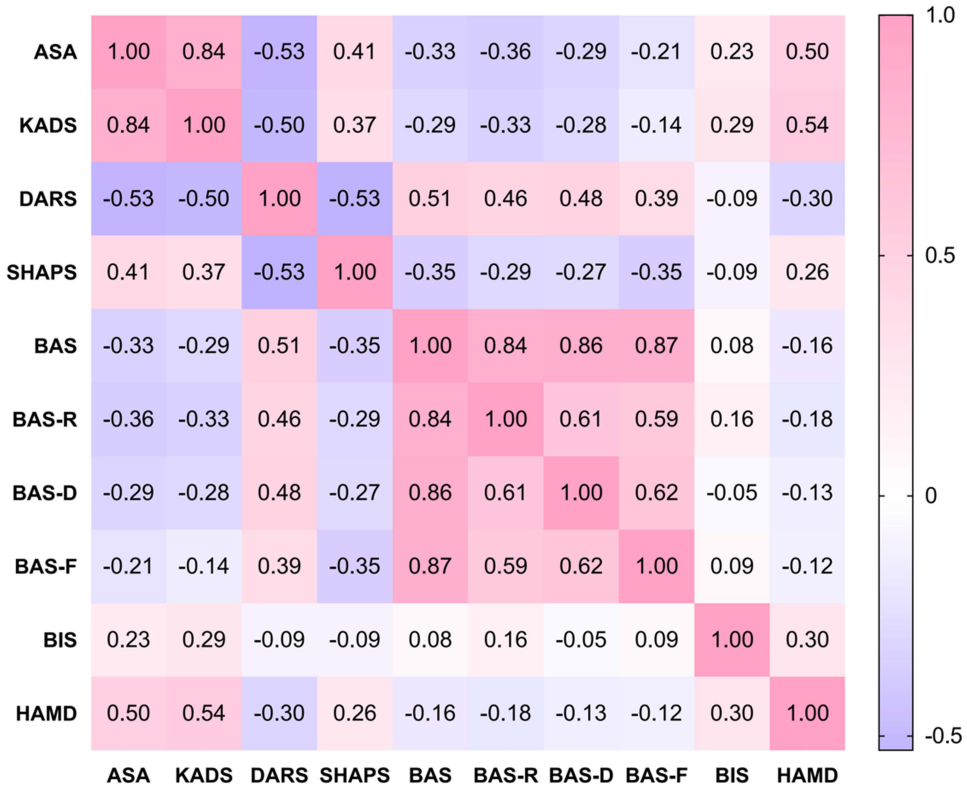

Figure 2 Correlation coefficient matrix diagram of the ASA and related criterion scales.
Abbreviations: ASA, Anhedonia Scale for Adolescents; DARS, Dimensional Anhedonia Rating Scale; KADS, the eleven-item Kutcher Adolescent Depression Scale (KADS-11); SHAPS, Snaith–Hamilton Pleasure Scale; BAS, Behavioral Activation System; BAS-R, Behavioral Activation System-Reward responsiveness; BAS-D, Behavioral Activation System-Drive; BAS-F, Behavioral Activation System-Fun seeking; BIS, Behavioral Inhibition System; HAMD, Hamilton Depression Scale.

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Table 4 Differences in ACE-IQ Scores Between the Subpopulation with Prominent Anhedonia and the Subpopulation with No Prominent Anhedonia

ASA Total Scores	≥21	<21	
ACE total scores (SD)	6.59 (3.829)	2.32 (2.767)	*t = 15.574, p < 0.001*
ACE-IQ Factor 1 scores (SD)	3.55 (2.472)	1.26 (1.771)	*t = 13.042, p < 0.001*
ACE-IQ Factor 2 scores (SD)	1.95 (1.141)	0.64 (0.334)	*t = 12.012, p < 0.001*
ACE-IQ Factor 3 scores (SD)	1.31 (1.058)	0.49(0.227)	*t = 8.988, p < 0.001*

Abbreviations: ACE-IQ, Adverse Childhood Experiences International Questionnaire; ACE-IQ Factor 1, Childhood Maltreatment; ACE-IQ Factor 2, Family/Household Dysfunction; ACE-IQ Factor 3, Violence Outside the Home.

Adverse Childhood Experiences and Anhedonia

The results indicated a significant positive correlation between total ACE-IQ and ASA scores ($r = 0.557$, p 0.010) across the entire sample. Childhood maltreatment, as measured by the ACE-IQ subscales, exhibited the highest correlation with anhedonia ($r = 0.487$, p 0.019) (Table S4). Notably, ACE-IQ total and subscale scores differed significantly across anhedonia-prominent and non-anhedonia-prominent groups. The prominent anhedonia group reported a higher frequency of adverse childhood experiences than did the non-prominent anhedonia group (Table 4).

Discussion

Although there are many scales available to assess anhedonia, most are designed for adults; adolescents are not just "little adults" and have unique aspects at the level of pleasure deficit symptoms. The study aimed to validate ASA-C, a unique anhedonia measure tailored for adolescents, including those who are typical, subthreshold, and clinically depressed. This study enrolled 652 Chinese adolescents and demonstrated robust psychometric properties of the ASA-C, supporting its reliability and validity as a self-report instrument for state anhedonia assessment in both MDD clinical and community adolescent samples. In particular, we determined the ASA cut-off score for detecting significant anhedonia, aiding in community screening and clinical evaluation. In addition, We identified a significant correlation between ASA and ACE-IQ scores, aligning with Pizzagalli's research, which demonstrated that chronic and early life stress primarily induce anhedonia by impacting the brain's reward system.[26]

Although the original scale was composed of three factors, the ASA-C had two factors extracted based on factor analysis. Factor 1 integrated items from the original scale's Factor 1 (Enjoyment, Excitement, and Emotional Flattening) and Factor 3 (Effort, Motivation, and Drive), constituting a negative dimension reflective of the affective and motivational symptomatic features of adolescent anhedonia. Factor 2 aligned with the original scale's Factor 2 (Enthusiasm, Meaning, and Purpose), representing a positive factor that reflects young people's experiences of connection, purpose, and enthusiasm related to pleasure. The CFA demonstrated a satisfactory fit for the two-factor structural model among Chinese adolescents. Given the observed divergence in factor structure from the original scale, we examined the validity and internal consistency of the two-factor model in MDD, SD, and HC groups. Our study found that the two-factor structure of the Chinese ASA exhibited optimal model fit and confirmed measurement invariance across demographic groups, establishing the ASA as a reliable instrument for evaluating anhedonia severity in individuals with depression, subthreshold depression, and healthy adolescents. Cultural differences and different characteristics of the participants may explain the difference in the factor structure from the original scale.

Furthermore, the total ASA-C demonstrated high internal consistency, consistent with prior findings in English adolescents.[18] Satisfactory internal consistency was observed across ASA subscales. Acceptable one-week test-retest reliability was also established for the scale.

Concurrent validity analyses revealed moderate-to-strong correlations between ASA scores and both HAMD-17/KADS measures. These findings further suggest potential incremental validity, given ASA's demonstrated sensitivity in detecting depressive characteristics among adolescents. Compared to traditional depression screening tools such as KADS-11, the ASA-C may be perceived as less stigmatizing by adolescents. This is primarily because the ASA-C focuses specifically on hedonic functioning—such as motivation, interest, and social engagement—without directly referencing depressive symptoms or

diagnostic labels. Significant moderate correlations were observed between ASA and established measures of pleasure, such as SHAPS and DARS.

This study employed LPA using total ASA scores to determine latent subgroups, with two classes determined to be optimal. The two classes were designated as individuals exhibiting clinically significant anhedonia and those who were non-anhedonic. ROC analysis showed that the ASA had a high recognition rate (AUC > 0.90) for pleasure deficits with a cut-off value of 20.5 points, at which the sensitivity of 96.86%, and the specificity of 99.2%. This study is the first to examine ASA cut-off scores. Despite its widespread use in assessing anhedonia in MDD patients, the SHAPS lacks a standardized cut-off scoring method for anhedonia.[27] Patients scoring above 2 on the SHAPS are typically identified as experiencing anhedonia.[11,27] Our recent study showed that DARS has a cut-off value of 28.5 points for identifying the anhedonia subgroup in MDD adult patients,[28] and neither SHAPS nor DARS has had their cut-off values validated in adolescent populations.

Notably, ACE-IQ scores demonstrated significant elevation among anhedonia-prominent participants versus non-anhedonia individuals, aligning with established literature. According to O'Brien et al, there is an association between childhood trauma and heightened anticipatory and consummatory anhedonia, based on their observations of stress impacts on those prone to psychosis and depression.[29] Bao et al found that young patients with MDD and two or more adverse childhood events exhibited more severe anhedonia symptoms and showed a significant reduction in reward sensitivity.[30] Research of Fan et al indicates that childhood trauma correlates with anticipatory and social anhedonia, mediated by neural connections within the core reward circuit.[31] These findings propose that adverse experiences in childhood may be a contributing risk factor for heightened anhedonia.

Limitations

This study had several limitations. First, the patients with depression recruited for this study were inpatients with more than moderate severity, which differed from the outpatient population of the original scale study. Second, the representativeness of the sample may be limited as participants in both the healthy and subthreshold depression groups were predominantly from Shandong Province, China. In addition, the clinical participants were from inpatient units of two tertiary psychiatric hospitals located in Beijing. This discrepancy in recruitment sites may introduce unmeasured regional biases, such as differences in socioeconomic background. Although the study aimed to capture a broad representation of adolescent anhedonia across clinical and non-clinical populations, future research should consider stratified sampling across multiple regions and recruitment settings to enhance generalizability.

Conclusions

Despite these limitations, the ASA-C has demonstrated robust psychometric properties as a validated instrument for assessing anhedonia across Chinese adolescent populations, including clinical (depressive), subclinical (subthreshold depressive), and healthy control groups. The ASA-C demonstrates clinical utility with an optimal cutoff score of 20.5, showing potential for identifying clinically significant anhedonia in both psychiatric and general populations. These findings suggest the ASA-C may serve as a reliable screening tool for community-based detection, clinical assessment, and research applications in the Chinese context.

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Disclosure

The authors report no conflicts of interest in this work.

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