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# Factors influencing the type of self-acceptance in drug addicts and the relationship with subthreshold depression: evidence based on latent profile analysis

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## Abstract

**Objective** To study the heterogeneity and influencing factors of self-acceptance of drug addicts in compulsory isolation in 2 drug rehabilitation centers in Sichuan Province, and to analyze the effects of different types of self-acceptance on subthreshold depression in drug addicts, in order to provide useful references for improving their mental health.

**Methods** Self-acceptance Questionnaire (SAQ), Drug use Stereotype Threat Scale (DSTS) and Center for Epidemiologic Studies Depression Scale (CES-D) were used to conduct a questionnaire survey in January 2024 on 1068 drug addicts in two compulsory isolation drug rehabilitation centers in Sichuan Province.

**Results** Drug addicts self-acceptance can be categorized into 5 potential categories; men were more likely than women to show lower self-acceptance in the 'low-low' ( $\beta = 0.285, OR = 0.381, p < 0.001$ ), 'low-high' ( $\beta = 0.331, OR = 0.383, p = 0.004$ ), and 'high-low' ( $\beta = 0.283, OR = 0.548, p = 0.033$ ) groups compared to the 'high-high' group; drug addicts with an education level of elementary school and below were categorized into the 'low-low' group ( $\beta = 0.642, OR = 6.173, p = 0.005$ ); HIV-negative drug addicts were more likely to show higher self-acceptance than positive patients ( $\beta = 0.418, OR = 2.427, p = 0.034$ ); the 'low-low' group had the greatest likelihood of being alienated ( $\beta = 0.169, OR = 3.249, p < 0.001$ ). The results of multiple linear regression showed that drug addicts in the 'moderate-moderate' group and 'high-high' group had significantly lower subthreshold depression than those in the 'low-low' group; the results of the Kruskal-Wallis Test showed that the 'high-high' group had the lowest level of subthreshold depression, and the 'low-low', 'low-high' and 'high-low' groups had the highest mean ranks in different dimensions of subthreshold depression ( $P < 0.001$ ).

**Conclusion** Heterogeneity exists in drug addicts' self-acceptance, and gender, HIV-positive or not, education level, and drug use stereotype threat are factors influencing self-acceptance in compulsory isolated drug addicts. High self-appraisal-high self-acceptance had the lowest level of subthreshold depression in drug addicts, and the consistency of poor self-appraisal and self-acceptance also affected the level of subthreshold depression in drug addicts.

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**Keywords** Self-appraisal, Self-acceptance, Latent profile analysis, Subthreshold depression, Drug addicts

## Introduction

The drug problem is a global social and health problem with high complexity, harmfulness and transmission. As mentioned in the China Drug Situation Report 2023 [1], owing to the effectiveness of counter-narcotics efforts against traditional drugs, some drug addicts have turned to new psychoactive substances, such as dextromethorphan, and other non-scheduled substances as substitutes for abuse. Mental health problems and substance use disorders are closely intertwined [2]. People who inject drugs (PWID) bear a disproportionate burden of mental illness, with depression being one of the most common diagnoses [3, 4]. In order to reduce the social cognitive load, group classifications and stereotypes are widespread [5], thus drug addicts are subjected to significantly higher levels of social discrimination and negative evaluation than the general population. Social identity theory states that individuals gain self-identity and self-esteem by classifying themselves into a certain social group. Drug addicts are often excluded by the mainstream society due to the particularity of their behavior and identity. This long-term marginalization, negative social identity and social evaluation are accompanied by individual self-depreciation and self-stigma [6], which affects the process of drug addicts' rehabilitation [7]. Self-acceptance is the ability of an individual to assess his own goals and make them a reality, that is, the individual compares his own qualities with those of others, accepts others' opinions about himself, and uses these opinions as a reference for his own enrichment and modification [8]. In describing self-actualization needs, Maslow's hierarchy of needs pointed out that being able to accept oneself and others, without being troubled by oneself or others' shortcomings or feeling guilty or uneasy, is one of the important characteristics of self-actualization. Drug addicts have suffered from invisible discrimination from society for a long time [9]. For them, it is difficult to completely overcome this trouble and anxiety. Additionally, self-acceptance is considered essential to an individual's mental health [10, 11]. People with high levels of self-acceptance typically show greater self-confidence and hold a more positive emotional attitude towards themselves. In contrast, people with low levels of self-acceptance are more likely to experience low self-esteem, introversion, and social anxiety [12]. The social label theory holds that everyone has "primary deviance", but only the primary deviant who is labeled can embark on "secondary deviance" and then embark on a "deviant career" [13]. Stereotype threat is a self-validating fear that others and even oneself will evaluate one's behavior on the basis of negative stereotypes. This triggers negative

emotions, which may accumulate, affecting an individual's mental health and social adaptation [14, 15]. For drug addicts, stereotype threat is the feeling of threat that arises when they become aware of other people using negative labels to evaluate them [16]. This drug-related threat is closely linked to social discrimination and social stigma. In China, especially in highly traditionalized social settings, drug use is generally regarded as an anti-social cultural norm behavior, rather than just confined to a health issue [17]. Such deep-rooted cultural norm and morality inevitably leads to prejudice and exclusion of drug addicts in society as a whole, as the higher the individual's sense of discrimination, the lower the level of self-acceptance [18], and this external pressure can negatively affect the self-acceptance of drug users, triggering a series of mental health problems. Subthreshold depression (SD) is defined as an individual who consistently and simultaneously exhibits any two or more of the symptoms of depression accompanied by some degree of social dysfunction for most or all of a two-week or longer period of time, but does not meet the Diagnostic and Statistical Manual of Mental Disorders (DSM) criteria for mild depression, major depressive disorder or bad mood criteria in the DSM [19]. Studies showed that subthreshold depression is about twice as common as major depression [20], not only are individuals with subthreshold depression similar to those with major depression in a number of ways, individuals with subthreshold depression also have an increased risk of developing major depression [20, 21]. The level of depression in the drug addict population is significantly higher than that in the general population [22], and close attention to subthreshold depression in drug addicts and early intervention are of great significance in preventing depression and maintaining the mental health of drug addicts. It has been noted that self-acceptance is closely related to mental health, and that the level of self-acceptance influences an individual's mental health [23], people who lack unconditional self-acceptance can lead to a variety of mood disorders and emotional difficulties, including depression [24, 25].

Numerous studies around the world have shown that depression levels among drug addicts are generally higher than the norm [22, 26, 27]. For the variable of self-acceptance, previous studies have more often adopted a variable-centered research paradigm, assuming homogeneity within the sample [28], and exploring the influencing factors or mediating roles from the overall perspective of the variable [12, 28–31]. Variable-centered analyses containing more than three interacting variables may be difficult to interpret and may be less suitable for making

inferences about individuals [32]. It may cause statistical problems such as increases in the variance inflation factor and reduced statistical power [33]. The use of latent profile analysis (LPA) helps to identify clusters of individuals with different levels of self-acceptance, providing a more accurate understanding of the diversity and complexity of self-acceptance among drug addicts. Therefore, it is necessary to adopt an individual-centered research approach (LPA) to study the heterogeneity of self-acceptance among drug users and to determine the existence of subgroups in sample [34]. This study could also explore differences in subthreshold depression levels between profiles of self-acceptance, providing a basis for precise interventions. In summary, although self-acceptance has been found to be a protective factor for mental health [10–12, 23, 24], few scholars at both domestic and international level have investigated the relationship between self-acceptance and subthreshold depression among drug addicts. The study in this paper used LPA to explore the subtypes of self-acceptance among drug addicts in Sichuan Province, China, and then analyzed their influencing factors through multiple logistic regression. Finally, the relationship between each subtype of self-acceptance and subthreshold depression was found using multiple linear regression and Kruskal-Wallis nonparametric test.

Maintaining sustained and long-term efforts in counter-narcotics and drug rehabilitation in countries worldwide. Attention to and research on the special group of drug addicts cannot be overlooked. China plays a pivotal role in global anti-drug action and is an indispensable participant, contributor and leader. Southwest China is a key anti-drug region in China, and Sichuan Province is an important battleground for China's anti-drug rehabilitation work due to its special geographic location and history. Against the backdrop of increasing global anti-drug cooperation, research on the relationship between self-acceptance and subthreshold depression among drug addicts in Sichuan Province, China, is not only of local significance, but also helps to provide a scientific basis for global drug treatment and rehabilitation strategies, as well as injecting new perspectives and methods into international research and exploration of drug treatment.

## Methods

### Design

This study was a cross-sectional study conducted from January to April 2024. Participants were informed of the purpose and confidentiality of their participation prior to the survey. After signing the informed consent form, participants completed the completion of the Self-Acceptance Questionnaire (SAQ), the Drug use Stereotype Threat scale (DSTS), and the Center for Epidemiological Studies Depression Scale (CES-D) by filling out questionnaires in person on site. Participants filled

out questionnaires and souvenirs and gifts were distributed to all participants.

### Sample and sampling method

A study was conducted in Ziyang Compulsory Drug Rehabilitation Center and Sichuan Women's Compulsory Drug Rehabilitation Center in Sichuan Province. Based on the principle of stratified cluster sampling, group tests were conducted on drug addicts in the two compulsory drug rehabilitation centers. First, the number of drug addicts in each brigade of the two drug rehabilitation centers was ranked, and then the number of people from each brigade was determined by implementing an equal proportion sampling strategy. Then, by calling the random function method, the people who were the subjects of the study were randomly selected, and finally, the paper questionnaires were distributed to the participants under the on-site guidance of professional investigators. According to the experience of previous studies using LPA, the sample size based on reliability and validity should be 5–10 times or more than the number of items, therefore the number should be 230–460 or more [35]. In order to ensure that participants can truly express their thoughts and feelings, this study adopted an anonymous survey and provided detailed instructions to participants [36]. All participants were informed that their responses would be kept strictly confidential and that the data would be used for research purposes only. This measure aims to reduce the bias of participants due to fear of social evaluation or discrimination. 1072 questionnaires were distributed and collected, 1068 valid questionnaires (548 males and 520 females; 895 HIV-negative and 173 HIV-positive) were obtained after excluding invalid questionnaires such as omissions, with a validity rate of 99.6%. The samples of this study are all from Sichuan Province, it is difficult to fully represent the diversity and regional characteristics of this group. In future cross-cultural research, it is recommended to use a multi-stage stratified random sampling method. By first stratifying according to countries/regions, drug rehabilitation institutions, etc., and then randomly selecting samples within each layer to ensure the universality and representativeness of the samples, reduce bias.

### Inclusion criteria

Participants were recruited based on the following criteria: (a) drug addicts who had completed physical detoxification and had a negative urinalysis, (b) met the DSM-V diagnostic criteria for abuse of or dependence on psychoactive substances, (c) did not have a serious psychiatric illness and were not taking medication, (d) were between the ages of 16–65 years old, and (e) had an education of elementary school or higher.

The purpose of the survey was explained to the subjects prior to this study, and the confidentiality of the data was assured and all subjects signed an informed consent form prior to participation.

## Measures

### *General information questionnaire*

The general information questionnaire design of this study is based on a clear research purpose and problem orientation, and the questionnaire framework is constructed through a systematic method, and the questions are carefully designed to ensure that the questions are clear, specific and accurate. In the verification stage, first consult experts in the field of psychology to obtain professional opinions and suggestions to ensure the scientificity and validity of the questionnaire content. A rigorous pilot test was then conducted, feedback from the test samples was collected, and the questionnaire was revised and refined according to the test results. The specific contents of the general information questionnaire include drug types (including traditional drugs such as opium, cannabis, cocaine, ecstasy and new drugs such as nitrous oxide and etomidate), age, years of drug addiction, gender, HIV infection and education level.

### *Self-acceptance questionnaire*

The Self-Acceptance Questionnaire (SAQ) is a self-report scale designed by Gao et al. to assess the degree of self-acceptance of individuals, mainly applicable to the Chinese population [37]. The semi-half reliability coefficient of the scale was 0.7506, test-retest reliability was 0.7653, and the Cronbach's  $\alpha$  coefficient of internal consistency of each item was 0.8573, which showed that SAQ had good internal consistency. The reliability coefficient of this questionnaire in the study of drug addicts in China has been confirmed by Cronbach's  $\alpha$  method ( $\alpha=0.86$ ) [38]. The scale consists of 2 dimensions, self-appraisal and self-acceptance, with 8 items for each dimension, all of which were scored on a Likert4 scale ranging from 'very much not in agreement' to 'very much in agreement', respectively. The scores ranged from 1 to 4, respectively. Questionnaire scores ranged from 16 to 64, with higher scores suggesting a higher level of self-acceptance. The scale Cronbach's alpha was 0.708. In this study, the AVE of self-acceptance was 0.368 with a CR of 0.820, and the AVE of self-appraisal was 0.326 with a CR of 0.793. Although the AVE values of these two factors were slightly lower than the threshold of 0.5, their CR values reached high levels, indicating good internal consistency between the measures under these two factors [39]. The square root of self-acceptance AVE is 0.607, and the square root of self-appraisal AVE is 0.571, which are greater than their correlation coefficients with the other

factors, so this scale has good discriminant validity in this study.

### *Drug use stereotype threat scale*

The Drug use Stereotype Threat scale (DSTS) based on von Hippel's Stereotype Threat Scale [40], which validates the applicability of the revised version of the Stereotype Threat Scale to drug use in the Chinese cultural context. The results of confirmatory factor analysis of the scale showed that chi-square test  $\chi^2/df \leq 2$  (indicating that the model fits well); The Root Mean Square Error of Approximation (RMSE)  $< 0.08$  (indicating that the model fits well); the fitting index (IFI, TLI, CFI equivalent values are greater than 0.8), all contents of the questionnaire met the evaluation criteria, indicating that the questionnaire is suitable for good applicability. The overall internal consistency reliability of the scale is 0.764, and it has good criterion validity [16]. The scale consists of 3 dimensions (stereotype awareness, stereotype identification, and alienation) with 10 questions on a 5-point Likert scale ranging from 1 (strongly disagree), 2 (disagree), to 3 (unsure), 4 (agree), and 5 (strongly agree). The higher the score, the stronger the threat of drug use stereotypes suffered by drug addicts. The scale has good reliability and validity in this study with scale Cronbach's alpha coefficient of 0.885. The AVE of stereotype awareness is 0.721, CR is 0.856, the AVE of stereotype identification is 0.549, CR is 0.828, the AVE of alienation is 0.516, CR is 0.757. The AVE values of these three factors are all higher than 0.5 and the CR values are all higher than 0.7, indicating that there is good convergent validity among the measures under these three factors. The square roots of the AVE of stereotype awareness, stereotype identification and alienation are 0.849, 0.741 and 0.718, which are all greater than their correlation coefficients with other factors, indicating that this scale has good discriminant validity in this study.

### *Center for epidemiologic studies depression scale*

The Center for Epidemiologic Studies Depression Scale (CES-D), developed by Radloff [41], is the most commonly used nationally and internationally as a representative initial screening tool for assessing subthreshold depression, and it consists of a total of 20 questions and four dimensions: depressed affect, positive affect, somatic symptoms and retarded activity, and interpersonal. A Likert 4-point scale was used: 1 (occasional or none: less than one day), 2 (sometimes: 1–2 days), 3 (often or half the time: 3–4 days), and 4 (most of the time or persistent: 5–7 days); the total score ranged from 0 to 60, with  $\geq 16$  indicating varying degrees of depressive symptoms, and higher scores indicating more severe depression. The Cronbach's alpha for this scale in this study was 0.840. Depressed affect had an AVE of 0.362 and a CR

of 0.771, positive affect had an AVE of 0.488 and a CR of 0.791, somatic symptoms and retarded activity had an AVE of 0.387 and a CR of 0.758, and interpersonal had an AVE of 0.427 and a CR of 0.787. Although the AVE values for these four factors were slightly below the threshold of 0.5, they all reached high CR values, indicating relatively good convergent validity between the measures under these factors [39]. Depressed affect, positive affect, somatic symptoms and retarded activity and interpersonal have AVE square root of 0.653, 0.622, 0.601, 0.689 respectively. The AVE square root of all the factors is greater than their correlation coefficients with the other factors and this scale has good discriminant validity in this study.

### Statistical analysis

Data were first entered, organized and analyzed using SPSS28.0, with missing values replaced by means. Frequencies and percentages were used to describe the count data such as gender, HIV infection status and education level of drug addicts, and quartiles were used to present the total score of self-acceptance. Next, latent profile analysis was performed using Mplus8.30, and the main indices of model fit were Akaike information criterion (AIC), Bayesian information criterion (BIC), sample corrected Bayesian information criterion (adjusted BIC, aBIC), Bootstrap likelihood ratio test (BLRT), Entropy, and LoMendell-Rubin likelihood ratio test (LMRT). Multiple logistic regression using SPSS26.0 was used to explore the factors influencing the potential categories of self-acceptance, multiple linear regression to analyze the factors influencing subthreshold depression, and finally Kruskal regression to analyze the factors influencing the potential categories of self-acceptance using Kruskal regression. factors, and finally, Kruskal-Wallis nonparametric tests were used to compare each potential category of self-acceptance on the total subthreshold depression score and the total score of each dimension.

### Statistical test criteria

Entropy takes a value between 0 and 1, generally reach more than 0.8 model is acceptable, the larger the value indicates that the classification is more accurate; BLRT,  $LMRT < 0.005$ , LMRT difference is statistically significant indicates that the model with  $m$  profiles is better than the model with  $m-1$  profiles [42]; BIC, aBIC, and AIC values are smaller, the better the model fit. Potential profiles were conducted using the 16 item scores of the Self-Acceptance Scale as exogenous variables to analyze the potential categorization of self-acceptance in drug addicts. The  $k$ th model with the best model fit index was the number of potential categories of self-acceptance.

### Ethical approval

All procedures performed in studies involving human participants were in accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The protocol of this study was approved by the institutional review board of the School of Basic Medicine, Chengdu University of Traditional Chinese Medicine. Informed consent was obtained from all participants after a detailed explanation of the study objectives.

## Results

### Sample description

The average age of drug addicts participating in the survey was  $40.11 \pm 9.97$  years old, and in terms of drug use, methamphetamine was the most popular user, accounting for 74.2%, while heroin users accounted for 32.6%. In addition to traditional drugs such as opium, marijuana, and cocaine, some participants used newer drugs including nitrous oxide and etomidate. The quartile of the total self-acceptance score was 39.33 (36,43), and the scores did not conform to a normal distribution according to the K-S method of normality test ( $p < 0.001$ ). Refer to Table 1.

### Common method bias test

The questionnaire used in the survey was self-reported and therefore a principal component analysis (i.e., common method bias test) was performed on all questionnaire items. Following the recommendation of Podsakoff [43], a one-way factor analysis based on Harman showed that there were 12 factors with eigenroots greater than 1, and the maximum factor variance explained was 16.98% (less than 40%), so there was no serious common method bias in this study.

### Model fit indices for potential profiling analysis of self-acceptance in compulsory isolation of drug addicts

Latent profile is a combination of potential characteristics or behavior patterns of different individuals or groups, which is indirectly inferred by a series of observable variables in data analysis. These potential characteristics are not directly revealed in the data, but the similarities and differences of different individuals or groups in multiple dimensions can be revealed through analysis, which provides a powerful tool for deeply understanding complex data structures [44]. By exploring the potential profiles of self-acceptance variables of drug addicts, we can deeper understand the degree and pattern of self-acceptance of drug addicts in different profiles, revealing the potential psychological state hidden under complex surface behaviors, which is of great significance for formulating more effective drug rehabilitation strategies and promoting psychological rehabilitation of drug addicts. The latent profile analysis of 16 items of self-acceptance scale was

**Table 1** Descriptive analysis of the sample (N= 1068)

Variables	n(%)
Gender	
Male	548(51.31)
Female	520(46.68)
Age	
Mean value (standard deviation)	40.11(9.97)
HIV	
Positive	173(16.19)
Negative	895(83.81)
Educational Level	
Elementary and below	228(83.81)
Junior high school	453(21.34)
Technical school or Vocational High School	154(42.42)
High School	91(14.42)
Junior College	93(8.71)
Bachelor degree or above	49(4.59)
Types of Drugs	
New Drugs	833(78.00)
Traditional Drugs	154(14.42)
Mixed Drugs	81(7.58)
Type of drug use	
Single type	960(89.89)
Two types and more	108(10.11)
Duration of drug use	
≤ 10 years	648(60.67)
10–20 years	288(26.97)
≥ 20 years	132(12.36)
Self-acceptance total scores	
[M(P25,P75)]	39.33(36,43)
Drug use Stereotype Threat total scores	
[M(P25,P75)]	31.81(26,38)
Subthreshold depression total scores	
[M(P25,P75)]	21.81(15,29)

Self-acceptance scores do not fit a normal distribution; quartiles give representative values of the data at different levels, are less sensitive to extreme values, and are more comprehensive and robust

carried out, and 6 latent profile models were developed. The results of each modeling index of potential profile analysis are shown in Table 2. The BLRT and LMRT values at 2, 3, 4, and 5 potential profiles were statistically significant, in which the entropy value of the 5 profiles was larger (0.826) and the BIC, aBIC, and AIC values were smaller, showing better model fitting, indicating that the model of the 5 profiles was the optimal model.

**Table 2** Model fit indices for potential profile analysis

CLASS	AIC	BIC	aBIC	BLRT(P)	Entrop	LMRT(P)	Probability of each category
1	45274.083	45433.237	45331.599	-	-	-	-
2	44020.171	44263.874	44108.241	< 0.001	0.764	< 0.001	0.516/0.484
3	43306.749	43635.003	43425.375	< 0.001	0.791	0.0017	0.514/0.182/0.304
4	42832.015	43244.819	42981.196	< 0.001	0.807	0.0017	0.173/0.514/0.184/0.129
5	42545.590	42951.944	42634.326	< 0.001	0.826	0.0003	0.177/0.081/0.480/0.138/0.124
6	42315.144	42897.649	42526.036	< 0.001	0.781	0.379	0.119/0.303/0.145/0.078/0.286/0.069

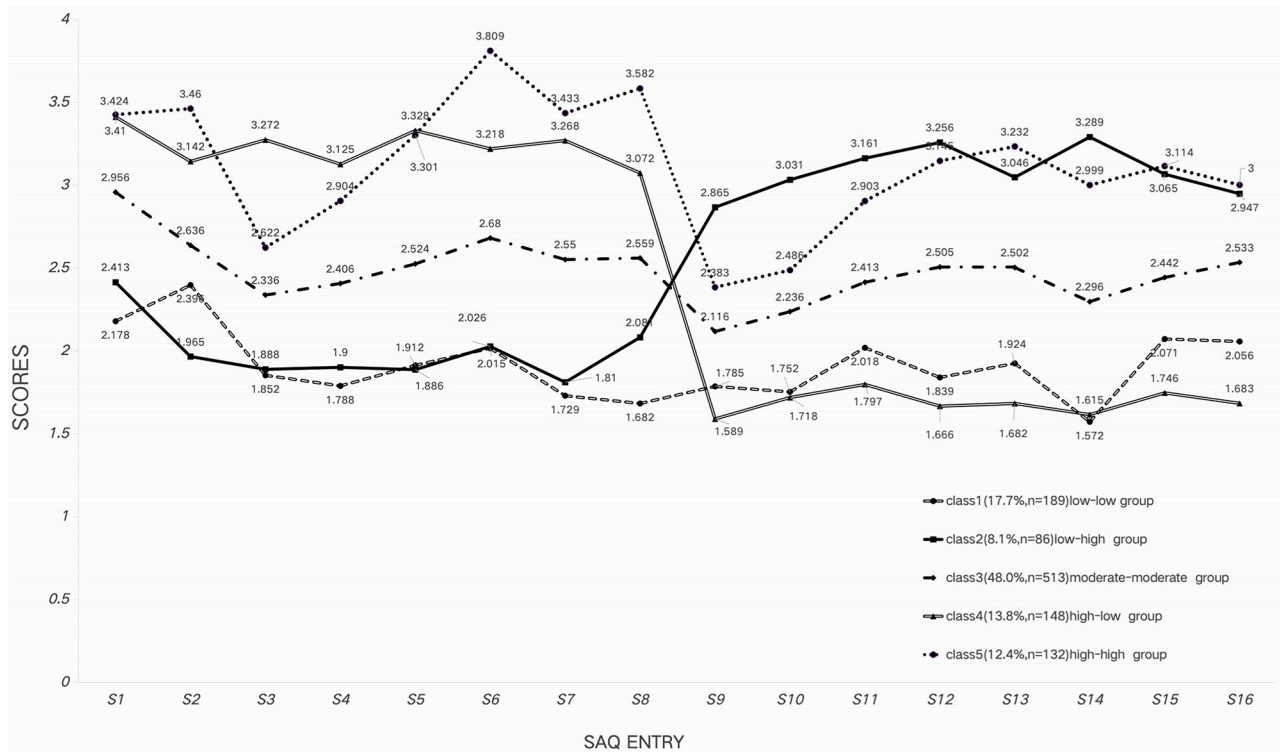
**Naming of 5 types of potential profiles of self-acceptance among compulsory isolation of drug addicts**

Potential profiles were conducted to obtain 5 categories of potential profiles as shown in Fig. 1. Since the results of the self-acceptance test did not conform to a normal distribution ( $p < 0.001$ ), the profiles were named according to the median.

Profile 1 is referred to as the ‘low self-appraisal-low self-acceptance’ group, or ‘low-low’ for short(N=189, 17.7% of the total sample), due to the fact that the median of both self-appraisal (1.882) and self-acceptance (1.881) were lower than the median of the overall self-appraisal (2.625) and self-acceptance (2.250) of the sample group; in Profile 2, the median self-appraisal (1.933) was lower than the overall median self-appraisal of the sample (2.625), and self-acceptance (3.056) was higher than the overall median self-acceptance of the sample (2.250), and is therefore referred to as the ‘low self-appraisal-high self-acceptance’ group, or the ‘low-high’ group (N=86, 8.1% of the total sample); in Profile 3, the median of self-appraisal (2.555) and self-acceptance (2.428) is close to the overall median of the sample (2.625/2.250), and therefore named ‘moderate self-appraisal- moderate self-acceptance’ group, or simply ‘moderate- moderate’ group (N=513, 48.0% of the total sample); Profile 4 had a higher self-appraisal (3.243) than the overall median self-appraisal of the sample (2.625) and a lower self-acceptance (1.683) than the overall median self-acceptance of the sample (2.250), and so it was named the ‘high self-appraisal-high self-acceptance’ group, or the ‘high-low’ group (N=148, 13.8% of the total sample); Profile 5 self-appraisal (3.243) and self-acceptance (3.001) were both significantly higher than the overall median of the sample (2.625/2.250), and are therefore referred to as the ‘high self-appraisal-high self-acceptance’ group, or ‘high-high’ group (N=132, 12.4% of the total sample).

**Analysis of factors influencing potential types of self-acceptance among drug addicts**

First, multivariate logistic regression was used to explore the effects of demographic variables and drug use stereotype threat on different types of self-acceptance. Self-acceptance profile categories were used as the dependent variable and the ‘high-high’ group was set as the reference group. Multilevel regression was performed with gender,



**Fig. 1** Self-appraisal and self-acceptance scores for the 5 profiles. SAQ ENTRY: s1-s8:self-appraisal; s9-s16:self-acceptance

**Table 3** Analysis of factors influencing potential types of self-acceptance among drug addicts [OR (95% CI)]

Demographic variables		Low-low	Low-high	Moderate-moderate	High-low
Gender	Male	0.381(0.218, 0.667)***	0.383(0.200, 0.732)**	0.787(0.493, 1.255)	0.548(0.314, 0.954)*
	Female	Ref.	Ref.	Ref.	Ref.
HIV	Negative	0.709(0.362, 1.389)	1.804(0.689, 4.726)	1.518(0.866, 2.662)	2.427(1.070, 5.508)*
	Positive	Ref.	Ref.	Ref.	Ref.
Educational level	Elementary and below	6.173(1.755, 21.716)**	1.744(0.405, 7.518)	2.030(0.733, 5.624)	3.415(0.760, 15.352)
	Junior high school	1.577(0.499, 4.990)	0.719(0.185, 2.795)	1.223(0.502, 2.979)	1.564(0.380, 6.430)
	Technical school or Vocational High School	1.621(0.472, 5.566)	0.429(0.096, 1.917)	0.899(0.342, 2.364)	1.189(0.267, 5.285)
	High School	0.612(0.421, 0.874)	0.616(0.124, 3.065)	1.039(0.359, 3.008)	1.764(0.366, 8.497)
	Junior College	0.824(0.232, 2.928)	0.151(0.026, 0.889)*	0.560(0.209, 1.501)	0.974(0.211, 4.509)
Drug use stereotype threat	Bachelor degree or above	Ref.	Ref.	Ref.	Ref.
	Stereotype Awareness	1.599(1.210, 2.115)***	1.369(0.958, 1.957)	1.394(1.093, 1.777)**	1.338(0.986, 1.816)
	Stereotype identification	0.943(0.745, 1.192)	0.534(0.367, 0.776)**	0.622(0.491, 0.788)***	0.532(0.385, 0.711)***
Alienation	3.249(2.334, 4.524)***	2.948(1.993, 4.361)***	2.429(1.832, 3.220)***	1.787(1.276, 2.504)***	

**Table 4** Analysis of factors influencing subthreshold depression in drug addicts

Variables	Standardized coefficient $\beta$	Standard errors
(constant)	1.220	0.033
Low-high	0.154**	0.059
Moderate-moderate	-0.124**	0.038
High-low	-0.002	0.049
High-high	-0.514***	0.051

Reference group: low-low Dependent variable: CES-D \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

HIV positive/negative, educational level, and drug use stereotype threat as independent variables. As shown in Tables 3 and 4, compared to the 'high-high' group, in the 'low-low' group ( $\beta = 0.285, OR = 0.381, p < 0.001$ ), 'low-high' group ( $\beta = 0.331, OR = 0.383, p = 0.004$ ) and 'high-low' groups ( $\beta = 0.283, OR = 0.548, p = 0.033$ ), males were more likely than females to exhibit lower self-acceptance; drug addicts with elementary school education and below are more likely to be categorized in the "low-low" group ( $\beta = 0.642, OR = 6.173, p = 0.005$ ). In

**Table 5** Comparison of total scores and dimensional scores of depression scales for different self-acceptance grouping sum of ranks

Self-acceptance grouping	Sum of ranks			
	De-pressed affect	Positive affect	Somatic symptoms and retarded activity	Inter-personal
'low-low'	592.64	629.55	546.97	541.57
'low-high'	695.01	532.95	704.90	647.98
'moderate-moderate'	523.34	527.62	538.31	538.04
'high-low'	578.71	560.91	588.54	609.65
'high-high'	340.47	396.56	330.25	352.41
p value	<0.001	<0.001	<0.001	<0.001
H value	86.237	46.118	89.650	70.704

the “high-low” group, HIV-negative drug addicts were more likely to show higher self-acceptance than positive patients ( $\beta=0.418, OR=2.427, p=0.034$ ). The effect of stereotype awareness was significant in the ‘low-low’ group ( $\beta=0.143, OR=1.599, p<0.001$ ) and ‘moderate-moderate’ group ( $\beta=0.124, OR=1.394, p=0.007$ ), with the ‘low-low’ group having the highest likelihood of the presence of stereotype awareness; the effect of alienation was significant for each profile, with the ‘low-low’ group ( $\beta=0.169, OR=3.249, p<0.001$ ) having the highest likelihood of being alienated. There was a significant strong correlation ( $p<0.01$ ) between age, duration of drug use, type of drug use among non-significant predictors, probably due to the fact that individuals may be exposed longer and try different types of drugs more as they age, thus leading to the strong association between these variables. This strong correlation causes models to struggle to distinguish their contributions to the dependent variable, rendering certain predictors that might otherwise be significant insignificant. The highest correlation of the four variables included in the logistic regression of this study was only 0.265, and the range of VIF values was 1.035–1.255, indicating that there was no obvious multicollinearity among the variables.

Dependent variable reference category is ‘high-high’ group; OR=odds ratio, CI=confidence interval; \* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$ .

#### The effect of self-acceptance type on subthreshold depression in compulsory isolation of drug addicts

In order to explore the effect of type of self-acceptance on the production of subthreshold depression in drug addicts, multiple linear regression analyses were conducted through the setting of dummy variables. The results showed that the subthreshold depression of drug addicts in the ‘moderate-moderate’ group ( $\beta=-0.124, p=0.001$ ) and ‘high-high’ group ( $\beta=-0.514, p<0.001$ ) was significantly lower than that of drug addicts in the low-low group, indicating that high

levels of self-acceptance suggests that a high level of self-acceptance can play a protective role against subthreshold depression in drug addicts.

Kruskal-Wallis nonparametric test was used to compare the total scores of the CES-D as well as the scores of the dimensions among the different self-acceptance profile groups, and the results are presented in Table 5. Differences between the different self-acceptance profile groups were statistically significant on the dimensions of depressed affect ( $H=86.237, p<0.001$ ), positive affect ( $H=46.118, p<0.001$ ), somatic symptoms and and retarded activity ( $H=89.650, p<0.001$ ), and interpersonal ( $H=70.704, p<0.001$ ). The ‘high-high’ group had the lowest mean rank, followed by the ‘moderate-moderate’ group. The ‘low-low’ group, the ‘low-high’ group and the ‘high-low’ group had the highest mean rank for the different dimensions of subthreshold depression. This revealed that the ‘high-high’ group had the lowest level of subthreshold depression; in addition to low levels of self-appraisal and self-acceptance, excessive differences in self-appraisal and self-acceptance can also affect the level of subthreshold depression. Then, a two-by-two comparison was performed. The median difference between the ‘high-high’ group and the ‘low-low’ group was the largest in depressive affect (0.76), that is, the effect size was the largest; among the positive effect, the largest effect size was found between the “high-high” group and the “low-low” and “high-low” groups (1.37); the “high-high” group had the largest effect size versus the “low-high” group in terms of somatic symptoms and and retarded activity (0.83), and in terms of interpersonal, the “high-high” group had the largest effect size versus the “low-high” and “high-low” groups (1.00).

## Discussion

### Gender, HIV-negative or not, education and drug use stereotype threat as influences on the type of self-acceptance of drug addicts

The results of the study showed that drug addicts’ self-acceptance could be categorized into five potential categories. Most drug addicts’ self-acceptance levels were at a low to moderate level, which is consistent with the findings of previous studies [45]. Tajfel’s social homogeneity theory states that dividing people into two groups can lead to intergroup discrimination and competition [46]. Drug addicts may be socially marginalized due to past drug use, leading to self-stigma, reduced self-acceptance, and negative emotions. Maslow’s hierarchy of needs suggests drug addicts may lack belonging, love, respect, and self-actualization during rehabilitation. This experience of social rejection and lack of belonging and respect can lower their level of self-acceptance.

Males in low self-acceptance populations are more likely to exhibit lower self-acceptance than females. The



gender role socialization theory proposed by Gayle Rubin suggests that males and females are socially assigned different role expectations and behavioral norms as they grow up. Male drug addicts experience greater stress [47], follow gender norms, suppress emotions, and have trouble expressing vulnerability and needs, and the accumulation of psychological problems exacerbates self-denial and rejection in this group, leading to a decrease in self-acceptance. Therefore, more attention should be paid to the mental health of male drug addicts, and when necessary, specific interventions and guidance should be provided to individuals, guiding them to express their thoughts and seek help in a timely manner, solving problems in a timely manner, alleviating negative emotions, and enhancing the ability of self-acceptance.

Within the drug addicts group, HIV-negative drug addicts are more likely to show higher self-acceptance than positive patients. Because individuals gain self-concept by categorizing themselves into a social group [48], HIV-negative drug addicts may be more likely to see themselves as part of the 'healthy' or 'uninfected' group. Furthermore, because both HIV and drug use stigma can negatively affect an individual's health [49, 50], HIV-positive drug users face dual impacts from HIV and drug use, creating a cross-stigma greater than a single stigma [50, 51], further exacerbating drug addicts' self-denial. Sichuan Province is a province with high incidence of AIDS [52], and the knowledge about AIDS prevention and control is popular in society, so it also brings more social discrimination and social stigma to drug addicts. Sichuan Province should pay extra attention to the special group of HIV-positive drug addicts, and to promote detoxification and rehabilitation, create special organizations and projects for HIV-positive drug addicts to enhance their sense of belonging and adaptability, and proactively guide them to establish the correct values and outlook on life, helping them to enhance the function of social adaptation and the level of self-acceptance.

Drug addicts with an education level of elementary school and below are more likely to have low levels of self-acceptance. Education is an important form of cultural capital that can influence an individual's status and opportunities in society [53]. Less educated drug addicts may face social competitive disadvantages due to lack of cultural capital, affecting their self-acceptance and perception. People learn new patterns of behavior by observing the behavior of others and its consequences. Highly educated people may be exposed to more knowledge about mental health and coping strategies during their formative years, which are internalized through social learning and become part of their self-regulation; therefore, highly educated people are more capable of self-regulating their mental health and are less likely to fall into a depressive state, and they are able to support

and improve their mental state at a cognitive level. In view of the above, systematic re-education and long-term educational work can help drug addicts improve their psychological resilience, cope with discrimination, and reintegrate into society with optimism.

The dimension of alienation plays an important role in the effect of drug use stereotype threat on the type of self-acceptance of drug addicts. Bandura's theory suggests that individuals form perceptions of social groups based on others' views, which may lead to simplified or biased information processing and prejudice. Zeng et al.'s ERP experiment found that participants responded faster and more accurately to negative words related to drug addicts [54], suggesting an implicit negative stereotype that affects their self-acceptance and leads to social detachment. Drug use stigma worsens depression and anxiety [55]. Social support is a protective factor between the effects of the stress of negative life events on physical and mental health [56], and an important resilience factor that buffers the negative psychological impact of stressful life events [57], as self-acceptance is related to resilience and coping [56], reducing alienation, providing social support, and increasing the level of resilience in drug addicts has a positive impact on enhancing their self-acceptance.

#### **High self-appraisal-high self-acceptance alleviates subthreshold depression in drug addicts**

Self-appraisal is the cognitive awareness and judgment of the actual self, and self-acceptance is the emotional and attitudinal pleasing to the actual self [26], and many studies have shown that enhancing the degree of self-acceptance of individuals can improve their mental health [10, 11, 58]. This is consistent with the results of this paper: high level of self-acceptance is a protective factor of subthreshold depression in drug addicts. The relationship between self-acceptance and subthreshold depression verifies the previous conclusions, and makes innovations in research objects and expands research methods. However, most previous studies show that there is a simple positive correlation between self-appraisal and self-acceptance [59, 60]. The results of this paper's analysis of self-acceptance potential profiles not only help us to understand this concept more comprehensively, but also help to better reveal the complex relationship between self-acceptance and individual mental health.

Suicide prevention is an essential component of depression management [61], self-acceptance moderated the association between depressive symptoms and suicidal ideation [62]. Besides, some studies have shown that there is a negative correlation between self-acceptance and mental health problems such as anxiety and depression [63], people who lack unconditional self-acceptance can lead to a variety of mood disorders and emotional

difficulties, including depression [24, 25]. People with higher levels of self-acceptance are often more resilient in the face of stress and adversity [64]. Individuals with low levels of self-acceptance tend to experience more negative emotions, including symptoms of depression and anxiety and reduced well-being [65, 66]. These studies suggest that self-acceptance is a protective factor in mental health [67]. Some scholars have pointed out that the level of self-acceptance affects the way patients attribute events, patients with low level of self-acceptance attribute bad events to objective and lasting, and are more likely to have depressive symptoms and aggravate depression [68]. In addition, negative automatic thoughts are an important cause of depression [69], and high self-appraisal-high self-acceptance people are less likely to produce negative automatic thoughts or to be able to recognize and cope with these thoughts more effectively [70], and are less likely to develop subthreshold depression. Self-determination theory was put forward by Deci and Ryan, which emphasizes that human beings have three basic psychological needs: autonomy, competence and relevance [71]. The fulfillment of these needs is essential for an individual's mental health and well-being. Individuals with high self-appraisal and self-acceptance are more likely to feel autonomy (i.e. the ability to control and determine themselves) and competence (i.e. the affirmation of their own abilities). The enhancement of these feelings helps individuals maintain a positive mindset in the face of challenges and difficulties, thus reducing depressive symptoms. Drug addicts often face the crisis of self-identity and the damage of self-esteem [72]. By improving their self-appraisal and self-acceptance level, they can be helped to regain their autonomy and sense of competence, thereby alleviating the symptoms of subthreshold depression. High level of self-acceptance plays a positive role in mental health [73], while social support is positively related to self-acceptance [74]. Thus, the family's emotional and financial support and the government's policy support have positive effects on reducing the possibility of subthreshold depression among drug addicts. Secondly, numerous studies on exercise detoxification indicate that appropriate exercise therapy can effectively manage physical symptoms, alter body functions, regulate psychology, and induce psychological changes [75–77]. After the intervention of collective sports activities (such as basketball and group games), the overall level of mental health of drug addicts has been improved [78]. Planned and purposeful sports can effectively eliminate the bad emotions of drug addicts, improve interpersonal relationship, enhance self-confidence and self-acceptance, and improve their mental health [78]. But it is worth noting that, in the intervention experiment of collective activities of drug addicts, the mental health level of the intervention group and

the control group was different only after 8 weeks of the experiment, which shows that the effect of collective activities on the mental health of drug addicts is not immediate, but needs a certain time to accumulate [78]. Daniel found that a 32-year-old male cocaine user had increased blood oxygen saturation and cardiac output in the prefrontal cortex, improved cognition and sleep quality, and reduced anxiety after four consecutive weeks of high-intensity exercise training three times a week [79]. This indicates that exercise intensity is also an important factor affecting the physical and mental recovery of drug addicts. In addition, since self-acceptance is the strongest mediator of mindfulness and depressive symptoms [80], we should further strengthen the construction of mental health centers in drug rehabilitation centers, and guide drug addicts to carry out mindfulness training through timely intervention of professionals, so as to correct their negative thinking in the process of drug rehabilitation, so as to achieve the purpose of strengthening drug addicts' self-acceptance and cultivating self-efficacy, and provide spiritual support for the reduction of subthreshold depression, smooth drug rehabilitation and social return.

In August 2024, the "Psychological Correction and Rehabilitation System for Drug Addicts with Family Therapy as the Core" National Advantage Education and Treatment Project Special Training and Practical Teaching Class was held in Chengdu, Sichuan [81]. The meeting mentioned that judicial administrative drug rehabilitation work has entered a new stage of efficient, sustainable and high-quality development, focusing on the transformation of the results of superior education and treatment projects, strengthening theoretical research, solving technical problems, innovating methods, expanding social services, comprehensively improving the quality of treatment, and opening a new chapter in drug rehabilitation work. This project provides theoretical and technical support for drug addicts to increase social support and family support, and helps drug addicts to face up to problems, accept themselves, maintain mental health, prevent subthreshold depression, strengthen their determination to get rid of drugs and regain their confidence in life.

#### **Consistency of self-appraisal and self-acceptance alleviates subthreshold depression in compulsorily isolated drug addicts**

Large discrepancies between drug addicts' self-appraisal and self-acceptance can lead to subthreshold depression. Leon Festinger's cognitive dissonance theory states that individuals strive for inner balance and will feel stressed when it's disrupted [82]. 'Self-serving bias' refers to the tendency to accept credit for success and deny responsibility for failure [83]. This bias may be more pronounced in drug addicts with high self-appraisal and low

self-acceptance. They tend to exaggerate their successes and contributions while avoiding acknowledging their failures and mistakes. This tendency reinforces their self-esteem but can impede their ability to confront problems and gain social acceptance. Consequently, it may trigger psychological issues like subthreshold depression and hinder drug rehabilitation progress. Drug addicts with low self-appraisal and high self-acceptance may show a tendency toward excessive self-blame, self-abandonment, and negative emotions. According to Freud's psychodynamic theory, self-blame may be related to superego oppression. The superego represents internalized social norms and moral standards, and a strict superego may cause individuals to feel guilt and self-blame when they violate self-perceived moral standards. Studies have shown that self-blame in drug addicts is predictive of mental health levels [84]. Drug addicts high in self-blame hold a negative evaluation of their own abilities and values based on their own particular social positioning, may tend to rely on the help and support of others, lack the motivation to think independently and act proactively, and are more susceptible to subthreshold depression. 'Psychological flexibility' refers to the fact that individuals can keep an open, accepting and flexible mentality when facing various life situations. It emphasizes the individual's ability to perceive, accept and regulate internal experiences. Kashdan also found that psychological flexibility has a prominent role in promoting mental health [85]. Highly consistent self-appraisal and self-acceptance means that individuals can maintain stable self-identity and positive self-attitude in different situations. Such stability helps individuals to maintain psychological flexibility in the face of challenges, i.e., to be able to flexibly adjust their mindset and behavior to adapt to environmental changes. Drug addicts need to learn to maintain psychological flexibility in the face of various difficulties and challenges in the process of drug rehabilitation. Studies by Chinese scholars have shown that group counseling based on Acceptance a Commitment Therapy (ACT) has a significant effect. This method reduced the depression level of Chinese drug addicts by improving psychological flexibility [86]. Whether this method has cross-cultural applicability can be further studied. In addition, drug addicts should be taught coping strategies like seeking support, setting realistic goals, and solving problems. These skills help them stay calm and cope with difficulties. While encouraging the public to treat drug addicts equally, we help them rebuild their confidence in independent living, increase their positive evaluation of their own abilities and values, and mobilize their subjective initiative to explore and realize their personal life goals and value pursuits, and prevent the occurrence of subthreshold depression.

The reason why drug addicts with moderate self-appraisal and moderate self-acceptance are less prone to subthreshold depression is that they possess a balanced and stable psychological state. Specifically, these drug addicts are able to view themselves in a relatively objective manner, neither over-exaggerating their own merits nor under-valuing themselves. This balanced self-concept helps them maintain a relatively stable psychological state when facing setbacks and difficulties, and they are less likely to fall into excessive self-denial and negative emotions. Meanwhile, moderate self-acceptance enables them to accept their past and present, including the behavior of drug abuse. They would not blame themselves excessively for their past mistakes, nor would they despair over their current state. This accepting attitude helps them to reduce their internal conflicts and anxiety, thus lowering the risk of subthreshold depression.

In March 2024, the Sichuan Provincial Judicial Administrative Drug Rehabilitation Work Conference was held in Chengdu, and published "Benchmarking, promoting the advantages and making up for the shortcomings, improving quality, energy and efficiency, and supporting and serving the new chapter of Chinese-style modernization in Sichuan with high-quality development of drug rehabilitation work" [87], this process promotes the further modernization of drug rehabilitation work in rehabilitation treatment, employment training and other aspects, and provides a favorable objective environment for drug addicts to find self-worth and enhance their sense of social belonging.

#### **Limitations and directions for future research**

Several limitations must be considered when interpreting the results of this study. First, this study was conducted with drug addicts and therefore cannot be compared with the general population. Second, the participants recruited for this study were residents of two drug rehabilitation centers in Sichuan Province, which may have limited the representativeness of the sample. Third, when categorizing HIV-positive and negative groups in the study, the sample size of female HIV-positive participants was too small, which may have had some impact on the results. Fourth, the cross-sectional design of this study was unable to capture individual psychological and emotional changes such as in self-acceptance and subthreshold depression. Thus, several factors should be considered in future research. First, the percentage of participants in each category should be kept approximately the same to reduce the error caused by demographic variables and enhance the comparability between groups. Secondly, care should be taken to control for differences in demographic variables, such as age, when adding the general population for comparison. Additionally, future research could focus on several avenues. Firstly, it could explore

specific strategies for enhancing self-appraisal and self-acceptance among drug addicts through intervention-based studies. Secondly, it could involve cross-cultural comparisons to gain a deeper understanding of the issue.

## Conclusion

This study provides evidence that self-acceptance is heterogeneous among drug addicts, exploring gender, HIV-negative or not, education level, and drug use stereotype threat as influences on the type of self-acceptance, as well as the relationship between the type of self-acceptance and subthreshold depression among drug addicts. Males had lower levels of self-acceptance than females, HIV-positive than negative, less educated than more educated, and drug addicts who were alienated. High self-appraisal-high self-acceptance reduced subthreshold depression among drug addicts, and congruence between self-appraisal and self-acceptance alleviated subthreshold depression among drug addicts. This suggests that we enhance the level of self-evaluation and self-acceptance of drug addicts to promote psychological health.

## Abbreviations

SAQ	The Self-acceptance Questionnaire
DSTS	The Drug use Stereotype Threat Scale
CES-D	Center for Epidemiologic Studies Depression Scale

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## Author contributions

YL conceptualized the study, analyzed data, interpreted the results and wrote the first draft. RW administrated project, designed research, collected data and wrote review. JL, LZ recruited participants, distributed questionnaires and collected data. All authors contributed to this manuscript and approved the submitted version.

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## Data availability

All relevant data are available from the corresponding author upon reasonable request.

## Declarations

### Human ethics and consent to participate declarations

All procedures performed in studies involving human participants were in accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The protocol of this study was approved by the institutional review board of the School of Basic Medicine, Chengdu University of Traditional Chinese Medicine. Informed consent was obtained from all participants after a detailed explanation of the study objectives.

### Consent for publication

Not applicable.

### Consent to participate

All participants having provided informed consent.

### Competing interests

The authors declare no competing interests.

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