Relationship between Suicidal Ideation and Stigma, Disclosure, and Perceived Social Support in HIV/AIDS Patients

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Relationship between suicidal ideation and stigma, disclosure, and perceived social support in HIV /AIDS patients

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【Abstract】 Objective: To explore the relationship between suicidal ideation and stigma, disclosure and social support in HIV /AIDS patients. **Methods:** A total of 1146 HIV-infected /AIDS patients were investigated by a general situation questionnaire, Perceived Social Support Scale (PSSS), Beck Suicidal Ideation Scale (Chinese version) (BSI-CV), disclosure questionnaire and Stigma Scale (SSS-S) on a WeChat platform. **Results:** 54.01% (619/1146) of the sample reported having suicidal ideation in the past week or at the height of depression; The results of multivariate logistic regression analysis showed that In SS-S, the affective dimension [OR value (95%CI) was 1.63(1.17-2.26)], the cognitive dimension [OR value (95%CI) was 2.06 (1.48-2.87)], the behavioral dimension [OR value (95%CI) was 2.05 (1.53-2.76)], and the family support [OR value (95%CI) was 0.64 (0.47 ~ 0.87)], which were associated with suicidal ideation in HIV /AIDS patients; Social support mediated between AIDS-related stigma and suicidal ideation (19.80% of the total effect). **Conclusion:** Suicidal ideation in HIV /AIDS patients is strongly associated with stigma, awareness, and perceived social support. So, stigma, awareness, and perceived social support should be incorporated into the suicide intervention system for HIV /AIDS patients.

【Key words】 HIV/AIDS, suicidal ideation, stigma, disclosure, perceived social support

According to the relevant data of the Chinese Center for Disease Control and Prevention STD AIDS Prevention and Control Center, as of September 30, 2018, A total of 849,602 cases of People living with HIV/AIDS (AIDS, Acquired Immune Deficiency Syndrome, PLWHA) have been reported in China. Among them, there were 497,231 HIV-infected patients and 352,371 AIDS patients^[1]. Highly active antiretroviral therapy (HART) significantly reduces the morbidity and mortality of PLWHA^{[2][3]}. However, HAART can only control the viral load of PLWHA, not cure it. At the same time, it also brings several adverse reactions, including mood disorders^[4] and other side effects that can lead to suicidal ideation^[5].

Suicide is a deliberate or voluntary act to end one's life by some means^[6]. Suicidal ideation is an individual's thought to want to die but has not been put into action, which is an important part and necessary stage of suicidal behavior^[7]. Emotion refers to the adaptive mechanism of the individual stress response^[8], Psychological problems are usually caused by the experience and improper regulation of negative emotions^[9]. Both interpersonal relationship theory^[10] and suicide avoidance theory^[11] emphasize the individual's

experience and regulation of negative emotions, Previous studies have also confirmed that negative emotions such as anxiety, depression and despair can affect suicidal ideation^{[12][13]}, and studies on negative emotions related to suicidal ideation in China are mostly focused on this. Are there any other negative emotions that can affect suicidal ideation? Gao Jun and others^[14] suggest that stigma may prompt individuals to exhibit more adaptive behavior or behavioral tendencies, Lester^[15] demonstrated that stigma is associated with suicidal behavior but is it a factor in suicidal ideation? The multi-dimensional view of emotional regulation structure^[16] holds that adaptive emotional regulation is not control or exclusion, but regulation of emotional experience, including the recognition, understanding, acceptance, control of impulsive behavior and use of regulation strategies. Alexithymia is a mood disorder characterized by difficulty in identifying emotions and experiencing emotions, and difficulty in distinguishing emotional and physical sensations, People with high alexithymia have defects in cognitive processing and regulation of emotions^[17], which can affect the generation and severity of anxiety and depression^{[18][19]}, does alexithymia also contribute to suicidal ideation? According to social support theory, social support can buffer stress in negative events and is an important protective factor^[20]. Studies have shown that perceived social support can buffer the occurrence of suicidal ideation through the use of social support and increase personal self-esteem^[21], This study hypothesized that perceived social support is a protective factor and explored its impact on suicidal ideation.

Informing the problem, especially PLWHA to their relatives and friends of the fact that they are infected with HIV. Most people in China still see HIV/AIDS as the only consequence of homosexuality, commercial sex, illegal drugs and drug abuse^{[22][23][24]}. In fact, most of the HIV infections in China occur in rural areas^{[25][26]}. This discrimination and stigmatization of the disease itself inevitably create a culture of discrimination. Because of the untreatability of AIDS and the specific way of infection, PLWHA generally suffers from more severe stress than other disease groups and often suffers from a variety of social discrimination^{[27][28]}. Stigmatization of the disease has also led to many PLWHAs since the diagnosis of HIV+, just like people living in cabinets, they hide their HIV infection status, seldom disclose their illness to their relatives and friends, for fear of losing their social reputation and value due to the evaluation of others^[29]. Some PLWHA patients are even unwilling to receive HIV-related antiviral treatment, thus becoming an uncontrolled source of infection, which objectively promotes the spread of AIDS^{[30][31]}. Alexithymia is also known as effective dyslexia or affective dyslexia, It is not a separate mental illness, it can be a personality trait, it can also be some physical or mental illness with more common psychological characteristics^[32]. For PLWHA, this concealment of HIV status, the inability to inform and receive social support from family and friends, is also alexithymia. Based on the above considerations, this paper aims to investigate PLWHA's sense of stigma, disclosure, and perceived social support, and to explore their relationship with suicidal ideation.

1. Samples & Methods

1.1 Samples

The PLWHA population is inaccessible. According to the preliminary investigation, PLWHA in the outpatient department of the Centers for Disease Control and Prevention and the Hospital for Infectious

Diseases is usually used for antiviral therapy or seeking medical treatment due to poor health conditions. In this special environment, it is difficult to ensure the confidentiality of the investigation and the privacy of PLWHA, and PLWHA's cooperation degree is quite low, so it is difficult to carry out the study. Considering the development, popularity and reality of the current "we-media" platform, this study took PLWHA users on WeChat ID set up by the center for disease control and prevention in a certain city as the research objects. As of September 1, 2018, there are 9,987 PLWHA signals in the center for Disease Control and Prevention. In reference to the world health organization, and recommended by the Chinese center for disease control and prevention sexually transmitted infection of high-risk groups sentinel surveillance standard sample size (usually in 250 ~ 400) ^[33] based on sample according to the media contact convenience and HIV/AIDS is sensitive to this kind of problem investigation difficulty of objective conditions, the PLWHA minimum sample size for 1500 people. In this study, simple random sampling was used to select samples. First, one infected person was selected from the top 10 fans in the WeChat public account as a random starting point, and then the remaining sample units were selected sequentially, one person was selected every 6 people until 1,500 people were selected. The researchers got in touch with the WeChat ID and conducted a one-to-one questionnaire survey via the WeChat line.

1.2 Questionnaires

Self-compiled sociodemographic data questionnaire: including gender, age, nationality, education, marital status, whether a student, residence, occupation, average monthly income, Whether have children, whether have a partner, HIV infection route, whether there are other chronic diseases, etc.

Social Support: PLWHA's Social Support is investigated using the Perceived Social Support Scale (PSSS) ^[34]. PSSS consists of 12 items. Higher scores in three dimensions of family Support, friend Support and other Support indicate a higher degree of Social Support. This scale has been widely used in China with good reliability and validity ^{[35][36]}.

Information questionnaire: the PLWHA patients inform the problems; including the following 6 items: (1) Do you mind telling others that you are a PLWHA? (2) Have you ever told anyone about your HIV infection? (3) Who were the first people you told? (4) Who have you told yourself so far? How did they react? (5) Have you ever had a romantic partner, friend or other person tell someone that you are infected with HIV after knowing that you are infected with HIV? (6) Have you ever had a romantic partner, friend or another person who, knowing that you have HIV, threatened you to tell others about your HIV infection?

Stigma: Stigma Scale (SSS-S) developed by Winnie^[37] was used to investigate the Stigma of PLWHA. All 9 items of the whole scale are open, including emotion, behavior and cognition. As follows: 1. Fear that others will know they are___; 2. As___, you feel helpless; 3. You feel insecure about who you are___; 4. Don't take the initiative to meet friends in case others will know you are___; 5. You will alienate others because you are ___; 6. Avoids contact with others because you are ___; 7. Being gay stigmatizes your life; 8. Being ___ makes your daily life difficult; 9. ___ A certain identity is a burden to you. The authors surveyed 175 (51% of women) mental health counselors and 110 immigrant women. The results showed that SSS-S had a very good

internal consistency, with Cronbach's for mental health consultants $\alpha=0.91$ and Cronbach's for immigrant women $\alpha=0.84$.

Suicidal ideation: The Chinese Version of Beck Scale for Suicide Ideation-Chinese Version (BSI-CV)^[38] was used to assess the individual's thoughts about life and death and the severity of suicidal Ideation in the last week or at the peak of depression. There are 19 items in total, each item has 3 options, and the higher the total score is, the higher the degree of suicidal ideation will be. The first 5 items are screening items, and the presence of suicidal ideation is determined according to items 4 and 5 (> 1 is classified as having suicidal ideation); The last 14 items assessed the level of suicidal ideation and suicide risk.

1.3 Quality control

All PLWHA samples were investigated by investigators for WeChat one-to-one online interviews and each online survey was conducted in a quiet, undisturbed environment. Every questionnaire must be verified on-site and the items that were not answered in time or clearly by the respondent were questioned and confirmed based on ensuring compliance with ethical principles.

1.4 Statistical Methods

In this study, SPSS21.0 was used for statistical analysis of data. Sociodemographic data of the group with and without suicidal ideation were compared by the Chi-square test, and PLWHA scale scores were compared by Student's t test. to explore the relationship between PLWHA suicidal ideation and stigma, disclosure and appreciate social support, logistic regression analysis was conducted with the presence of suicidal ideation as a binary variable.

2 Results

2.1 Sociodemographic data and suicide ideation detection

Table 1 Comparison of sociodemographic data of group with or without suicidal ideation in the last 12 months [n(%)]

Project	Total n=1146	The group with suicidal ideation n=619	The group without suicidal ideation n=527	χ^2 Value	P- Value
Path of infection					
Male-male sexual behavior	951 (83.0)	505 (44.1)	446 (38.9)	2.77	0.250
Heterosexual sex	86 (7.5)	47 (4.1)	39 (3.4)		
Blood infection / Mother-to-child transmission	109 (9.5)	67 (5.8)	42 (3.9)		
Gender					
Male	1101 (96.1)	595 (51.9)	506 (44.2)	0.01	1.000
Female	45 (3.9)	24 (2.1)	21 (1.8)		
Household register					

Urban	670 (58.5)	339 (29.6)	331 (28.9)	7.58	0.007
Rural	476 (41.5)	280 (24.4)	196 (17.1)		
Nation					
Han nationality	1073 (93.6)	573 (50.0)	500 (43.6)	2.54	0.111
Ethnic minority	73 (6.4)	46 (4.0)	27 (2.4)		
Marital status					
Unmarried	826 (72.1)	446 (38.9)	380 (33.2)	1.45	0.484
Married	245 (21.4)	137 (12.0)	108 (9.4)		
Divorced/Widowed	75 (6.5)	36 (3.1)	39 (3.4)		
The only child					
Yes	498 (43.5)	259 (22.6)	239 (20.9)	0.26	0.128
No	648 (56.5)	360 (31.4)	288 (25.1)		
Student					
Yes	121 (10.6)	83 (7.2)	38 (3.3)	11.58	0.001
No	1025 (89.4)	536 (46.8)	489 (42.7)		
Education					
Master degree and above	100 (8.7)	51 (4.5)	49 (4.3)	5.69	0.224
Undergraduate degree	508 (44.3)	270 (23.6)	508 (44.3)		
Junior college degree	252 (22.0)	127 (11.1)	125 (10.9)		
High school or technical secondary school degree	189 (16.5)	113 (9.9)	76 (6.6)		
Junior high school degree/Primary school education	97 (8.5)	58 (5.1)	39 (3.4)		
Inform					
Inform family members	602 (52.5)	313 (27.3)	289 (25.2)	2.09	0.149
Not inform family members	544 (47.2)	306 (26.7)	238 (20.8)		
Inform friends	498 (43.5)	252 (40.7)	246 (21.5)	4.13	0.042
Not inform friends	648 (56.5)	367 (32.0)	281 (24.5)		
Inform others	558 (48.7)	288 (51.6)	270 (23.6)	2.52	0.112
Not inform others	588 (51.3)	331 (28.9)	257 (22.4)		

As shown in Table 1, among the 1146 PLWHA surveyed in this survey, 619 of them (54.0%) reported that they had suicidal ideation in the past week or when their depression was at their worst. Among the 1146 valid samples, the oldest was 66 years old, the youngest was 17 years old, and the average age was 31.5 ± 7.5 . 83.0% (951/1146) were infected through male-to-male sex, 7.5% (86/1146) were infected through heterosexual sex, 109 were transmitted through blood (blood transfusion/sharing needles) and mother-to-child transmission, accounting for 9.5%; male 96.1 % (1101/1146), 45 women (3.9%); Han nationality accounted for 93.6% (1073/1146), 43.46% (498/1146) were only children; 10.6% (121/1146) were school students, of whom 5 were junior high school or high school students (0.44%), 22 were junior college students (1.9%),

68(5.9%)were undergraduate students, 19(1.7%) were master students, and 7 were doctoral students (0.6%); Among the 1146 PLWHA, 8.7% (100/1146) had a master's degree or above, 44.3%(508/1146) had a bachelor's degree, 252(22.0%) had a college degree, and 189 (16.5%) had a high school or technical secondary school degree. 89(7.8%) had a junior high school education, 8 (0.7%) had a primary school education; 826 were unmarried, accounting for 72.1%. 245 were married, accounting for 21.4%.69 were divorced, accounting for 6.0%. And 6 were widows, accounting for 0.5%.

The living conditions of 1146 PLWHA: 42.8% (491/1146) lived with their families, 331(28.9%)lived alone, 11.4%(131/1146) shared with others, living in dormitories (such as dormitories for students, military, work units, etc.) accounted for 11.3% (130/1146), and others accounted for 5.5% (63/1146); Their occupational status, in descending order of proportion, are as follows: 468 (40.8%) full-time employees in the company or enterprise, 14.1 % (162/1146) had part-time job, 10.6% (121/1146) were students, 10.4% (119/1146) worked in service industry, 7.8% (89/1146) were teachers or civil servants, samples who were unemployed accounted for 6.3% (73/1146), others accounted for 10.0% (187/1146)including doctors, nurses, soldiers, farmers, fishermen, herders and others; The current average monthly income of individuals: 41.5% (476/1146) below 4000 yuan, samples with an average monthly income between 4000 to 8,000yuan accounted for 34.1%, and those with an average monthly income of RMB 8001 accounted for 24.35% (279/1146). 22.7% (260/1146) of PLWHA reported that they currently have children, 56.0% (642/1146) currently have a lover, 41.2% (472/1146) have a permanent sex-partner, 39.4% (452/1146) have a temporary sex-partner, 41.1 % (471/1146) had a history of substance abuse in the past 12 months, 31.8% (364/1146) had unprotected sex in the past 6 months, 76.8% (880/1146) had normal indicators in the latest physical examination, 25.9% (297/1146) said they had other long-term diseases besides HIV.

The results of the χ^2 test showed that there was a statistically significant difference in suicidal ideation between whether they were school students, their original household registration, and whether they told their friends the truth that they were infected with HIV+ (Table 1).

2.2 PLWHA stigma

Table2 PLWHA stigma Scale [n(%)]

Entry	Totally disagree / disagree	Somewhat agree	Quite agree/Strongly agree	M	SD
1. Fear that others will know that you are PLWHA	57(5.0%)	158(13.8%)	931(81.2%)	4.36	0.97
2. Being PLWHA , I feel helpless	75(6.6%)	145(12.7%)	926(80.8%)	4.32	1.02
3. I feel uneasy because I am PLWHA	135(11.8%)	215(18.8%)	796(69.5%)	4.02	1.15
4. Don't dare to take the initiative to meet friends, in case others will know that you are PLWHA	365(31.8%)	198(17.3%)	583(50.9%)	3.40	1.41
5. I will alienate others because I am a PLWHA	410(35.8%)	295(25.7%)	441(38.5%)	3.10	1.32

6. I will avoid contact with other people because I am a PLWHA	439(38.3%)	26(23.5%)	438(38.2%)	3.06	1.34
7. The identity of PLWHA stains your life	207(18.1%)	239(20.9%)	700(61.1%)	3.78	1.28
8. PLWHA's identity will bring inconvenience to your daily life	144(12.6%)	267(23.3%)	735(64.1%)	3.89	1.15
9. The identity of PLWHA is a burden to you	110(9.6%)	213(18.6%)	823(71.8%)	4.11	1.12
Total				34.04	8.40

As shown in Table 2, among the 9 items on the stigma scale, scores of 1146 PLWHA from high to low are: "1. Fear that others will know that you are PLWHA (4.36 ± 0.97)"; "2. Being PLWHA , I feel helpless (4.32 ± 1.02)"; "9. The identity of PLWHA is a burden to you (4.11 ± 1.12)"; "3. I feel uneasy because I am PLWHA (4.02 ± 1.15)" "8. PLWHA's identity will bring inconvenience to your daily life (3.89 ± 1.15)"; "7. The identity of PLWHA stains your life (3.78 ± 1.28)"; "4. Don't dare to take the initiative to meet friends, in case others will know that you are PLWHA (3.40 ± 1.41)"; "5. I will alienate others because I am a PLWHA (3.10 ± 1.32)"; "6. I will avoid contact with other people because I am a PLWHA (3.06 ± 1.34)" The total score of this scale is between 9 and 45 points, with an average score of 34.04 ± 8.40 .

2.3 PLWHA informing problem

In this study, a self-made questionnaire was used to investigate whether PLWHA had informed others about HIV infection, with a total of 6 questions. 54.8% (628/1146) of PLWHA said they were very mindful of telling others about their HIV infection. Although most people said they were very mindful of telling others about their infection, 77.4% (887/1146) of PLWHA still had told their family members、friends or others about the truth that they were infected with HIV. 43.46% of PLWHA have told friends, followed by sexual partners (39.4%), spouse (27.8%), mother (27.0%), siblings (21.9%), father (22.5%), classmates (13.4%), colleagues (8.3%),neighbor(4.0%),others (8.3%) (such as doctors, patients, relatives, unit leaders, etc.). As shown in Table 3, most PLWHA said that after telling their parents, relatives and friends, their attitude is mindful or very mindful. After controlling for factors such as gender, ethnicity, age, household registration, whether you are a student, education, only child, infection route, income, and whether you have other chronic diseases, stigma [OR value (95% CI) is 1.45 (1.09~1.93)] is an influencing factor whether PLWHA informs.

Table 3 PLWHA disclosure status and the reaction of the notified object after disclosure [n(%)]

Notified object	Frequency	Attitude after disclosure	
		Totally don't mind/don't mind	mind/ strongly mind
(1) Father	258(22.5)	148(12.9)	110(9.6)

(2) Mother	309(27.0)	177(15.5)	132(11.5)
(3) Spouse	318(27.8)	202(17.63)	116(10.12)
(4) Sex mate	452(39.4)	256(22.3)	196(17.1)
(5) Brothers and sisters	251(21.9)	168(14.7)	83(7.2)
(6) Offspring	50(4.4)	17(1.5)	33(2.9)
(7) Friend	498(43.5)	417(36.4)	81(7.1)
(8) Classmate	154(13.4)	105(9.2)	49(4.3)
(9) Colleague	95(8.3)	42(3.7)	53(4.6)
(10) Neighbor	46(4.0)	6(0.5)	40(3.5)
(11) Others	95(8.3)	32(2.8)	63(5.5)

21.9% (251/1146) of PLWHA state that a lover, friend or another person who knows they have HIV has deliberately disclosed their infection to others without their consent. Even 6.8% (78/1146) PLWHA said that a lover, friend, or other person had threatened to tell someone about HIV infection after they knew you were infected with HIV.

2.4 PLWHA social support level

Table 4 Social support level of PLWHA (n=1146)

Entry	Totally disagree/Slightly disagree/ Disagree	Neutrality	Slightly agree/Agree/ Strongly agree	M	SD
1.Some people (leaders, relatives, colleagues) will be there for me when I have problems	214(18.7%)	421(36.7%)	511(44.6%)	4.37	1.57
2.I can share happiness and sorrow with some people (leaders, relatives, colleagues)	278(24.2%)	332(29.0%)	536(46.8%)	4.35	1.65
3.My family can help me in a concrete way	251(21.9%)	278(24.3%)	617(53.8%)	4.67	1.76
4.I can get emotional help and support from my family when I need it	223(19.5%)	264(23.0%)	659(57.5%)	4.8	1.76
5.Some people (leaders, relatives, colleagues) are my real source of comfort when I am in trouble	307(26.8%)	348(30.4%)	491(42.8%)	4.26	1.76
6.My friends can really help me	255(22.3%)	343(29.9%)	548(47.8)	4.4	1.63
7.I can count on my friends in times of trouble	314(27.4%)	360(31.4%)	472 (41.2)	4.18	1.66
8.I can talk about my problems with my family	445(38.8%)	300(26.2%)	401(35.0%)	3.86	1.85
9.My friends can share happiness and sadness with me	239(20.9%)	333(29.1%)	574(50.1%)	4.45	1.61
10.There are certain people in my life (leaders, relatives, colleagues) who care about my feelings	255(22.3%)	310(27.1%)	581(50.7%)	4.4	1.62

11.My family is willing to help me make all kinds of decisions	290(25.3%)	317(27.7%)	539(47.0%)	4.37	1.73
12.I can discuss my problems with my friends	322(28.1%)	327(28.5%)	497(43.4%)	4.17	1.66
Family support				17.70	6.23
Friends support				17.19	5.88
Other support				17.38	5.42
Total points				52.27	14.96

As shown in Table 4, the total score of social support is between 12 and 84. The average score of 1146 PLWHA social support is 52.27 ± 14.96 , the average family support dimension is 17.70 ± 6.23 , the average friend support dimension is 17.19 ± 5.88 , other average support dimension is 17.38 ± 5.42 . After controlling for factors such as gender, ethnicity, age, household registration, whether a student, education, only child, route of infection, income, or other chronic diseases, inform members of the family that the OR value (95% CI) is 0.68 (0.d) 50 to 0.92) and informing friends that the OR value (95% CI) is 0.66 (0.49 to 0.88) is a factor in the level of social support in PLWHA.

2.5 Comparison of the score of each scale dimension of the group with or without suicidal ideation

Table 5 Comparison of the score of each scale dimension of the group with or without suicidal ideation ($\bar{X} \pm s$)

Scale	Total n=1146	Group with suicidal ideation n=619	The group without suicidal ideation n=527	<i>t</i>	P
The total score of the stigma scale	34.0±8.4	37.1 ±7.3	30.5 ±8.2	14.50	<0.001
Emotional dimension	12.7±2.7	16.6 ±6.49	19.0 ±5.8	10.83	<0.001
Cognitive dimension	11.8±3.1	12.8 ±2.6	10.5 ±3.2	13.26	<0.001
Behavior dimension	9.6±3.8	10.8±3.5	8.1 ±3.5	12.86	<0.001
PSSS score	52.3±15.0	49.3 ±14.9	55.8±14.3	-7.54	<0.001
Family support	17.7±6.23	16.6 ±6.4	19.0 ±5.8	-6.68	<0.001
Friends support	17.2±5.9	16.2 ±6.0	18.4 ±5.5	-6.40	<0.001
Others support	17.4±5.4	16.5 ±5.4	18.4 ±5.2	-6.05	<0.001

The total scores of stigma and the cognitive and behavioral dimensions of the group with suicidal ideation were higher than those of the group without suicidal ideation, while the emotional dimension scores were

lower than those of the group without suicidal ideation; the total PSSS score and scores of all dimensions of the group without suicidal ideation were higher than the group with suicidal ideation (Table 5).

2. 6 Logistic regression analysis results of factors related to the group with or without suicidal ideation

Taking suicidal ideation (no=0, yes=1) as the dependent variable, gender (1=male, 2=female), age (1≤31 years old, 2≥32 years old), ethnicity (1=Han nationality, 2 = Other ethnic groups), the place of household registration (1 = urban, 2 = rural), the route of HIV infection (1=male to male, 2=heterosexual, 3=blood transmission, mother-to-child transmission), marital status (1=unmarried, 2 = married, 3 = divorced or widowed), only child (1 = yes, 2 = no), student (1 = no, 2 = yes), education (1 = elementary school or junior high school, 2 = high school or technical secondary school, 3=college, 4=undergraduate, 5=master's degree and above), income (1=monthly income below 4000 yuan, 2=monthly income 4001~6000 yuan, 3=monthly income 6001~yuan), whether to raise children (1 =No, 2=Yes), whether there is a lover (1=Yes, 2=No), whether the latest physical examination is normal (1=normal, 2=abnormal), whether you have other chronic diseases (1=yes, 2=no), inform family members (1=Yes, 2=No), inform friends (1=Yes, 2=No), inform others (1=Yes, 2=No), SSS-S behavioral dimension (1=score≤ 9,2=score > 9), cognitive dimensions (1=score≤11,2=score>11), affective dimensions (1=score≤17, 2=score>17), PSSS family support (1=score≤17, 2=score>17), friend support (1=score≤17, 2=score>17), other support (1=score≤17, 2=score>17) are independent variables for multivariate logistic regression analysis. The results show that in SSS-S, the emotional dimension [OR value (95% CI) is 1.63 (1.17 to 2.26)], the cognitive dimension [OR value (95% CI) is 2.06 (1.48 to 2.87)], the behavior dimension [OR value (95% CI) as 2.05 (1.53 ~ 2.76) is a risk factor for suicidal ideation, and family support in PSSS [OR value (95% CI) is 0.64 (0.47 ~ 0.87)] is a protective factor for suicide ideation.

2.7 The relationship between suicidal ideation and stigma, disclosure, and perceived social support

Table 6 The mediating effects of information and social support on stigma and suicidal ideation were examined

	Independent variable	Dependent variable	Regression equation	B	SE	Wald	OR (95%CI)	P
Step1	Sense of stigma	Suicidal ideation	Y=-1.67X	-1.67	0.14	151.45	5.32 (4.08~6.94)	<0.001
Step2	Sense of stigma	Inform	M ₁ =-0.37X	-0.37	0.15	6.52	1.45 (1.09~1.93)	0.011
Step3	Inform	Social support	M ₂ =-0.40M ₁	-0.40	0.14	7.48	0.67 (0.51~0.89)	0.006
Step4	Sense of stigma	Social support	M ₂ =-0.58X	-0.58	0.14	21.58	0.51 (0.44~0.72)	<0.001
Step5	Sense of stigma	Suicidal ideation	Y=-1.62X	-1.62	0.13	138.57	5.03 (3.85~6.59)	<0.001
	Social support		-0.57M ₂	-0.57	0.14	17.57	0.57 (0.43~0.74)	<0.001

Table 6 lists the testing process of the mediating role of disclosure and social support between stigma and suicidal ideation. In the first, second, third, and fourth steps, after controlling other variables, stigma can significantly predict suicidal ideation and disclosure and social support; disclosure can also significantly predict social support. After controlling the influence of other variables, social support, and disclosure on suicidal ideation, the predictive effect of stigma on suicidal ideation decreased (regression coefficient was 1.67 before the introduction of the intermediary variable and 1.62 after introduction), but it could still significantly predict suicide ideation. The five-step tests are all significant, and it can be inferred that social support has a mediating effect on stigma and suicidal ideation, which is a partial mediation. It shows that the stigma of PLWHA can directly affect their suicidal ideation, and it can also indirectly affect suicidal ideation through the increase of social support. The ratio of the mediation effect to the total effect is $-0.58 \times (-0.57) / 1.67 = 19.80\%$.

3 Discussion

In comparison, the detection rate of suicidal ideation among Chinese college students is 5.5%~ 22.7%^[39], the rate of suicidal ideation among adolescents aged 11~16 years old is 17.4%^[40], and the reported rate of suicidal ideation among mainland medical students is 12.9%^[41]. In the past five years, the elderly with suicidal ideation accounted for 4.78% of the national elderly population^[42]. In this study, 54.01% (619/1146) of the samples reported that they had suicidal ideation in the past week or the most severe depression, which was much higher than other groups and worthy of attention.

The results of this study showed that PLWHA with suicidal ideation were more likely to experience stigma, less likely to tell friends, relatives or others, and less likely to perceive social support. The interpersonal relationship theory of suicide^[10] has three core parts: the trauma of belonging, the sense of burdening and the acquisition of suicidal ability. Individuals with low social support, such as family and friends, have a relatively weak sense of belonging. According to Tangney and Dearing, stigma is a kind of self-conscious emotion related to the sense of incompetence and inferiority. People with stigma often experience feelings of depression, negativity, withdrawal, smallness, worthlessness and powerlessness^[43]. In such a state, individuals tend to have a sense of burden. When individuals are in negative emotions but cannot recognize, describe or regulate these emotions, they are prone to psychosomatic diseases, depression and anxiety disorders, etc.^[44]. All of these factors may trigger suicidal ideation. According to the results of multivariate logistic regression analysis, PLWHA with high stigma experience of their behavior habits and low perceived family support were more likely to have suicidal ideation: On the one hand, individuals who have high stigma experience are easily sharpened self-criticism and depression^[14], they also are prone to social anxiety^[45], which makes them have smaller opportunities to seek friends, relatives and so on social support, family support for them is very important at this time if they feel the family cannot provide support for them, their negative emotional experience and self-stigma may increase, may be more likely to have suicidal thoughts. On the other hand, families provide little support, and individuals feel alienated in the family, which may enhance their experience of stigma, which further leads to the difficulty for families to have close feelings with them and provide practical and psychological support. The relationship between social support and stigma can be further studied.

Further mediating effect analysis showed that social support played a partial mediating role between stigma and suicidal ideation, that is, higher stigma directly affected PLWHA's suicidal ideation on the one hand, and indirectly affected suicide ideation through increased social support on the other hand. This suggests that reducing suicidal ideation in PLWHA requires, on the one hand, we need to use a variety of measures to reduce stigma. For example, the spread of AIDS-related knowledge and the reduction of social discrimination and exclusion against people living with AIDS; on the other hand, attention should be paid to the level of social support of AIDS patients to reduce PLWHA suicidal ideation by improving the level of social support. Previous studies have shown that providing emotional support, material help and other forms of social support can alleviate individual stress ^[46]. PLWHA often finds it difficult to get social support directly from relatives and friends. At this time, medical staff provide psychological support and care for AIDS patients playing a very important role. Therefore, the advantage of easy access to patients by health service personnel (especially AIDS prevention and treatment personnel) can be exploited to provide them with adequate and sustainable psychological care and support as much as possible while providing them with medical care to help patients better cope with AIDS-related stress and maintain a good state of the quality of life.

At present, in the worldwide survey on suicidal ideation of AIDS patients, the population with suicidal ideation shows an increasing trend and a younger trend ^{[47][48]}. Perceived family and social support are protective factors for suicidal ideation ^[49]. In this study, gay people with AIDS were more concerned because they were under more psychological stress than others. Therefore, the elimination of social discrimination, active mobilization of social and family support and establishment of social support models will be very effective ways to help the PLWHA reduce the pressure and psychological burden from all aspects.

4. Deficiencies of this study and future research directions

This study also has certain limitations; (1) we only investigated the PLWHA of a certain CDC WeChat account. Among the 1146 valid samples, men who had sex with men accounted for 86.6% (992/1146). We believe this is related to the higher education level of men who have sex with men ^[50] and the daily interaction of friends who rely more on Blued, WeChat, Weibo and other new media. The situation of men who have sex with men is also unique. Our results cannot be generalized to the entire PLWHA group because of sample bias. In the future, we can sample the PLWHA population nationwide. (2) Due to the difficulty of the actual survey in the PLWHA special population, for the 220 (14.67%) survey subjects who did not cooperate with the investigation, we did not record their basic information such as age, gender and infection route. Therefore, we cannot give a specific explanation as to whether there is a difference between the situation of the persons who do not cooperate with the investigation and the persons who cooperate, and whether it will affect the results of this research. (3) In addition, we investigated the WeChat connection. There are still some differences between WeChat's connection and a face-to-face survey. For example, during the WeChat online survey, it was difficult for us to comprehend the environment of the survey; other details such as the participants' body language were also difficult to observe. (4) Finally, this survey is only a cross-sectional survey; the respondents' recall bias or reporting bias on some issues is still out of control. For example, some PLWHA cannot recall the previous situation well. In the case of sensitive problems, some respondents

may be unwilling to give correct answers and cause reporting bias. Research can only provide clues for the generation of suicidal ideation as a purpose for the current situation investigation, but cannot form causal inference. (5) Suicidal ideation and suicide are different concepts. The research on suicidal ideation cannot completely guide the work of suicide crisis intervention. In future studies, case-control studies and psycho-anatomical methods can be used to further explore the relationship between suicide and stigma, disclosure, and social support in PLWHA patients with suicidal behaviors and suicidal deaths.

Declarations

Ethics approval and consent to participate

The study protocol was approved by the Guangxi Normal University Board of Ethics (0108-2018), Ethics Committee of Shizhong District CDC of Jinan (2018-007), Guangxi Nanxishan Hospital' Ethics Committee (2019079). Administrative clearance was obtained from the District Health Officer of Shandong CDC. Verbal informed consent was obtained in this study using a standardized form, which included counseling on the risks, benefits and anonymities. Informed consent was obtained from all the samples. Consent was documented on a standardized form that was included in samples' paper study record. Obtaining verbal informed consent was approved by the institutional review boards and ethics committees that reviewed this study.

Consent to publish

Not applicable.

Availability of data and materials

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare no competing financial interests exist.

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Authors' Contributions

YY wrote the initial draft. SYM revised and translated it. ZL, SLL and XJ provided overall supervision and critical edits. All authors reviewed the manuscript. The authors read and approved the final manuscript.

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